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REFERENCE

*Christoph Gabriel, Randall Gess,
Trudel Meisenburg (Eds.)*

MANUAL OF ROMANCE PHONETICS AND PHONOLOGY

MANUALS OF
ROMANCE LINGUISTICS

Manual of Romance Phonetics and Phonology

MRL 27

Manuals of Romance Linguistics

**Manuels de linguistique romane
Manuali di linguistica romanza
Manuales de lingüística románica**

Edited by
Günter Holtus and Fernando Sánchez-Miret

Volume 27

Manual of Romance Phonetics and Phonology

Edited by
Christoph Gabriel, Randall Gess,
and Trudel Meisenburg

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Manuals of Romance Linguistics

The international handbook series *Manuals of Romance Linguistics* (*MRL*) offers an extensive, systematic and state-of-the-art overview of linguistic research in the entire field of present-day Romance Studies.

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volume will offer a structured and informative, easy-to-read overview of the history of research as well as of recent research trends.

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Günter Holtus (Lohra/Göttingen)
Fernando Sánchez-Miret (Salamanca)
July 2021

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Christoph Gabriel (Mainz), Randall Gess (Ottawa), and Trudel Meisenburg (Osnabrück)
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Table of contents

Manuals of Romance Linguistics — V

Acknowledgments — VII

List of abbreviations — XIII

Trudel Meisenburg, Christoph Gabriel, and Randall Gess

Romance phonetics and phonology: an introduction — 1

I Key topics in Romance phonology

- Pavel Iosad and W. Leo Wetzels
- 1 Length and weight in Romance — 31**
- Diana Passino, Joaquim Brandão de Carvalho, and Tobias Scheer
- 2 Syllable structure and (re)syllabification — 89**
- Daniel Recasens
- 3 Processes affecting vowels — 127**
- Helene N. Andreassen, Jacques Durand, and Chantal Lyche
- 4 From vowel weakening in Romance to French schwa — 150**
- Roberto Petrosino and Andrea Calabrese
- 5 Palatalization in Romance — 173**
- John Hajek
- 6 Nasals and nasalization — 215**
- Haike Jacobs
- 7 The evolution of Latin stress into Romance with special consideration of French — 242**
- Elinor Payne
- 8 Comparing and deconstructing speech rhythm across Romance languages — 264**
- Philippe Martin
- 9 Intonation — 299**

- Julien Eychenne
10 Corpus phonology — 319
- Zsuzsanna Fagyal and Justin Davidson
11 Sociophonetics — 342
- Johanna Stahnke
12 First language acquisition of Romance phonology — 375
- Conxita Lleó
13 Bilingual phonological acquisition — 407
- Nicholas Henriksen
14 Second and third language acquisition of Romance phonology — 435
- Christoph Gabriel and Uli Reich
15 The phonology of Romance contact varieties — 462
- Elissa Pustka
16 Loanword phonology in Romance — 503

II Phonetics and phonology of Romance languages

- Margaret E. L. Renwick
17 Romanian — 531
- Martin Krämer
18 Italian — 559
- Rosangela Lai
19 Sardinian — 597
- Paolo Roseano and Franco Finco
20 Rhaeto-Romance: Friulian, Ladin, and Romansh — 628
- Marie-Hélène Côté
21 French — 669
- Damien Mooney
22 Occitan — 709

Maria-Rosa Lloret and Pilar Prieto
23 Catalan — 743

José Ignacio Hualde
24 Spanish — 779

Travis G. Bradley
25 Judeo-Spanish — 808

Marina Vigário
26 Portuguese — 839

Fernando Martínez-Gil
27 Galician — 882

Mirna Reyna and Eric Louis Russell
28 Romance-lexifier creoles — 929

List of contributors — 955

Index — 957

List of abbreviations

1	first person	Friul.	Friulian
2	second person	FUT	future
3	third person	Gal.	Galician
ABL	ablative	Gasc.	Gascon
ACC	accusative	GEN	genitive
AFr.	Acadian French	GER	gerund
AGR	agreement	Ger.	German
AmSp.	American Spanish	Gherd.	Gherdëina
Arab.	Arabic	Gr.	Greek
ArgSp.	Argentinean Spanish	HCr.	Haitian Creole
ART	article	Heb.	Hebrew
Arum.	Arumanian	IMP	imperative
AUG	augmentative	IMPF	imperfect
AUX	auxiliary	IND	indicative
Berg.	Bergamasco	INDF	indefinite
Bol.	Bolognese	INF	infinitive
BPor.	Brazilian Portuguese	IPFV	imperfective
Bul.	Bulgarian	It.	Italian
Cal.	Calabrian	JSp.	Judeo-Spanish
Camp.	Campidanese	Lad.	Ladin
CanFr.	Canadian French	Lat.	Latin
CastSp.	Castilian Spanish	Leng.	Lengadocian
Cat.	Catalan	LFr.	Laurentian French
CAUS	causative	Lig.	Ligurian
CGal.	Central Galician	Lim.	Lemosin
CMP	comparative	Ln.	Leonese
Com.	Comelican	LOC	locative
COND	conditional	Log.	Logudorese
Cors.	Corsican	M	masculine
Cz.	Czech	MCr.	Mauritian Creole
Dalm.	Dalmatian	MexSp.	Mexican Spanish
DAT	dative	MFr.	Middle French
DECL	declarative	MLat.	Medieval Latin
DEF	definite	ModFr.	Modern French
DEM	demonstrative	N	neuter
DET	determiner	Neap.	Neapolitan
DIM	diminutive	NEG	negation, negative
ECat.	Eastern Catalan	NOM	nominative
EGal.	Eastern Galician	NorFr.	Norman French
Egd.	Engadinic	Oc.	Occitan
ENC	enunciative	OCat.	Old Catalan
Eng.	English	OFr.	Old French
EPor.	European Portuguese	OIt.	Old Italian
EurSp.	European Spanish	OOC.	Old Occitan
F	feminine	OPor.	Old Portuguese
FOC	focus	OSp.	Old Spanish
Fr.	French	OSrd.	Old Sardinian

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XIV — List of abbreviations

OVen.	Old Venetian	Rm.	Romanian
Pal.	Palenquero	Rom.	Romansh
Pap.	Papiamentu	Sal.	Salentino
Pd.	Piedmontese	SBJV	subjunctive
PL	plural	SG	singular
Por.	Portuguese	Sic.	Sicilian
POSS	possessive	Sp.	Spanish
PRET	preterit(e)	Srd.	Sardinian
PRF	perfect	StGal.	Standard Galician
PROG	progressive	Sur.	Surmiran
PRS	present (as unmarked tense usually not noted)	Surs.	Sursilvan
PRS.PTCP	present participle	Sut.	Sutsilvan
PST	past	Turk.	Turkish
PST.PRF	pluperfect	Tusc.	Tuscan
PST.PTCP	past participle	v	verb
PTCP	participle	Ven.	Venetian
Q	question particle/marker	VLat.	Vulgar Latin
Qu.	Quechua	WGal.	Western Galician
		Wol.	Wolof

Trudel Meisenburg, Christoph Gabriel, and Randall Gess

Romance phonetics and phonology: an introduction

Abstract: In this chapter, we sketch the historical development of the discipline, provide an overview of different theoretical approaches applied to the phonology of Romance languages and outline the structure of the volume.

Keywords: history of phonetics, transcription, history of phonology, phonological frameworks

1 Phonetics: a historical sketch of the discipline

Phonetics can be defined as the study of the sound side of language, comprising the following central questions:

- How is speech sound produced? This question concerns the field of articulatory phonetics, which treats the physiological foundations of speaking. It is in close relation with fields of study examining medical and pathological aspects of speech production.
- How is speech sound transmitted? This question relates to the physical domain of sound waves and their structures investigated by acoustic phonetics.
- How is speech sound perceived? How do we hear, and eventually understand, spoken language? These are questions treated by auditory (or perceptive) phonetics.

Another important point, which cannot be easily assigned to one of the three areas of phonetics presented so far, concerns the volatility of spoken language. How can this fleetingness be counteracted? How can speech sound be captured, recorded, made permanent, visible, transcribed? As the relation between sound and symbol has played an important role in the history of phonetics this is one of the lines that we shall follow here. A second one concerns the development of interest in the functioning – and the non-functioning – of the human voice and the emergence of (speech) sound. A third one is about the artificial production of human speech, or speech synthesis.

Phonology also studies the sound side of language, but its interest is more restricted. It focuses on the aspect of systematicity and regularity and aims at determining the structures, principles, rules or constraints according to which the sound side of language – or a certain language – functions.

The beginning of phonology as a linguistic discipline is usually associated with the work of the Linguistic Circle of Prague which started its activities in 1926 and espe-

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cially with Nikolaj Trubeckoj's *Grundzüge der Phonologie (Principles of phonology)*,¹ published posthumously in 1939 (cf. Section 2). The history of phonetics, however, predates the Prague Circle. In the modern understanding of science, it has existed since the late 18th century – the time when many scientific disciplines, including linguistics, began to take shape – and it was at that time that the term ‘phonetic/s’ was coined.² But if we take a more general view of the study of spoken language, the origins of phonetics lie much further back in time. The (pre)history of phonetics is often considered to have begun in ancient India, between 800 and 100 BCE, when Panini and other grammarians set out to describe the pronunciation of Sanskrit (or, more exactly, of the Vedas, the religious texts of Hinduism) as precisely as possible and with modern terminology. By doing so they wanted to preserve the sacred texts from threatening alterations that language contact and language change were assumed to cause (Deshpande 1994). Sometimes the beginning of phonetics is seen in ancient Greece where, around the same time as the Indian grammarians, Greek scholars were concerned with speech sounds and their classification and also studied prosody. But they seem to have been much more interested in the grammatical structure of their language than in its pronunciation (MacMahon 2013, 108).

Whereas the ancient Indian and Greek contributions can be considered as the origin of phonetics as an area of study, it seems reasonable to set its beginning – understood in a very broad sense as a preoccupation with the sound of language and its formability – still much earlier. Indeed, we can assume that at least some people will have been concerned with the sound shape of speech since mankind has disposed of spoken language for oral communication, i.e. for at least 40,000, perhaps even 1.5 million years – that is how far apart recent estimates are (Mufwene 2013; Uomini/Meyer 2013). These people certainly had no intention to describe pronunciation as did the ancient Indians or Greeks, but we can be quite sure that they shaped spoken language artistically, and deliberately created euphony and other phonetic effects to please, impress or intimidate fellow humans, gods, spirits etc. This seems to have been the very first, consistently and universally practiced human involvement with the sound side of language.³ We can also assume that there has always been a certain sensitivity to phonetic differences between linguistic varieties.

1 There are different traditions of rendering the original Cyrillic spelling of the author's name <Николай Сергеевич Трубецкой>. We have chosen to use the scientific transliteration <Nikolaj Sergeevič Trubeckoj> throughout this book.

2 According to Zwirner/Zwirner (1982, 26–27) the Danish archeologist and Egyptologist Georg Zoega was the first to use the term in 1797, namely, to point out that Egyptian hieroglyphs may also refer to sounds of the language – an observation that Jean-François Champollion later used in deciphering ancient Egyptian writing; cf. also Koerner (1994) and Ascani/Buzi/Picchi (2015).

3 Ice Age cave paintings provide evidence of the visual artistic skills that humans had already developed tens of thousands of years ago. Artistic forms of expression in spoken language will also have existed; they have just not been preserved.

The reference to the sound side of language became even more evident when, about 6,000 years ago, men felt the need to conserve at least parts of their fleeting oral utterances, and writing came into play. In the beginning, the cuneiform symbols that Sumerians imprinted in wet clay or the hieroglyphs that ancient Egyptians painted on papyrus were logographic signs: they represented morphemes (or words) that stood mainly for concepts of objects. But following the rebus principle, many of these signs were soon used for homophonous syllables or words so that the *phonetic* form became relevant, and a relation between sound and symbol was established (Rogers 2005, 79–114; Sampson 2015, 40–59). Applying the acrophonic principle, Egyptian writers even developed an alphabet consisting of 24 hieroglyph letters. Instead of representing whole words these hieroglyphs stood only for the initial sound of the corresponding word – a principle that is still used today in sound tables for children learning to read and write alphabetic scripts. But in ancient Egypt this alphabet was almost exclusively applied to write proper names. Systematic use of the acrophonic principle and the corresponding letters was, however, made in the Semitic script, which originated in the course of the second millennium BCE in Ugarit (Palestine/Syria). As all Semitic words were consonant-initial, the resulting script, predecessor of, among others, the Arabic and the Hebrew alphabets, only contained letters for consonants. Employed by the Phoenicians since around 1050 BCE, this consonantal script was later adopted and adapted by the Greeks who redefined some characters as vowel signs. Through Etruscan mediation, a western version of the Greek alphabet reached the Romans and was further developed there as the Latin alphabet, nowadays one of the most widely used phonographic scripts in the world (Jensen 1969).

Whereas the creators of sound-based writing must be rightly called phoneticians, such scripts normally do not follow a consistent phonetic orientation in their development; rather, they integrate various other aspects into the spelling. These are often etymological references when, after a given sound change, writing continues as before, with no reflection of it. Morphology and semantics may also play a role, and there are often tendencies to apply a similar spelling to forms that belong to the same semantic or morphological patterns even if they have drifted apart phonetically. On the other hand, words that happen to be homophonous often tend to be spelled differently (Meisenburg 1998). These deviations from an unambiguous representation of speech sound have always been a cause for disputes, and we can assume that as long as phonographic writing has existed, scholars have thought about the relationship between spelling and pronunciation – and thus also about phonetics. A famous early example is the Roman rhetorician Quintilian who, in the first book of his *Institutio oratoria*, published around 95 CE, states that “within the limits prescribed by usage, words should be spelt as they are pronounced. For the use of letters is to preserve the sound of words and to deliver them to readers as a sacred trust: consequently, they ought to represent the pro-

nunciation which we are to use”.⁴ The representation of sound is thus prescribed by usage, and pronunciation should follow spelling.

In the eighth century, Alcuin of York, one of the leading figures of the Carolingian literary reform, made a significant contribution to the correct pronunciation of Latin with his treatise *De orthographia* (cf. Alcuino 1997), in which he restored Latin orthographic forms and urged his readers to pronounce them as the ancient Romans did (Wright 1981). Since this reconstructed Latin pronunciation no longer resembled that of Old French, the gap that had developed between Latin and Gallo-Romance became obvious, thus opening the way for the vernacular to create its own written language (Lüdtke 1978).

In order to write the newly emerged Romance languages, appropriate signs had to be found for the numerous new sounds that had resulted from diverse phonological processes such as palatalization or diphthongization, and after a period of experimentation, regional patterns with letter combinations and often context-sensitive rules crystallized (cf. Meisenburg 2013). The problems already mentioned for phonographic writing are also evident here: from the beginning, there are etymological references to Latin spellings, and tendencies towards constant orthographic representation of various phonetic forms (allomorphy) emerge. An interesting example of the latter is provided by the *Orthographia Gallica*, the oldest treatise on French orthography and pronunciation, probably written in England around 1300. Regarding consonant-initial words, the author states that

consonans anterioris diccionis potest scribi sed in pronunciacione non debet proferri ut: *apres manger* debet sonari *apre manger* (Stürzinger 1884, 17–18)

‘the (final) consonant of the preceding word may be written, but it must not appear in the pronunciation, so that *apres manger* [after eating] must sound like *apre manger*’

With his *Gramatica castellana* (1492) and his *Reglas de orthographia en la lengua castellana* (1517) Antonio de Nebrija initiated the long series of treatises on the pronunciation and spelling of Spanish and the need for orthographic reforms. The most important rule for Nebrija (as for many others) was that one must write as one pronounces and pronounce as one writes. Moreover, he demanded that there should be only one constant sign for each sound, thus context-sensitive spellings should be avoided. Despite his various reform proposals, Nebrija himself only used spellings that were already largely generalized in his time, and the orthography of his texts is not uniform (Meisenburg 1996, 245–249; Llamas Pombo 2012, 37–38).

⁴ “Ego (nisi quod consuetudo obtinuerit) sic scribendum quidque iudico, quomodo sonat. Hic enim est usus litterarum, ut custodiant voces et velut depositum reddant legentibus, itaque id exprimere debent quod dicturi sumus” (chap. vii “Orthography: difference between spelling and pronunciation”, Quintilianus 1920, 144–145).

Another Renaissance advocate of a phonetic orthography was the Italian humanist Gian Giorgio Trissino, who in his *Epistola de le lettere nuovamente aggiunte ne la lingua italiana* ('Epistle of the newly added letters in the Italian language') from 1524 (with a second edition in 1529) proposes, among other suggestions, to borrow the Greek letters <ε> and <ω> into the Latin alphabet to better differentiate the quality of Italian mid vowels (Griffith 1976; Michel 2012, 79–81).

In Portugal, Fernão de Oliveira, whom Coseriu (1991, 47) considered to be the most important phonetician of the Romance Renaissance, provides in his *Grammatica da lingoagem portuguesa* (Lisbon 1536) a detailed study of the articulation and spelling of Portuguese sounds, distinguishing himself by precise observation and systematic description. According to his account, the adequate rendering of Portuguese would require 32 or 33 characters instead of the 24 letters of the Latin alphabet, and Oliveira makes various suggestions for improving the relationship between pronunciation and spelling. But like so many reform proposals that have emerged since the 16th century, these too are hardly reflected in the spelling (Meisenburg 1996, 293–305).

Equally unsuccessful were the numerous attempts that were made in France to reorganize spelling as an accurate reflection of pronunciation. We limit ourselves at this point to mention the first important grammarian and reformer, the humanist Louis Meigret from Lyon. In 1542, his *Traité touchant le commun usage de l'écriture françoise* ('Treatise concerning the common use of French writing') appeared, significantly, in conventional orthography. It was not until the late 1540s that Meigret found a printer who published his works in the writing system he had devised, notably his *Tretté de la grammeure françoëze* (*Traité de la grammaire française*, 'Treatise on French grammar', 1550). In this first scientific grammar of French (which was also written in French), he devoted several chapters to the sounds and syllables of the language. His contemporaries criticized his reformed spelling mainly for the fact that it reflected only his own Lyonesse pronunciation (cf. Baddeley 2012, 107–108; Meisenburg 1996, 175–181; Hausmann 1980).

From the 17th century on, the search for a sign system capable of representing the sounds of all languages comes to the fore. Francis Lodwick, a member of the Royal Society of London for Improving Natural Knowledge, who had also worked on the development of an artificial philosophical language (cf. Henderson/Poole 2011), seems to have been the first to advance such a universal alphabet, "which should contain an Enumeration of all such single Sounds or Letters as are used in any Language" (Lodwick 1687, 126). In his system, a kind of syllabary, consonants are systematically represented according to their place and mode of articulation, while vowels are indicated by diacritics (Lodwick 1687).

The development of a cross-linguistic sign system becomes the main goal of the *Fonètik Tîtercz' Asóciécon* (FTA, with a journal of the same name) founded by Paul Passy in Paris in 1886 (Durand/Lyche 2020). As the name (which was changed to "læ mɛ:trə fɒnɛtik" – *Le Maître Phonétique* – in 1889, when French became the official language of the organization) suggests, the founders were language teachers who

wanted to reform the teaching of foreign languages (and also the teaching of reading in the mother tongue) through a greater orientation towards phonetics. In 1897 the name changed to the *Association phonétique internationale* (API), and since 1971 it is the *International Phonetic Association* (IPA) with the corresponding *Journal of the International Phonetic Association*. The *International Phonetic Alphabet* (IPA) developed, modified, and revised by this association has become one of the most widely used phonetic transcription systems in the world (IPA 1999; Kemp 2006), and it is consistently employed in this book as well.

The emergence of the IPA has not ended the discussions on the representation of sound, which continue today (Loakes 2013). However, before further entering into the recent history of phonetics and phonology, we would like to take a brief look at the functioning of the human voice, a question of concern for millennia. The first testimonies here come from disorders of vocal function, i.e. from pathological conditions. According to Stemple/Roy/Klaben (2020, 3), one of the first reports on voice disorders is found in the so-called Edwin Smith Papyrus, an ancient Egyptian medical text written around 1600 BCE. Hippocrates, the most famous physician of antiquity (5th century BCE), also transmitted numerous observations of voice disorders, including aphonia. The first to locate the origin of the voice in the larynx was the ancient Greek philosopher Aristotle (384–322). In his *History of animals* (Τὼν περὶ τὰ ζῷα ἱστοριῶν, *Ton peri ta zoia historion*) he describes in humans – one species among many other animals – the neck as the part between the face and the trunk, where the larynx is in front and the esophagus behind. The front part, composed of gristle, through which respiration and speech are affected, is termed the windpipe (ἀρτηρία, *arteria*) (Smith/Ross 1910, 493; Panconcelli-Calzia 1941/1994; 1942a; Stemple/Roy/Klaben 2020, 4–5).

Greater progress in anatomical knowledge concerning the functioning of the voice was not achieved until 500 years later by the physician and scholar Claudius Galenos (or Galen). As a researcher, Galen was particularly interested in the network of the nerves in the body, for the study of which he often undertook animal experiments. In one of these, he made a cut in the neck of a strapped pig that was struggling, squealing, and kicking; the pig immediately stopped squealing, but continued kicking: Galen had cut its laryngeal nerve with his accidental incision. He immediately examined the peculiar recurrent course of this nerve and subsequently described it in detail. Through experiments of this type, Galen was also able to show that the nervous system is controlled from the brain and not from the heart, as many contemporaries assumed (Gross 1998; Stemple/Roy/Klaben 2020, 5–6).

Throughout the Middle Ages, Galen's findings were simply passed on. Only with the Renaissance there is new progress in this regard. Leonardo da Vinci, with his great interest in questions of anatomy, is particularly worthy of mention here. He, too, performed many dissections in order to understand how living creatures function, and he depicted human anatomy in detail in his drawings. The first illustration of a larynx and the first phonetically motivated drawing of a sagittal section of the vocal tract are attributable to him (Panconcelli-Calzia 1941/1994; 1942b). About a century

later, Hieronymus Fabricius ab Acquapendente (or Girolamo Fabrizio) was an active contributor to the field of voice. He was a famous Italian anatomist and surgeon who performed dissections in Padua in a *Teatro Anatomico* built for this particular purpose in 1597 (Smith et al. 2004). In 1600, his treatise *De visione, voce, auditu* ‘On vision, voice and hearing’ was published (Fabricius ab Acquapendente 1600). Chapters on the eyes and the sense of sight are followed by a section on the voice or larynx as vocal organ. Here, animal and human larynxes are described and pictured in detail and their functions are explained. Also illustrated are the vocal folds, which Fabricius had discovered. In 1601, his *De locutione et eius instrumentis liber* ‘Book on speech and its instruments’ appeared, which deals with sounds (*litterae*), vowels, consonants, syllables, speaking etc., not from a grammatical but from an anatomical and philosophical point of view, following Aristotle and Galen (Fabricius ab Acquapendente 1601). The book is considered the first physiological treatise on phonetics.

While knowledge of the functioning of the human voice is thus progressing well, another field of phonetics is opening up with the artificial production of the voice, i.e. with the construction of speaking machines as precursors to speech synthesis. Already since the Renaissance period, organ stops have been in use in pipe organs which are explicitly designated as *vox humana* (in Latin), *voce umana* (in Italian) or *voix humaine* (in French), i.e. as ‘human voice’, and which are quite comparable to the human voice in classical singing with regard to their sound (Gottwald 2006; Brackhane 2015, 9–19). The early pioneers of speech synthesis, who made a name for themselves towards the end of the 18th century (in particular Erasmus Darwin, Christian Gottlieb Kratzenstein, Abbé Mical, and Wolfgang von Kempelen; cf. Brackhane 2015, 29–73; Gessinger 1994, 527–631), tried to further develop principles of organ stop construction to artificially reproduce the human voice. An important problem scholars had to deal with in this context was the differentiation of the various vowels, which on the same pitch take on different timbres depending on the articulatory design of the oral cavity (Brackhane 2015, 33–35, 39–40; Kratzenstein 1781/2016, 28–31). Kratzenstein’s solution to this problem consisted in the construction of a different resonator for each vowel (Kratzenstein 1781/2016, 82–95; cf. also Brackhane 2015, 43–45). As Kratzenstein’s machine, also known as “vowel organ”, focused on synthesizing vowels, the production of utterances was limited to a few basic syllables such as [mama], [nana], [papa] (Kratzenstein 1781/2016, 84–85; Brackhane 2015, 48–49; Hoffmann et al. 2018).

Greater progress was achieved with Wolfgang von Kempelen’s “speaking machine”, which he presented to the public around the year 1783 and whose performance he explained in detail in an extensive work on the functioning of human speech (Kempelen 1791/1970; cf. also Kempelen 2017; Brackhane 2011; Reininger 2007; Pompino-Marschall 2004). Following Brackhane (2011, 49), Kempelen’s bellows-operated speaking machine constitutes “the first ever fully functional speech synthesizer” and “can be considered a milestone in the history of speech research”. Kempelen was not content to synthesize only a few vowels but intended to build a machine that would master all speech sounds in the world (Brackhane 2011, 79). Even if the number

of sounds generated by this machine was ultimately very small, it showed that many details of human speech could be replicated (Brackhane 2011, 91–93). In contemporary reports, the utterances Kempelen produced with it are described as being largely intelligible and appropriate (Brackhane 2011, 97–100).

The invention of the phonograph about a hundred years later offered the possibility to record and reproduce spoken language. The reproduction and the associated visualization of sound waves opened new possibilities for the processing and analysis of speech. This led to a better understanding of many of its acoustic characteristics, e.g. of resonance frequencies and formants, which greatly enhanced acoustic phonetics in general and speech synthesis in particular (Hoffmann et al. 2018; Tillmann 1994). It is in these times that phonetics developed into a fully recognized scientific discipline drawing from many different fields such as medicine and physiology, physics, philology, anthropology, psychology, language teaching, voice instruction, stenography, and spelling reform, among others, but still representing a remarkably unified field (Ohala 1994).

With the emergence of historical-comparative Indo-European linguistics in the late 18th century, special attention falls on the changes that the sounds of the world's languages undergo over time. The discovery of the regularity with which these changes take place is one of the great achievements of this new scientific approach. These findings encouraged the study of phonetics, for precise descriptions of sounds and their environments were needed, and they stimulated intensive research activities on the history of the Indo-European languages, which by systematic comparison were discovered to be genetically related. Earlier stages and an Indo-European original language were reconstructed, and grammarians formulated “sound laws” which they claimed to be without exceptions (Rankin 2003). Romance languages formed a particularly fruitful object of study, since their source language, Latin, was widely attested and described, at least in its standardized classical form. With his *Grammatik der romanischen Sprachen* (‘Grammar of the Romance languages’, 1836–1843), the first volume of which was devoted to phonetics, Friedrich Diez, the founder of Romance philology, applied the historical-comparative method to the principal groups of Romance.

The Neogrammarians, who formed the dominant school of linguistics towards the end of the 19th century, further elaborated the doctrine of exceptionless sound laws (cf. Hale 2003). But at the same time, they called for the study of contemporary living languages and their dialects, since in them sound patterns would be directly observable (Osthoff/Brugmann 1878/2014, IX). While most linguists continued to work on historical issues studying exclusively written evidence, others had already started to include contemporary dialects into their research – mostly to show by the examination of these data how changes might have taken place historically. The first scholar to be mentioned in this context is Graziadio Isaia Ascoli, the founder of Romance dialectology. With his *Saggi ladini* (Ascoli 1873a) and *Schizzi franco-provenzali* (Ascoli 1875), he provided the scientific community with access to Romance varieties that had

hitherto remained largely unknown. For the written representation of dialect forms he developed a phonetic transcription system that is detailed in Ascoli (1873b).⁵

Other important contributions to Romance philology and in particular to phonetics in this period come from the priest Jean-Pierre Rousselot. With his thesis titled *Modifications phonétiques du langage étudiées dans le patois d'une famille de Cellerfrouin (Charente)*, published in 1891, he provides a highly valuable dialectological study for which he had collected data in extensive interviews with speakers of his native dialect, which is situated on the border between the *oc* and *oïl* territories. Rousselot had also worked intensively on the physics and physiology of sound. As the ear alone seemed too unreliable to him for his research, he devised an electric speech recorder and decided to apply the “graphic method” (on himself) for his study. This method allowed him to trace the movements of the larynx and of all the articulators on carbon-coated paper, so that he could study sequences of sounds and the transitions between them very precisely (Rousselot 1891, 3–4, 8–22; cf. also Deraze/Loyant 2014). A central result of his thesis: even within a single family (his own), the way to speak is not uniform, but sounds vary according to parameters such as gender, age, and occupation. In 1889, Rousselot became the head of the world’s first phonetic laboratory created in Paris; he is known as the “Father of Experimental Phonetics” (Scripture 1925, 165), and published fundamental works in this field (cf. especially Rousselot 1897–1908).

If sound laws were consistently valid, as was postulated by the Neogrammarian School, then the sound shape of speech should be largely homogeneous, at least for the speakers of one dialect, and dialects would have to be clearly distinguishable from each other. But Rousselot’s (1891) thesis had shown variation within a single family, and the question of dialect variability and boundaries between them became virulent (Gauchat 1903). To clarify this issue was one of the concerns of linguistic geography, which set out to map linguistic data in order to compare the forms obtained in different locations in linguistic atlases. The first exemplary undertaking of this kind is the *Atlas linguistique de la France* (ALF, Gilliéron/Edmont 1902–1910). With a questionnaire containing more than 1,900 items, Edmond Edmont, the interviewer in this venture, visited 639 localities, all situated in the Gallo-Romance areas of France, Switzerland, Belgium, and Italy, where he asked a preferably older native informant to translate the sentences and expressions of the questionnaire into his or her local dialect. The transcribed results were sent to Paris where Gilliéron transferred them to the relevant maps (Goebel 2016, 73–74). By analyzing and comparing the data of the atlas it became possible to determine the boundaries or isoglosses for different types of linguistic phenomena, among them all kinds of phonetic features. When several of such isoglosses combine to form a bundle, this is an indicator for

⁵ Further developed by the Romance philologist Eduard Böhmer this transcription system, known as *Böhmer-Ascoli*, is still in use in Romance dialectology today.

some type of boundary between dialects. The distribution of linguistic phenomena can also provide information about diachronic evolution, for example, if older forms are preserved in peripheral areas or if newer developments spread along important traffic routes.

The example of the ALF has led to numerous imitations and further developments. Even if all kinds of linguistic manifestations can be mapped with the means of linguistic geography, the documentation of phonetic phenomena often plays a weighty role. The methods of linguistic geography have been adapted and renewed again and again in the more than a hundred years of its history – up to the online atlases of recent times that present authentic audio data aligned with transcriptions and/or spectrograms, e.g. the *Vivaio acustico delle lingue e dei dialetti d'Italia* (VIVALDI, Kattenbusch 1998–2018), the *Interactive atlas of Romance intonation* (Prieto/Borràs-Comes/Roseano 2010–2014) or the *Atlas sonore des langues régionales de France* (Boula de Mareüil/Rilliard/Vernier 2021).

2 The emergence and development of phonology

While the Neogrammarians were able to absorb the work of linguistic geography as a supplement and correction to their approach, and unflinchingly continued their studies of historical (sound) changes, a complete reorientation of linguistics was initiated by Saussure at the beginning of the 20th century.⁶ In his (French) terminology, he distinguishes between *langue* as the collective linguistic knowledge stored in the brains of the members of a speech community and *parole* as its concrete manifestation in the utterances exchanged by these members. Turning away from “atomistic” diachronic research Saussure (1916/1971) advocated the synchronic investigation of *langue* as a system in which all elements are related to each other. This is the beginning of structuralism in linguistics, which became the dominant research paradigm throughout the first half of the 20th century and is still going strong today.

There is a chapter titled “Phonologie” in the *Cours* with an appendix on “Principes de phonologie” (Saussure 1916/1971, 60–85), where “phonèmes” are described, but the phonology treated here is rather what we would call physiological or articulatory phonetics today, and the phonemes are simple speech sounds.⁷ The one who consistently applied Saussure’s principles of structuralist synchronic linguistics to the

⁶ Ferdinand de Saussure died in 1913. His main work, the *Cours de linguistique générale*, was published posthumously in 1916 on the basis of his students’ lecture notes. There are numerous new editions and translations in many languages, in English by Roy Harris (1983).

⁷ “Principles of Physiological Phonetics” is Harris’ translation for the title of the appendix, and “Les espèces phonologiques” are rendered as “Sound Types” (Fehr 2014, 63). For Saussure (1916/1971, 61) *phonetics* was a historical science, and in his view the term was to be reserved for the study of the evolution of sounds.

science of sounds was the Russian linguist Nikolaj Trubeckoj. Inspired by discussions within the *Cercle Linguistique de Prague* (CLP or *Prague School* founded in 1926) his *Grundzüge der Phonologie* ‘Principles of phonology’ appeared in 1939. Adopting Saussure’s distinction between *langue* and *parole*, Trubeckoj is also the one who introduced a consistent division within the science of sounds: on the one side is phonetics which deals with concrete utterances (*parole*) and thus with physical phenomena for which methods of natural sciences are used; on the other, there is phonology, which investigates *langue* as a system and applies purely linguistic, humanistic methods (Trubeckoj 1939/1958, 7).

In a clear way, Trubeckoj (1939/1958) sets out what will become the foundations of **structuralist phonology**: the important role of the meaning-differentiating function of sounds with the phoneme as the smallest distinctive unit of the *langue*, often realized with different variants (later known as allophones) in speaking (*parole*); the network of oppositions, correlations, and neutralizations by which phoneme systems are characterized; the combinatorial constraints to which the phonemes of a language may be subject. While Trubeckoj primarily outlines a segmental phonology, the role of prosodic features such as syllables, morae, and boundary signals, is also considered.

The division of the discipline into phonetics and phonology introduced by Trubeckoj and some of his CLP colleagues (especially Roman Jakobson) does not mean that specifically phonological issues had never been considered before; rather, they had been treated as part of phonetics. And not all members of the scientific community accepted the separation. The phonetician and Romance philologist Bertil Malmberg (1954/2002, 110), for example, considered it “une grave erreur” (‘a serious mistake’) and pleaded for continuing both branches under the traditional name “phonetics”, with phonology as “functional phonetics” if necessary. Even though the separation is now firmly established, the connection remains close, and the two (sub)disciplines are dependent on each other. To say it with Peter Ladefoged’s (2003, 1) words (which he uttered with respect to fieldwork): “The phonology has to be clear before you can make a meaningful description of the phonetics; and without a description of the sounds, you cannot get very far with the phonology. The two kinds of investigation have to advance hand in hand”.

This seems an appropriate moment to anticipate and mention some more recent approaches that comprise a new rapprochement between phonology and phonetics before continuing our more chronologically oriented presentation of contemporary phonological frameworks. The first of these currents is **experimental phonology** (Ohala/Jaeger 1986; Ohala 1995), which perhaps not coincidentally echoes the title of Rousselot’s (1897–1908), famous *Principes de phonétique expérimentale* (cf. Demolin 2012). In this approach, the importance of evidence for testing hypotheses and evaluating or verifying theories is emphasized, and empirical methods are devised to support or correct theoretical assumptions. Similar objectives hold for **laboratory phonology** where phonological theory is approached from several empirical directions and the interaction between physical and cognitive aspects of speech

(sounds) is central, speech being seen as embedded in a broad communicative system (Kingston/Beckman 1990; Cohn/Fougeron/Huffman 2012; 2017). The outputs of laboratory phonology, many of them concerning Romance languages, are published in the journal of the same name (starting in 2010) and since 1990 in the series *Papers in Laboratory Phonology*. Similar views again are promoted by the framework of **articulatory phonology** (Browman/Goldstein 1989; 1992; Hall 2017), which also attempts to integrate the domains of phonology and phonetics departing from phonological units as discrete gestures which vary in timing.

The last “field of research” to be mentioned in this context is **corpus phonology** (Durand/Gut/Kristoffersen 2014). It can be seen as an interdisciplinary approach that places corpora of spoken language at the center of interest, and thus abandons the view, widespread in traditional theoretical linguistics (phonology included), that concrete language data would only represent degenerate versions of the actual linguistic competence to be explored. So phonological hypotheses are not – or not primarily – tested through experiments but are matched with the results of an analysis from large data collections, the “corpora”, which implies a concern with phonetic variation (Durand 2017). Corpus-based phonology is successfully applied to Romance languages with, among others, the corpus projects *Phonologie du français contemporain* (PFC, projet-pfc.net, cf. e.g. Durand/Laks/Lyche 2014; Durand 2014) and *(Inter-) Fonología del español contemporáneo* ((I)FEC, cf. Pustka et al. 2018).

But let us return to the chronology of phonological frameworks. The concept of phonology can be regarded as the most important achievement of linguistic structuralism, and phonology became the basic discipline of structuralist language analysis, which, apart from the Prague School, was further developed and diversified in the linguistic circle of Copenhagen (cf. Hjelmslev 1943/1963) and also by American structuralists (where phonemics was the more common term; cf. e.g. Bloomfield 1933; Harris 1951; Hockett 1955). In the course of the 20th century, numerous works on phonology appeared which took up the structuralist approach, elaborated on it, and applied it to individual languages, including Romance languages (e.g. Alarcos Llorach 1950/1965 for Spanish; Muljačić 1969 for Italian), and to diachronic linguistics (e.g. Martinet 1955).

Already Trubeckoj (1939/1958, 35) had defined the phoneme as “the sum of the phonologically relevant properties of a sound”.⁸ Thus, it does not represent an indivisible final unit, but is structured in itself and therefore can be further analyzed in features: distinctive (or phonological) features on which oppositions and correlations of phoneme systems are based, and redundant (or phonetic) features which add language-specific but not distinctive sound characteristics. In the further

⁸ The citation follows the English translation (Trubeckoj 1969, 36). As noted by Trubeckoj (1939/1958, 35, fn. 2), this definition is similar to one given by Jakobson in an entry to the Czech Encyclopedia in 1932 (Kibort 2007; Vachek 1966, 46).

development of phonology, research interest has turned to the systematic recording and inventorying of distinctive features. The aim of **distinctive feature theory** was to determine the (smallest possible) number of features to fully define the phonemes of all languages and thus to capture all potential contrasts. In the United States of America, Jakobson had continued to work toward this goal, and in 1952 he and his colleagues proposed an inventory for which they claimed universal validity (Jakobson/Fant/Halle 1952). The twelve features they identified are primarily acoustically based, but articulatory and eventually auditory correlates can also be assigned to them. They form binary oppositions that are concerned only with the presence or absence of a particular feature. This labeling allows for a division of phonemes into natural classes that behave in the same way with respect to phonotactic constraints or other regularities (cf. also Jakobson/Halle 1956; Jakobson/Waugh 1979). Subsequently, the inventory of features that can be distinctive in the languages of the world has been repeatedly revised and refined (for a recent summary cf. Hall 2007).

With the emergence of generative linguistics, which becomes the dominant paradigm in the second half of the 20th century, the development of phonology takes a new direction. While the neutralization of phonological oppositions, which Trubeckoj (1939/1958, 70–75) had treated by drawing on the concept of the “archi-phoneme”, already involves an unstated notion of processes that occur between *langue* and *parole*, such processes become the focus of interest for **generative phonology** and lead to the dynamization of the concept of phonological knowledge. In the course of the so-called cognitive turn, the view had changed from Saussure’s *langue* as the collective sign inventory of the speech community to Chomsky’s conception of a speaker-hearer’s individual competence (Chomsky 1965/2015, 2–3). Phonological processes occur between the underlying phonological forms (or phonological representations) stored in the mental lexicon with all their idiosyncratic properties and the utterances concretely produced by the speaker, which can be observed as surface phonetic representations. In classical generative phonology, as presented in the seminal work *The sound pattern of English* (SPE, Chomsky/Halle 1968), the predictable relationship between underlying phonological form and phonetic surface is captured by sets of phonological rules which change the feature specifications of the involved representations. The new approach spread rapidly and was applied to several Romance languages, e.g. by Schane (1968) and Dell (1973/1985) to French, by Harris (1969) to Spanish, and by Mateus (1975/1982) to (European) Portuguese.

Early criticism of classic generative phonology came from, among others, Donagan/Stampe (1979) who argued in the context of **natural phonology** for less abstract, i.e. close-to-surface phonological representations, so that the mediation between underlying structure and phonetic realization would become more comprehensible. They also pleaded for a distinction between (universally valid) phonological processes and (language-specific) rules which must be acquired (cf. Hurch/Rhodes 1996, which contains several applications to Romance languages).

Natural phonology must not be confused with **natural generative phonology**. Developed in the early 1970s (Vennemann 1972; Hooper 1976), this approach does not break with mainstream generative phonology, but criticizes the often high degree of abstractness of underlying representations and argues for more transparent and realistic phonological analyses. An example of an application to Romance is Lyche's (1979) contribution on glides in French.

In contrast, **lexical phonology**, which goes back to Siegel (1974) and was elaborated by Mohanan (1982; 1986) and Kiparsky (1982; 1985), aligns with the earlier generative framework in allowing abstract underlying representations. Its central concern is the interaction of phonology and morphology, and it crucially assumes a level-ordered morphological component of the grammar in which affixation and compounding take place, with cyclical application of lexical rules gradually adapting forms to the phonological requirements of the language. Post-lexical rules then apply to the output of lexical rules; they provide for redundant features and cover processes that occur between words (cf. Kaisse/Shaw 1985). For issues in the framework of lexical phonology concerning Spanish cf. Wong-opasi (1987/1989) and Kaisse (1999), concerning French cf. Johnson (1987; 1992), concerning Catalan cf. Iverson (1993).

Further progress in distinctive feature theory comes from the emergence of **feature geometry**, which was essentially developed by Clements (1985). The basic idea is that instead of phonological features being grouped independently in unorganized bundles or large feature matrices, they interact with each other in a hierarchically organized way. The assumed hierarchy is usually represented in the form of a feature tree in which the root node dominating the entire tree structure contains the major class features. Directly subordinate to the root node are the laryngeal and the supralaryngeal nodes, the latter in turn dominating the manner node and the place node where features can be further specified. The hierarchical structure makes clear that specifications are bound to the higher-order feature node and thus apply to certain classes of sounds. In its application to linguistic issues, the feature geometry approach is often used not only for phonological but also for morphological features, cf. e.g. Bonet (1995); D'hulst (2006).

Feature geometry's objective of capturing subsegmental phenomena without a strict attachment to the segment combines easily with **autosegmental phonology**, an offspring of generative phonology which was essentially developed by Goldsmith (1976/1979). Relying on preliminary work from Leben (1973), Williams (1976), and Clements (1976/1980), the approach has been continuously refined since. The basic idea is that features are not necessarily restricted to a single root node but are autonomous and can spread. It is therefore reasonable to split up phonological representations into several layers or tiers. This has been convincingly demonstrated for tonal languages where pitch movements (as in contour tones) can occur on a single tone bearing unit. In addition to the segmental tier there is thus a tonal tier where low (L) and high (H) tones are represented as so-called autosegments. Via association lines these tonal features are connected (or mapped) to their tone-bearing units. The tonal

tier is also used to represent the tones of intonation in the autosegmental-metrical model developed to account for intonation (Pierrehumbert 1980).

In further progress of autosegmental phonology, more and more phonological features were arrayed on independent tiers. For example, a tier representing nasality allows for a straightforward analysis of nasalization as feature spreading across segmental boundaries. The notion of spreading has been successful in accounting for a variety of other assimilatory processes, including vowel and consonant harmony. Particularly useful in the autosegmental framework is the skeletal (or timing) tier, which consists of timing slots marked by X which, among other things, allow for an elegant representation of quantity: a long vowel, for example, is a single root node linked to two X slots, whereas an affricate is two root nodes linked to a single X slot.⁹ Examples of the autosegmental approach applied to issues in Romance languages are, among others, Marotta (1988) and Hualde (1989).

In tight relation to autosegmental phonology is **metrical phonology** (cf. Goldsmith 1990) which shares the assumption of independent tiers for phonological representations. Here they serve to account for stress which is no longer treated as a feature of an individual segment. Instead, stress patterns are defined as alternations between strong and weak syllables (Liberman/Prince 1977). The consideration of the syllable, which had long been ignored in generative phonology, leads to the inclusion of syllable tiers representing syllabic constituents to which segments from the segmental tier associate. Syllables are labeled as strong (S) or weak (W) and are further organized into feet (which are also strong or weak) and feet are grouped into prosodic words (Hayes 1995). Besides the grouping of these constituents into different tiers which combine to form labeled metrical trees, there is a metrical grid approach as another way to account for different grades of prominence (for a critical review cf. Laks 1997). The metrical tree approach is applied to Spanish in Harris (1982).

The combination of principles from autosegmental and metrical phonologies to the **autosegmental-metrical** or **AM model** (Pierrehumbert 1980; Ladd 2008) represents a current and widely used approach in international intonation research. A central assumption is the distinction, on the tonal tier, between two types of basic tonal units, pitch accents and boundary tones. The former associate with metrically strong (or: stressed) syllables, the latter with the edges of larger or smaller prosodic units. With the model of a well-formed intonational phrase, Beckman/Pierrehumbert (1986) have developed a universally valid intonational grammar that contains potentially all possible tone combinations. On the basis of the AM model, much research on the intonation of Romance languages has been conducted, including e.g. Frota (2000), Prieto/Roseano (2010), Prieto/Cabré (2013), Sichel-Bazin (2015), Frota/Prieto (2015).

⁹ In **CV phonology** (Clements/Keyser 1983) the skeletal tier had been introduced as a CV tier providing C and V slots to be associated with segments.

Where feature geometry, autosegmental phonology, and metrical phonology all share a focus on issues of representation, **dependency phonology** (Anderson/Jones 1974; Anderson/Ewen 1987) and **government phonology** (Kaye/Lowenstamm/Vergnaud 1985; 1990) take this focus to an extreme such that they may be referred to as “purely representational” (Balogné Bérce/Honeybone 2020, 3). They are also highly abstract and have a “‘non-phonetic’ conceptual bent” (Honeybone 1999, 180). In these frameworks, which rely on unary melodic primes and crucially depend on segment-internal dependency relations, there are two basic types of phonological phenomena, assimilation and lenition, which involve spreading on the one hand and either delinking or decomposition on the other. Balogné Bérce/Honeybone (2020, 5) point out that these frameworks “currently form a substantial minority position in Europe”. There are however noteworthy examples of government phonology applied to Romance languages, e.g. Charette (1991) to French, Sauzet (1994) to Occitan, Russo (2007) to Neapolitan, Carvalho (2011) to Portuguese.

With **optimality theory** (OT), Prince/Smolensky (1993/2004) introduced a novel generative approach that has become the “largest, most popular and most populous contemporary framework in phonology” (Balogné Bérce/Honeybone 2020, 5). In fact, the approach goes beyond phonology, seeking to integrate the modules of linguistic knowledge into a coherent whole. The fundamental innovation: in OT, it is not ordered rules but the parallel interaction of conflicting constraints that ensure mappings between underlying phonological representations (= input) and the corresponding phonetic surface realizations (= output). A generator function provides sets of possible output candidates for certain input strings, and an evaluation process driven by the constraints, selects the best (or “optimal”) of these candidates. Crucially, OT assumes parallel processing (evaluation of all constraints happens at once), thus abandoning the idea of serial derivations which was central to generative phonology, although some degree of derivation is reintroduced in **harmonic serialism** (McCarthy/Pater 2016) and **stratal OT** (Bermúdez-Otero 2017).

Optimality-theoretic constraints are assumed to be universal and thus valid for all languages: it is only their hierarchical ordering that differs from variety to variety. In these language-specific orderings, constraints act like a filter: the optimal candidate is the one that least violates the ranked constraint set and thus gets furthest in the evaluation. Two basic types of such violable constraints are distinguished: faithfulness constraints, which ensure that the difference between input and output remains as small as possible, banning, e.g., elision or epenthesis of segments; and markedness constraints, which penalize marked structures, preferring, e.g., that syllables have an onset but no coda. A third type is alignment constraints, which refer to the correspondence (or alignment) between different linguistic levels, such as that between word and syllable edges – a constraint that is violated by resyllabification across word boundaries as typically occurs in Romance languages (e.g. Fr. *avec elle* [avɛ.kɛl] ‘with her’ or Sp. *el ala* [e.lala] ‘the wing’).

Classic optimality theory, the foundations of which we have briefly summarized in the previous paragraphs (cf. Iosad 2017 for a more comprehensive account), has subsequently evolved in many ways, and numerous kinds of constraint interaction have been proposed (Krämer 2017). One widely supported sub-theory, for example, assumes **output–output faithfulness** to account for morphologically related forms or the varying realization of words in isolation vs. in phrasal position (cf. Kager 1999, 257–295); another one, **dispersion theory**, uses perceptually based constraints (Flemming 2002). Furthermore, aspects of OT are often associated with other phonological frameworks, yielding e.g. **gestural OT** which combines OT with the representations of articulatory phonology (cf. above; Bradley 2006). There are also many attempts to incorporate variation and frequency effects into an OT framework (e.g. Boersma/Hayes 2001; Gabriel 2010) and to use experimental methodologies (e.g. Ortega-Llebaria 2004). OT-based contributions to Romance languages are far too numerous to list here. We therefore content ourselves with a small selection: a comprehensive overview of OT and Spanish phonology is given in Bradley (2014), cf. also Martínez-Gil/Colina (2006); for Italian cf. e.g. Krämer (2009); for French, Tranel (2000), and Gess (1996) for the first diachronic application of OT; for Romanian, Chitoran (2002); for Catalan, Wheeler (2005).

Exemplar theory, the last framework to be presented here, can be seen as a kind of counter-model to the other approaches to phonology. Introduced by Bybee (2001; 2006) and Pierrehumbert (2001), its focus is not on the (abstract) modeling of linguistic competence. Rather, linguistic structures are placed in direct relation to language use, which has to be reconstructed on the basis of extensive corpus data (cf. corpus phonology above). Exemplar phonology can therefore be identified as usage-based. A basic idea of the approach is that the representation of an expression in a speaker's grammar is in constant interaction with the perhaps strongly varying realizations of this expression that confront the speaker as a listener every day. Each perceived realization of a word, i.e. each token, thus affects speakers' representations of it, which can constantly change. Phonological forms are not understood as abstract entities but as clusters of so-called exemplars organized around a prototype. If the concrete equivalents of such exemplars occur more frequently in language use, these gain lexical strength; conversely, if a form is used less and less frequently (decreasing token frequency), the exemplar corresponding to it also moves further to the periphery of the mental lexicon and may disappear altogether. Exemplar theory is in close relation to (socio)phonetics and morphology; cf. Frisch (2017) for a more comprehensive review. Romance studies within or testing the framework of exemplar theory include, for instance, Boomershine (2006) and Pycha (2017) on Spanish, Cristófaró Silva/Freitas (2020) on (Brazilian) Portuguese, and Nguyen et al. (2007) on French.

Following Balogné Bérce/Honeybone (2020), the poststructuralist frameworks that we have presented in this section can be classified into four major currents

that determine contemporary phonological theory.¹⁰ Specifically, these are (i) rule-based approaches comprising classical generative as well as lexical phonology; (ii) representation-based approaches including feature geometry, autosegmental, metrical, dependency, and government phonology; (iii) constraint-based approaches with optimality theory (which has partly incorporated autosegmental, derivational, and various other aspects of prior approaches); and (iv) usage-based frameworks such as exemplar theory, which rather stand for a non-autonomous and less formalized phonology. Approaches such as experimental, laboratory, articulatory or corpus phonology form a methodology group that can be fit into any of the above theoretical frameworks. All this adds up to an impressive and prolific diversity, which is reflected in the chapters of this volume, whose structure will be presented in more detail in Section 3.

3 Structure of the volume

The present volume is divided into two parts. The first part, *Key topics in Romance phonetics and phonology*, includes a total of seventeen chapters and aims to provide an overview of central topics of research in Romance segmental and suprasegmental phonology, encompassing as well comparative and diachronic aspects. Starting out with an overview of recent work on the phonological status of vowel and consonant length and syllable weight, the first chapter (↗1 Length and weight in Romance) addresses a set of features that distinguish Romance languages from their diachronic ancestor, Latin, and at the same time represent a link between the former and the latter across two thousand years of linguistic evolution, given the many diachronic traces of length and weight found in present-day Romance varieties. Following up on this, the topic of syllable weight is put into a larger context by discussing the internal structure of syllables and adjustments of syllable structure across morpheme and word boundaries (↗2 Syllable structure and (re)syllabification). This chapter provides a survey of syllabic constituents according to their content and behavior across Romance languages and highlights specific issues that are relevant for current phonological theorizing. The following two chapters address Romance vowels and their allophonic variants by focusing, in the first instance, on respective phonological processes such as metaphony and vowel harmony, diphthongization, lengthening, quantitative changes, and merging (↗3 Processes affecting vowels) and, in the second instance, addressing weak vocalic elements (↗4 From vowel weakening in Romance to French schwa). A further chapter is devoted to palatalization, which represents one of the crucial processes responsible for the restructuring of the Romance

¹⁰ Most of these frameworks are also thoroughly reviewed in Clark/Yallop/Fletcher (2007, 372–432). For phonology in the 20th century cf. also Anderson (1985) and Fischer-Jørgensen (1975); a comprehensive overview of contemporary currents in phonology is given in Hannahs/Bosch (2017).

consonant inventories (↗5 Palatalization in Romance). Fundamental changes from Latin to Romance sound systems are also apparent in the realm of nasals, not only with respect to nasal consonant inventories but also regarding the emergence of phonemic nasal vowels in French and Portuguese (↗6 Nasals and nasalization). A further group of chapters is devoted to the suprasegmental characteristics of Romance languages: A first chapter, mainly couched in the framework of optimality theory, describes the major changes that took place in the evolution from Latin stress to the contemporary Romance varieties (↗7 The evolution of Latin stress into Romance with special consideration of French). The subsequent two chapters address the higher levels of the prosodic hierarchy and focus on the durational and tonal properties of Romance languages (↗8 Comparing and deconstructing speech rhythm across Romance languages; ↗9 Intonation). General methodological issues are also dealt with in the present volume, in particular corpus phonology, which has recently emerged as an autonomous field at the interface between phonology and corpus linguistics (↗10 Corpus phonology), and the highly interdisciplinary field of sociophonetics, focusing on fieldwork- and corpus-based analyses of speaker- and group-specific variation of the sound surface of selected Romance languages (↗11 Sociophonetics). The next three chapters of Part I address the question of how Romance sound systems are acquired by children, who are raised in both monolingual (↗12 First language acquisition of Romance phonology) and bilingual settings (↗13 Bilingual phonological acquisition) and how they are learned by adolescents and adults (↗14 Second and third language acquisition of Romance phonology). The topic of language contact, which is already implicit in the treatment of second and third language acquisition, is explored in greater depth in the last two chapters of the first part, which deal, on the one hand, with the phonology of more or less stable contact varieties established in particular language communities (↗15 The phonology of Romance contact varieties) and, on the other hand, with the special topic of loanword integration (↗16 Loanword phonology in Romance).

The second part, *Phonetics and phonology of Romance languages*, provides a state-of-the-art report of research on the segmental and prosodic properties of a vast array of Romance languages. It comprises eleven chapters on individual Romance vernaculars, including *linguae minores* such as Occitan (↗22 Occitan) and the three major varieties of Rhaeto-Romance (↗20 Rhaeto-Romance: Friulian, Ladin, and Romansh) as well as Judeo-Spanish as a prototypical diaspora variety (↗25 Judeo-Spanish), and an overview of the sound shape of Romance-based creole languages (↗28 Romance-lexifier creoles).

4 Closing remarks

Given the space limitations of an introductory chapter, we have only addressed selected facets of the history of phonetics and phonology on the one hand and contemporary phonological theorizing and its application to Romance languages on the

other. We nevertheless hope that this brief overview is useful for readers who were not already familiar with the respective phenomena. Furthermore, we hope to have provided a useful introduction to a handbook for readers seeking a state-of-the-art picture of ongoing debates in the field as well as for those who have had little contact with the subject. The individual contributions to our volume were selected for their specific relevance to the ongoing discussion and because of fact that they are all characterized by a close intertwining of the empirical and the theoretical sides of Romance phonetics and phonology.

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I Key topics in Romance phonology

Pavel Iosad and W. Leo Wetzels

1 Length and weight in Romance

Abstract: In this chapter we consider the phonological status and patterning of vowel and consonant length and syllabic quantity across Romance varieties. The chapter is divided into two parts. In the first section, we provide an overview of the status of vowel and consonant length in the modern Romance varieties and describe the diachronic context. Synchronically, the presence of a phonemic contrast between short and long vowels is characteristic particularly of Gallo-Romance (including the varieties of northern Italy and Alpine Romance); some kind of distinction between short and long vowels and/or consonants (not necessarily one with phonemic significance) is found in a broader range of varieties, primarily in Italy. Diachronic traces of length, however, are found across most Romance languages. The second section takes up the question of phonological weight and shows that weight-sensitive patterns, primarily relating to the placement of stress, minimality requirements, and prosodic morphology, are pervasive throughout the family, even in languages without phonological length distinctions.

Keywords: weight, stress, quantity, vowel length, consonant length

1 Introduction

The subject of this chapter is the phonological patterning of length and syllable weight distinctions in the Romance languages. We make the following distinctions between the related notions of duration, length, and weight. Duration refers to the physical measurement of temporal extent, which is implicated in the phonetic realization of phonological distinctions. For example, in most Romance languages increased vowel duration is a cue of lexical stress (cf. Marotta 2016). In this chapter, we focus on length and weight. By length we understand systematic differences in duration that are implicated in the phonological grammar, such as the system of phonemic contrast and morphophonological alternations. As we shall see in Section 2, not all present-day Romance languages make use of such a distinction, either in consonants or in vowels. Even when a distinction is present, phonemic contrasts in length exist in some varieties, whereas in others length distinctions are distributed in a predictable manner, but there is no underlying phonemic contrast. In Section 3, we turn our attention to syllable weight, that is to say phonological patterns that are sensitive to

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the metrical structure of words, irrespective of whether that metrical structure is realized phonetically in a way that involves duration.

2 Length

2.1 Standard Italian

Most standard Romance varieties in the present day lack consistent length distinctions in both vowels or consonants. The major exception is Standard Italian, which largely follows the developments in Tuscany. Stressed vowels in penultimate syllables can be either short or long: It. *fato* ['fa:to] 'fate' vs. *fatto* ['fat:to] 'done', *pala* ['pa:la] 'shovel' vs. *palla* ['pa:la] 'ball'. Although a phonetic distinction between these two types of words is well-established (cf. e.g. D'Imperio/Rosenthal 1999), the phonological analysis is more contested. Short and long vowels are in complementary distribution: long vowels occur in open syllables (except word-finally), and short vowels occur in closed syllables (including before an intervocalic long consonant). However, Italian also has distinctive consonant length in positions other than after a stressed vowel: *correggia* [ko'reʤʒa] 'strap', *innalzare* [in:al'tʃa:re] 'raise_{INF}'. Therefore, the length of the vowel in *pala* or *fato* can be interpreted as allophonic before a short consonant. However, it can also be argued that the vowel length, whilst not present underlyingly, is part of the phonological grammar. In this case, long vowels are created by rule in response to a requirement for a penultimate stressed syllable to be heavy: that is to say, it must contain either a long vowel or a short vowel followed by a consonant (the coda of the syllable). Repetti (1989) describes this pattern as a "bimoraic norm": every stressed syllable must contain two units of weight called moras, where the first mora corresponds to the short vowel or the "first half" of a long one, and the second mora either creates a long vowel or corresponds to the coda.

Stressed vowels in proparoxytones are often analyzed as short. However, at least in open syllables such vowels are longer than unstressed vowels: It. *camera* ['ka'mera] 'room', *subito* ['su'bito] 'soon' (e.g. Marotta 1985). Authors such as D'Imperio/Rosenthal (1999) and Morén (2001) argue that they are phonologically short, and that the lengthening in such cases is phonetic, i.e. does not create a second mora. They analyze the main stress foot in *subito* as a trochee consisting of two light syllables, with stress on the first of these ('LL). However, Krämer (2009) suggests that an antepenultimate stressed vowel is bimoraic in words like *polizza* ['pɔ'liʦa] 'policy', where a penultimate syllable is, exceptionally, unstressed despite being heavy. He suggests that to avoid a foot with the structure ('LH), with a stressed light syllable followed by an unstressed heavy one – which is illicit in systems with moraic trochaic feet – such words are parsed as ('H)H<σ> (with the final syllable being treated as extrametrical). Even more radically, Canalis/Garrapa (2012) argue that *all* antepenultimate stressed

vowels in Italian are most appropriately analyzed as long (i.e. bimoraic), making all stressed (non-final) syllables heavy (cf. 3.5 for more on the structure of proparoxytones in Italian). Another instance of the tendency for all stressed syllables to be bimoraic irrespective of position in the word is the gemination of consonants after stressed vowels. Although not synchronically productive in the standard language, it is observed in numerous items such as *femmina* ‘woman’, *legittimo* ‘legitimate’, *collera* ‘anger’, and is widespread in dialects (Rohlf 1966, 320–322).

In final syllables, long vowels are generally prohibited: It. *città* [tʃitˈta(*:)] ‘city’, *canterà* [kanteˈra(*:)] ‘sing_{3SG.FUT}’. It is frequently argued that here the bimoraic norm is enforced by *raddoppiamento fonosintattico*, i.e. the gemination of the initial consonant of a following word after a stressed vowel: *canterà bene* [kanteˈrabˈbeːne] ‘sing_{3SG.FUT} well’ (Saltarelli 1983; Repetti 1991; Loporcaro 1996; Morén 2001; Krämer 2009; ↗18 Italian).¹

2.2 Italo-Romance and Sardinian

A similar situation prevails in the vernaculars of Italy south of the La Spezia–Rimini line. Stressed vowels are generally long in open penultimate syllables, and short in closed penultimate syllables. These varieties also often possess distinctive gemination of consonants. Compare in the Calabrian dialect of San Giovanni in Fiore (Mele 2009) [kaˈtːɾna] ‘chain’, but [ˈβɪnːu] ‘sell_{1SG}’; also in proparoxytones [ˈjɪrːɾtu] ‘finger’ (< GIDITU < DĠĠTU(M)), but [ˈðitːˈara] ‘letter’.

Length distinctions are unusual word-finally in these dialects, but Rohlf (1966, 424) reports long [t:] from *LL > [d:] in some southern varieties, such as Palagiano (Puglia): [kutt] ‘that one’ (It. *quello*), [ʃitt] ‘wing’ (< *AXILLA(M)).

Sardinian often preserves a consonantal length contrast, including in the sonorants [n] and [r]: /manːɔs/ [ˈmanːɔzɔ] ‘big_{M.PL}’ vs. /manɔs/ [ˈmanɔzɔ] ‘hand_{PL}’. For the lateral, the distinction between short and long [l] is often converted into a quality distinction such as [l] vs. [d], and similarly for plosives: due to the widespread lenition of singletons, geminated plosives often contrast with their ungeminated counterparts not just in quantity but also in quality. In Nuorese, geminate voiceless plosives merge with voiceless singleton plosives: [ˈlatɛ] ‘milk’ < LACTE(M) like [ˈlatu] ‘side’ < LATU(M). By contrast, in Logudorese they are distinct both quantitatively and qualitatively: [ˈlatte] vs. [ˈlaðu]. As for vowels, most descriptions do not remark on stressed vowels being long in Sardinian, but Loporcaro (2015), referring to the raw data in Wagner (1941) and Contini (1987), notes that stressed vowels are also long in open syllables: [ˈjuːyu] ‘yoke’, [ˈgattu] ‘cat’ (Wagner 1941, 79, 82).

¹ Cf. also Passino (2013) for an analysis that divorces *raddoppiamento* from the well-formedness of stressed syllables.

2.3 Northern Romance

Contrastive vowel length is best established in Northern Romance; synchronically, it is particularly widespread in the Romance vernaculars of northern Italy and Switzerland, that is to say Gallo-Italian dialects and the Rhaeto-Romance varieties. In addition, it is, or was, present in Francoprovençal, Occitan, and French varieties. Unlike the more southerly varieties of Italy, they generally lack quantity distinctions in consonants: contrastive vowel length is usually restricted to the stressed syllable within a final two- or one-syllable window. It often co-occurs with apocope, which targets non-open vowels, to the exclusion of Latin -A.

2.3.1 Friulian

In Friulian, vowel length is contrastive in stressed final and penultimate syllables (e.g. Vanelli 1979; 1998; Frau 1984; Finco 2007), with the exception of peripheral varieties in the west (in contact with the dialects of Veneto, which lack vowel length) and the east. In final syllables, traditional descriptions recognize minimal pairs such as [va:l] ‘cost_{3SG}’ (< VALET) vs. [val] ‘valley’ (< VALLE(M)), [pas] ‘step’ (< PASSU(M)) vs. [pa:s] ‘peace’ (< PACE(M)), [bru:t] ‘broth’ vs. [brut] ‘ugly’, [la:t] ‘gone_{M.SG}’ vs. [lat] ‘milk’. This is the situation in central dialects and the “koiné” variety of Friulian (Table 1.1): western and northern varieties often show diphthongs in place of close and/or mid long vowels.

Table 1.1: Long vowels and diphthongs in Friulian varieties (Francescato 1966; Frau 1984).

Dialect	PĚDE(M)	NŎVE(M)	PĚ(N)SU(M)	CRŬCE(M)
Central	[pi:t]	[nu:f]	[pe:s]	[kro:s]
Carnico	[pi:t]	[nu:f]	[pejs]	[krowf]
Lower Tagliamento	[pejt]	[nowf]	[pe:s]	[kro:f]
Western	[pejt]	[nowf]	[pejs]	[krows]

In penultimate syllables, long vowels can appear before historical *muta cum liquida* sequences, with deletion of the obstruent: [‘vo:li] ‘eye’ < ŎC(U)LU(M), sometimes with alternations between short and long vowels ([vo’gla(:)] ‘eye_{INF}’). There is extensive dialectal variation in the permissibility of word-final long stressed vowels, notably in infinitives: [a‘ma] or [a‘ma:] ‘love_{INF}’ < AMARE.

An aspect of the Friulian system that has drawn the attention of theoretical phonologists is the fact that while vowel length appears phonemic in pairs such as [la:t] vs. [lat], it is largely predictable from the underlying representation of the following consonant, which is obscured by final devoicing: [lat] from /lat/ ([‘late]

‘breastfeed_{3SG}’), but [la:t] from /lad/ ([‘lade] ‘gone_{F.SG}’). As the examples show, the generalization is that vowels lengthen before underlyingly voiced obstruents. This relationship between length and consonant voicing is productive, for instance in Italian borrowings (Vanelli 1986): [a‘fit] ‘rent’ (It. *affitto*, Friul. [afi‘tut] ‘rent_{DIM}’), but [ban‘di:t] ‘bandit’ (It. *bandito*, Friul. [bandi‘dut] ‘bandit_{DIM}’). Some phonetic data is provided by Baroni/Vanelli (2000), who suggest that Friulian final devoicing does not result in complete neutralization of the contrast, and by Finco (2007).

2.3.2 Ladin and Romansh

In Ladin, distinctive vowel length in stressed syllables is present only in Val Badia/Gadertal, as in Marebbe [pɛr] ‘pear’, but [pɛ:r] ‘pair’; [bɔʃk] ‘wood’, but [a‘rɔ:ʃk] ‘frog’ (Bernardasci 2013). The contrast is restricted to stressed syllables, but not only to word-final ones: [‘lita] ‘read_{PST.PTCP.F.SG}’ ≠ [‘li:ta] ‘choice’. It is also found word-finally: [ma] ‘more’ ≠ [ma:] ‘only’.

Distinctive vowel length is amply attested in Romansh. Montreuil (1999, 528), based on Caduff’s (1952) description of the Surselvan dialect of Tujetsch, states that “length is clearly phonemic”: [ə‘nif] ‘nest’ vs. [rɛʒ‘di:f] ‘renewal’, [‘zurə] ‘over’ vs. [‘gu:lə] ‘throat’. For Surmeiran, Loporcaro (2015, 113) gives pairs such as [go:t] ‘forest’ (< Ger. *Wald*) vs. [got] ‘drop’ (< GÜTTA(M)), [e:r] ‘field’ (< AGER) vs. [er] ‘also’ (< *ERA). Engadine varieties (also Loporcaro 2015, 113) show a contrast both in final and penultimate stressed syllables, as in the following examples from Scuol: [fi:t] ‘trust_{1SG}’ (< FĪDO) vs. [fit] ‘rental’ (< FĪCTU(M)), [‘fɔ:sa] ‘false_{F.SG}’ (< FALSA(M)) vs. [‘fɔsa] ‘grave’ (< FÖSSA(M)).

2.3.3 Varieties of northern Italy

Contrastive vowel length is found in many varieties of northern Italy, including most Ligurian varieties, Western Lombard, Emilian, and Romagnol; it is not found in most Piedmontese varieties or in Veneto. As elsewhere, length is mostly restricted to stressed syllables. In Cremonese (Emilian) and Genoese (Ligurian), long vowels are found in final, penultimate, and even antepenultimate syllables.

(1) Cremonese: final, penultimate and antepenultimate syllables

Long vowel	Short vowel
a. [pa:n] ‘bread’	[pan] ‘cloth’
b. [pɔ:] ‘Po’ (river name)	[pɔ] ‘then’
c. [‘la:na] ‘wool’	[‘kana] ‘reed’
d. [‘ta:vula] ‘table’	[‘fabula] ‘story’

(2) Genoese: final and penultimate syllables

Long vowel	Short vowel
a. ['fry:tu] 'fruit'	['brytu] 'ugly'
b. ['fa:su] 'false'	['fasu] 'do _{1SG} '
c. [pa'pɛ:] 'paper'	[ka'fɛ] 'coffee'

Genoese, and Ligurian in general, also show length contrasts in *unstressed* (specifically, pretonic) syllables.

(3) Genoese: length in unstressed syllables

Long vowel	Short vowel
a. [ka'setə] 'sock _{DIM} '	[ka'setə] 'ladle _{DIM} '
b. [fry'ta] 'benefit _{INF} '	[by'ta] 'throw _{INF} '

By contrast, Western Lombard dialects such as Milanese (e.g. Sanga 1988; Montreuil 1991; Prieto i Vives 2000; Torres-Tamarit 2015) and Casale Corte Cerro (Weber Wetzel 2002) show distinctive vowel length only in final (stressed) syllables (both closed and open).

(4) Milanese: final syllable

Long vowel	Short vowel
a. [pe:] 'feet'	[pɛ] 'foot'
b. [an'da:] 'go _{3SG,IMPF} '	[an'da] 'go _{INF} '
c. [ka:l] 'loss'	[kal] 'corn'

In penultimate stressed syllables, the contrast is neutralized in Western Lombard, creating vowel length alternations in stressed syllables: both short and long vowels are permitted in final syllables, but only one kind of vowel occurs in penults.² The outcome of the neutralization is described as short in Milanese:

(5) Milanese: vowel length alternations

Final syllable	Penultimate syllable
a. [mɛ:z] 'half _{M.SG} '	['mɛza] 'half _{F.SG} '
b. [gɒb] 'hunchbacked _{M.SG} '	['gɒba] 'hunchbacked _{F.SG} '

In Casale Corte Cerro, the neutralization produces half-long vowels:

² Of course, stress mobility also creates alternations in these varieties: Milanese [na:z] 'nose', [na'za] 'sniff_{INF}'.

(6) Casale Corte Cerro: alternations (Weber Wetzel 2002, 111)

	Final syllable	Penultimate syllable
a.	[bu:n] ‘good _{F,PL} ’	[‘bu:nə] ‘good _{F,SG} ’
b.	[bɛl] ‘beautiful _{F,PL} ’	[‘bɛːlə] ‘beautiful _{F,SG} ’

Several authors have suggested that Western Lombard, like Friulian, lengthens underlying short vowels (Montreuil 1991; Prieto i Vives 2000; Iosad 2012; Torres-Tamarit 2015; 2016); however, Loporcaro (2015) points out that the absence of length from non-final syllables is a general phonotactic constraint, and therefore alternations such as those in (5) and (6) are best analyzed with a shortening of underlyingly long vowels (cf. Repetti 1992; Iosad 2016).

Consonant length is rare, but is found in Emilian dialects such as Bolognese (Coco 1970; Filipponio 2012), which has a system of complementary length similar to that of Standard Italian, coupled with apocope. As a result, long consonants can occur word-finally: [sakː] ‘dry_{M,SG}’ < siccu(M). For Friulian, differences in the duration of word-final consonants (also driven by the length of the preceding vowel) are reported by Baroni/Vanelli (2000) and Finco (2007).

2.4 Gallo-Romance

Length distinctions are also found north of the Alps in the vernacular varieties of France, Belgium, as well as in North America (↗21 French). For instance, regional varieties of French in Alsace and Lorraine, as described by Montreuil (2010) on the basis of dialect atlases, show a pattern very similar to Friulian, with long vowels before voiced obstruents and short vowels before voiceless obstruents: Western Lorraine [vaːz] *vase* ‘mud’ but [ɑ] *hache* ‘axe’. In the rest of Lorraine and in Alsace, these long vowels are opacified by final devoicing: [frɛːs] *fraise* ‘strawberry’ vs. [frɛːzje] *fraisier* ‘strawberry bush’. Further, the patterning of historical final devoicing may be obscured by apocope, creating (derived) contrasts such as [vøf] *veuf* ‘widower’ vs. [vøːv] *veuve* ‘widow’. A synchronic vowel length contrast is also found in Walloon. For the variety of Tenneville in the south-east of Belgium, Francard (1980) notes a contrast between short and long /i y u a/, in both open and closed final syllables. In the dialect of Mélen, Lechanteur (1973) reports a contrast for /i y u ɛ ɔ a/.

(7) Tenneville Walloon (Francard 1980)

	Long vowel	Short vowel
a.	[pi:l] ‘chirp _{3SG} ’	[pil] ‘stack’
b.	[fu:] ‘outside’	[fu] ‘do, play _{3SG} ’
c.	[y:t] ‘eight’	[yt] ‘besides’

Synchronically, Standard French has almost entirely lost the length distinctions whose existence has been posited for the early modern period.³ In conservative varieties of Parisian French in the 19th century, the contrast was found in many positions. Some examples are given by Michaelis/Passy (1897, xxii–xxiii):

(8) Conservative Parisian French

Long vowel	Short vowel
a. [tɛ:t] <i>tête</i> ‘head’	[tɛt] <i>tette</i> ‘teat’
b. [tu:s] <i>tous</i> ‘all’	[tus] <i>tousse</i> ‘cough _{3SG} ’
c. [vø:l] <i>veule</i> ‘tired’	[vøel] <i>veulent</i> ‘want _{3PL} ’
d. [pa:s] <i>passe</i> ‘pass _{3SG} ’	[bat] <i>batte</i> ‘hit _{3SG} ’

Non-contrastive length, according to Michaelis/Passy (1897), was found in word-final syllables before the voiced continuants [v z ʒ j ʁ]: [bu:ʒ] *rouge* ‘red’, [ka:v] *cave* ‘cellar’, a situation that persists in Parisian French today. Conversely, word-finally the length contrast was for most speakers neutralized in favor of the short vowel: [vy] *vu(e)* ‘see_{PST.PTCP.M/F}’ (rather than [vy:] ‘see_{PST.PTCP.F}’).

Martinet (1969) describes an earlier traditional system with an important asymmetry in the distribution of length: in the close vowels /i y u/, the contrast was rare outside word-final position (although cf. *tous* ≠ *tousse* (8b), *dégoutte* ‘drip_{3SG}’ ≠ *dégoûte* ‘disgust_{3SG}’), but extremely common word-finally, where it was an exponent of gender (*joli* [ʒo’li] ‘nice_{M.SG}’ vs. *jolie* [ʒo’li:] ‘nice_{F.SG}’). Conversely, among the non-close vowels /ɛ ø o a/ the contrast was mostly restricted to non-final position. Word-final length distinctions in close vowels were already neutralized by the time of Michaelis/Passy (1897), whereas in the non-close vowels, as reported by Martinet (1969), by the middle of the 20th century it had almost entirely changed into a qualitative distinction (/a/ vs. /ɑ/ etc.), with the sole exception of the contrast between /ɛ/ and /ɛ:/, as in *mettre* ‘put_{INF}’ vs. *maître* ‘teacher’. However, even where the lexical vowel length contrast has disappeared, coda /v z ʒ r/ still retain their lengthening effect on preceding stressed vowels in many varieties of standard French (cf. Fagyal/Kibbee/Jenkins 2006, 50), over and above the general lengthening effect of voiced consonants.

Laurentian French shows a similar system: the phonemic contrast is limited to /ɛ/ vs. /ɛ:/, but non-phonemic lengthening is found before /v z ʒ r/ and /vr/ (obligatorily in closed syllables, variably in open syllables). Moreover, the contrastively

³ However, some scholars, such as Plénat (1991) for Standard French and Rizzolo (2002) for Midi French, have argued that the French close mid vowels need to be analyzed as bimoraic, particularly to account for the complementary distribution of close and open mid vowels in open and closed syllables respectively (*loi de position*). Cf. Eychenne (2006), Courdès-Murphy (2018) and Storme (2017) for a critical response.

tense vowels /ø o α/ as well the nasal vowels /ɛ̃ œ ɔ̃ ã/ are obligatorily lengthened in stressed closed syllables (Dumas 1974; Walker 1984).

Elsewhere in the orbit of the French standard language, both traditional dialects and regional varieties of the standard are often described as preserving at least some length distinctions. For example, extensive use of vowel length is reported for Belgian regional French – unsurprising in view of the Walloon data.

(9) Belgian regional French (Francard 2010)

Long vowel	Short vowel
a. [pa:t] <i>pâte</i> ‘dough’	[pat] <i>patte</i> ‘paw’
b. [a'mi:] <i>amie</i> ‘friend _F ’	[a'mi] <i>ami</i> ‘friend _M ’
c. [mɛ:tʁ] <i>maître</i> ‘teacher’	[mɛtʁ] <i>mettre</i> ‘put _{INF} ’

Francard (2010) also reports long vowels in initial unstressed syllables ([y:'zin] *usine* ‘factory’) and in final syllables before voiced consonants ([sa:l] *sale* ‘dirty’, [ku:dʁ] *coudre* ‘sew_{INF}’).

Montreuil (1995) notes the extensive use of vowel length in the regional French of Lower Normandy, including both lexical distinctions ([fes] *fesse* ‘smack_{3SG}’ ≠ [fe:s] *fesse* ‘buttock’, [mu:] *mouille* ‘soak_{3SG}’ ≠ [fu:] *fouille* ‘search_{3SG}’) and derived contrasts like *ami* vs. *amie*. A similar system is also found in Channel Islands varieties such as Jersey Norman French (Spence 1985). Another example is found in Touraine, where Morin (2006), citing Davau (1979), reports the preservation of length contrasts in pairs such as [bu:] *bouche* ‘block_{3SG}’ vs. [bu] *bouche* ‘mouth’. In Burgundian regional French (Taverdet 1989), a combination of a length contrast and coalescence of vowels with schwa produces what is at least apparently a ternary length distinction:

(10) Burgundian regional French

a. [kry]	<i>cru</i>	‘raw _{M.SG} ’
b. [kry:]	<i>cru</i>	‘believe _{PST.PTCP.M.SG} ’
c. [kry::]	<i>crue</i>	‘raw _{F.SG} ’ = ‘believe _{PST.PTCP.F.SG} ’

Also in Burgundy, Galand (1968) reports for the regional French of the Pays de la Dheune a length contrast in close vowels in both stressed ([lu] *loup* ‘wolf’ vs. [lu:] *loue* ‘rent_{3SG}’) and unstressed syllables ([u] in *goutter* ‘drip_{INF}’ vs. [u:] in *goûter* ‘taste_{INF}’).

All that said, Gess (2001; 2006) offers a forceful repudiation of the traditional understanding of length distinctions in varieties of French (tackling historical evidence, descriptions of varieties of standard French, and descriptions of vernaculars). Gess’ proposals, in turn, are critiqued by Morin (2006; 2012).

Other varieties with length distinctions include the Occitan dialect of Val Germanasca (Morin 2003; Loporcaro 2015, citing Pons/Genre 1997), and numerous Franco-

provençal varieties. In the latter case, descriptions note a length contrast in absolute final position and also before consonants, with intervocalic consonants being lengthened after short, stressed vowels (as in Standard Italian). Martinet (1956, 74–75) describes the Francoprovençal dialect of Hauteville, where the length contrast covers the phonemes /ε ɔ a/. He interprets the opposition as one of contrastive shortness rather than length, since only a small subset of phonemic vowel qualities can be short. Consonants are systematically lengthened after contrastively short, stressed vowels, but Martinet rejects an analysis where the vowel length is allophonic and dependent on following consonant length, because the vowel length contrast also obtains in word-final position.

(11) Hauteville: length contrast in vowels

Long vowels	Short vowels
a. ['bɔ:la] 'bundle'	['bɔ:la] 'ball'
b. [sa'r:a:] 'be _{1SG.FUT} '	[sa'r:a] 'be _{3SG.FUT} '
c. ['mɔ:] 'evil, bad'	['mɔ] 'word'

A different kind of vowel length patterning is found in several Occitan varieties such as that of Vinzelles, in the present-day *département* of Puy-de-Dôme (Dauzat 1897; Morin 2000), where length distinctions are freely found in both stressed and unstressed syllables:

(12) Vinzelles: length distinctions in stressed and unstressed positions

Long vowels	Short vowels
a. ['ku:ta:] 'side _{PL} '	['d̥zʊr] 'day'
b. [f̥sa:'te] 'castle'	[bɛ'te] 'ship'
c. [mʊ:'to] 'ram'	[bo'to] 'button'

2.5 Other Romance varieties

The two major branches of Romance where neither vowel nor consonant distinctive length are consistently attested in their current synchronic state are Daco-Romance (both Romanian and the minor Balkan languages) and Ibero-Romance.

In Ibero-Romance, the pattern of quantity observable elsewhere in Romance is generally reflected in qualitative distinctions, particularly with respect to consonants. Nevertheless, various vowel lengthening and/or consonant gemination patterns are reported for a number of Ibero-Romance vernaculars. Particularly well-known is the case of Andalusian Spanish, where “s-aspiration”, i.e. debuccalization of coda /s/, can produce, among other effects, pre- and post-aspiration (especially of plosives) with some lengthening or gemination of the following consonant, and/or the lengthening

of the vowel, as in *pasta* ‘dough’ [ˈpahta], [ˈpa(·)^ht:a], [ˈpat:^ha]. The literature on this phenomenon is extensive: for traditional descriptions cf. Alarcos Llorach (1958); Mondéjar (1991); and, for instance, Romero Gallego (1995); Gerfen (2002); O’Neill (2010); Torreira (2012); Ruch/Harrington (2014) for some experimental results. Conversely, Resnick/Hammond (1975) report that in Miami Cuban Spanish s-aspiration results in total deletion of the coda [s] with lengthening of the preceding vowel, hence *pescado* [pe:ˈkaðo] ‘fish’ ≠ *pecado* [peˈkaðo] ‘sin’.

The preservation of long -NN- and -LL- is reported in the Aragonese variety of Bielsa (Badía Margarit 1950), but otherwise original consonant quantity is generally transformed into quality distinctions in Ibero-Romance (cf. 2.9 below). “New” geminates are reported to arise, usually in a variable rather than categorical manner, in a number of Caribbean varieties of Spanish, such as Cuban, where it is a possible outcome of assimilation in liquid-consonant sequences (Carlson 2014, with extensive references). Many Romance languages also show “fake” geminates, i.e. sequences of identical consonants: for instance, in Standard French one may cite *mourait* ‘die_{3SG.IMP}’ vs. *mourrait* ‘die_{3SG.COND}’, *éclaira* ‘illuminate_{3SG.PRET}’ vs. *éclairera* ‘illuminate_{3SG.FUT}’, *illisible* ‘illegible’ etc. In Catalan, non-distinctive gemination is found in certain kinds of *muta cum liquida* sequences (Wheeler 2005, 265–269): [ˈdobl̩lə] *doble* ‘double’, in addition to a number of lexical items where long consonants could probably be considered clusters of identical consonants, since they show no clear evidence of patterning as a single segment: [ˈɔbbi] *obvi* ‘obvious’, [səmˈmanə] *setmana* ‘week’.

2.6 Analytical issues

The synchronic analysis of vowel length in Romance has been subject to extensive discussion in the theoretical literature. In traditional structuralist phonology, phonemic vowel length is widely recognized as characteristic particularly of the “Northern Romance” type exemplified above by varieties such as Cremonese, Genovese, Western Lombard, and Friulian (Haudricourt/Juilland 1949; Martinet 1955). However, as we have seen, the distribution of vowel length can be at least partially predictable. Such length would be considered allophonic in a structuralist analysis and derived by rule in a generative analysis (cf., e.g., Schane 1971). For example, in French it suffices to posit rules of lengthening to account for the predictable length of vowels before [v z ʒ r], without an underlying length contrast (Gess 2008). Similarly, contrasts of the type [aˈmi] *ami* vs. [aˈmi:] *amie*, could be analyzed as deriving from the coalescence of the stem-final vowel with an underlying schwa (/amiə/ → [aˈmi:]), or by affixation of a mora as the exponent of a feminine singular morpheme (Bermúdez-Otero 2018).⁴

⁴ A typological parallel can be provided by languages such as Scottish Gaelic (Morrison 2019).

However, Montreuil (2003) cautions against such analyses. In any case, significant differences of opinion remain as to the status of such derived length (Morin 2012).

A particularly debated issue in the phonology of Romance vowel length is its status where it bears a non-trivial relationship to the voicing of a following consonant. The bulk of the literature concentrates on Friulian and on Western Lombard varieties such as Milanese. In Friulian, vowels are long in a final syllable before underlyingly voiced obstruents, but not before underlyingly voiceless ones: /lad/ ‘gone_{M.SG}’ → [la:t] but /lat/ ‘milk’ → [lat]. Hualde (1990), Montreuil (2010), and Torres-Tamarit (2015) argue that the lengthening in forms like /lad/ but not in forms like /lat/ is mediated by the fact that voiced, but not voiceless, coda obstruents can become moraic, with final devoicing forcing the reassociation of the mora from the final consonant to the vowel: /lad/ → [la_μd_μ/ → [la_{μμ}t]. Several authors rely on underlying moraic (or more generally quantity) specifications to derive the patterns. Montreuil (1991) argues that voiceless, but not voiced, obstruents are underlyingly moraic, and posits a synchronic bimoraicity requirement, so that underlying /la_μd/ undergoes vowel lengthening to [la_{μμ}t], but underlying /la_μt_μ/ is already bimoraic and retains the short vowel. Conversely, Repetti (1992) argues that in forms with a long vowel followed by an underlyingly voiced obstruent (like /la:d/) the coda projects a mora, which is shared with the preceding vowel. Prieto i Vives (2000) and Iosad (2012) argue that the long vowels are underlyingly short and derived by the pressure from the bimoraic norm, with the assignment of the second mora to the consonant or the vowel being driven by phonological considerations. Loporcaro (2015, 121–144) provides an extensive critique of these proposals, arguing that they overlook important subregularities, such as the lack of systematic lengthening before underlying /dʒ/, or forms with long vowels before underlyingly voiceless obstruents in Friulian, such as [po:k] *pôc* ‘few_{M.SG}’ and [o:k] *ôc* ‘gander’ (cf. *pôcje* ‘few_{F.SG}’, *ôcje* ‘goose’). He argues instead that the length alternations should be viewed as lexicalized remnants of an old process rather than as part of regular phonology.

2.7 Ternary contrasts

As noted in various sections above, some Romance varieties appear to make a surface distinction between three degrees of duration, particularly in vowels. Existing sources interpret them as shortness vs. half-length vs. length (as in Standard Italian or Casale Corte Cerro) or as shortness vs. length vs. overlength (as in Burgundian regional French). The distribution of these is often predictable: for instance, in Casale Corte Cerro half-long vowels are in complementary distribution with both short and long vowels: half-long vowels appear only in open non-final unstressed syllables, where neither short nor long vowels can occur. It is therefore possible to consider them allophones of either short or long vowels.

In other cases, like Burgundian regional French, it is possible to analyze overlong vowels as underlying heterosyllabic sequences (cf. the discussion of *ami* vs. *amie* above): if overlong [kry:] is the feminine form of both short [kry] ‘raw_M’ and long [kry:] ‘believe_{PST.PTCP.M.SG}’, then it can be derived from underlying /kryə/ in the former case (with lengthening in hiatus) and from /kryə/ in the latter.

Nevertheless, a body of literature argues that such ternary distinctions should be taken seriously for the purposes of phonological analysis. Trumper (1980) describes a number of dialects in the Lausberg zone (on the Basilicata/Calabria border) as distinguishing three kinds of stressed vowels: short and lax (in non-final closed syllables), long and tense (in antepenultimate open syllables) and overlong, tense or diphthongized (in penultimate open syllables, including in hiatus). Hajek (2000) further suggests that data from Standard Italian and from Lombard varieties with a traditional short vs. half-long vs. long distinction should also be assimilated into a framework that recognizes trimoraicity. Finally, Balsemin (2017), working in a Government Phonology framework, reanalyzes the Friulian distinction of [‘late] ‘breast-feed_{3SG}’ vs. [‘lade] ‘gone_{F.SG}’ vs. [‘la:t] ‘gone_{M.SG}’, usually seen as one of short vowels in the penultimate syllable vs. a long vowel in the final syllable, as a ternary distinction between short, long, and overlong vowels, respectively.

2.8 The diachrony of vowel and consonant length

Where does the distinctive length of modern Romance varieties come from? Any reconstruction of its development should be able to handle at least four patterns:

- phonemic vowel length of the Northern Romance type, no consonant quantity distinctions (e.g. Cremonese, Friulian, Ladin)
- predictable vowel length in stressed open syllables, with a consonant quantity contrast (e.g. Standard Italian, Sardinian)
- a mix of phonemic and derived vowel length of the French type
- no synchronic vowel length contrast (e.g. Ibero-Romance, Daco-Romance, Veneto, most of Ladin)

To this must be added the various outcomes of consonantal developments, which have often been treated together with developments of the vocalic quantities (Haudricourt/Juilland 1949; Martinet 1955). For up-to-date book-length discussion of the issues, the reader is referred to Loporcaro (2015). It is uncontroversial that Proto-Romance did not inherit the vowel quantity system of Classical Latin directly. Instead, the reflexes of short and long vowels over most of the Latin-speaking area differ in quality, with more open, “laxer” qualities being associated with classical short vowels, and closer, “tenser” qualities continuing classical length. A crucial development for the rise of vowel length in later Romance is provided by degemination and other lenition

processes (e.g. Väänänen 1981; Loporcaro 2011). Proto-Romance gemination is preserved in southern Italy and in parts of Sardinia, but entirely lost or transformed into a qualitative contrast elsewhere. The three main patterns of vowel and consonant length (Table 1.2) are usefully summarized by Loporcaro (2007, 313):

Table 1.2: The three main types of length patterning in Romance.

Type	'CV.CV	'CVC.CV
Italian	[ˈlaːto]	[ˈgatːo]
Spanish	[ˈlaðo] < LATU(M) 'side'	[ˈgato] < CATTU(M) 'tomcat'
Cremonese	[paːn] < PANE(M) 'bread'	[pan] < PANNU(M) 'cloth'

In the Italian type, both vowel and consonant length are preserved, with a complementary distribution between the two in a stressed penultimate syllable. In the Spanish type, vowel length distinctions disappear, but the development of the following consonant may still indicate whether it descends from a singleton or geminate; Daco-Romance also belongs to the Spanish type. In the Cremonese type, representative of Northern Romance, consonantal quantity distinctions disappear whereas vowel length is phonemic. Historically, French also belongs to this “Cremonese” type, but this fact is much obscured by later developments.

2.9 The development of geminates

Across Romance, it is worth distinguishing between the patterns of degemination and lenition in obstruents and in sonorants. Southern and central Italian varieties, including Standard Italian, generally preserve the Proto-Romance geminate obstruents, which in turn descend either from Classical Latin geminates or from consonant assimilation: *bocca* ‘cheek’ < BŪCCA(M) and *scritto* ‘write’_{PST.PTCP.M.SG} < SCRĪPTU(M), *freddo* ‘cold’_{M.SG} < FRĪG(I)DU(M). Thus, old geminates do not usually merge with old singletons. As for sonorants, while the quantity contrast is usually preserved, additional qualitative changes (such as -LL- > [dʎ]) can occur.

In Daco-Romance, early degemination leads to merger between Proto-Romance geminate and singleton plosives (Romanian *bucă* ‘cheek’ like *roată* ‘wheel’ < RŌTA(M)), but in sonorants the length distinction is not neutralized until later: single intervocalic -L- changed into [r] (*soare* ‘sun’ < SŌLE(M)) whereas long -LL- degeminated to [l] (with further developments), as in *cale* ‘street’ < CALLE(M). The distinction between -NN- and -N- is neutralized in modern Romanian, but it was still in effect at the time of pre-nasal closing processes, which affected /a e o/ before singleton -N- (*câne* ‘dog’ < CANE(M); *bine* ‘well’ < BĒNE; *bun* ‘good’_{M.SG} < BŌNU(M)), but not before -NN- (*an* ‘year’ < ANNU(M)). The contrast between -RR- and -R- is still reflected in 16th-century texts (Sala 2012).

In Western Romance, degemination and lenition of singleton plosives is quite general (Carvalho 2008). In Ibero-Romance in most cases, unlike Daco-Romance, it does not lead to mergers: instead, we observe a chain shift of the form voiceless geminates > voiceless plosives > voiced plosives > voiced continuants. This outcome is best preserved in Galician-Portuguese: Por. *cupa* ‘cup’ < CŪPPA(M), *saber* ‘know_{INF}’ < SAPERE, *cavalo* ‘horse’ < CABALLU(M), whereas in Spanish and French the outcomes of the lenition of voiceless singletons undergo further lenition to merge with the old voiced plosives: Fr. *savoir* and *cheval* both with [v], Sp. *saber* and *caballo* both with [β]. However, in a small area in the Pyrenees (Béarnais Gascon and Aragonese) voiceless singletons remain and merge with voiceless geminates (Gascon [my'ta] ‘change_{INF}’ < MŪTĀRE), as in Daco-Romance (Elcock 1938).⁵

Again, as in Daco-Romance, the quantity contrast in Ibero-Romance sonorants appears to have held on for longer than in plosives. As mentioned above, it was (at least variably) preserved in parts of Aragonese as late as the mid-20th century: [ka'panna] ‘cabin’ (< CAPANNA(M), Sp. *cabaña*), [ˈbella] ‘beautiful_{F.SG}’ (< BĒLLA(M)). Pensado (1993) reviews the evidence for the preservation of quantity distinctions in Spanish and shows that it was at least partially present in plosives at the time of the Arabic conquest and persisted in sonorants until later into the medieval period. More common, however, is what is known as *transphonologization* (Haudricourt/Juillard 1949; Martinet 1952; 1955), in which these length distinctions transform into quality contrasts. In most Romance varieties of Spain, -NN- and -LL- undergo palatalization to [ɲ] and [ʎ] (with further developments; Catalán 1954), while -RR- becomes a trill [r] as opposed to the flap [ɾ] from -R-. Some of the “fortis” outcomes spread to word-initial position: R- becomes [r] in Castilian, to which Catalan adds [ʎ] for L-, while Leonese shows initial [ɲ] for N- in addition to these (cf. e.g. Cravens 2002). Among other possible outcomes across Western Romance (Haudricourt/Juillard 1949, 58–68) are, for -LL- vs. -L-, [ʃ] vs. [l], [ʁ] vs. [l], [w] vs. [l], and [l] vs. [r]; for -NN- vs. -N-, [ɲ] vs. [ɲ], and [r] vs. [n]; for -RR- vs. -R-, [ð] vs. [r], [z] vs. [r], and [r] vs. [ʁ]. In Portuguese, short -N- and -L- are deleted, while long -NN- and -LL- are degeminated and the contrast in rhotics is transphonologized: *lua* ‘moon’ < LŪNA(M) vs. *ano* ‘year’ < ANNU(M); *céu* ‘heaven’ < CAELU(M) vs. *belo* ‘beautiful_{M.SG}’ < BĒLLU(M); *caro* ‘dear’ (< CARU(M)) with [r] vs. *carro* ‘car’ (< CARRU(M)) with a variety of realizations across varieties, such as [ʁ], [x], [h], [R]. Deletion of -N- is also found in Gascon. These developments are summarized by Carvalho (1989a), who sets up an implicational hierarchy of degemination: obstruents > nasals > laterals > rhotics.

In Gallo-Romance north of the Alps, degemination of plosives occurs early (although not early enough to feed the extensive lenitions affecting singleton plosives). The same is true of sonorants, except rhotics, where the contrast is preserved

⁵ In the Pyrenean case, the lack of lenition of -P-, -T-, and -C- is commonly ascribed to language contact with Basque (Jungemann 1950).

in French until the 16th or 17th century (Zink 1986, 176). Degemination is also found in other Northern Romance varieties, although of a later date: Loporcaro (2011, 152) reviews the evidence, which again shows the degemination of sonorants, which can be recovered both from spelling and from the conditioning of other sound changes (as in Daco-Romance), trailing the earlier degemination of obstruents.

2.10 The sources of vowel length

It is generally recognized that the collapse of the Classical Latin vowel quantity system and its replacement by the common Romance qualitative oppositions was followed, at least in some parts of the Romance-speaking world, by the lengthening of stressed vowels in open syllables, at least in penultimate position. That is to say, a stressed vowel in a 'CVCV(C)# sequence underwent lengthening (we shall call this the “long” position), but the stressed vowel in a 'CVCCV(C)# sequence would not, whether the stressed syllable was closed by the first member of a consonant sequence or the first half of a geminate consonant (this we shall call the “short” position).⁶ This has the potential to create a complementary relationship between the length of the stressed penult and the nature of the following consonant. This is essentially the system found in central and southern Italy, including Standard Italian, as well as in some Francoprovençal varieties like Hauteville: short vowels are followed by long consonants, and vice versa.

In Northern Romance, this open syllable lengthening is usually considered in the light of *qualitative* developments observed in stressed open syllables but not in stressed closed syllables. In French, this concerns the partial closing of the open vowel [a] and the diphthongization of the close-mid vowels.

(13) Closing and diphthongization: French

	Open syllable	Closed syllable
a. [a]	<i>mer</i> ‘sea’ < MARE	<i>part</i> ‘part’ < PARTE(M)
b. [e]	<i>foi</i> ‘faith’ < FĪDE(M)	<i>terre</i> ‘land’ < TERRA(M)
c. [o]	<i>neveu</i> ‘nephew’ < NĪPŎTE(M)	<i>col</i> ‘neck’ < CŌLLU(M)

Similar developments are observed in Northern Romance varieties in Italy and Switzerland, even those that do not have distinctive length today, such as some Romansh (Lüdtke 1954–1955) or Ladin ones. For Romansh, developments are synthesized by Eichenhofer (1999): for instance, Proto-Romance [e] (Lat. -ĭ-, -Ē-) is often

⁶ Some of the traditional literature describes vowels in light open syllables as “free” (e.g. Fr. *libre* in Haudricourt/Juillard 1949) and those in closed syllables as “checked” or “trapped” (e.g. Fr. *entravé*), to distinguish this distinction from the Classical length contrasts.

diphthongized in “long” position, but remains otherwise: *paraid* ‘crag, escarpment’ (< PARĒTE(M)) but *metter* ‘put’ < MĪTTERE. For Ladin, Loporcaro (2015, 110) shows that in Fassano, which does not have synchronic distinctive length, the reflexes of -A- in Proto-Romance open syllables are different from their reflexes in closed syllables: original open syllable [pɛl] ‘post’ < PALU(M), [pjɛʃ] ‘please_{3SG}’ < PLACET, but original closed syllable [val] ‘valley’ < VALLE(M), [braʃ] ‘arm’ < BRACCHIU(M). Emilian dialects show similar outcomes, except they often *do* have synchronic vowel length overlaid on top of these qualitative developments (Coco 1970; Uguzzoni 1975; Repetti 1992; Filipponio 2012): Frignanese [ˈpjɛ:ga] ‘sore_{F.SG}’ < PLAGA(M), [nɛ:s] ‘nose’ < NASU(M), but [ˈva:ka] ‘cow’ < VACCA(M); Bolognese with closing of -A- in “long” positions ([lɛ:g] ‘lake’ < LACU(M), but [gat] ‘cat’ < CATTU(M), and diphthongization of mid vowels in “long” position vs. opening in “short” position: [raɪd] ‘net’ < RĒTE(M), but [pas] ‘fish’ < PĪSCE(M); [duˈlaɪr] ‘pain’ < DOLĒRE(M), but [tar] ‘tower’ < TŪRRE(M).

One additional source of vowel length is prominent in the history of French. As noted above, Gallo-Romance has undergone extensive lenition of intervocalic obstruents; in particular, Common Romance voiced plosives -D- and -G- were deleted (Fr. *voir* ‘see_{INF}’ < VĪDĒRE, *nier* ‘refuse_{INF}’ < NĒGĀRE), as were the voiceless singletons -T- and -C- (Fr. *muer* ‘change_{INF}’ < MŪTĀRE, *sûr* ‘secure’ < SĒCŪRU(M)). As a result, numerous hiatus sequences arose in the language, which coalesced into long vowels, as in cases like *chaîne* ‘chain’ < OFr. *chaeine* < CA(T)ĒNA(M), *bâiller* ‘yawn_{INF}’ < OFr. *baaillier* < BA(T)A(C)ŪLĀRE and many others. A similar, but separate, process of vowel coalescence is also responsible for contrasts such as *ami* [aˈmi] vs. *amie* [aˈmi:] in many French varieties.

Another common source of distinctive vowel length is compensation for the loss of coda consonants. Particularly frequent is the lengthening of vowels before a deleted coda [s]: hence Fr. *gout* ‘taste’ < GŪSTU(M), *château* ‘castle’ < CASTĒLLU(M). We have also seen that similar processes can apply in other Gallo-Romance vernaculars (such as the Occitan dialect of Vinzelles) and in varieties of Spanish (cf. Miami Cuban Spanish above), where it may be related to the widespread debuccalization of coda [s]. In Friulian, vowels can be lengthened if the initial consonant is lost in a following *muta cum liquida* sequence: [ˈpa:ri] ‘father’ < PATRE(M), [ˈvo:li] ‘eye’ < OC(U)LU(M). In Ligurian, long vowels can arise to compensate for the loss of coda laterals and other sonorants. However, this change may have involved vocalization of the coda consonants, so is better treated as of coalescence or monophthongization. Indeed, monophthongization is yet another common source of long vowels, as in Friulian *pôc* ‘few_{M.SG}’ < PAUCU(M).

The phenomenon that has probably attracted the most theoretical attention is the rise of phonemic vowel length systems, particularly widespread in Northern Romance varieties such as Cremonese, Milanese, and Friulian. Structuralist, teleological analyses of the pattern by Haudricourt/Juilland (1949) and Martinet (1955) saw the degemination of consonants as the key to the phonemicization of vowel length: a contrast between /ata/ and /atta/, realized as [ˈa:ta] ≠ [ˈatta], is endangered by degem-

ination, and is upheld by phonemicizing vowel length. These two processes together result in an /a:ta/ ≠ /ata/ distinction. With additional apocope, such an account can readily accommodate the rise of systems allowing minimal pairs like Cremonese [pa:m] ‘bread’ ≠ [pan] ‘cloth’ (< PANE(M) ≠ PANNU(M)).

Another analysis of the rise of vowel length, focused on French, was offered by De Chene/Anderson (1979). They argue that phonological vowel length contrasts can only be initially established by coalescence of hiatus sequences, as in French SĒCŪRU(M) > *seūr* > *sūr*. They then use this claim to argue that compensatory lengthening produced by processes such as monophthongization and coda consonant loss were facilitated by the existence of long vowels of hiatus origin. However, their claim has been challenged by Gess (1998) on the basis of metrical evidence for the chronology of coalescence (cf. Kavitskaya 2017 for a rejoinder) and by Morin (2012) on the basis of relative chronology.

Two other suggestions for the origin of contrastive vowel length have been made in the literature, with a particular focus on Friulian. One concerns the role of consonant voicing. Friulian presents an extreme case of the close relationship between obstruent voicing and the historical length of the preceding vowel discussed earlier in this section. Recall that in general voiced obstruents are associated with preceding long vowels, since voicing (lenition) only affected singletons, and singletons were generally preceded by long vowels. However, this association is not always watertight, since voiced consonants can also descend from voiced geminates, which required the preceding vowel to be short.⁷ Indeed, Northern Romance varieties often have short vowels before the outcomes of voiced geminates, so GUBBU(M) ‘hunchbacked_M’ (It. *gobbo*) gives Cremonese [gup] (feminine [ˈguba]), Milanese [gɒb] (feminine [ˈgɒba]); similarly, FRIG(I)DU(M) ‘cold’ (It. *freddo*) gives Cremonese [fret], Milanese [fretʃ]. This is not, however, the case in Friulian, where the association between the voicing of the consonant and the length of the preceding vowel is entirely regular (Vanelli 1998): cf. [fre:t] ‘cold’.⁸ Consequently, it has been suggested by authors such as Francescato (1966), Vanelli (1979), Hualde (1990) and Baroni/Vanelli (2000) that the lengthening of the vowel has to do with the voiced character of the final consonants, and perhaps with the final devoicing that affects them. So, for instance, Vanelli (1979) suggests that the loss of voicing in word-final position is the cause of vowel lengthening, while Hualde (1990) specifically grounds the lengthening in the well-known voicing effect on vowel duration (e.g. Westbury/Keating 1986). In this scenario lengthening can only occur in varieties with final devoicing, which is itself necessarily preceded by apocope of non-open vowels

⁷ A major exception here is the affricate [dʒ], where it derives from -DI- or -GI- and intervocalic -I-.

⁸ Morin (2003, 126) suggests that historically this form was either analogically brought into line with the regular pattern (cf. feminine singular [frede]) or derived from an earlier form with a diphthong such as [frejd].

(FĪNĪTU(M) ‘finish_{PST.PTCP.M.SG}’ > [fi'nidu] > [fi'nid] > [fi'ni:t]) and does not capitalize on an early open syllable lengthening.

A slightly different, but related approach is offered by Prieto (1992) and Repetti (1992). Building on the seminal work of Hayes (1989), they argue that vowel lengthening in Northern Romance dialects crucially depends on apocope: that is to say, it is an example of CVCV compensatory lengthening, where the deletion of the second vowel leaves behind a stray mora, which then gets reassociated to the preceding vowel to produce lengthening. In this respect, they reproduce the traditional view of the importance of apocope in establishing a phonemic vowel length contrast by the creation of minimal pairs along the lines of Cremonese [pa:n] vs. [pan]; cf. Videsott (2001). Once again, the sequence of events requires apocope to precede (or at least be simultaneous with) lengthening and starts with a short vowel in a Proto-Romance stressed open syllable.

Although these analyses may appear plausible in isolation, several scholars, notably Morin (1992; 2003; 2012) and Loporcaro (2007; 2011; 2015), have argued that they face considerable empirical problems, particularly once a wider range of evidence from Northern Romance is considered. In particular, if vowel lengthening is crucially fed either by final devoicing or by apocope, then it should be impossible for contrastive vowel length to be present if either of those sound changes has not occurred. Vowel lengthening without final devoicing occurs in the Francoprovençal variety of Breil (Dalbera 1994; Morin 2003): [a'mi:g] ‘friend’ < AMĪCU(M). Another possible example is Milanese, where final devoicing is not obligatory (Sanga 1988). Contrastive vowel length in paroxytones without apocope occurs in Ligurian (cf. the Genoese examples in (2)). Even more seriously, if vowel lengthening occurs exclusively as a result of apocope or the devoicing of following consonants, it should be categorically excluded from the stressed syllables of Proto-Romance proparoxytones, which are not word-final even after apocope, and yet examples such as Cremonese ['ta:vula] ≠ ['fabula] demonstrate a length contrast. Some account must also be given for those varieties where contrastive vowel length is found in absolute word-final position, which again usually cannot be explained as either CVCV compensatory lengthening or compensation for final devoicing.

Consequently, these scholars argue that vowel length contrasts of the Northern Romance type ultimately go back to the Proto-Romance open syllable lengthening. Under this account, Cremonese, with its retained length in proparoxytones represents one of the most archaic stages of development. According to Loporcaro (2007; 2015), the scope of contrastive vowel length then contracts, as it is lost first in proparoxytones (as in Bolognese or Friulian), then in paroxytones (as in Milanese) and then lastly even in final syllables (as in most of Ladin). Loporcaro ascribes this to rhythmic factors, specifically the fact that vowel duration is more and more compressed the longer the word is (for Standard Italian, cf. Marotta 1985; McCrary 2004), and so any vowel length distinction is endangered in longer words. Additional processes can, of course, intervene to change the scope of the length contrast, such as compensatory

lengthening before *muta cum liquida* sequences in Friulian or additional lengthening in stressed syllables in Frignanese (Repetti 1992). In any case, under this basic scenario there is no need to posit CVCV compensatory lengthening or similar processes in Northern Romance.

That being said, some instances of CVCV lengthening *are* found in Romance, specifically in varieties of French, where, as discussed by Morin (2006, 150), the loss of final schwa could lead to lengthening of the preceding vowel. So, for instance, in Vaudois French we may find contrasts like [mal] *mal* ‘badly’ ≠ [mal] *malle* ‘trunk’ (old length, now shortened) ≠ [ma:l] *mâle* ‘male’ (Andreassen/Lyche 2003).

3 Weight

Since Harris (1983) published his proposal for a weight-based analysis of Spanish main stress, an impressive stream of literature has emerged around the question whether Spanish stress is predictable and, if so, what the conditioning factors are. While for some time the syllable weight discussion was limited to the distribution of main stress, it has become clear now that the prosodic categories of mora, (heavy) syllable, and (mora-based) foot types may play a more pervasive role in the structuring of phonological words and in the expression of phonological generalizations and morphological processes. Accordingly, the question has become to what extent syllable weight functions in the phonology and morphology of the Romance languages.⁹

In the following sections, we will address this issue, starting with the question whether native speakers determine the location of main stress by way of a mora count. We begin our discussion with Brazilian Portuguese, as it is the one Romance language for which scholars have come close to agreement on the relevance of syllable weight for the distribution of main stress.¹⁰ The conclusions drawn from Brazilian Portuguese phonology and morphology will guide the exploration of the use of syllable weight in the other Romance languages. We will limit the discussion to the standard languages, for which these areas have been sufficiently explored: Portuguese, Spanish, Catalan, Italian, French, and Romanian.

⁹ We will not discuss the question of moraic onsets or the relation between syllable weight and prominent prosodic positions in general. For recent discussion cf. Ryan (2019), Nevins/Pinheiro Costa (2019).

¹⁰ Cf. Bisol (1992), Wetzels (1992), Massini-Cagliari (1999), and Magelhães (2016). For a morphology-based analysis cf. Lee (1997).

3.1 Brazilian Portuguese

3.1.1 The Brazilian Portuguese main stress rule

Up to a shallow level of abstraction, Brazilian Portuguese stress occurs within a three-syllable window at the right word edge. Syllable rhymes may contain two segments at the most, except for the coronal fricative /s/, which may be added after a branching rhyme of which the right segment is either a glide or a nasal mora.¹¹ Proponents of a weight-based stress rule use the notion ‘heavy rhyme’ in its most general interpretation, being that any syllable with two filled rhyme positions counts as heavy. The list of possible bimoraic rhymes in Brazilian Portuguese is presented in (14). Stress is indicated by underlining the stressed syllable:

(14) Brazilian Portuguese Heavy Rhymes¹²

	final	prefinal
VI	<u>anel</u> ‘ring’	<u>respaldo</u> ‘backrest’
VR	<u>abajur</u> ‘lampshade’	<u>alerto</u> ‘alert’
VS	<u>cortes</u> ‘courteous’	<u>adestro</u> ‘spare’
VN	<u>irmã</u> ‘sister’	<u>macumba</u> ‘voodoo’
oral diphthong	<u>heroi</u> ‘hero’	<u>perfeito</u> ‘perfect’
nasal diphthong	<u>irmão</u> ‘brother’	<u>cãibra</u> ‘cramp’

With the exception of /S/, non-sonorant codas are not tolerated and trigger the epenthesis of the high vowel /i/, as can be seen in the English loans *clube* [‘klubi] ‘club’, *bife* [‘bifi] ‘steak’, *close up* [klo‘zapi] ‘close-up’ etc. In the syllable coda, /l/ is pronounced as [w] in most parts of Brazil. A generalization based on syllable weight predicting the stress location in Brazilian Portuguese non-verbs can be phrased as follows:

- (15) Stress in Brazilian Portuguese non-verbs is realized on the word-final syllable, if heavy, otherwise it is on the prefinal syllable.

The statement in (15) covers the vast majority of Brazilian Portuguese non-verbs, as can be seen in Table 1.3 below, collected from the electronic version of the Houaiss dictionary (Houaiss/Villar 2009) by Aquino (2013, 70).¹³ The data in Table 1.3 are com-

¹¹ We assume that Brazilian Portuguese surface contrastive nasal vowels are lexically represented as a sequence of an oral vowel followed by a nasal mora /V_{μN}/, the latter being specified for nasality only: /ba_{μN}ko/ *banco* ‘bank’, /so_{μN}/ *som* ‘sound’. In this chapter, the nasal mora will be transcribed in phonological representations as /N/.

¹² Where /R/ and /S/ are unspecified for predictable context-dependent place of articulation and voicing, respectively.

¹³ We are grateful to Carla de Aquino for allowing us to use these data and for clarifying discussion about the way these were collected.

piled from a list containing 10,162 nouns and adjectives ending in the consonants /l/, /R/, /S/, and the nasal mora /N/, excluding those derived with a derivational suffix that represents or contains a heavy syllable.

Table 1.3: Brazilian Portuguese word-final rhymes as stress attractors.

{u, o, a}l ##	98.3 %	<i>azul</i> ‘blue’, <i>anzol</i> ‘fishhook’, <i>animal</i> ‘animal’
el ##	96.9 %	<i>anel</i> ‘ring’
il ##	84.6 %	<i>barril</i> ‘barrel’
{i, o, a}R ##	95.6 %	<i>elixir</i> ‘elixir’, <i>abajur</i> ‘lampshade’, <i>amor</i> ‘love’, <i>altar</i> ‘altar’
eR ##	46.0 %	<i>prazer</i> ‘pleasure’
{i, u, o, a}N ##	97.7 %	<i>alecrim</i> ‘rosemary’, <i>comum</i> ‘common’, <i>batom</i> ‘lipstick’, <i>irmã</i> ‘sister’
eN ##	5.5 %	<i>armazém</i> ‘warehouse’
VS ##	57.0 %	<i>nariz</i> ‘nose’, <i>avestruz</i> ‘ostrich’, <i>cortês</i> ‘polite’, <i>feroz</i> ‘fierce’, <i>capaz</i> ‘able’

As Table 1.3 shows, the stress-attracting property of final heavy syllables closed by sonorant consonants is robust overall, except for the words ending in /eR/, /eN/ and, to a lesser degree, /il/. Upon closer examination, the relatively numerous exceptions for these sequences appear to be either loanwords or instances of productive phonologically or morphologically conditioned sub-regularities.

For the words ending in /il/, the distribution of the competing final or prefinal stress patterns observed in the database largely correlates with the lexical categories of nouns and adjectives, respectively. This correlation was tested by carrying out a search for the relevant words in the *Dicionário inverso do português* (DIP) (d’Andrade 1993),¹⁴ where we found that the vast majority of the ninety /il/-final words listed as nouns carry final stress, while the large majority of the ninety-two words listed as adjectives have prefinal stress. It is therefore no coincidence that the exceptions to the expected final stress found by Aquino (2013) are adjectives: *ágil* ‘agile’, *útil* ‘useful’, *contábil* ‘accounting’, *débil* ‘weak’ etc.

The regular correspondence between lexical category and stress pattern suggests the existence of a pre-accenting adjective-forming suffix *-il*, which attaches to bound roots: *fissil* [fis+il] ‘fissionable’,¹⁵ as is also proposed in Aquino (2013). This would imply that native speakers of Brazilian Portuguese perceive these adjectives as morphologically complex. If this assumption is correct, we can eliminate these words as

¹⁴ The *Dicionário inverso do português* contains a total of 82,700 words.

¹⁵ In the latter word, as well as in some others, the same root can be isolated in related words: *fissurar* ‘fission_{INF}’, *fissão* ‘fission’. We leave open the question whether (all) these adjectives are synchronically derived or lexicalized as morphologically complex. The important fact is that adjectives ending in /il/ mostly carry prefinal stress, irrespective of /il/ being analyzed as a suffix.

a group from the set of underived exceptional words, explaining their prefinal stress as a property of the suffix.

There is, however, a small group of oxytonic /il/-final adjectives which appears to constitute a semantic niche of words meaning 'X-like', where X is the morphological base categorized as [human]. In a subset of this group, /il/ attaches to Latin roots: *senil* 'senile', *juvenil* 'juvenile', *feminil* 'feminine', *viril* 'virile', *pueril* 'childish', *infantil* 'childlike', *heril* 'lordly'. However, parallel formations exist where stress-attracting -il attaches to nominal stems, showing the productivity of this derivational process within the restricted semantic field: *escurril* 'awkward' (*escurra* 'awkward person'), *mancebil* 'boylike' (*mancebo* 'boy'), *mulheril* 'womanly' (*mulher* 'woman'), *senhoril* 'lordly' (*senhor* 'sir'), *pastoril* 'pastoral' (*pastor* 'shepherd'), *estudantil* 'student-like' (*estudante* 'student'), *varonil* 'virile' (*varão* 'man') etc. Assuming that there is a pre-accenting adjective-forming suffix -il, the latter group of adjectives could, in turn, be considered as being derived by a homophonous stress-attracting suffix that submits to the default stress rule. The remaining small set of stress-final adjectives, such as *fabril* 'manufacturing', *febril* 'febrile', *sutil* 'subtle', *hostil* 'hostile', *gentil* 'kind', *mercantil* 'commercial', which do not belong to the set just described, must then be marked as exceptions to the class of morphologically complex paroxytonic adjectives.

As for the prefinal stresses found in a subset of the words ending in /el/, the explanation for these can be similar to the one just suggested for adjectives ending in /il/. The productive pre-accenting adjective-forming suffix -vel, meaning 'that which can be V-ed' or 'that which V-s', typically attaches to verbal stems: *navegável* 'navigable' (*navegar* 'navigate_{INF}'). Although there are adjectives that cannot be derived regularly from existing verbs, like *sensível* 'sensitive', *horível* 'horrible', *possível* 'possible' etc., one could, again, assume that most of these words are in fact felt as morphologically complex and listed as such in the lexicon, precisely because of the categorical, segmental, and metrical resemblance they show to the ones productively derived with pre-accenting -vel. Moreover, a search through the DIP shows that all adjectives ending in the sequence /Vvel/, whether synchronically derived or not, are stressed on the prefinal syllable, showing the existence of a phonological sub-regularity, which takes priority over the default weight-based final stress.

Among the nouns ending in /VR/, the ones ending in /eR/ stand out because of the relatively large number of cases with prefinal stress. As it turns out, of the 68 words with prefinal stress, 54 are listed as loans by Aquino (2013, 192), mostly from English, such as *câncer* 'cancer', *contêiner* 'container', *líder* 'leader', *pôquer* 'poker' etc. It looks as if the large influx of Germanic words of this type has led to the creation of a specific loan strategy, such that the string ω[... ɔ.C₀eR] results in such lexical items being tagged as foreign. If these words are really perceived as foreign, they must be considered exceptional as a group. Otherwise, the fact remains that large subsets of /eR/-final words are predictably paroxytonic, such as the set of words ending in /ter/: *éster* 'ester', *éter* 'ether', *gângster* 'gangster', *poliéster* 'polyester', *pôster* 'poster', *repórter* 'reporter', *suéter* 'sweater', *carácter* 'character', *esfínter* 'sphincter' etc. As expected, words of

this type listed with final stress in dictionaries are moving into the paroxytonic class: *ureter* ~ *uréter* ‘ureter’, *cateter* ~ *catéter* ‘catheter’, *clister* ~ *clíster* ‘enema’. Similarly, German or English first names or family names ending in /eR/ are systematically borrowed with prefinal stress: *Bohrer*, *Dreher*, *Sopher*, *Mahler*, *Peter*, *Helder*, *Walker*, with *Walter* vacillating with *Walter*. Names of this type have become popular among Brazilian men and serve as a model for new creations like *Vander*, *Ihefter*, *Wender*, *Eder*, *Kleber*, *Jader*, *Weller*, *Heber*, *Gualter* etc., which could mean that these proper names are analyzed as containing a pre-accenting -er suffix. More drastically, the shift of oxytonic /eR/-final nouns to the paroxytonic class could be considered as proof that prefinal stress has become the norm for this word type. The DIP makes no mention of /eR/-final words other than nouns or infinitive verbs. Verbs as well as nouns zero-derived from verbs are always stressed on the final syllable (*poder* ‘can, power’, *dever* ‘have to, duty’ etc.), while among the underived oxytonic nouns there is a clear divide between a small class of high-frequency native words like *prazer* ‘joy’, *mulher* ‘woman’, *colher* ‘spoon’ and a somewhat larger class of low-frequency nouns, like *belveder* ‘belvedere’, *sumilher* ‘steward’, *escaler* ‘longboat’. Consequently, the final/prefinal stress dichotomy has come to correspond largely to the lexical classes of nouns and infinitive verbs plus nouns derived through conversion: *revólver* ‘revolver’ / *revolver* ‘revolve_{INF}’.

While the overwhelming majority of Brazilian Portuguese words ending in nasal vowels /VN/ receive final stress, the numbers in Table 1.3 suggest that words ending in /eN/ are exceptions to this generalization. Indeed, consultation of the DIP shows that all the words that end in /3eN/ (written <gem> or <jem>) have prefinal stress, including the very large class of words derived with the suffix -agem, which forms event nouns, usually from transitive verbs: *lavagem* ‘wash’ (*lavar* ‘wash_{INF}’), *drenagem* ‘drainage’ (*drenar* ‘drain_{INF}’) etc. Only ten exceptional /eN/-final words (e.g. *armazém* ‘warehouse’) remain that cannot be explained as belonging to this phonologically conditioned sub-regularity, which takes precedence over the word-final default stress found in the remaining sixty-three words listed in the DIP.

Words ending in phonological /aN/ (orthographic <â>, rarely <am> or <an>), such as *irmã* ‘sister’, are not listed in Aquino (2013). This rhyme type attracts stress with very few exceptions. The same is true for the falling oral and nasal diphthongs of Brazilian Portuguese. As for the oral diphthongs, exceptions are only found for /ei/, all of which are loans from English: *hóquei* ‘hockey’, *jersei* ‘jersey’, *jóquei* ‘jockey’, *pônei* ‘pony’, *vôlei* ‘volleyball’, whereas for the nasal diphthongs, only five of the 84 words in the corpus were exceptionally stressed on the prefinal syllable, only two of them being used regularly: *órgão* ‘organ’ and *órfão* ‘orphan’ (Aquino 2013, 140).

From the discussion above, we may conclude that word-final syllables with sonorant codas¹⁶ overwhelmingly attract word accent in underived non-verbs. Individual

¹⁶ We consider glides in falling diphthongs to be derived from underlying V+high vowel sequences, of which the glides become affiliated to the syllable coda. Cf. Collichon/Wetzels (2016) for discussion.

exceptions are mostly loanwords, while large sets of exceptions can be defined as a class on the basis of their specific morphological and phonological properties. One must therefore seriously consider the hypothesis that Brazilian Portuguese falls into the class of languages in which word-final sonorant codas are moraic.

Brazilian Portuguese allows for a single non-sonorant coda segment, which is /S/. The class of /Vs/-final words collected by Aquino (2013) contains a relatively large number (43%) of non-oxytonic words. Of these, the majority are hardly ever used, many of them having a definite foreign flavor and belonging to the class of learned words acquired at a late stage of the acquisition period, mostly through reading. The different behavior of word-final /S/ as compared to the remaining licit coda segments has led some scholars to propose that word-final /S/ is weightless or extrametrical. However, the hypothesis of the generalized extrametrical status of word-final /S/ is challenged by its solidarity with sonorant codas in other weight-based generalizations, as we will show in the following sections.

3.1.2 Stress in newly created underived words

In the preceding discussion, we have shown that most exceptions to the weight-based stress rule of Brazilian Portuguese are explained by independent phonologically or morphologically conditioned constraints. In spite of this fact, the mere existence of such weight-independent constraints together with some sets of arbitrary exceptions may be felt to contest the hypothesis of a productive stress rule operating in Brazilian Portuguese, regardless of whether it is defined with reference to syllable weight. A way of testing the hypothesis that non-verbal stress is predictable, and revealing the relevant predictors, is to see what speakers do when confronted with new vocabulary. We therefore turn to three sets of newly created underived words and see what Brazilian Portuguese speakers do when assigning stress to such words. One set consists of acronyms, which are traditionally used to test the weight hypothesis for main stress, not only for Brazilian Portuguese (cf. Wetzels 2006/2007; Hermans/Wetzels 2012), but also for other Romance languages, as will be shown below. The other two sets consist of newly coined first names and names for new drugs.

The formation of acronyms¹⁷ is an important source of new vocabulary in Brazilian Portuguese. The following examples, most of which were taken from Wetzels (2006/2007), represent only a small sample of the many hundreds of acronyms that are in regular use:

¹⁷ In the remainder of this chapter, abbreviations that are pronounced as a sequence of letters are referred to as initialisms, e.g. ONU [o.e.ni.u]. They will be called acronyms when the sounds corresponding to the letter sequence are pronounced as if they form a single prosodic word, e.g. ONU ['onu].

- (16) a. VN JOCUM [ʒo'kũ], DETRAN [de'trã]
 b. VR UFIR [u'fix], CONAR [ko'nax]
 c. VI VARSUL [vax'suw], UFAL [u'faw]
 d. VG INEI [i'nej], FUNAI [fu'naj]
 e. VS FIES [fi'es], IBAS [i'bas]¹⁸

Acronyms that end in a light syllable are always stressed on the prefinal syllable: ONU, OVNI, SIESE, BANESPA¹⁹ etc. Speakers are also consistent in assigning stress to word-final syllables ending in letters representing sonorant sounds or nasal moras. When it comes to assigning stress to acronyms ending in the grapheme <s>, agreement is not always complete, although speakers show a clear preference for prefinal stress.²⁰ At first glance, this preference could be taken as proof for the extrasyllabic status of word-final /s/. We believe that, again, this conclusion would be too hasty.

Regarding the variation in the pronunciation of <s>-final acronyms, it is important to note that, in Brazilian Portuguese, the sound [s] is encoded word-finally by two different letters, <s> or <z>. Words ending in <z> are always pronounced with final stress: *avestrz* 'ostrich', *narz* 'nose', *arroz* 'rice', *xadrez* 'chess', *rapaz* 'boy'; in other words, word-final <z> functions as a categorical stress marker.²¹ By contrast, in oxytonic words ending in <s>, the final syllable carries a stress mark: *cortês* 'polite', *após* 'after', while prefinal stress, which is considered regular, remains unmarked: *lapis* 'pencil', *atlas* 'atlas'. Thus, in the absence of a stress diacritic, <z> and <s> signal final and prefinal stress, respectively. Words, especially nouns, ending in <z> are numerous in Portuguese. The question then is whether Portuguese orthography

¹⁸ JOCUM (*Jovens com uma Missão*), DETRAN (*Departamento Estadual de Trânsito*), UFIR (*Unidade Fiscal de Referência*), CONAR (*Conselho Nacional de Autorregulamentação Publicitária*), VARSUL (*Variação Linguística na Região Sul do Brasil*), UFAL (*Universidade Federal de Alagoas*), INEI (*Instituto de Educação Infantil*), FUNAI (*Fundação Nacional do Índio*), FIES (*Financiamento Estudantil*), IBAS ((*Fórum de Diálogo*) *Índia-Brasil-África do Sul*).

¹⁹ ONU (*Organização das Nações Unidas*), OVNI (*Objeto Voador Não Identificado*), SIESE (*Sindicato das Empresas de Sistemas Eletrônicos de Segurança*), BANESPA (*Banco do Estado de São Paulo*).

²⁰ In order to test native speakers' intuitions about <s>-final acronyms, a list of twelve existing acronyms was presented to six native speakers of Brazilian Portuguese, all of whom are academics. For the sequences FIES, IBAS, CADBES (*Cadastro Bolsa Escola*), IES (*Instituições de Ensino Superior*), UES (*Unidade Experimental de Saúde*), AFES (*Atividades Físicas e Esportivas*) at least four speakers preferred stress on the final syllable, while the following were given prefinal stress by all or most of the informants: CERIS (*Centro de Estatística Religiosa e Investigações Sociais*), CREAS (*Centros de Referência Especializados de Assistência Social*), EELIS (*Esporte, Educação, Lazer e Inclusão Social*), RIDES (*Regiões Integradas de Desenvolvimento*), UFES (*Universidade Federal do Espírito Santo*), CEFIS (*Centro de Estudos Fiscais*).

²¹ The few examples of <z>-final acronyms that we have found were pronounced with final stress by all our informants: ESAMAZ (*Escola Superior da Amazônia*), FAMAZ (*Faculdade Metropolitana da Amazônia*), CONAMAZ (*Conselho Nacional da Amazônia Legal*), CONFASZ (*Conselho Nacional de Política Fazendária*).

would mark final stress in <s>-final non-verbs as exceptional if the orthographic distinction between word-final <s> and <z> were not made. If not, the speakers' preferred reading for <s>-final acronyms as paroxytonic would perhaps not exist. Consequently, one would not wish to derive an argument for the generalized extrametrical status of word-final /S/ in Brazilian Portuguese merely from the way <s>-final acronyms are pronounced.

Speakers become familiar with acronyms mainly through reading. Contrary to Brazilian Portuguese orthographic practice, explicit stress markers are rarely used in acronyms. This could cast doubt on the idea that these words reflect unmarked stress patterns, since readers might produce the patterns that the government's orthographic committee considers unmarked based on statistics. For example, final stress is considered unmarked in words ending in <Ci>, <Cu>, mostly loans from stress-final indigenously languages (*abacaxi* 'pineapple', *urubu* 'vulture'), while paroxytones with the same endings are considered exceptional and therefore marked with a diacritic on the prefinal syllable (*táxi* 'taxi', *júri* 'jury', *ravióli* 'ravioli'). Inversely, words ending in without an orthographic stress mark should be pronounced with prefinal stress, while finally stressed words of this type are marked as exceptional (*garagem* 'garage' vs. *refém* 'hostage'). As we can see, Brazilian Portuguese speakers generally follow neither of these conventions, as the graphical to phonological encoding of the acronyms follows the weight-based generalization (15): ONU, OVNI, SIESI, FEBEM, ENEM, PLANASEM²² etc. Only when the orthographic stress conventions correspond with (near) exceptionless stress patterns in the spoken language, as is the case of words ending in /Ci/, /Cu/, one finds some rare exceptions, such as the acronym SAMU (*Serviço de Atendimento Móvel de Urgência*) with final stress.

Brazilian parents often create new names or nicknames for their children by combining syllables or sounds taken from their own or relatives' first or last names. As an example, consider the name *Alimcoara*, with prefinal stress, given to the son of Correio de Araújo Andrade Lima composed of **A** (Andrade), **lim** (Lima), **co** (Correia) and **ara** (Araújo) (Souto Maior 1974, 43). Some more examples, taken from Souto Maior (1974), are given below.

- (17) a. VI## Baruel, Ginestal, Idelazil
 b. VR## Nabor, Hepilazir, Zarifebarbar
 c. VS## Harpalus, Mesrelaz, Yopros
 d. VN## Chinem, Froin, Jurupitan
 e. V## Trazibulo, Etecleife, Acheropita

²² FEBEM (*Fundação Estadual para o Bem-Estar do Menor*), ENEM (*Exame Nacional do Ensino Médio*), PLANASEM (*Plano Nacional de Sementes*).

In the words in (17), we see the same distribution of final and prefinal stresses typical of acronyms, which are selected as a function of the weight of the word-final syllable. Names with stress on a final open syllable sometimes arise when the last syllable of the newly created name corresponds to the stressed syllable of one of the model names, as in *Marichá* from *Mari(áno) Chá(gas)*. Some other newly coined first names with exceptional stress are either compounds the right member of which carries final stress when used in isolation, such as *Frantomé* from *Fran(cisco) and Tomé* or truncated forms of compounded proper names: *Marimé* from *Mari(a-A)mé(lia)*. Otherwise, names with stress on a final open syllable are extremely rare, as are names with a prefinal stressed syllable followed by a heavy syllable or names with antepenult stress.²³ The ever-expanding pharmaceutical market requires a steady influx of new brand names to enter Brazilian Portuguese. The following is just a small sample of the more than one hundred examples of commercial names for anesthetic drugs that are sold in Brazil, gathered from an online corpus.

- (18) a. VI## Beserol, Legil, Tramal
 b. VN## Arotin, Fenaren, Ponstan
 c. VR## Efexor, Eufor, Pamelor
 d. VS## Depress, Dorless
 e. V## Feldene, Celestone, Pondera

As expected, all the words above that end in a heavy syllable are stressed on that syllable, while the ones that end in a light syllable carry stress on the penultimate syllable. For the three classes of neologisms discussed above, a single, weight-based generalization has allowed us to predict the location of main-stress. It is no surprise that the stress rules that emerge as productive in the newly created words comply with the stress patterns most frequently attested in the traditional Brazilian Portuguese vocabulary.

3.1.3 Absence of proparoxytonic words with a prefinal heavy syllable

It is well-known that antepenultimate stress is only rarely found in words with a heavy penult in a number of Romance languages. This is also the case in Brazilian Portuguese, where this word-type is not attested in underived words. Two words frequently cited as counterexamples are the loans *pênalti* ‘penalty’ and *récorde* ‘record’ (Araújo et al. 2007, 42). While *pênalti* replaces an older form *penal*, stressed on the final syllable, still used in rural areas and by elderly people, *récorde* has a variant

²³ But cf. Hermans/Wetzels (2012) for productive antepenultimate stress in names (and non-verbs in general) in which a prefinal high vowel stands in hiatus, as in *Amélia*.

reçorde. Several other words exist, which suffer an unspoken existence in voluminous dictionaries and cannot therefore be considered part of the average Brazilian Portuguese speakers' lexicon, such as *cóferdão* 'cofferdam', mentioned in the 1986 printed edition of the *Aurélio* dictionary (Holanda Ferreira 1986), with more than 100,000 entries, but not, for example, in the *Exitus* dictionary by Houaiss/Every (1981), with over 60,000 entries, while the current electronic version of the *Aurélio* provides the form *coferdame*, with regular prefinal stress. Brazilian students asked to evaluate proparoxytonic nonce words with a prefinal heavy syllable that otherwise conform to Brazilian Portuguese phonotactics find them odd. The Brazilian structuralist linguist Macambira (1985, 63) explicitly attests to the ungrammaticality of this word type as he states: "There is no proparoxytonic word with a closed **pre-final** syllable. *Cônsorte* would go against the phonological structure of Portuguese".²⁴ We conclude that the ban on proparoxytonic stress in words with a prefinal heavy syllable is a pertinent constraint in the synchronic grammar of Brazilian Portuguese. For this constraint, all the consonants licensed in the syllable coda, including /s/, must be considered moraic.

3.1.4 Minimal word requirement

Languages may have a requirement specifying the minimal shape of lexical content words (Gordon 2006, 48).²⁵ For some time, the hypothesis has been that the shape of a minimal word in a given language depends on whether that language contains a "quantitative distinction" (McCarthy/Prince 1995, 321). Although Brazilian Portuguese has no quantitative distinctions at the level of the phoneme system, the distinction between light and heavy rhymes appears relevant for the rule of stress allocation. If a weight-based Minimal Word Requirement (MWR) exists, it would call for a minimum size of at least two moras. CV prosodic words with high vowels are rare in Brazilian Portuguese, especially when inflected verbs are not taken into account: *cru* 'raw', *nu* 'naked', *cu* 'ass'. CV words with close-mid vowels are absent,²⁶ whereas CV words with open-mid or open vowels are somewhat more frequent: *mó* 'millstone', *nó* 'knot', *pé* 'foot',

²⁴ Translated from Portuguese. Emphasis as in the original.

²⁵ Although the lexical content words of Brazilian Portuguese represent a subset of the larger set of prosodic words, we will henceforth refer to the category of lexical content words as prosodic words. In particular, inflected verbs, names of letters, musical notes, and function words were not taken into account. Cf. also Inkelas/Orgun/Zoll (1997) for the idea that minimality requirements may not be absolute.

²⁶ Except for some monosyllables that are the outcome of shortening, like *vô* [vo] for *avô* 'grandfather', contrasting with *vó* [vɔ] for *avó* 'grandmother' (more frequently used in the reduplicative forms *vovó* and *vovó*), or *sô* [so] for *senhó* < *senhor* 'mister'. In hypocoristics, we find *Tê* for *Tereza* or *Rê* for *Renata*, for which faithfulness requirements preserve the underlying mid-vowel quality to facilitate recoverability of the base (cf. Lima/da Silva/Gonçalves 2009).

fê ‘faith’, *pá* ‘spade’, *chá* ‘tea’ etc. Bimoraic monosyllabic words are noticeably more numerous than monomoraic ones, probably also because of the fact that the set of permitted coda segments, absent in monomoraic monosyllables, gives way to a greater number of possible intra-syllabic contrasts. It nevertheless looks as if close and close-mid vowels are hosted much more comfortably within a branching than within a non-branching rhyme, including the ones in which the nucleus is followed by /s/: *tíl* ‘tilde’, *tír* ‘tier’, *giz* ‘chalk’, *gim* ‘gin’, *sul* ‘south’, *luz* ‘light’, *rum* ‘rum’, *c[o]r* ‘color’, *g[o]l* ‘goal’, *bom* ‘good’, *b[o]i* ‘ox’, *l[e]i* ‘law’, *m[e]s* ‘month’ etc., next to the numerous monosyllables with open-mid and open vowels: *pr[ɔ]l* ‘advantage’, *n[ɔ]z* ‘nut’, *c[ɛ]u* ‘sky’, *g[ɛ]l* ‘gel’, *ar* ‘air’, *sal* ‘salt’, *paz* ‘peace’, *pai* ‘father’, *pau* ‘stick’, *pão* ‘bread’, *lã* ‘wool’ and many more.

In view of the facts mentioned above, we take the position that, given the overall scarcity of CV prosodic words, the Brazilian Portuguese minimal word is bimoraic of the type C_0VC_0V or C_0VC .²⁷

3.1.5 Prosodic morphology

In prosodic morphology, morphological operations like reduplication or truncation derive words the size of which is defined in terms of prosodic categories like mora, syllable, foot, or prosodic word. For Brazilian Portuguese, these processes have been extensively studied by Gonçalves (2004; 2016) and Lima/Da Silva/Gonçalves (2009). As in many languages, morphology-phonology interactions in Brazilian Portuguese may involve weight-based prosodic categories, such as the moraic trochee. The examples in (19), taken from Gonçalves (2004), show the result of a right-edge oriented process in which anthroponyms are shortened to create names with a hypocoristic meaning.

(19) a. <u>Francisco</u> → <u>Chico</u>	d. <u>Isabel</u> → Bel
b. <u>Gertrudes</u> → <u>Tude</u>	e. <u>Marimar</u> → Mar
c. <u>Leopoldo</u> → <u>Poldo</u>	f. <u>Miguel</u> → Guel

The examples in (19) illustrate what Gonçalves (2004, 16) considers the most productive model of hypocoristic formation in Brazilian Portuguese. The shortened forms represent genuine bimoraic trochees (CVC or 'CVCV) and, as such exemplify the minimal word types of Brazilian Portuguese. Uneven trochees, with a heavy syllable in the head position,²⁸ are also possible outputs ('CVC.CV). Taken together these foot

²⁷ With the phonotactically optimal minimal word having its onset filled.

²⁸ As the authors show, for reasons of syllable markedness, only sonorant segments are tolerated in the coda of the foot head of the shortened form: *Francisco* → *Chico*; *Robel[x]to* → *Beto*.

types constitute the default stress patterns of Brazilian Portuguese. Since the hypocoristic forms must contain both the stressed and final syllable of the base, input sequences with exceptional proparoxytonic stress are shortened to fulfill the disyllabic restriction: *Débora* becomes *Deba*, in a way that preserves the mora of both the stressed and the final vowel. Furthermore, anthroponyms with stress on a word-final vowel are not accepted as inputs to the general shortening process: *Salomé* → **Mé*, *Dinorá* → **Rá*. For these bases, hypocoristics are derived instead by way of a reduplication strategy: *Memé* and *Naná*.²⁹

3.1.6 Vowel lowering as a prominence enhancing strategy in stressed syllables

Brazilian Portuguese is well known for the reduction of its seven-vowel system in prosodically weak positions, where the two mid vowel series /e ε o ɔ/ collapse into one, realized as close-mid. Less known is the fact that mid-vowel neutralization also regularly happens in stressed syllables, but then to the benefit of the open-mid qualities. Two of these constraints have the appearance of being prosodically conditioned, named Spondaic Lowering (SponLow) and Dactylic Lowering (DacLow) in Wetzels (1992). Both constraints relate to word classes with an exceptional stress pattern: SponLow involves paroxytonic non-verbs with a final heavy syllable and DacLow concerns proparoxytonic non-verbs. Examples of spondees are given below:³⁰

(20) Spondaic Lowering

a. Vɪ#	m[ɔ]vel	‘mobile’	proj[ɛ]til	‘projectile’
b. VR#	d[ɔ]lar	‘dollar’	C[ɛ]sar	‘Caesar’
c. VS#	D[ɔ]ris	‘Doris’	f[ɛ]zes	‘feces’
d. VN#	[ɔ]rfã	‘orphan girl’	el[ɛ]tron	‘electron’
e. Vj#	j[ɔ]quei	‘jockey’	j[ɛ]rsei	‘jersey’
f. Vw̃#	s[ɔ]tão	‘loft’	m[ɛ]dão	‘sand dune’

Stressed mid vowel neutralization in prefinal syllables is systematic for words ending in a heavy syllable. If the final syllable is light, close and open mid vowels are con-

²⁹ Gonçalves’ (2004) findings contradict those of Grau Sempere (2006a, vii), where it is said that (Brazilian) Portuguese shares with the Valencian variety of Catalan “a quantity insensitive truncatory morphology”; cf. also Grau Sempere (2006a, 116–117). This discrepancy is due to the fact that Gonçalves (2004) distinguishes the process that preserves both the stressed syllable and the last syllable of the base (i.e. the examples in (19)) as different from a much less productive process that only preserves the last syllable: *Ariváini* → *Ni*.

³⁰ Systematic exceptions to SponLow are words in which the stressed vowel is followed by a nasal consonant, in which case neutralization happens to the benefit of the close mid vowels, as in *pônei* ‘pony’. Non-systematic exceptions are very rare.

trastive, as in the minimal pairs s[ʰe]de ‘thirst’ vs. s[ʰɛ]de ‘headquarters’; s[ʰo]co ‘blow’ vs. s[ʰɔ]co ‘type of shoe’.

While the preference for open mid vowels over close mid vowels in metrically strong positions is expected,³¹ the non-local weight condition for mid vowel neutralization in this word type may be unexpected. In addition, in Brazilian Portuguese a constraint similar to SponLow is operative in dactyls, as illustrated in the words below.

(21) Dactylic Lowering

a.	ab[ʰɔ]bora	‘pumpkin’	m[ʰɛ]dico	‘physician’
b.	helic[ʰɔ]ptero	‘helicopter’	h[ʰɛ]lice	‘propeller’
c.	l[ʰɔ]bulo	‘lobule’	c[ʰɛ]rebro	‘brain’
d.	[ʰɔ]sseo	‘bony’	r[ʰɛ]dea	‘bridle’

The simultaneous existence of these constraints supports the hypothesis of a foot-based conditioning. Observe also that in mora-based versification, spondees can often be exchanged with dactyls.³² As one would expect, mid vowels in loanwords that satisfy the conditions for SponLow or DacLow are systematically open-mid: d[ʰɔ]-lar ‘dollar’, trap[ʰɛ]zio ‘trapezium’ etc.

Vowel opening in stressed syllables is not limited to Brazilian Portuguese and appears not to be restricted to the opening of mid vowels. A more uncommon case is reported in Gordon (2006) for the Havasupai language, where high vowels are opened to mid vowels in strong positions in chanted verse. According to Gordon (2006, 71), the opening has “the effect of increasing [...] the energy profile of a syllable in strong position”. He observes that “[...] vowel lowering in strong positions is not exclusively duration-driven [as] is suggested by the fact that it applies even in closed syllables, which cross-linguistically are long enough to occupy heavy positions in other languages”.³³

As it happens, a comparable phenomenon is attested in Brazilian Portuguese. Observe the catchphrases below, sung by the fans of the São Paulo State football clubs Palmeiras and Santos: “Olê, porco” (Palmeiras); “Olê, peixe” (Santos). In normal speech, word-final unstressed mid vowels are obligatorily closed to close vowels in most variants of Brazilian Portuguese, also in the *Paulista* variant spoken in the state

³¹ Cf. Wetzels (1992; 2010), for extensive discussion of stressed and unstressed mid-vowel neutralization in Brazilian Portuguese.

³² In Brazilian Portuguese, the duration of vowels in stressed open syllables may be up to twice as long as in unstressed syllables (Nobre/Ingemann 1983; Borges 1991).

³³ Likewise, SponLow and DacLow apply to stressed mid vowels in closed and open syllables. The greater duration of stressed open mid vowels as compared to close mid vowels is not systematic in Brazilian Portuguese, but shows variation for place of articulation, gender, dialect, and position in the word (Brito 2013, 80; Borges 1991, 44), while mid-vowel opening in stressed syllables shows neither type of variation.

of São Paulo, as in [ˈporku] *porco* ‘pig’, [ˈpejʃi] *peixe* ‘fish’, but when the final syllable of these words appears in the strong position of the catchphrases, which are almost melodies (cf. Figure 1.1), closing of the mid vowel series does not happen: [porˈko:], [pejˈje:].³⁴



Figure 1.1: Blocking of word-final vowel neutralization in catchphrases.

Similarly, in paroxytonic vocatives, when the word-final vowel is lengthened, mid-vowel closing is blocked: *Carl*[ˈo:]s!,³⁵ *Jair*[ˈo:]!, *Claric*[ˈe:]!,³⁶ *ti*[ˈo:]! ‘uncle’ etc. The monosyllables [mãj] *mãe* ‘mother’ and [paj] *paj* ‘father’ have a disyllabic variant used as the vocative form [mãˈje:] *mãe*! and [paˈje:] *paj*!, respectively, in which the final epenthetic vowel has a close-mid quality, whereas /i/ functions as the default epenthetic vowel in Brazilian Portuguese, which necessarily surfaces as unstressed: [i]studo ‘study’, club[i] ‘club’ etc. The blocking of mid-vowel closing usually holds when emphatic stress strikes the last syllable of otherwise atonic final vowels: *estou descend*[ˈo:]! ‘I am coming down!’.

Mid-vowel opening under regular stress as well as the blocking of mid-vowel closing under emphatic stress and in strong positions in chanted speech point to the recruitment of high energy vowels as a prominence enhancing strategy for stressed syllables in Brazilian Portuguese. Vigário (↗26 Portuguese) mentions the activity of *DacLow* and *SponLow* also for the European variant of Portuguese.³⁷ Stressed mid-vowel neutralization in dactyls is reported for Catalan by Mascaró (1984), Renwick/Nadeu (2019), among others, and both *DacLow* and *SponLow* are given detailed attention in ↗27 Galician.

³⁴ Thanks to José Roberto do Carmo Jr., linguist and musician, for providing this example.

³⁵ Although the lexical stress is prefinal in these vocatives, when pronounced in isolation it is the last syllable that is the most prominent, with longer duration, higher pitch, and higher intensity than the prefinal syllable (cf. Nascimento 2000).

³⁶ As was pointed out by Rachel Santos (p.c.), blocking of final closing does not happen in the vocatives of names like Bernadete, Adelaide, in which final /te/, /de/ are pronounced [tʃi], [dʒi]. This is probably because, since the affrication of /t/, /d/ is conditioned by the following /i/, blocking of closing would yield sequences that are phonotactically ungrammatical without the concomitant blocking of affrication.

³⁷ Mid-vowel opening can also be the effect of coarticulation between mid-vowels and a preceding or following consonant, also in unstressed syllables, as happens in a number of Romance languages before rhotics. ↗26 Portuguese for /e o/ in European Portuguese and Bradley (2011) for /e/ in Ibero-Romance.

3.2 European Portuguese

While most Brazilian scholars agree that the default stress pattern in Brazilian Portuguese non-verbs is typically predicted by way of a moraic trochee located at the right edge of the prosodic word, opinions among the specialists of European Portuguese are somewhat more divided. Scholars like Pereira (1999; 2007), Vigário (2003), and others follow Mateus (1983) and Mateus/d'Andrade (2000), where a morphology-based analysis of stress is proposed for verbs and non-verbs. Some of the arguments these scholars raise against a weight-based stress rule are specific to Portuguese, Brazilian Portuguese included, one of these being the large number of loanwords with stress on a word-final open syllable. Other language-specific arguments include the presence of minimally contrastive word sets like *sábia* 'wise', *sabiá* 'song-thrush', *sabia* 'know_{1/3SG.IMPF}', as well as the existence of exceptions of the spondaic or dactylic type given in 3.1.6, above. Other arguments are typological, such as the absence of a phonological length contrast in the Portuguese vowel system (Mateus/d'Andrade 2000, 118) and the claim that no language tolerates the existence of a weight-based stress system for non-verbs alongside a morphology-based subsystem for verbs. No mention is made of other manifestations of syllable weight in Portuguese, such as the "barrier" effect of prefinal closed syllables, the minimal word size, or the non-local weight condition on the application of SponLow. The generalization that Mateus and d'Andrade propose is paraphrased in the following:

Stress goes on the prefinal syllable if the word ends in one of the class markers /a, e, o/ (*modelo* 'model', *pigmeu* 'pygmy', *tufão* 'typhoon'³⁸), on the final syllable if there is no class marker (*hospital* 'hospital', *café* 'coffee', *jardim* 'garden'). (Mateus/d'Andrade 2000, 210–211)

Whereas Vigário (2003, 48) endorses the main stress rule proposed by Mateus/d'Andrade (2000), Vigário (2006 Portuguese) opens the door to a weight-based stress rule in non-verbs, while also taking the barrier effect of prefinal heavy syllables as proof of the relevance of syllable weight for European Portuguese stress. Other scholars, such as Carvalho, consider European Portuguese stress as quantitative: "(Unmarked) stress falls on the penultimate mora" (Carvalho 1989b, 417; 1992, 8). The same position is defended in Carvalho (2011), with the proviso that /VS##/ is excluded from the set of stress-attracting rhymes. Carvalho also takes the "barrier" effect of prefinal heavy syllables as proof of the significance of syllable weight in European Portuguese.

Booij (2004) defends the hypothesis of a bimoraic Minimal Word,³⁹ against Vigário (2003, 158) and Vigário/Martins/Frota (2005, 903), because it explains why clitic elements, which are mostly light syllables, must prosodically integrate with

³⁸ From which one may conclude that, in the derivational model used by these authors, the final glides in words like *pigmeu* [pig'mew] and *tufão* [tu'fẽw] derive from an underlying class marker which constitutes an independent syllable at the level in the derivation where the stress rule applies.

³⁹ P.c. from the author. The size of the minimal word is not made explicit in Booij (2004).

a host. The issue of the MWR is taken up by Veloso (2017b), who accepts (15) as a valid generalization for European Portuguese non-verbal stress. Inspired by Plénat's (1993) study on the pronunciation of French abbreviations, Veloso (2017a) explores the pronunciation of abbreviations in European Portuguese. For French, Plénat had suggested that the pronunciation of abbreviations as acronyms instead of initialisms can be predicted with reference to a minimal word size, which should contain at least two moras and a CV sequence. For example, SAMU (*service d'aide médicale urgente*) is pronounced [sa'my] with two moras, while FO (*force ouvrière*) is pronounced as bi- or tri-moraic [ɛ.fo] / [ɛf.o] rather than as monomoraic [fo]. On the other hand, UV (*unité de valeur*) is not pronounced [yv], but [y.ve], because it does not satisfy the CV requirement, despite being bimoraic (cf. 3.6). According to Veloso, for European Portuguese, the pronunciation of abbreviations is generally more arbitrary and cannot be predicted in a similar way.

It remains unclear if prosodic morphology can provide evidence for the role of the moraic trochee in European Portuguese truncation processes. According to Vigário (2003, 337–338), the Peninsular variant of Portuguese has no productive truncation of the kind that reduces words to feet.⁴⁰

3.3 Spanish

The fact that stress patterns in Spanish and Portuguese non-verbs are very similar leads us to expect that for both languages their distribution follows from the same principles. While there is near unanimity on the morphological basis for verbal stress in Spanish, there is no consensus on the factors conditioning the location of non-verbal stress. Roca (2006, 263–264) defends an analysis by which unmarked stress is placed on the stem-final stress bearer with the concomitant denial of the relevance of syllable weight. Contrary to Roca (2006) and Baković (2016), Piñeros (2016) takes the phonological word instead of the stem as the stress domain and predicts the unmarked prefinal stress by means of a right-aligned syllabic trochee, while word-final and antepenultimate stresses, considered phonologically irregular, are conditioned by morphology.

In the “pre-syllable” era of the generative literature on Spanish phonology, Foley (1965, 84) asserts that non-verbal stress cannot fall on the antepenultimate vowel “when the penultimate vowel is followed by two consonants”. A restatement of this phonotactic restriction in terms of syllable structure is made in Harris (1983, 118): “Antepenultimate stress is impossible if the penult is a closed syllable”. Harris (1983, 85) also observes that unmarked stress is prefinal in vowel-final non-verbs and final

⁴⁰ Although hypocoristics as reduced anthroponyms admittedly exist, these are not further discussed (cf. Vigário 2003, fn. 313).

in non-verbs that end in a consonant. Recent studies by Waltermire (2004), Shelton/Gerfen/Gutiérrez Palma (2012), and Fuchs (2018) provide strong experimental support for the stress attracting potential of prefinal heavy syllables. As for the stress-attracting capacity of word-final heavy syllables, expressive frequency data are provided in Morales-Front (2014, 244–245), who, through an electronic search of 91,000 items, found that 88% of words ending in a vowel bear stress on the penult, while 97.83% of consonant-final words bear final stress. Newly created vocabulary, such as acronyms (ALADI, CANACINTRA, IMER⁴¹ etc.; cf. Harris 1992, 15) as well as brand names (*palmolive*, *profidén*, *paracetamol*; Roca 2006, 242) comply with the “stress the ultimate if heavy, otherwise stress the penult” generalization. The outcome of nonce word experiments also appears indisputable, at least according to Waltermire (2004), who, contrary to Barkanyi (2002) or Face (2006), concludes that “the weight of the final syllable is consistently the most powerful factor in the placement of stress for nonce words” (Waltermire 2004, 185).

In Brazilian Portuguese, the most productive model of hypocoristic formation is right-edge oriented, in which the stressed syllable and, if this stressed syllable is non-final, the stressed syllable and the last syllable of the base are preserved in the hypocoristic form. Piñeros (2000) studies right-anchored hypocoristic truncation for Latin American Spanish, which in some dialects yields a disyllabic trochee (*Inés* → *Ne[tʃ]a*), while in other dialects the truncated form may also consist of a single heavy syllable (*Inés* → *Nes*) (cf. Piñeros 2000, 295, fn. 6).

According to Sanz Álvarez (2015) and Torres-Tamarit (2021),⁴² in Peninsular Spanish the left-edge oriented model is the most popular, which preserves the first two syllables of the corresponding anthroponym with consistent initial stress: *Manuel* → *Manu*, *Isabel* → *Isa*, but also *Fernando* → *Fernan*, *Alberto* → *Albe(r)*. Since truncates correspond to minimal prosodic words, the Spanish word must be minimally disyllabic, that is, must be measured in terms of syllables not moras. Nevertheless, both authors admit that bimoraic monosyllabic truncates also exist, while monosyllabic CV truncates are unattested.

Grau Sempere (2013), following Dunlap (1991, 75), asserts that underived prosodic words largely respect a bimoraic minimum (*pan* ‘bread’, *sed* ‘thirst’ etc.), despite the existence of some rare monomoraic ones (*fe* ‘faith’, *té* ‘tea’ etc.). Grau Sempere (2013) also analyzes left- and right-anchored hypocoristic truncation, showing that both processes yield monosyllabic as well as disyllabic outputs. Examples of left-anchored monosyllabic output forms are provided below, next to some disyllabic ones.

⁴¹ ALADI (Asociación Latinoamericana de Integración), CANACINTRA (Cámara Nacional de la Industria de la Transformación), IMER (Instituto Mexicano de la Radio).

⁴² Torres-Tamarit (2021) also discusses trisyllabic truncates, which are analyzed as internally layered feet.

- (22) Sp. Gustavo → Gus Orlando → Or Eugenia → Eu
 Cristina → Cris Fernando → Fer Jorge → Jor
 Rafael → Rafa Francisco → Francis Javier → Javi

According to Grau Sempere (2013) the truncated words in (22) show that the left-anchored truncation type is controlled by the minimal bimoraic word/foot size requirements, disagreeing with Sanz Álvarez and Torres-Tamarit on this point. Spanish allows for monosyllabic truncated words when the leftmost syllable is heavy. When the leftmost syllable is light, bisyllabic truncates are created: *Rafael* can only produce *Rafa*, not **Ra*. Similarly, right-edge oriented truncated words are disyllabic or monosyllabic, depending on the stress placement of the source. Anthroponyms with prefinal stress yield a disyllabic trochaic hypocoristic: *Felipe* → *Lipe*. Oxytone bases produce a monosyllabic bimoraic foot that may be preserved in the abbreviated form in some dialects, but which undergoes the adjunction of a gender morpheme in others. The former strategy is most commonly used in Peninsular Spanish (*Jesús* → [tʃ]us), while, as also attested by Piñeros, the adjunction of a gender morpheme is more typical of Latin American dialects.

We have seen in 2.5 that some varieties of Peninsular and Latin American Spanish have developed long vowels or geminates resulting from the deletion of coda consonants, which, if interpreted as compensatory lengthening (cf. Hayes 1989), would show the moraic status of coda consonants in Spanish.

3.4 Catalan

As noted by Serra (1996, 346), for some 86% of Catalan non-verbs, the distribution of main stress is correctly predicted by the generalization in (15). Exceptions are mainly oxytones ending in a vowel (2%), paroxytones ending in a consonant (11%), and proparoxytones with a word-final closed syllable (2%). The same generalization correctly predicts the stress position in acronyms, such as *UNESCO*, *ESADE*, *ADIFAD*, *CIRIT*,⁴³ provided by Cabré (2002, 924). Serra (1997, 209) furthermore observes that a number of English loans ending in a final heavy syllable have changed their original stress to become oxytones in Catalan: *futbol*, *tiquet*, *hoquei*.

In Catalan, not only non-verbs ending in a thematic vowel, but also masculine nouns of which the final vowel belongs to the root are stressed on the prefinal syllable (*ciri* ‘altar candle’, *negoci* ‘business’, *canari* ‘canary’), although exceptions with stressed word-final vowels also exist (*peroné* ‘fibula’, *ximpanzé* ‘chimpanzee’). The

⁴³ *UNESCO* (United Nations Educational Scientific and Cultural Organization), *ESADE* (Escola Superior d'Administració i Direcció d'Empreses), *ADIFAD* (Agrupación de Diseño Industrial del Fomento de las Artes Decorativas), *CIRIT* (Consell Interdepartamental de Recerca i Innovació Tecnològica).

prefinal stress in masculine vowel-final nouns makes it more difficult to contend that default stress in this language is final in the root, as some have proposed for Spanish and Portuguese.

Except for Mascaró (1984), Alsina (2016), Wheeler (2005), and Serra (1992/1993), who consider main stress as generally unpredictable in underived words, most accounts of Catalan stress accept the role of syllable weight as crucial and agree upon the efficiency of the right-aligned moraic trochee to predict the stress location in non-verbal word classes (Cabr  1993; Serra 1996; 1997; Vallverd  1997; Bonet/Lloret 1998; Grau Sempere 2006a; Torres-Tamarit/Bonet 2019; Torres-Tamarit/Pons-Moll 2019). Aside from Torres-Tamarit/Pons-Moll (2019), even the scholars who are skeptical about the stress-attracting capacity of word-final heavy syllables agree that antepenultimate stress is heavily marked in words with a closed, prefinal syllable. Against this view, Torres-Tamarit/Pons-Moll (2019) present an OT analysis of stress in non-verbs in which weight-by-position is licensed in word-final syllables only. Since the right-aligned moraic trochee is regarded as the unmarked foot for non-verbs, the grammar they propose is able to account for final stress in words ending in a heavy syllable. It can also explain, in conjunction with lexical word-final syllable extrametricality, the antepenultimate stress in loans like *Manchester* or *badminton*, because the coda consonant of the penultimate syllable is not moraic. However, the main focus of their study is on the explanation of the stress patterns of some specific verb-clitic sequences, which differ among Catalan dialects but all of which appear to conform to the unmarked nominal stress system. The metrical optimization of the verb-clitic stress pattern is most directly visible in the Formenteran dialect, a subdialect of Balearic Catalan. Consider the second person singular imperative forms in (23), taken from Torres-Tamarit/Pons-Moll (2019).

(23) Stress shift in Formenteran Catalan

a.		b.	
i.	['kantə] 'Sing!'	[kən'təl]	'Sing it!'
ii.	['donə] 'Give!'	[du'nəli]	'Give to him/her!'
iii.	['mɔstrə] 'Show!'	[mustɾə'mələ]	'Show it to me!'

In the sequences (23b), stress moves away from the verbal stem onto the penultimate or the final syllable of the verb-clitic sequence, depending on whether the sequence-final syllable is open or closed. The authors regard this fact as strong independent evidence for the weight-sensitivity of Catalan stress. In her study of hypocoristic truncation in Eastern Catalan, Cabr  (1994) defines the minimal word as bimoraic. Catalan hypocoristics are prosodically shaped as moraic trochees, which are extracted from the right edge of their base. As is also the case in Brazilian Portuguese, hypocoristic truncates are either bimoraic monosyllables or disyllables with a light syllable in the dependent position, as illustrated below.

- (24) ECat. a. Bartomeu → Meu
 b. Augustina → Tina
 c. Fernando → Nando

Truncates derived from anthroponyms with antepenult stress are either reduced to disyllables or cannot be derived (*Angèlica* → **Gèlica*) and for bases with stress on the word-final vowel, no corresponding hypocoristics are found: *Salomé* → **Me*.

Anthroponyms ending in a stressed heavy syllable may have a hypocoristic variant that represents the last two syllables of the base, sometimes in addition to the monosyllabic form:⁴⁴

- (25) Bartomeu → Tomeu/Meu, Montserrat → Serrat/Rat, Narciset → Ciset/Zet

In iambic hypocoristics of the type (25) the final stressed syllable is obligatorily preceded by a light syllable, i.e. these forms represent the prosodic mirror image of the words in (24c). Bases with a prefinal heavy syllable do not allow for the creation of bisyllabic truncates (*Estanislau* → *Lau*, **Nis.lau*) and neither do bases in which the last syllable is preceded by two open syllables (*Elisabet* → *Bet*, **Zabet*). According to Cabré (1994), these restrictions on the formation of iambic hypocoristics are related to the foot structure of the base, in which heavy syllables as well as two light syllables preceding the main stress themselves create a well-formed foot. Compare the foot structure of the words in (26).

- (26) (bar)to(meu) e(lisa)(bet) (es)ta(nis)(lau)

Because a light syllable cannot be split off from a disyllabic foot, only the unparsed [to] in (bar)to(meu) can be joined to the stressed syllable. Observe that the foot structure of the base that correctly predicts which monosyllabic hypocoristics may have an iambic alternative is obtained by way of a right-to-left parsing into strictly bimoraic trochees. Therefore, even the iambic truncates provide independent evidence for the moraic trochee in Catalan (cf. Cabré 1994, 16).

In a manner distinct from Eastern Catalan, hypocoristic truncation in Valencian Catalan creates exclusively left-headed disyllabic words the first syllable of which can be light or heavy: *Isabel* → *Bela*, *Vicent* → *Cénto*, *Rosario* ['arjo] → *Sári* (Cabré 1998; Grau Sempere 2006a; 2006b). Monosyllabic heavy syllables are not derived: *Isabel* → **Bel*. As in Eastern Catalan, oxytonic and proparoxytonic bases do not participate in the process. As the Valencian dialect shows, the output of truncation does not necessarily mirror the foot type required for main stress placement.

⁴⁴ In Cabré (1998), monosyllabic hypocoristics like *Meu* are treated as recursive truncations from disyllabic hypocoristics.

3.5 Italian

For the Iberian languages, including Galician (↗27 Galician), most proposals for quantity-based stress are founded on the observation that word-final heavy syllables act as stress attractors and prefinal heavy syllables as barriers to antepenult stress within a three-syllable window. Italian main stress appears to be different in several respects. The three-syllable stress window is not rigorously respected in first conjugation verbs, where stress may fall on the preantepenultimate syllable in the forms of the third person plural present (*limitano* ‘limit_{3PL}’). Davis/Mangarano/Napoli (1987) brought an additional remarkable fact to light in observing that when a root from the second conjugation class ends in more than one consonant or a geminate, stress is on the final root vowel, which leads to antepenultimate stress in the infinitive forms. Compare *tenere* ‘keep_{INF}’, *persuadere* ‘convince_{INF}’ etc. with stress on the theme vowel and *perdere* ‘lose_{INF}’, *fingere* ‘pretend_{INF}’ etc., with stress on the last root vowel. The productivity of these patterns, which suggests sensitivity to syllable weight in the placement of stress in this verb class, is supported with historical data as well as with nonce-word experiments. Otherwise, according to Krämer (2009, 165), prefinal stress is unmarked in verbs. Interestingly, in Neapolitan Italian, stress shifts rightwards to the penultimate syllable in verb+clitic sequences to avoid preantepenultimate stress in imperatives, with gemination of the onset of the last clitic: [ˈporta] ‘bring!’, [ˈportələ] ‘bring it!’, [ˈportaˈmil:ə] ‘bring it to me!’, [ˈfravəkə] ‘build!’, [ˈfravəkəl:ə] ‘build it!’ (Marotta 2016, 491).

As for non-verbs, word-final heavy syllables, which almost exclusively exist in loans, may or may not attract main stress, as in the following examples, taken from Sluyters (1990, 77).

(27) a.	<u>bazar</u>	‘bazar’	b.	<u>festival/festival</u>	‘festival’
	<u>hotel</u>	‘hotel’		<u>autobus/autobus</u>	‘bus’
	<u>harem</u>	‘harem’		<u>zenit</u>	‘zenith’
	<u>mammut</u>	‘mammoth’		<u>manager</u>	‘manager’

Although some of the foreign words in (27) show final stress, Krämer (2009, 158) refers to acronyms to argue that heavy finals are generally not stressed in neologisms: *AGIP*, *ENEL*, *IRAP*, *OPEC*⁴⁵ etc. Evidence for the markedness of vowel-final oxytonic words comes from Tuscan, where these words tend to be prosodically demarked by way of an epenthetic syllable (*n*): *icché* → *icchène* ‘what’, *sì* → *sìe* ‘yes’ (Ledgeway 2016, 214).

Observe that the first two examples in (27b) illustrate free variation in the stress location, which also occurs in some words with final open syllables: *amaca/amaca* ‘hammock’, *salubre/salubre* ‘healthy’, *Kosovo/Kosovo* (country name) (Ledgeway 2016,

⁴⁵ AGIP (Azienda Generale Italiana Petroli), ENEL (Ente Nazionale per l'Energia Elettrica), IRAP (Imposta Regionale sulle Attività Produttive), OPEC (Organization of the Petroleum Exporting Countries).

214). Geographic variation of the same nature is also found. According to Marotta (2016, 491) and Ledgeway (2016, 213), in northern Italy there is a tendency to shift stress from the penultimate to the antepenultimate syllable: *mollica* → *mollica* ‘crumb’, *recluta* → *recluta* ‘recruit’, *devio* → *devio* ‘deviate_{1SG}’. This may (partially) be a sociolinguistically promoted change, as Ledgeway (2016, 214) affirms that “original penultimate stress [is] now perceived as an indicator of a (pompous) higher register”. It remains unclear from Ledgeway (2016) how extensive the shift ... σ'σσ# → ... 'σσσ# really is. Actually, the formulation of the shift by Ledgeway (2016, 213) and Marotta (2016, 491) specifies the word-initial syllable as the recipient of stress. However, most of the examples they provide involve trisyllables with a light penult, whereas words with more than three syllables show that stress shifts no further than the antepenultimate syllable: *persuadere* → *persuadere* ‘convince_{INF}’, *evapora* → *evapora* ‘evaporate_{3SG}’. At the same time, there is virtual unanimity among scholars about the barrier effect of prefinal heavy syllables. Exceptions to this generalization are very rare, all of the instances being (mainly Greek) loans, such as *mandorla* ‘almond’, *polizza* ‘insurance policy’ and some place names like *Otranto*, *Taranto*. Sluyters (1990, 80) shows rightward stress shift to the prefinal (heavy) syllable in German loans that undergo theme-vowel adjunction: *Hamburg* → *Amburgo*, *Stuttgart* → *Stoccarda*, despite the existence of prosodically marked place names like *Otranto* and *Taranto*. Nevertheless, it would be premature to speculate about the re-emergence in the northern dialects of the Classical Latin stress system, with a right-edge oriented moraic trochee, and with word-final σ-extrametricity, but without distinctive vowel length: *caver(na)* ‘cave’, *molli(ca)* ‘crumb’, *mana(ger)* ‘manager’.

The variation between penultimate and antepenultimate stress in words with a light prefinal syllable raises the question which of the two represents the default stress in words of this type. Thornton (1996) studies a number of prosody-controlled morphological processes. For hypocoristic truncation, she finds that Italian has both left- and right-edge oriented truncations, which typically produce disyllabic trochees of the kind 'HL and 'LL, as in Valencian Catalan: *Alessandro/a* → *Ale*, *Giampiero* → *Giampi* etc.; *Salvatore* → *Tore*, *Rodolfo* → *Dolfo* etc. As expected, Thornton regards the disyllabic shape of these truncates as characteristic of the Italian minimal word.

We have seen earlier that default stress is prefinal in Italian verbs. Krämer (2009, 161) averages frequency counts of Italian stress patterns done by a number of scholars and finds that penultimate stress occurs in around 70 to 80% of all lexical items. His findings, together with Thornton's observations, suggest that the syllabic trochee is the appropriate default foot type. This is the position taken by D'Imperio/Rosenthall (1999, 12, fn. 7), who propose that Italian stress is “preferably quantity-insensitive” with 'HL or 'LL as the unmarked foot types. However, the dispreferred monosyllabic moraic trochee (H)_{foot} also exists but only emerges under specific conditions, when forced by a more powerful constraint (NonFinal), which requires that the word-final syllable remains unparsed. The OT grammar D'Imperio/Rosenthall (1999) propose opts for the prosodic structure ... ('σ)_{foot}(σ)_w as the most harmonic one for the allegedly exceptional antepenultimate stress, as in *credito* ‘credit’ or *festival* ‘festival’,

but selects ... $(\sigma_{\mu})_{\text{foot}}\sigma)_{\omega}$ not only for *caverna* ‘cavern’, but also for *lav*['o:]ro ‘work’. According to these authors, this is because Italian lacks generalized phonological vowel lengthening in stressed open syllables (i.e. “stress to weight”). Therefore, the lengthening (mora doubling) of the vowel in the penultimate syllable of *lavoro* is indicative of the formation of a monosyllabic bimoraic foot.

Krämer (2009) sets off from the analysis by D’Imperio/Rosenthal (1999) but finds that phonological vowel lengthening also occurs in the few words that show antepenultimate stress before a heavy penult: ['pɔ:lits:a] ‘policy’ apparently to avoid an illicit trochee. Combining this observation with the findings of D’Imperio/Rosenthal, he concludes that “the Italian foot cannot exceed the size of two moras” (2009, 165). Hence, the prosodic structure proposed for ['pɔ:lits:a] is $(\sigma_{\mu})_{\text{foot}}\sigma_{\mu}\sigma)_{\omega}$. The prosodic word structure for paroxytones is as proposed by D’Imperio/Rosenthal (1999). Observe that the proposals of both D’Imperio/Rosenthal (1999) and Krämer (2009) depend on the interpretation of the context-dependent variable phonetic length of stressed vowels in open syllables as phonetic or phonological (cf. the discussion in 2.1).

Krämer (2009, 166) furthermore argues that the optimal word in Italian consists of a bimoraic trochee, LL or H, followed by an unfooted light syllable: $((\text{LL})_{\text{foot}}\text{L})_{\text{word}}$ or $((\text{H})_{\text{foot}}\text{L})_{\text{word}}$. Reacting to Thornton’s (1996) conclusion according to which the minimal word coincides with the disyllabic trochee typical of hypocoristic truncates, Krämer insists that Italian hypocoristics submit to his own mora-based definition of the optimal prosodic word, with the added restriction that the trochee be monosyllabic $((\text{H})_{\text{foot}}\text{L})_{\text{word}}$ in hypocoristic truncates: *Giampi*, *Dolfo*, but also *Ale*, *Tore*, the latter two surfacing with a bimoraic stressed vowel.

3.6 French

For all the Romance languages reported on so far, prosodic categories like the syllable and the foot have an important role in shaping the output of particular morphological processes. In theory, this could be true for French, a language without a quantity-sensitive main accent, or even, as some scholars claim, a language in which stress demarcates the phonological phrase,⁴⁶ rather than the phonological word.⁴⁷ The non-contrastive nature of French stress and its post-lexical expression are at the base of the controversy over whether reference to syllable weight or to foot structure in general is in any way required in the phonology or prosodic morphology of this language. Since main stress is indifferent to the supplementary weight caused by coda consonants, evidence for the phonological use of syllable weight must be found elsewhere in the grammar.

⁴⁶ Although the existence also of a domain-initial accent has long been recognized. Cf. Astésano/Bertrand (2016) for references and discussion.

⁴⁷ Which is not to say that the phonological word does not exist as a prosodic constituent in French; cf. Lyche/Girard (1995), Nemoto/Adda-Decker/Durand (2010), Astésano/Bertrand (2016).

As for the question whether French has a MWR, the answer is unambiguously negative when considering the number of underived prosodic words consisting of a single open syllable, which is enormous compared to the small numbers one finds in the languages discussed previously. The following list, which does not include inflected verb forms, shows that for the randomly chosen sequence /p({l,r})V/, nearly all phonotactically well-formed instantiations exist as prosodic words: *pie* [pi] ‘magpie’, *pet* [pɛ] ‘fart’, *peu* [pø] ‘little’, *pou* [pu] ‘louse’, *pot* [po] ‘pot’, *peau* [po] ‘skin’, *pas* [pa] ‘step’, *pli* [pli] ‘fold’, *plaie* [plɛ] ‘wound’, *plus* [ply] ‘more’, (*lampe à un*) *plot* [plo] ‘single contact bulb’, *plat* [pla] ‘flat’, *plat* [pla] ‘dish’, *prix* [pʁi] ‘price’, *pré* [pʁɛ] ‘meadow’, *près* [pʁɛ] ‘nearby’, *preux* [pʁø] ‘gallant’, *proue* [pʁu] ‘prow’, and, for those who believe that French nasal vowels are lexically contrastive, there are *pin* [pɛ̃] ‘pine-tree’, *pain* [pɛ̃] ‘bread’, *pont* [pɔ̃] ‘bridge’, *pan* [pɑ̃] ‘piece of garment’, *plein* [plɛ̃] ‘full’, *plain* [plɛ̃] ‘even’, *plomb* [plɔ̃] ‘lead’, *plan* [plɑ̃] ‘flat’, *plan* [plɑ̃] ‘plan’, *prompt* [pʁɔ̃] ‘quick’. A global assessment of the number of open and closed monosyllabic prosodic words moreover shows no clear preference for one syllable type or the other. If there is no MWR for underived words, the question is whether, in the vein of Krämer’s characterization of the Italian optimal word, some optimal size for French words derived by prosodic morphology can be defined that unavoidably refers to a weight-based foot type.

Scullen (1993) studies the prosodic morphology of French through the analysis of a number of shortening processes, such as clippings, acronyms, and hypocoristics, as well as reduplications and echo words. This author concludes that the output of prosodic morphological processes must obey a minimal and a maximal size restriction of two and four moras, respectively. Since prominence sets upon the last syllable in the stress domain, the relevant foot (ϕ) is the iamb, which represents a well-formed prosodic word in its three expansions: LL and LH and H, as exemplified in the clippings in (28a–c). Besides the regular expansions of the iambic foot, clippings consisting of an iamb followed by a light syllable (28d, e) and sequences of two iambs (28f, g) are also possible outputs of prosodic morphology. Monomoraic clippings are rare and mostly have complex onsets.

(28) a. <i>cinéma</i>	[si] _L [ne] _L	((σ σ)ϕ)ω	1 iamb (2 σ)
b. <i>caféteria</i>	[ka] _L [fɛt] _H	((σ σ)ϕ)ω	1 iamb (2 σ)
c. <i>faculté</i>	[fak] _H	((σ(μ μ)σ)ϕ)ω	1 iamb (2 μ)
d. <i>pharmacie</i>	[faʁ] _H [ma] _L	(ϕ σ)ω	1 iamb + 1 light σ
e. <i>apéritif</i>	[ape] _{LL} [ʁo] _L	(ϕ σ)ω	1 iamb + 1 light σ
f. <i>dactylographe</i>	[dak] _H [tilo] _{LL}	(ϕ ϕ)ω	2 iambs
g. <i>certificat</i>	[sɛʁ] _H [tif] _H	(ϕ ϕ)ω	2 iambs

The prosodic word shapes provided in the third column in (28) all crucially satisfy the structural condition of representing a maximally binary prosodic word (Scullen 1993, 175), with a pivotal role for the weight-sensitive iambic foot. Scullen (1993, 204) finds that 97% of the truncated forms in her database obey the prosodic binarity requirement.

Scullen (1993) furthermore addresses the problem of French speakers pronouncing abbreviations either as acronyms or as initialisms, reacting to an earlier discussion of this topic by Plénat (1993).⁴⁸ According to the latter author, an abbreviation is usually pronounced as an acronym when it contains at least two moras. Below this limit, it will be spelled. Moreover, the abbreviation must contain a CV sequence, which predicts that VC or VV abbreviations, although bimoraic, are spelled instead of syllabified (AG [a.ʒe], *[aʒ] *Assemblée Générale*; IA [i.a], *[ja] *Intelligence Artificielle*). Bimoraic letter sequences of the type CVC and (C)VCV are usually pronounced as acronyms (FEN [fɛn] *Fédération de l'Éducation Nationale*; ONU [o.ny] *Organisation des Nations Unies*), although the spelling option is also available for these sequences.

While it is predicted that monomoraic C(C)V abbreviations are pronounced as initialisms, there are three types of exceptions: LV (RA [ʁa] *Restaurant administratif*), CLV (CLA [kla] *Centre de linguistique appliquée*), and CCV (SCO [sko] *Sporting Club Olympique*), where L stands for a liquid and C for a non-liquid consonant. To explain the acronymic pronunciation of the (C)LV sequences Plénat suggests that liquid onsets are moraic in French. On the other hand, when the onset cluster does not contain a liquid, the first C is claimed to represent a rhymal element which is moraic, prosodically represented as $(\mu s_\sigma(\mu ko)_\sigma)_\phi$ for SCO.⁴⁹ Plénat furthermore proposes an explanation that would account for the fact that some abbreviations are preferably spelled: if pronounced as a single syllable, a CV sequence would be monomoraic in violation of the minimality condition, but when spelled, it satisfies the minimal bimoraic requirement: CA [ka] vs. [se.a] (*Conseil d'administration*). If this were indeed the reason for it, it remains to be explained why CVC and VCV abbreviations can be pronounced variably as acronyms or initialisms: FEN [fɛn] vs. [ɛf.ø.ɛn] and ONU [o.ny] vs. [o.ɛn.y], while longer abbreviations are preferentially syllabified. To account for this discrepancy Plénat puts an upper limit on the optimal prosodic word, which should not exceed three syllables. Beyond that limit, and if the CV condition is satisfied, abbreviations will be realized preferentially as acronyms.

Scullen (1993, 193) reacts to Plénat's (1993) proposal by observing that the great majority of French abbreviations can be analyzed in the same way as clippings. In order for abbreviations to be pronounced as acronyms, they must conform to a maximally binary prosodic word: FEN $((\sigma(\mu \mu)\sigma)\phi)\omega$, RA $((\sigma(\mu \mu)\sigma)\phi)\omega$, ONU $((\sigma \sigma)\phi)\omega$, SCO $((\sigma \sigma)\phi)\omega$, CREDIF $(\phi \phi)\omega$,⁵⁰ OVNI $(\phi \sigma)\omega$ etc. Compliance with the Maximally

⁴⁸ Scullen reacts to an unpublished paper by Plénat with almost the same title as the one published as Plénat (1993) to which we refer and from which the examples in this paragraph are taken.

⁴⁹ A complicating factor is the presence of a hiatus, which hinders the acronymic reading especially in shorter abbreviations, as in CIA [se.i.a], *[seja] (*Central Intelligence Agency*), as opposed to CREA [kʁe.a] (*Centre de Recherche en Épistémologie Appliquée*).

⁵⁰ The prosodic representation is in accordance with Plénat's moraic analysis of CL/sC initial clusters, on which Scullen (1993, 299) is first undecided, but finally dismissive. Otherwise, RA and SCO would be exceptions and CREDIF a regular iamb.

Binary Prosodic Word Template is also required by hypocoristic truncated forms and reduplications, with the proviso that these processes enforce some further output restrictions. Clippings have a maximum of three syllables and four moras; the same is true for acronyms, which must moreover be C-initial; reduplicated forms (including the output forms of hypocoristic reduplication) are C-initial disyllabic iambs (*dormir* → *dodo* ‘sleep’, *Éduard* → *Dudu*).

Since, according to Scullen, the derived prosodic word is minimally an iambic foot, derived monomoraic words should not exist. (C)CV monosyllables, which make up a little less than 2% in the corpus, are indeed scarce and therefore considered exceptional. Nevertheless, tri- or quadrisyllabic forms are also rare,⁵¹ the vast majority of truncates being either bimoraic or bisyllabic, the latter including illicit iambs of the type HL or HH, analyzed by Scullen as a sequence of an iamb + a light syllable [faʁ]_H[ma]_L, or as two iambs [paʁ]_H[des]_H (*pardessus*) ‘overcoat’.

The proposal that the French minimal, or rather optimal word should be defined as a disyllable is defended by Plénat (1999), Plénat/Roché (2003), Plénat/Solares Huerta (2006), and, explicitly, in Andreassen/Eychenne (2013, 129), where it is stated that “the strong preference for the disyllabic template might well be the result of a bias towards binary words, without reference to moraic weight or foot structure”.

Following this line of thought, Plénat/Solares Huerta (2006) consider that French truncatory hypocoristics optimally contain two syllables. Hypocoristic formation yields CVCV or CVCVC sequences depending on whether the second syllable is open or closed in the base form: *Dominique* → *Domi*; *Sébastien* → *Sébas*. However, CV (*Bérengère* → *Bé*) and CVC (*Victor* → *Vic*, *Nathalie* → *Nat*) hypocoristics are also derived. The authors observe that CVC hypocoristics are preferred over disyllabic CVCV when the onset of the second syllable of the base is low on the sonority scale and its nucleus evokes a pejorative value. Vowels that express a pejorative value, like /a/ and the front unrounded mid vowels, are usually not realized. This is why *Nathalie* more easily yields *Nat* than *Natha*. On the other hand, the high front vowel in *Domi* expresses “smallness, kindness” and is therefore maintained. In the case of *Bérengère* → *Bé*, the nucleus of the second syllable cannot be maintained because of its pejorative value, while the preceding rhotic is not preserved on account of it being too high on the sonority scale. CVC sequences also regularly function as hypocoristics when derived from bases of which the first syllable is closed by a low-sonority consonant, as in *Victor* → *Vic*. Given the universal preference of low-sonority consonants for the syllable onset position, Plénat/Solares Huerta (2006) hypothesize that this consonant type is maintained in words like *Nat* and *Vic*, because it indeed functions as the onset of a rhymeless syllable $_{\sigma}(Na)_{\sigma}(t)$. This hypothesis also explains why the onset of the third syllable in trisyllabic names is rarely preserved. For example, /t/ in

⁵¹ Especially if *o*-abbreviations are disregarded: *camembo* (*camembert* ‘(type of) cheese’); *dactylo* (*dactylographe* ‘typist’).

the hypocoristic **Dorot* from *Dorothé* would function as a third syllable. Therefore, **Dorot* qualifies as suboptimal compared to the attested disyllable *Doro*. Clearly, since onsets are weightless, the optimal hypocoristic is measured in terms of syllables, not moras.

Whereas Plénat and others defend the existence of a general preference in French for disyllabic word-shapes without reference to a specific foot type, the weight-sensitive nature of the foot is crucial in the work by Eychenne (2006) on Midi French, which connects with earlier studies by Durand (1976) and Selkirk (1978). A central role in Eychenne's argumentation is played by the complementary distribution in Midi French between close- and open-mid vowels, called the *loi de position*. Following Durand (1990), Eychenne assumes that Midi French has only one series of mid vowels underlyingly, which are realized within the prosodic word domain as close-mid in CV syllables and as open-mid in CVC syllables and CVCə sequences. This distribution is illustrated in the words below, taken from Eychenne (2006, 120):

- (29) peau [po] 'skin' port [pɔʁ] 'harbor' pore ['pɔʁə] 'pore'
 paix [pe] 'peace' pair [pɛʁ] 'pair' père ['pɛʁə] 'father'
 pleut [plø] 'rain_{3SG}' pleur [plœʁ] 'tears' pleure ['plœʁə] 'weep_{3SG}'

Eychenne reminds us of Plénat's (1993) conclusion that the oralization of abbreviations points to a bimoraic minimum for prosodic words in French.⁵² He also refers to Scullen's (1993) analysis of truncation, where it is shown that, while monosyllables can be the output of truncation, CVC syllables are clearly preferred over CV syllables, i.e. clippings and hypocoristic truncates are minimally bimoraic. To argue for the moraic nature of schwa, Eychenne presents cases of compensatory vowel lengthening caused by the loss of schwa in various dialects of French. If all the oral vowels, including schwa, as well as coda consonants are moraic in Midi French, closed syllables and open syllables followed by schwa can be represented as bimoraic feet. Consider the representations in (30) proposed by Eychenne (2006, 167) for the words *nez* 'nose', *net* 'clean_M', *nette* 'clean_F':

- (30) a. ((nɛ_μ)_σ)_{foot}
 b. ((nɛ_μt_μ)_σ)_{foot}
 c. ((nɛ_μ)_σ(tə_μ)_σ)_{foot}

In the prosodic structures in (30), every vowel except schwa is the head of a foot. Instead, schwa is joined to a preceding open syllable to form a bimoraic foot. The

⁵² Notice that, since moraicity can be process-specific, coda consonants could be moraic for the sake of the *loi de position* independently of any weight-based well-formedness requirement imposed on clippings or hypocoristics.

context of appearance of the open-mid vowels is therefore the trochee, whereas close-mid variants are consigned to a light foot. Observe that, in Eychenne's proposal, Midi French has no restriction on the minimal foot size. This assumption is in accordance with the existence of the large set of underived monomoraic prosodic words, which Midi French shares with Standard French.

In Eychenne's analysis of Midi French, all coda consonants are considered moraic, including the low-sonorant ones (cf. 30b), in order to warrant the proper functioning of the *loi de position*.⁵³ Generalized weight-by-position is also assumed by Scullen's (1993) analysis of abbreviations. According to Plénat (1993) the acronymic pronunciation [pyp] corresponding to the abbreviation PUP (*Parti d'unité prolétarienne*) is explained because it satisfies the requirements of containing a CV sequence and the bimoraic minimum. So far, these scholars agree that coda consonants can be moraic, even if the rule for stress assignment, whatever its domain of application, does not make use of their supplementary weight.⁵⁴ However, from the perspective of Plénat/Solares Huerta (2006), PUP [pyp] could be reanalyzed as [_σ(py)_σ(p)] with the bimoraic requirement given up in favor of the allegedly favorite disyllabic shape. The question then is whether word-final low-sonority consonants are correctly analyzed as onsets of rhymeless syllables. There is room for doubt. In the case of non-hypocoristic truncation, the claimed preference for disyllabic truncates does not seem to hold, as the following examples taken from the Scullen (1993, 311–316) corpus show: *amphétamines* → *amphet*, *cafétéria* → *cafèt*, *bénéfice* → *bénéf*, *démocrate* → *démoc*, among many others. In these clippings, the final low-sonority consonant corresponds to an onset consonant in the base, which should therefore be analyzed as a word-final rhymeless syllable: [_σ(de)_σ(mɔ)_σ(k)]. The large number of this type of forms in the corpus challenges the claim that clippings generally respect an optimal disyllabic shape. Alternatively, one may treat the final consonants in these words as codas, the numerous CVC clippings being analyzed as bimoraic: *supplémentaire* → *sup* [syp], *microphone* → *mic* [mik], *baccalauréat* → *bac* [bak], alongside sonorant-final ones like *gymnastique* → *gym* [zim], *kilogramme* → *kil* [kil] etc. Considering the rarity of CV clippings as compared to CVC ones we are then back to imposing a bimoraic minimum at least on the shape of clippings. Since weight criteria may be inconsistent across phenomena within the same language (Gordon 2006, 5), the difference between the mainly disyllabic hypocoristic truncates and the minimally bimoraic clippings is not unexpected. Recall also that hypocoristics require onsets, as opposed to clippings: *agrégation* → *agreg*, *amphétamines* → *amphet* etc.

⁵³ Coda consonants remain crucially moraic in the rhythmic analysis of the *loi de position* in Midi French, without feet as constituents, as proposed in Andreassen/Eychenne (2013).

⁵⁴ This is also true for Eychenne's (2006) analysis of Midi French, in which language stress goes to the head of the final foot, light or heavy.

3.7 Romanian

The three-syllable window constraint found in a number of Romance languages also confines the position of main stress in Romanian. Prefinal stress is normal in non-verbs ending in an open syllable (*căldare* [kəl'da.re] 'cauldron'), while final closed syllables are usually stressed (*pământ* [pə'mɪnt] 'earth'). However, nouns that end in a consonant on the surface are masculine or neuter and have an underlying word-final /u/ which surfaces before the suffixed definite article: *lupul* 'the wolf', after consonant clusters: *albastru* 'blue', and, as a glide, after a vowel: *bou* [bow] 'ox'. Elsewhere underlying final /u/ is deleted. Exceptional antepenultimate stress exists, even in words with a prefinal heavy syllable, as in *pajiște* ['paʒiʃte] 'lawn', *liniște* ['liniʃte] 'silence', and word-final vowels can be stressed: *curea* [ku'rea] 'belt'. As Chitoran (1996) proposes, the domain for the stress rule is the stem plus derivational suffixes. Inflectional suffixes do not interfere with the stress location, as in the following example, in which the internal bracket delimits the right edge of the stress domain: /lupu]-lu/ 'wolf-the' > /'lupu]-lu/ > ['lupul]. Within its domain of application, default stress is assigned by way of a right-aligned syllabic trochee, which also accounts for antepenultimate stress, modulo syllable extrametricality: *pajiș{te}* 'lawn', where a moraic trochee would yield ungrammatical prefinal stress. Given that Romanian stress is not sensitive to syllable weight,⁵⁵ we must explore other sites of the grammar to look for prosodic patterns or constraints that are defined in terms of weight-sensitive feet.

The question whether Romanian has a MWR is unclear. Avram (2014) takes the very small set of light prosodic words to show that there is no MWR for underived words: *gri* 'gray', *șa* 'saddle', *zi* 'day'. As we have seen, CVC nouns are underlyingly CVCV, which could suggest the existence of a disyllabic minimum at the lexical level. Clear evidence for weight-sensitivity comes from prosodic morphology. As Avram (2014) shows, hypocoristics obtained through truncation consistently represent instances of the moraic trochee: CVC, CVCCV, CVCV. Some examples of left-anchored truncations are given in (31a), right-anchored truncations are in (31b).

(31) a.	Grigore → Grig	b.	Georgeta → Geta
	Nicolae → Nic		Cornelia → Neli
	Mădălina → Mădă		Augustin → Gusti
	Viorel → Vio		Alexandru → Sandu

The literature on prosodic morphology in Romanian is scarce, apparently because truncation processes are not as common there as they are in other Romance lan-

⁵⁵ A slightly different analysis of Romanian stress, also without reference to syllable weight, is proposed in Chitoran (2002), briefly discussed in the respective chapter of this volume (717 Romanian).

guages (Avram 2014, 11). Nonetheless, despite the quantity-insensitive stress system, the prosodic shape of hypocoristic truncates is characterized by the moraic trochee. Interestingly, compared to Valencian Catalan, in Romanian the opposite weight mismatch holds between the stress foot and the word/foot derived through truncation.

4 Conclusion

In this chapter, we have provided an overview of the distribution and behavior of length and syllable weight across the Romance languages. Although phonemic length distinctions are relatively rare in the standard languages, they are widespread in Romance vernaculars across much of Italy and francophone territories. This is particularly true of vowel length contrasts, with distinctive consonant length largely restricted to central and southern Italy. Nevertheless, the loss of Latin quantity distinctions in both vowels and consonants across much of the Romance-speaking world was a prolonged process, which has left multiple traces in the phonological systems even of many of those varieties where length contrasts are now absent. In order to evaluate the importance of syllable weight, we have focused on the literature in which the specialists have supported its relevance for predicting the position of main stress in the native vocabulary and in neologisms, for its role in controlling minimum prosodic word shapes and in modeling the structure of derived minimal or optimal words in prosodic morphology. We have been able to establish that, to a varying degree, syllable weight is a relevant explanatory concept in the phonology and/or prosodic morphology of all the Romance languages investigated.

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2 Syllable structure and (re)syllabification

Abstract: This chapter provides a survey of syllable structure and resyllabification in Romance languages. On the one hand, onsets, nuclei, and codas are described according to their content and behavior across the main Romance areas. On the other hand, some specific issues are given special attention as they appear to be relevant for current discussion in phonological theory.

Keywords: syllable structure, syllable complexity, open vs. closed syllables, word-final consonants, tautosyllabic clusters vs. heterosyllabic sequences

1 Introduction

Providing a brief overview of syllable structure and resyllabification in Romance languages is a difficult task, not just because there is a myriad of dialectal varieties. Two main questions arise. First, which criteria provide the best guideline for examining the subject matter? Second, should the study tend towards an exhaustive description of data and literature, or should it give place to topics and case studies that to date have not ranked highly on the agenda but appear to be relevant for phonological theory?

Regarding the first question, it is shown in Section 2 why we have not pursued the idea of analyzing syllable structure in Romance in the light of increasing or decreasing “complexity” insofar as the latter refers to the number of segments putatively contained by the syllable. As to the second question, in the sections below we will try to offer a balance of the two approaches: on the one hand we will survey views on onsets (Section 3), nuclei (Section 4), and codas (Section 5), but we will also draw attention to specific issues that may challenge current views of syllable structure.

2 Syllabic complexity

2.1 Coexistence of contradictory trends

A widespread typological viewpoint from which the Romance syllable has been observed consists in assessing its complexity with respect to that of the Latin syllable. In this perspective, complexity mainly concerns syllable margins: hence it is evaluated by considering the number of consonants and the type of cluster in the onset and the coda (Lehmann 2005, 138; Heinz 2014, 88). The literature diagnoses

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complexity reduction when the number of onset and coda consonants decreases (Kiss 1971; Lehmann 2005, 138; Heinz 2014, 88–89), or when the constraints increase on the combination of consonants permitted in onsets and codas (Lehmann 2005, 138–139). In this sense, Romance is said to have undergone decomplexification of onsets and codas with respect to Latin (Lehmann 2005, 138–139). Another indicator is the percentage of simple CV syllables in the lexicon, as compared to other, more complex syllabic configurations (CVC, CCV etc.). On the basis of the evidence provided by a number of phonological processes that have characterized Late Latin and that result in open syllables and/or less complex margins, including simplification of clusters, degemination, and the loss of word-final consonants, some scholars conclude that a simplification trend characterized Late Latin and persisted in individual Romance languages (cf. Kiss 1971, 23–102, for a complete list of processes and the study of corpus of inscriptions; Lehmann 2005, 145–146; Heinz 2014).

Within this approach it has been widely noticed, however, that an increase in syllabic complexity may also be observed in Romance. Late Latin syncope, which was strengthened in Western Romance (Kiss 1971, 99–102; Mayerthaler 1996; Schmid 2014; Heinz 2014, among others), increases syllable complexity. Thus, Loporcaro (2011, 105), as opposed to the general trend, argues in favor of a tendency towards closed syllables operating in Late Latin stressed syllables.

Both tendencies, one towards decreased complexity and another towards increased complexity, are attested in the Ibero-Romance dialect continuum where coda weakening is gradually undermined by syncope as one moves to the East, from Galician-Portuguese to Catalan, through the Astur-Leonese, Castilian, and Navarro-Aragonese areas (Carvalho 1989a, 173–176). The two opposite trends are often related in the literature to rhythmic properties of the languages such as stress or syllable timing. Mayerthaler (1996) identifies a number of processes that increase syllable structure complexity in Italo-Romance dialects common to Western Romance, and that are induced by stress-timing, whereby the inter-stress intervals tend to be equal (isochrony). Also, Schmid (2014) and Heinz (2014) respectively analyze Italo-Romance varieties and standard languages such as Spanish and French, in terms of rhythmic properties, expressing the isochronic/isosyllabic typology using the distinction known as word vs. syllable languages (Auer 1993; Caro Reina/Szczepaniak 2014). In this perspective, they identify syllabic complexity as one of the properties that characterize word languages and conclude that there was indeed a decomplexification in the evolution from Old French (word language) to Modern French (syllable language). The complexification tendency, on the other hand, is identified for the evolution from Latin (syllable language) to Old French and other Gallo-Romance languages (word languages; cf. Noske 2015, 65–68).

2.2 Phonological and typological settings are constant

Genetically related languages certainly build on a common pool of properties that guide their evolution, but each sub-group or individual language will also implement innovations of its own. A uniform trend is hardly expected across the many varieties spoken in the Romance dialect continuum. As illustrated below, there is significant variation across Romance regarding, for example, the set of syllabic positions that can affect the quality of segments. Also, typologically speaking, a number of rare syllabic and syllabification patterns have emerged in the evolution of Romance languages, which may contribute to our understanding of syllable structure as such. These issues are further debated in this chapter.

The discussion regarding a putative complexity/simplicity drift in syllable structure that is found in the literature merely counts surface consonants, from the left edge of the word to the first vowel (onset complexity) and from the right edge of the word until the last vowel (coda complexity). Hence CCCVC and CCVC syllables will be said to be different, as will CCVC and CCVCC syllables. This widespread perspective is instantiated for example by Maddieson (2013) in the World Atlas of Language Structures (WALS, cf. Dryer/Haspelmath 2013) database where CVC and CCV syllables are said to be moderately complex, whereas syllables allowing three or more consonants in the position preceding the vowel, and/or two or more consonants in the position after the vowel (CCCVC and CVCC) are classified as being highly complex. It is a discussion that is helpful in characterizing the differences in the overall phonotactic shape of Romance languages. The complexity debate, however, is perhaps less fruitful to describe a deeper level, that of syllable *structure*.

Counting consonants before the first and after the last vowel may reflect pronunciation. However, it does not determine syllable structure, which follows from phonological behavior and principles that restrict constituent membership. Phonologists broadly agree that merely counting consonants at word margins does not reveal constituent membership. For instance, all theories converge in saying that /s/+C sequences at the beginning of the word are not tautosyllabic (although there is no agreement on their actual status: appendix, extrasyllabic, separated by an empty nucleus etc., cf. the overview in Scheer 2015, 67–75).

An alternative perspective is that of Government Phonology (Kaye/Lowenstamm/Vergnaud 1990; Lowenstamm 1996; Scheer 2004), where the branching of onsets and rhymes is only binary, i.e. where the constituents at hand can host two segments at most.¹ In this perspective no complexity difference as to constituent membership

¹ Although Lowenstamm's (1996) and Scheer's (2004) theory, which is a later version of Government Phonology, is based on 'flat' CVCV representations, and involves lateral relations instead of branching hierarchies, constituency-based terms such as 'branching onset', 'rhyme', and 'coda' will be used in this chapter as they are widespread in the phonological *lingua franca*.

exists between #C2C1VC and #C3C2C1VC “syllables”, since both strings contain a branching onset, C2C1, in both Latin and Romance. The latter string features an initial /s-/ that does not belong to the following syllable and hence does not affect its complexity (in #C3C2C1VC, C3 is always /s/).

When looking at the evolution from the perspective of available syllabic constituents (the syllabic template), there is no difference between Latin and Romance languages: Latin has a maximal template allowing for codas and branching onsets, as have the Romance languages. Some variation exists concerning the tolerance of word-initial preconsonantal /s/, however, which lies outside of the syllable onset. Accordingly, no evolution of the formal structure of the syllable has taken place from Latin to Romance, since, to the best of our knowledge, no Romance language is on record where codas or complex onsets are banned from the syllabic inventory.² An evolution disallowing codas or branching onsets would indeed reduce syllabic complexity when compared to Latin – but no development of this kind appears to have occurred.

The constant presence of codas and branching onsets from Latin through intermediate evolutionary stages down to present-day Romance varieties is certainly remarkable, since codas and branching onsets are cross-linguistically marked (Kaye/Lowenstamm 1981, among others). Notwithstanding the documented lenition processes that have targeted codas and branching onsets across Romance, no system among the many of Romance varieties of the dialect continuum seems to have altered the formal structure of the syllable template that held in Latin. This does not mean, however, that nothing happened over the relevant time span. As was mentioned above, interesting evolutions took place regarding syllable constituents and syllabification. Some specific cases are studied in the sections below.

² A counterexample to this statement is provided by the Acadian variety of Quebec French in which, if one accepts Charette’s (2018) analysis, surface word-initial and word-internal obstruent+liquid sequences like in [plas] ‘site’ or [sakre] ‘swear_{INF}’ are in fact bogus clusters, i.e. enclosing an empty nucleus. The evidence on which Charette’s analysis is based comes from the fact that such clusters are never followed by schwa. While this is the case in most dialects of French, the realization in Acadian French (AFr.) is obstruent+ə+sonorant (e.g. *brebis* [brəbi], AFr. [bərbi] ‘sheep’). Obstruent+sonorant+vowel clusters are bogus in Acadian French, i.e. the obstruent and the sonorant are syllabified in distinct onsets and the nucleus between them can be properly governed only by a following lexically filled nucleus. The Acadian French schwa in this analysis is not a lexical nucleus, but the expression of an ungoverned empty nucleus surfacing when the empty nucleus in between the obstruent+sonorant sequence is followed by another empty nucleus and not by a lexical vowel, as in /bərəbi/ > [bərbi]. Gallo-Romance dialects such as Walloon (Francard 1981) and Picard (Auger/Steele 1999), which display a similar situation, deserve further investigation on the subject, which we leave for future research.

3 Onsets

3.1 Empty onsets

Latin syllables allowed empty, simplex, and branching onsets. Romance languages also generally allow all three kinds of onsets although some languages consistently repair empty onsets of stressed syllables through epenthesis. In eastern Abruzzese dialects, as in many southern Italo-Romance dialects, empty onsets of syllables are filled by the voiced glottal fricative [ɦ] or the velar fricative [ɣ] ([ˈfiannə] (proper name), [ˈɦɔttə] ‘eight’). Before non-low vowels homorganic glides appear in free variation with [ɦ] ([ˈɦu:nə]/[ˈwu:nə] ‘one’) (Hastings 1997, 323).

The same process appears to characterize many Sicilian dialects like the one spoken in Messina (Sampson 2010), Dalmatian (Schürr 1980, 85; Maiden 2016, 127), and some Daco-Romanian dialects (Sala 1976, 42–43; Loporcaro 2011, 97). In the latter, homorganic glides are inserted ([ˈji]nimă ‘heart’, [ˈja]rc ‘bow’), while in Sicilian and Dalmatian the epenthetic glide is palatal (Dalm. [ˈjuaɫb] ‘white’, Dalm. [ˈjaɫara] ‘ivy’).

Although word-initial empty onsets may be allowed, word-internally glides are epenthesized in order to resolve hiatus in Romanian (Chitoran 2002, 95–124). The strategies of hiatus resolution in 14th-century Portuguese also reveal an interesting sonority scale of the form openness (A) > roundness (U) > frontness (I) whereby the disyllabicity of V_1V_2 sequences is preserved if and only if V_1 has lower sonority than V_2 (Pimenta 2019, 193–195). Thus, IA, UA > IjA, UwA with glide epenthesis (TELA > tea > teia ‘web’, BONA > bōa > boa ‘good_F’) vs. AI, AU > Aj, Aw (SALES > saís ‘salt_{PL}’, MALU > mau ‘bad’), but also IU > IjU (PLENU > chēo > cheio ‘full’) vs. UI > Uj (PONES > pō[j]s ‘put_{2SG}’). Identical sonority (AA, UU, II) causes reduction to a monophthong (MALA > maa > má ‘bad_F’, SOLU > soo > só ‘only, alone’, PEDE > pee > pé ‘foot’). Modern Portuguese still avoids the creation of stable glides as onsets of stressed syllables, as [ˈjV], [ˈwV] sequences alternate with dissyllabic [iˈV], [uˈV] (Mateus/d’Andrade 2000, 49–50), e.g. in *piar* ‘chirp’, *suar* ‘sweat’, *moeda* ‘coin’.

3.2 Segmental restrictions

In Latin simplex onsets, a vast array of consonants was allowed (Marotta 1999; Cser 1999). Likewise, Romance languages generally apply few restrictions on the consonants that may appear in simplex onsets. However, consonants produced by palatalization that are absent from Latin such as [ʎ], [ɲ] are infrequent or completely inexistent in word-initial position (e.g. It. [ʎi]_{3SG.M.DAT} It. [ɲomo] ‘dwarf’, cf. Marotta 1993). In Cotentin Norman [ʎ] is excluded from word-initial position but unlike in other Romance varieties that feature this segment in their inventory, it can appear as the second member of a branching onset (Montreuil 2000, 88): [ˈbʎe] ‘wheat’,

['kʎok] 'bell'. The Francoprovençal dialect spoken in Hauteville among other Franco-provençal varieties displays a complementary distribution of [l] and [ʎ] in branching onsets, whereby the first surfaces after labial plosive and the second after velars (Martinet 1956, 64–65): [kʎar] 'clear', [gʎas] 'ice' vs. [blat] 'wheat', [plana] 'plain' (Stich 2001). The labiodental fricative patterns with velars [fʎama] 'flame'. In Romansh, word-initial [ɲ] may trigger vowel epenthesis, e.g. NIDU(M) > [ə'ɲif] 'nest' (Montreuil 1999, 528). The same applies in Brazilian Portuguese: [i'ɲoki] 'gnocchi' (Wetzels 1997, 219). More generally, Portuguese [ɲ] and [ʎ] have been argued to derive from underlying geminates (Wetzels 1997, 220) or, as regards [ɲ], from nasal diphthongs (Pimenta 2019, 220–222).

The only cases of frequent word-initial palatal sonorants are found in Astur-Leonese, where L-, N- gave [ʎ-], [ɲ-], as in LATU(M) > *llado* 'side', NOCTE(M) > *ñueite* 'night' (cf. Zamora Vicente 1979, 122–124, 130–131), in Catalan, where L- gave [ʎ-] (LATRO > *lladre* 'thief'), and in (conservative varieties of) Castilian, whose initial [ʎ-] comes from CL- clusters (PLUVIA(M) > *lluvia* 'rain', CLAVE(M) > *llave* 'key', FLAMMA(M) > *llama* 'flame').

Word-initial /z/ is also rare, for example in French and Portuguese, or absent, as in the rest of Ibero-Romance and in Italian (Bertinetto/Loporcaro 2005, 133). The same goes for approximants, whose appearance in simple onsets is generally more restricted than that of other consonants. For example, Galician-Portuguese historically showed a strong tendency to avoid glides as simple onsets, cf. E(G)O > Por. *eu*, as opposed to Sp. *yo*. However, as glides in Spanish underwent fortition ([j] > [j̥] (> [ʒ]), [w] > [gʷ]) at later stages in many varieties, the modern language does not always allow glides as simple onsets (Colina 2012, 138).

Latin palatal glides (also called *yod*) underwent fortition to [dʒ] in Italian, but glides as simple onsets can be found in word-initial or intervocalic position in loanwords and Latinisms. As opposed to ordinary singleton consonants, however, the palatal glide in word-initial position selects the masculine definite article allomorph dedicated to heterosyllabic sequences and geminates (*lo* [j]ogurt 'the yogurt', *lo specchio* 'the mirror', *lo* [ddz]ero 'the zero' vs. *il cane* 'the dog', *il treno* 'the train', Marotta 1988; Bertinetto/Loporcaro 2005, 141–142). In addition, the palatal glide does not participate in the length contrast that characterizes the majority of Italian consonants and does not lengthen under *raddoppiamento sintattico*, a *sandhi* lengthening phenomenon triggered by word-final stressed vowels or by a handful of lexical items (≈18 Italian). This has led Passino (2015a) to analyze this segment as underlyingly long but short on the surface, a so-called virtual geminate (Ségéral/Scheer 2001b). The palatal glide behaves as a virtual geminate also in the upper southern Italo-Romance dialect of Teramo spoken in the Abruzzi. As in Italian, in this variety *yod*-initial words do not undergo *raddoppiamento sintattico* or other lengthening phenomena concerning consonants. In addition, as shown in Table 2.1, *yod*-initial words pattern with words displaying initial geminates and heterosyllabic sequences in triggering vowel-zero alternations in the negative adverb [nən] (cf. Passino 2009).

Table 2.1: Allomorphs of [nən] following Passino (2009).

	Single consonants and tautosyllabic clusters	Heterosyllabic sequences and geminates	yod
Allomorphs	nən vɑ:kə	nnə ʃɑ:mə	nnə ʝɑ:kə
of [nən]	'I don't go'	'we don't go out'	'I don't play'
	nən drɔ:və	nnə mbru:jə	
	'I don't find'	'I don't cheat'	

3.3 Complex onsets

3.3.1 Typology of complex onset sequences

Complex onsets in Latin could be composed of *muta cum liquida* (plosive+liquid). In addition, the labiodental fricative [f] could also be the first member of a branching onset. The situation is similar in Romance. In French for example, [vr] is marginal (only four roots with word-initial [vr] occur: *vrai* 'true', *vriller* 'twist_{INF}', *vrac* 'bulk' and *vrombir* 'buzz_{INF}', the latter being of onomatopoeic origin) and [vl] is absent except for onomatopoeic words (*vlan!* 'bang!') or borrowed proper names (*Vladimir*). That French disallows word-initial [vl] is also evident from its diachronic evolution: labial plosives engaged in intervocalic branching onsets are reduced to [v], except when [vl] would be created, in which case the lenition P > [b] > [v] is blocked at the [b] stage: PR > [vr] ('CAPRA(M) > OFr. *chievre* (ModFr. *chèvre*)), [br] > [vr] ('LĀBRA > OFr. *levre* (ModFr. *lèvre*)), but PL > [bl] ('DUPLU(M) > OFr. *double* (ModFr. *double*)) and BL > [bl] ('TAB(U)LA(M) > OFr., ModFr. *table*).

Romanian is rather permissive: [v] and [h] qualify as first members of branching onsets (*vlagă* 'vigor', *vreme* 'weather', *hrană* 'food', *hlamidă* 'gown'), and a few nasal+liquid clusters exist in words of Slavic origin such as *mlădios* 'slender' (Chitoran 2002, 14). The branching onsets [hr]/[hl] may be also found in Gascon (Sampson 2010, 198).

As in other (Indo-European) languages that restrict word-initial clusters to branching onsets (i.e. of rising sonority, such as Germanic), [tl] and [dl] are rare word-initially. They can be found in dialects characterized by pretonic syncope (on which more below), e.g. Gallo-Italic Bolognese *tlar*, Ussegliese *tle* 'weaving loom' or other Francoprovençal dialects where Latin CL > [tl] (i.e. Chablais, Cluses, cf. Stich 2001). Word-internally [tl], [dl] are also avoided: 'vētūlu > **vetlu* 'old' led to two different complex onsets: (i) *veclu*, attested in the *Appendix Probi*, whence It. *vecchio*, Por. *velho*, Fr. *vieil* 'old' etc., and (ii) **vetru* > *vedro*, which is found in Galician-Portuguese toponyms like *Pontevedra*, *Torres Vedras* etc. As can be seen, either the place feature of the obstruent undergoes backing if the lateral is preserved, or the lateral is replaced with a rhotic if the coronal is maintained. There is also a third solution: [tl] > [ll] as in ROT(U)LU(M) > OFr. *rolle* (ModFr. *rôle*).

The reason why [tl], [dl] are avoided word-initially is subject to debate. A number of hypotheses have been formulated, including homorganicity avoidance (but then why are homorganic [tr], [dr] unproblematic?) and perceptual indistinctness (especially with velar-lateral clusters, Michaels 2011). Perceptual indistinctness may be a factor but does not explain why avoidance of [tl], [dl] occurs particularly in word-initial position, or why there are languages such as many Slavic idioms where initial [tl], [dl] are perfectly regular. A more promising approach to the question is syllable-based: [tl], [dl] do not qualify as branching onsets in any language. Hence, they are excluded from the initial position in languages like English, German, Italian, or French where initial clusters are restricted to branching onsets (plus /s/+C clusters). Those Slavic languages that feature initial [tl], [dl] (Czech, Polish) also allow for items of falling sonority [#rt], [#lp] etc. The correlation that languages allowing for initial clusters with plateau of falling sonority also allow for initial [tl], [dl] appears to also hold true within Romance: the cases of Gallo-Italic and Francoprovençal mentioned above, where initial [tl], [dl] are found, occur in dialect groups where pretonic syncope has created initial clusters of non-rising sonority that appear unrepaired in word-initial position.

Among liquids, rhotics in particular have different phonetic realizations across Romance varieties. In branching onsets this can lead to the surfacing of intrusive vowels in the transition between obstruents and rhotics, most noteworthy in French and Spanish. However, according to Colantoni/Steele (2005), who have studied the subject in depth and with whom we agree, epenthesis here is a phonetic phenomenon and as such has no impact on syllable structure.

Not all obstruent+liquid sequences are parsed as branching onsets in Romance, though. In Chilean Spanish (Martínez Gil 1997, 170–172), all plosives undergo vocalization in coda position. Compare Standard and Chilean forms: [p] *apto* – *a[w]to* ‘apt’, [b] *observar* – *o[w]servar* ‘observe_{INF}’, [t] *étnico* – *é[j]nico* ‘ethnic’, [d] *admirar* – *a[j]mirar* ‘admire_{INF}’, [k] *doctor* – *do[j]tor/do[w]tor* ‘doctor’, [g] *dogma* – *do[j]ma/do[w]ma* ‘dogma’. In addition, voiced plosives undergo the same vocalization in intervocalic *muta cum liquida* sequences: *pobre* – *po[w]re* ‘poor’, *madre* – *ma[j]re* ‘mother’, *regla* – *re[j]la/re[w]la* ‘rule’. Vocalization evidently occurs in coda position and hence *muta cum liquida* is a heterosyllabic sequence in this variety of Spanish, since the former kind of vocalization-triggering cluster ([pt], [bs], [tn], [dm], [kt], [gm]) can only be a coda-onset sequence.³

The same goes for the evolution of French where velars reduce to *yod* before [r] (‘LACRIMA(M) > OFr. *lairme* (ModFr. *larme*) ‘tear’, ‘NIGRU(M) > OFr. *neir* (ModFr. *noir*) ‘black’) and [l] (‘MAC(U)LA(M) > OFr., ModFr. *maille* ‘spot’, VIG(I)‘LARE > OFr. *veillier* (ModFr. *veiller*) ‘watch_{INF}’), just as they do before obstruents (‘FACTA > OFr., ModFr. *faite* ‘make_{PST.PTCP.F}’, LA‘XARE > OFr. *laissier* (ModFr. *laisser*) ‘loosen, leave_{INF}’). The same

³ Note that vocalization cannot be said to simply occur before any consonant since word-initial plosive+consonant sequences never vocalize. This is because vocalization would produce a coda-onset sequence, which is prohibited in word-initial position.

occurred in Ibero-Romance for the evolution of velar+[l] sequences: 'OC(U)LU(M) > Por. *olho* 'eye', *VECLU > Por. *velho* 'old', whose [ʎ] comes from the same stage [jɫ] that was maintained before plosive ('FACTU(M) > Por. *feito*). This [ʎ] later evolved into [ʒ] in Old Castilian and eventually gave [x] in Modern Spanish (*ojo*, *viejo*).

In the same way, there is a large upper southern Italo-Romance area going from southern Abruzzi to non-Salentine Apulia stretching over to northern Calabria and Basilicata (more on this in 4.1), where intervocalic obstruent+liquid sequences display a heterosyllabic parse, as shown by the evolution of preceding vowels that is different in open and closed syllables (von Wartburg 1950; Weinrich 1958; Loporcaro 2005; Passino 2015b; Passino/Pescarini 2018).

In addition to *muta cum liquida*, other kinds of sequences may show a tautosyllabic parse in Romance (Loporcaro 1998; Passino 2013). This is the case in some Gallo-Italic (Emilian, Piemontese, Garfagnana, and Lunigiana), Romansh (most noteworthy the ones spoken in Upper Engadina), and Gallo-Romance dialects (mainly Picard, Norman, Walloon, and Francoprovençal dialects, like the dialect of Hauteville, Vaux, and the ones spoken in the Vosges and in Piedmont). Such sequences arose from syncope that targeted mainly pretonic mid-vowels in open syllables (PE'DICULU(M) > Bol. [bdof] 'louse'), but also postonic vowels ('PORTICU(M) > Bol. [pordg] 'portico'). As discussed next, at least in Emilian dialects such as Bolognese, these clusters behave phonologically like complex onsets (Loporcaro 1998; Passino 2013).

It is shown in (1a) that word-initial obstruent clusters originating from syncope were not repaired by epenthesis, while sonorant+obstruent sequences underwent repair.⁴ Also, in contrast to sonorant+obstruent sequences but following *muta cum liquida*, word-internally and word-finally obstruent clusters may appear after sonorant codas, thus showing tautosyllabic behavior, as in (1b, c). Finally, synchronically, like obstruent+liquid clusters, they do not trigger epenthesis when preceded by a monoconsonantal clitic yielding a triconsonantal sequence, as shown in (1d), where " indicates sentence stress:

(1) Tautosyllabic parse of obstruent clusters

- Bol. a. *VES'SĪCA > [ˈpsiga] 'bladder' vs. LAE'TĀMEN > [al'dam] 'manure'
 b. [ˈpaɲdg] 'mouse'
 c. [ˈmandga] 'sleeve'
 d. [na'mofad''pke] 'a lot of sins'

⁴ The epenthetic segments that repaired sonorant+obstruent sequences are now lexicalized and no such sequences exist synchronically (i.e. *aldam* 'manure' < LAETAMEN).

Among Emilian, Piedmontese, Lombard (Gallo-Italic), and Ladin dialects, another noteworthy feature concerning the parse of consonant sequences is documented. Before sonorant+obstruent sequences (whose crosslinguistically stable parse is heterosyllabic), vowels behave as if in open syllables. This suggests a tautosyllabic parse of the sonorant+obstruent cluster, as shown in (2):

(2) Outcomes of Ā, Ā in Bolognese (cf. Coco 1970, 3–5)

Open syllable	Closed Syllable
Ā, Ā > ε	Ā, Ā > a
¹ LACU(M) > [lɛ:g] ‘lake’	¹ GALLU(M) > [ga:l] ‘cock’
¹ CAPRA(M) > [ˈkɛ:vra] ‘goat’	¹ CATTU(M) > [ga:t] ‘cat’
¹ ALTU(M) > [ɛ:lt] ‘tall’	
¹ BARCA(M) > [bɛ:rk] ‘ship’	

Word-internally, the diachronic evolution of these dialects also shows that nasal+consonant sequences were parsed differently according to the voicing value of the obstruent following the nasal. That is, vowels followed by sequences of nasals and voiceless consonants occur in an open syllable. By contrast vowels followed by sequences of nasals and voiced consonants occur in a closed syllable, as shown in (3) with data from the Lombard dialect of Villa di Chiavenna (Savoia 2015):

(3) Evolution of Ā, Ā in Lombard (Villa di Chiavenna, cf. Savoia 2015, 177)

Open syllable	Closed Syllable
Ā, Ā > ε	Ā, Ā > a
¹ LANA(M) > [ˈlɛnɛ] ‘wool’	¹ CATTU(M) > [gat] ‘cat’
¹ CANTO > [ˈkɛnti] ‘sing _{1SG} ’	¹ GAMBA(M) > [ˈgambɛ] ‘leg’

Word-initial sonorant+obstruent sequences, on the other hand, are generally not allowed in Romance. As shown in (1a), sequences produced by syncope in Emilian (and Piedmontese) were repaired by prosthesis after a reconstructed stage of syllabicity of the initial liquid (Bertoni 1925, 18). In other such dialects (Norman; Wallon; Picard, i.e. Vimeu in Auger 2001; Francoprovençal, i.e. Hauteville in Martinet 1956, 92), prosthesis is not always lexicalized but takes place in sandhi when no vowel-final word can provide a syllable nucleus for the initial liquid. For the Francoprovençal dialect of Usseglio, spoken in Piedmont, Terracini (1919, 354) reports differences between rhotic+obstruent and lateral+obstruent sequences, where prosthesis is respectively lexicalized ([arkyˈla] < RECUˈLARE ‘draw_{INF} back’) or takes place in sandhi ([uˈsastalˈva] ‘he got up’, [ˈfalulˈva] ‘let him get up’ < LEˈVARE ‘get up_{INF}’). Word-initial sonorant+obstruent sequences originating from syncope of pretonic vowels in all Romance languages cited are often described as having involved a transitional stage where the

sonorant was syllabic before developing prosthesis (Meyer-Lübke 1890, 317; Sampson 2010, 217–218).

Moreover, rhotic+obstruent sequences that arose from the loss of an initial vowel were repaired by anaptyxis in Abruzzese ((U)R'TICA(M) > [ræt'to:kə]/[ræt'tr:kə] 'nettle'). However, like many other southern dialects, Abruzzese allows for word-initial sequences of nasal+consonant, where the consonant is homorganic with the nasal ([mba'pi:tə] 'idiot'), as well as initial geminates ([tʃi:tə] 'kill_{INF}'). In southern dialects, word-initial obstruent+obstruent sequences are unknown or repaired in loanwords. Under the influence of these dialects, for instance, Slavic dialects spoken in Molise known as *nanas*, simplify word-initial obstruent+obstruent sequences by deleting the first member (e.g. [ptif] > [tif] 'bird'; de Giovanni 2003, 152).

Even though initial rhotic+obstruent sequences are disallowed across Romance, they may arise through syncope in French and Portuguese. In the former language, *retraite* 'retirement' may be pronounced [ʁət]raite or [χt]raite (note the voice assimilation). While it is certainly true that the rhotic+obstruent sequence is more likely observed after a vowel (*la retraite* 'the retirement') than after a consonant (*ce[t] retraite* 'this retirement'), it does also occur utterance-initially ([χp]rends du gâteau! 'take some more cake!'). Likewise, European Portuguese has [χt]ira a tampa! 'remove the cover!'.

3.3.2 Obstruent+glide

Beyond the variation encountered in obstruent+liquid clusters, the main Romance innovation regarding branching onsets is the introduction of glides as second members. Examples are Fr. *p[jɛ]rre* 'stone', It. *p[jɔ]ggia* 'rain' and Rm. *m[jɛ]re* 'honey'.

Glides have generally arisen from diphthongization of non-low vowels, but also from lenition of C+/l/ branching onsets in Italian. Independently of the etymological origin, distributional evidence in Italian indicates that the palatal glide occupies the dependent position in complex onsets (it freely combines with any following vowel and any preceding consonant). On the other hand, the velar glide is part of the nucleus of following mid-back vowels and the second member of a contour segment where the first member is a velar plosive: its appearance is restricted to these two contexts (Marotta 1988). Branching onsets with a palatal glide coming from C+/l/ are also found in Spanish (Malmberg 1961). Palatal glides are also shown to be part of the onset in Romanian (Chitoran 2002, 25) and French (Tranel 1987a, 115–118). However, C+[j] sequences are not characteristic of all Romance languages. In the Francoprovençal dialect of Hauteville (Martinet 1956, 67), dental plosives followed by *yod* are palatalized, while schwa anaptyxis occurs when other consonants precede *yod* ([ləjō] 'lion').

3.3.3 Obstruent+liquid+glide

In (Standard) French, obstruent+liquid+glide (OLG) sequences are only possible in monomorphemic strings when the glide can be argued to belong to the nucleus. In this configuration OL+[w] (as in *trois* ‘three’) and OL+[ɥ] (as in *bruit* ‘noise’) occur, while OL+[j] is absent (Kaye/Lowenstamm 1984) (but OL+[j] does occur in Midi French, as witnessed by Durand/Lyche 1999). These facts may be illustrated by a process called syneresis whereby high vowels are pronounced as glides. Hence *li-er* ‘join_{INF}’, *lou-er* ‘rent_{INF}’, *su-er* ‘sweat_{INF}’ may be pronounced [lje], [lwe], [sqe]. This gliding is impossible after obstruent+liquid clusters, though: *tri-er* ‘sort_{INF}’, *trou-er* ‘make_{INF} a hole’, *influ-er* ‘influence_{INF}’ may only be pronounced [tɣije], [tɣuwe], [ɪnflyqe], *[tɣje], *[tɣwe], *[ɪnflyqe] being impossible. The reason for their ungrammaticality is the fact that syneresis produces consonantal glides, not vocalic first members of diphthongs. Hence [tɣwa] is the pronunciation of *trois* ‘three’ (with a lexical diphthong [wa]) but cannot be the realization of *il troua* [tɣuwa] ‘make_{3SG.PRET} a hole’, as the onset cannot contain three segments.

Interestingly, OL+/ie/ sequences were monosyllabic (i.e. the result of syneresis) until the mid-17th century: *meurtrier* ‘killer’ and *sanglier* ‘wild boar’ were bisyllabic (*meu*[χtɣje], *san*[glje]). In 1636, the French Academy condemned the innovative trisyllabic pronunciation *meu*[χtɣije], *san*[glije] (Fouché 1952–1961, 740–742; Pope 1952, 192–193), which has nevertheless gained ground since then and is the only one possible today in standard French.

Just as in French, in Romanian [w] can be preceded by obstruent+liquid clusters, while *yod* cannot. Chitoran (2002, 25–26) therefore argues that non-palatal glides are part of the nucleus whereas *yod* is part of the onset. Similarly, in Italian OLG clusters with palatal glides are attested (*dipietriano* ‘follower of the politician Antonio Di Pietro’) but avoided by speakers who prefer using a different suffix to form a lexeme with the same meaning, i.e. *dipietrista*, in order to avoid the OLG sequence arising in word-formation (Thornton 2001). Finally, another reaction against OLG clusters is documented in a number of dialects in northern France (*oïl*): as in earlier stages of the standard language (Fouché 1952–1961, 740), obstruent+liquid sequences trigger anaptyxis when followed by a glide (e.g. *ouv*[ə]rier) in Guernsey Norman (Brasseur 1978), while *brouette* is documented as *b*[ə]rouette in western varieties (Anjou, Vendée, Poitou) (Duguet 1978).

3.4 Strong and weak onsets

As in many other languages (Ségéral/Scheer 2001a; 2008), onsets in Romance are split into two distinct groups according to their behavior in lenition and fortition: word-initial and post-coda onsets {#,C}__ are strong, while intervocalic onsets V__V are weak. To be complete, the weakness of intervocalic onsets is different from the weakness of coda consonants, which occur word-finally and before heterosyllabic

consonants __{#,C}. Hence coda consonants __{#,C} are the exact reverse (mirror image) of strong onsets {#,C}__.

This situation is depicted under (4). Since the 19th century the two strong onsets have been referred to as the Strong Position, which contrasts with weak positions. The insight embodied by the Strong Position is especially pervasive and deeply rooted in Romance where it constitutes a major observation: its effects are visible in all Romance languages (Meyer-Lübke 1890, 418–419; Lausberg 1967, 44; Zauner 1944, 98).

(4) The five basic syllabic positions and their grouping

position	usual name	
a. #__V	word-initial	} strong positions
b. VC.__V	post-coda	
c. V__.CV	internal coda	} coda } weak positions
d. V__#	final coda	
e. V__V	intervocalic	

This distribution is illustrated in Table 2.2 below by the evolution of Latin obstruents in French.⁵

Table 2.2: Evolution of Latin obstruents in French.

a. #__		b. post-coda		c. coda		d. V__V	
p	'PORTA(M) porte	'TALPA(M) taupe	'RUPTA(M) route	'RIPA(M) rive			
b	'BENE bien	'HERBA(M) herbe	'CUB(I)TU(M) coude	'FABA(M) fève			
t	'TELA(M) toile	CAN'TARE chanter	'PLAT(A)NU(M) plane	'VITA(M) vie			
d	'DENTE(M) dent	AR'DORE(M) ardeur	ADVE'NIRE avenir	'CODA(M) queue			
k	'COR cœur	RAN'CORE(M) rancœur	'FACTA(M) faite	LAC'TUCA(M) laitue			
g	'GULA(M) gueule	AN'GUSTIA(M) angoisse	'RIG(I)DU(M) raide	*A'GUSTU(M) août			
f	'FAME(M) faim	IN'FERNU(M) enfer	'STEPH(A)NU(M) Etienne	DE'FORIS dehors			
s	SER'PENTE(M) serpent	VER'SARE verser	'MUSCA(M) mouche	'CAUSA(M) chose [z]			

Before a (heterosyllabic) consonant (Table 2.2, column c), i.e. in coda position, Latin obstruents are lost altogether. They are also weakened in intervocalic position (Table 2.2, column d), but do not always disappear: labial plosives spirantize, dental and velar plosives (the latter only if adjacent to a back vowel) as well as [f] are lost,

⁵ The Strong Position in French is described by, among others, Bourciez/Bourciez (1967, 122), Nyrop (1914, 303), Pope (1952, 96), Rheimfelder (1953, 151, 187). For the sake of exposition, final consonants are missing. The analysis is exposed at greater length in Ségéral/Scheer (2001a) and Scheer (2004, 122–124).

while [s] voices. By contrast, word-initially (Table 2.2, column a) and after codas (column b), all consonants show the exact same behavior: they appear unmodified in Modern French and have thus sailed through 2000 years of evolution without experiencing any damage.

The cross-linguistically pervasive split of consonants that ought to be onsets into strong and weak items cannot be captured by regular syllabic theory (the onset-rhyme-nucleus-coda model, e.g. Blevins 1995) where all consonants at hand are onsets and have no further syllabic identity. This model is unable to make a difference between the two onsets that are strong ($\{ \#, C \}_\_\_$) and one that is weak (V_V), except listing the former in the disjunctive statement $\{ \#, C \}_\_\_$. Just as the coda disjunction $\_\_ \{ \#, C \}$ was reduced to a single and unique phonological object (the coda), the strong position disjunction $\{ \#, C \}_\_\_$ calls for a reduction to a single and unique phonological object.

But a non-disjunctive description of the Strong Position is not all that needs to be done: whatever this description looks like, it should be somehow the mirror image of the coda: it can hardly be accidental that the two disjunctions are mirror images of each other, and that they also produce opposite effects (strength vs. weakness).

Ségéral/Scheer (2001a; 2008) show that under the assumptions of the CVCV framework (or Strict CV, Lowenstamm 1996; Scheer 2004) both requirements have a straightforward solution. That is, consonants in strong position occur after an empty nucleus $\emptyset\_$ (where $\emptyset$ represents the empty nucleus), while coda consonants are found before an empty nucleus $\_ \emptyset$. Intervocalic consonants on the other hand are not adjacent to any empty nucleus. Given its mirror properties with respect to the coda, Ségéral/Scheer (2001a; 2008) refer to the strong position, $\emptyset\_$, as the Coda Mirror.

3.5 Word-initial /s/+C sequences

Since the 2nd century CE, Latin word-initial /s/+C sequences of different etymological origin are known to have triggered prosthesis (Väänänen 1981, 47–48). The phenomenon is first documented in Pompei, i.e. before 79 CE. It seems that the prosthetic vowel first occurred only when the preceding word ended in a consonant and after a pause: Old French Alexis writes *la spuse* ‘the wife’ (< SPONSA(M)), but *ad espus*. Prosthesis was then lexicalized and occurred in all items of words that began with /s/+C in Latin (Bourciez 1946, 48). The prosthetic vowel only survived in Western Romance and Sardinian (Bourciez 1946, 156).

Prosthesis was typical of Proto-Romance and older stages of Romance languages, but progressively disappeared from the synchronic grammar in many varieties (Sampson 2010, 53–145, offers a detailed survey). For instance, French lexicalized prosthetic vowels and no longer repairs word-initial /s/+C clusters in loanwords (among recent loans are *sport* ‘sport’, *scander* ‘chant_{INF}’ etc.). In child language and in low registers, however, prosthesis may still appear (Plénat 1993, 160). Walloon on the other hand

still synchronically carries out sandhi-driven repair of /s/+C sequences, interestingly by anaptyxis instead of prosthesis (Francard 1981; Burov 2013, 237): compare the word *école* after C-final and V-final words in [ɛnsi'kɔl] (cf. Fr. *une école* 'a school') vs. [lis'kɔl] (cf. Fr. *l'école* 'the school'). The anaptyctic vowel, [i] or [y] according to the variety, is inserted only when /s/ cannot be syllabified in sandhi.⁶ In addition to Gallo-Romance, Gallo-Italic dialects spoken in Emilia-Romagna and Piedmont also still carry out a sandhi-driven repair of /s/+C and other heterosyllabic word-initial sequences by regular prosthesis: [spetʃ] 'mirror', [kwatraspetʃ] 'four mirrors' (Zörner 1989; Repetti 1997).

Ibero-Romance varieties are characterized by the impossibility of /s/+C clusters in initial position, independently of sandhi, although they show inconsistent patterns under the influence of the standard language. In Spanish *un[a]strella* 'a star' is a quite common pronunciation, but it competes with the less colloquial *un[ae]strella*. Note that a lexical /e/ cannot undergo deletion: we have *un[ae]tapa* 'a step', not **un[a]tapa*.⁷ This restriction also holds for most Occitan varieties, although some Occitan and Ligurian dialects spoken in the Alpes-Maritimes display unrepaired /s/+C clusters at the beginning of the word (Dalbera 1994, 69).

Finally, Italian and Romanian allow for word-initial /s/+C clusters. Romanian features two types of sibilants in such clusters, alveolar /s/ and palatal /ʃ/. They agree in voicing with following plosives, while both voiced and voiceless sibilants are attested before sonorants (Chitoran 2002, 13). In Italian only the alveolar sibilant is attested, which also agrees in voicing with the following obstruent and is voiced before sonorants (Lepschy/Lepschy 1981, 83, among others). /s/ palatalizes before selected obstruents in some Italo-Romance varieties but a consistent pattern cannot be identified. In some dialects, e.g. in Campanian, coronals are excluded from palatalization, while in others, e.g. in Abruzzese, /s/ palatalizes only before coronals (eastern) or before all consonants (Aquilano).

4 Nuclei

4.1 Length and syllable structure

Notwithstanding the loss of vowel quantity that occurred in Vulgar Latin and thus affected all Romance languages without exception, in stressed nuclei phonologically

⁶ French words of recent introduction like *scarlatine* do not trigger anaptyxis (Francard 1980, 197, fn. 49, quoted from Sampson 2010, 130). The Walloon pattern may thus be better described as an alternation of lexically affiliated floating vowels with zero, rather than as an insertion of vowels that are absent underlyingly.

⁷ This may seem less clear in European Portuguese where [ʃC-] has almost replaced the conservative variant [ɲC-] preserved in Brazilian Portuguese. The liaison realization of *s* in *a[zəʃ]colas* 'the schools', however, attests that there is still a schwa-like vowel in word-initial /s/+C clusters.

long vowels may be found in many northern Italo-Romance dialects (PANE(M) > [pa:n] ‘bread’, PANNU(M) > [pan] ‘cloth’) as an effect of Open Syllable Lengthening (OSL) and degemination. The process of OSL induced phonetic length on vowels in open syllables (PANE(M) > [pa:ne]) which is absent from syllables containing the first part of a geminate (PANNU(M)). After degemination that occurred in all Romance languages, except for the Italian peninsula below the La Spezia–Rimini line, this length was phonologized in northern Italo-Romance dialects. It distinguishes an important number of words, in particular after final vowel loss (Loporcaro 2015, 61).

Beyond vowel length in northern Italo-Romance dialects, the OSL-induced contrast between nuclei in open and closed syllables has a number of other consequences in different systems, where it yielded a differentiation of vowel quality in open and closed syllables. Vowel differentiation concerned French, Vegliote Dalmatian, and many Italo-Romance dialects in particular in the northern area (von Wartburg 1950). One case in point is a subgroup of the upper southern dialects that includes southern Abruzzi, non-Salentine Apulia, northern and central Lucania and northern Calabria through Molise (Rohlf 1966, 30; Savoia 2015; Passino/Pescarini 2018; Loporcaro 1988; Carosella 2005, among others). In these dialects, tonic open syllables display a richer inventory of vowels, in particular tense vowels undergoing lengthening or breaking under sentence stress, while closed syllables are only able to host a smaller inventory of vowels that do not undergo lengthening, typically lax vowels or light diphthongs. The phenomenon, known as differentiation by position, arose in diachrony but also characterizes synchronic inventories. Most noteworthy, in this area, open syllables of proparoxytonic words pattern with closed syllables (cf. references quoted above). An example taken from the dialect of San Valentino (Passino/Pescarini 2018) is shown in Table 2.3.

Table 2.3: Vowel differentiation by position in Sanvalentinese.

Open syllable		Closed syllable
Paroxytones	Proparoxytones	
pej̥te < PĒDE(M)	met̥ərə < MĚTERE	ˈpett̥ə < PĚCTU(M)
noʊv̥ə < NŌVU(M)	ˈrɔt̥ələ < RŌTULU(M)	ˈkəll̥ə < CŌLLU(M)

This pattern is very rare, as is vowel-breaking under sentence stress (which is attested under different conditions in Gallo-Italic, cf. Carpitelli 1995 for the dialect of Antona, and Gallo-Romance, cf. Léonard 2000 for the Maraîchin dialect). The area featuring vowel differentiation by position and vowel-breaking under stress coincides with the area described in 3.3.1 where word-internal *muta cum liquida* display a heterosyllabic parse. This can hardly be a coincidence and a possible interpretation sees the processes as driven by the action of a metrical template consisting of a stressed syllable followed by two CV slots, the same template yielded by the Latin stress

algorithm⁸ (Passino 2015b). The argument runs as follows: diachronically, the different vocalic qualities depend on vowel-length differences induced by the application of vowel lengthening in stressed open syllables (OSL). Instead of the open/closed syllable dichotomy relevant in other areas, in this area the application of this process was regulated by the template mentioned, which acted as a minimal and maximal target. As shown in (5) with data from the dialect of Bisceglie (de Gregorio 1939), where the stressed CV is indicated in bold, paroxytonic words are the only subminimal words with respect to the template. Since this was the only case in which the template was not respected, OSL applied eventually yielding a differently colored vowel in the evolution of the dialect. The reason why the vowel quality of open syllables of paroxytones stands out with respect to the vowel quality of open stressed syllables in proparoxytonic words and in closed stressed syllables is clearer in this perspective. It also becomes clear why vowels preceding *muta cum liquida* pattern with these latter cases:

(5) Subminimal word Templatic application of OSL⁹ Evolution of V length to quality

C	V	C	V	>	C	V	C	V	C	V	>	C	V	C	V
C	A	N	E		C	A		A	N	E		k	ɔ	n	ə

Words respecting the template No OSL application, no effects on V quality

C	V	C	V	C	V	>	C	V	C	V	C	V
B	A	R		B	A		v	a	r		v	ə
R	A	D	I	C	A		r	a	t	ə	k	ə
L	A	T		R	O		l	a	t		r	ə

Synchronically, the effect of the same template may be posited (cf. Passino 2015b for further evidence) to explain why vowel breaking (or tonic lengthening) applies only to open syllables in paroxytonic words under sentence stress, which in these dialects is final. Length has been transformed into a distinct vowel quality, so paroxytonic words are still subminimal but phrase-internally they satisfy the template in *sandhi* as shown in (6a), where the paroxytonic word ['kɔʃə] is followed by the clitic *lu*. Proparoxytonic words, words with internal *muta cum liquida* or other clusters satisfy the

⁸ In the CVCV syllabic framework some of the positions may remain empty.

⁹ The analysis of open syllable lengthening according to which the melody of the stressed vowel spreads onto an empty slot has been first proposed from the perspective of standard syllable theory, where stress is said to project an empty skeletal slot (Chierchia 1986) or mora (Repetti 1991). In CVCV theory a minimal empty slot is a CV unit, since according to the tenets of the theory a V position always entails a C position and vice-versa. The idea underlying this proposal is the same in both the CVCV and standard perspectives.

template lexically. Only paroxytonic sentence-final words are subminimal. By vowel breaking (or in some dialects tonic lengthening) they satisfy the template, as in (6b), where ['koʦə] has undergone diphthongization to ['keuʦə], so vowel breaking under sentence stress as well as *muta cum liquida* heterosyllabicity are epiphenomena of a metrical template requirement, as exemplified with data from the dialect of Vasto (Rohlf 1966, 30), where " indicates sentence stress:

- (6) a. me 'koʦə lu "stuoməkə
 DAT.1SG burn_{3SG.PRS} DEF.ART.M.SG stomach
 'It burns, my stomach.'
- b. lu 'stuoməkə me "keuʦə
 DEF.ART.M.SG stomach DAT.1SG burn_{3SG.PRS}
 'My stomach burns.'

4.2 Diphthongs

The widespread monophthongization of Latin diphthongs has not precluded the emergence of new diphthongs all over the Romance territory, which originate in a number of distinct phonological processes (cf. Sánchez Miret 1998, 77–80, for a survey of Romance diphthongization).

As was mentioned in 3.3.2, in many Romance languages the first member of opening diphthongs was reanalyzed as part of the onset (ǫvU(M) > Sp. *huevo* > [gw] *evo* 'egg'). In some cases – most noteworthy Romansh and Francoprovençal – glides in closing diphthongs also hardened to plosives (TELA > *tejla* > *teglä* 'cloth', Kamprath 1987; Krier 1985; Montreuil 1999).

Some other interesting aspects concerning diphthongs are on record in Romance. In Romanian, for instance, alongside diphthongs with close vowel onset glides, there are also mid-vowel onsets ([ɔa], [ɛa]). Romance diphthongs may be rising, falling, and in some cases also centering. Rising and falling diphthongs may be found in the same language (Vegliote Dalmatian, upper southern Italo-Romance dialects, Romansh). The peculiar phenomenon of surface diphthongization in open syllables under sentence stress in an upper southern Italo-Romance area has been discussed in 4.1 and exemplified in (6).

Falling diphthongs in closed syllables are not allowed in Ibero-Romance, except when the coda is weightless /-s/ (Spanish *seis* 'six', Portuguese *mais* 'more', *sais* 'salt_{PL}'), but they are not rare elsewhere, Romansh, Francoprovençal, and Vegliote Dalmatian being cases in point. Diphthongs in closed syllables can be rising, falling, or both, metaphonic, non-metaphonic, or both. Rising and falling diphthongs can be distributed according to the type of syllable (i.e. the metaphonic diphthongs in Casalincontrada: TRAVE(M) > ['tra:və] 'beam', metaphonic ['treivə], PASSU(M) > ['passə] 'step', metaphonic ['pjessə], cf. De Lollis 1890–1892) but diphthongs in closed

syllables are not restricted to rising diphthongs (i.e. Lombard [tɛ̃mp] ‘weather’, Apulian [ˈvugkkə] ‘mouth’; Romansh [daɲt] ‘tooth’, cf. Savoia 2015).

5 Codas

5.1 Word-internal codas

5.1.1 The situation across Romance

Unlike simplex onsets, where few or no segmental restrictions are observed, the coda frequently imposes restrictions on sonority and place of articulation. Latin, however, did not impose any restrictions of this kind: both obstruents and sonorants of different place of articulation could be a coda in this language (Marotta 1999, 302; Cser 1999).

A very general evolution is found in all of Western Romance where Latin geminates (whose left member stands in coda position) degeminate: cf. CUPPA(M), GUTTA(M), VACCA(M), OSSU(M) > Por. *copa* ‘goblet’, *gota* ‘drop’, *vaca* ‘cow’, *o[s]o* ‘bone’.

In a number of Romance languages like Spanish, Portuguese, and Italian obstruent codas are either not permitted or marginal: they appear only in formal registers, learned words, or loans, are neutralized or suffer from other restrictions, and undergo a number of different repairs, like obstruent voicing neutralization in Spanish (Alonso 1945; Hualde 1989; Colina 2012, 143–145), vowel epenthesis in Portuguese (BPor. *enig[i]ma*, EPor. *enig[ə]ma*), loss of the coda consonant and compensatory lengthening of the following consonant (often referred to as assimilation) (*pragmatica* > *prammatica* ‘pragmatics’), or epenthesis (*stricnina* > *stricchinina* ‘strichnine’) in Italian (Porru 1939).

If we leave aside those marginal cases, Romance languages show a strong general tendency to impose conditions on codas, restricting the segments licensed in this position to the three sonorants /N/, /l/, and /r/ plus the fricative /s/ (cf., e.g., Baroni 1993 and Marotta 1995 for Italian). Obstruent codas are licensed only if they form the first part of geminates (Itô 1986): cf. Italian where plosives in coda are lost, driving compensatory lengthening of the following consonant (often referred to as assimilation) (LACTE(M) > *latte* ‘milk’, ADRIPIRE > *arrivare* ‘arrive_{INF}’, OBTURARE > *otturare* ‘block_{INF}’, SCRIPSI > *scrissi* ‘write_{1SG,PRET}’).

Within this common pattern, each system shows more specific realizations and additional phonemes in coda position. Thus, Castilian Spanish also admits /θ/ and /d/, even though the latter has a large array of variants comprising [d], [t], [ð], [θ] and zero (Hualde/Eager 2016). Also, liquids lenited to *yod* and neutralized in some Spanish dialects. The lateral is velarized in Catalan and Portuguese and many northern and southern Italo-Romance dialects. A number of southern and American Spanish varieties have debuccalized /s/ (*pasta* > *pa[h]ta*), the result of which may trigger tense/lax contrasts

(along with vowel harmony) as in Eastern Andalusian (e.g. [poko]/[pɔkɔh] *poco/pocos* ‘little_{SG}/few_{PL}’; Zamora Vicente 1979, 290–296).

Another rather general characteristic of Romance is the homorganicity of nasal-obstruent sequences (Bolognese being a noteworthy exception, i.e. [paŋdg] ‘rat’). Further assimilations of the type [mb] > [mm], [nd] > [nn] also took place in Italo-Romance, Catalan, Aragonese, and (as regards [mb]) Castilian.

In French, broadly speaking all consonants in internal codas save /r/ have been eliminated in the evolution from Latin to Middle French. More specifically, when internal codas were eliminated, their segmental properties were typically transferred to their (left-hand) environment. Hence coda nasals disappeared but their nasality was shifted to the preceding vowel (GAMBA(M) > *jambe* [ʒãb] ‘leg’). Coda velars were reduced to *yod*, which then combined with the preceding vowel (FACTU(M) > *fait* [fɛ] ‘fact’). Laterals in internal coda position were velarized and vocalized to [w], and eventually combined with the preceding vowel (TALPA(M) > *taupe* [top] ‘mole’). Only labial and dental obstruents disappeared without a trace (RUPTA(M) > *route* ‘road’, PLAT(A)NU(M) > *plane* ‘plane’), /s/ producing a compensatory lengthening on the preceding vowel (TESTA(M) > *tête* ‘head’, cf. Gess 2006 for the status of this length, which did not catch on). The modern language, however, allows coda consonants introduced by loans (from Latin or other sources): *fa*[kt]eur ‘postman’, *Stali*[ŋg]rad (Metro station in Paris), *fa*[ls]ifier ‘falsify_{INF}’, *re*[st]er ‘stay_{INF}’ etc.

5.1.2 Codas that look like onsets

In (southern) varieties of mainland French, ATR values of mid vowels are in (strict) complementary distribution (Durand/Slater/Wise 1987; Durand 1990, 24–27, cf. also Dell 1973, 209; Morin 1986; Tranel 1987b, the phenomenon is called *Loi de position* or Closed Syllable Adjustment): +ATR in open syllables *b*[e]tise ‘stupidity’, *f*[ɔ]lie ‘madness’, *g*[ø]ler ‘bawl_{INF}’), -ATR in closed syllables (*b*[ɛ]te ‘stupid’, *f*[ɔ]lle ‘mad_F’, *g*[œ]le ‘gob’). This also extends to the position before consonant clusters: *m*[e]trique ‘metric’ vs. *al*[ɛ]rte ‘alert’, *se* *v*[o]trer ‘sprawl_{INF}’ vs. *div*[ɔ]rcer ‘get_{INF} divorced’, *p*[ø]pler ‘inhabit_{INF}’ vs. *s*[œ]rfer ‘surf_{INF}’. ATRness of mid vowels is thus a diagnostic of syllable structure: -ATR before final consonants shows that these are codas, and sequences behave as expected according to their sonority slope: -ATR before sonorant+obstruent, obstruent+obstruent and sonorant+sonorant sequences confirms that these are coda-onset interludes, while +ATR before obstruent+sonorant clusters show that they are branching onsets.

Interestingly, schwa misbehaves: in open syllables when the following vowel is a schwa, -ATR items occur to its left: *b*[ɛ]tt[ə]rave ‘beetroot’, *p*[ɔ]tt[ə]rie ‘pottery’. Schwa thus behaves as if it were not there. Even more interesting is the fact that whether schwa is actually pronounced or not is irrelevant: forms without pronounced schwa also show -ATR vowels: *b*[ɛtʁ]ave, *p*[ɔtʁ]ie.

Its -ATR value shows that the first vowel of these items is checked despite the apparently well-formed branching onset [tr] to its right. The only possible conclu-

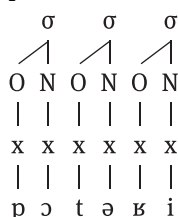
sion is that the sequences at hand are coda-onset sequences. There is thus a contrast between secondary obstruent+sonorant sequences (which are created by the non-pronunciation of a schwa) and primary obstruent+sonorant clusters (which cannot be pronounced with a schwa in their midst): the latter are branching onsets, while the former are coda-onset interludes.

One may think of an analysis whereby the two consonants have failed to resyllabify in absence of the schwa: [tr] is a good branching onset but, when created by schwa loss, does not engage in this close relationship. This cannot be true, though, since we know that the [t] *did* resyllabify: it closes the preceding syllable and hence creates a coda-onset sequence. Its first consonant, [t], was thus an onset in the presence of the schwa and has become a coda in its absence. In a language where regular syllabification of obstruent+sonorant clusters produces branching onsets there is no way to achieve a coda-onset syllabification of the same clusters when resyllabification occurs. Therefore, the clusters in *b[ɛtʁ]ave*, *p[ɔtʁ]ie* cannot be coda-onset sequences. If they were, they would violate the sonority specification of this type of cluster anyway: only clusters of falling or plateau sonority slope qualify.

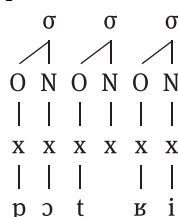
It must thus be concluded that the sequences in question are neither branching onsets nor coda-onset interludes. The only logical possibility that is left, then, is to consider them as two independent onsets – exactly what they were before schwa was dropped. That is, resyllabification fails indeed when schwa is left unpronounced: its non-pronunciation is the only event that occurs, which leaves an empty nucleus. This is shown under (7).

(7) *p[ɔ]terie*

a. pronounced with schwa



b. pronounced without schwa



Relevant in this context may be the experimental literature that has tested the phonetic properties of sequences of sounds that belong to the same morpheme and are lexically adjacent, as opposed to the same sequence when it is heteromorphemic. Spinelli/McQueen/Cutler (2003) examine liaison consonants as opposed to word-initial consonants (/r/ in *dernier oignon* ‘last onion’ vs. *dernier rognon* ‘last kidney’), while Fougeron/Steriade (1997) contrast word-initial /dr/ with /dʁ/ produced by schwa deletion at the end of the first word (*pas drôle* ‘not funny’ vs. *pas d’rôle* ‘no role’). Both studies find that although the respective sequences could/should be homophones, they are actually not: the phonetic signal systematically carries information

that distinguishes monomorphemic and heteromorphemic items (schwa was completely absent, but [d] had greater linguopalatal contact and a longer occlusion in *pas d'rôle* than in *pas drôle*, liaison consonants are shorter than word-initial consonants).

Regarding the liaison case, however, Shoemaker (2009) and Shoemaker/Bird-song (2008) show that Spinelli/McQueen/Cutler (2003) are wrong in concluding that the presence of a systematic difference in the phonetic signal is used by speakers in order to disambiguate the two sequences. Shoemaker's experimental results demonstrate that speakers are unable to correctly recognize homophonous-looking but in fact phonetically distinct sequences like *un air* 'a song' and *un nerf* 'a nerve'. They ignore the phonetic information present in the signal in spite of the pragmatic pressure to tell the two sequences apart. Shoemaker thus shows that the phonetic signal is irrelevant for phonological analysis since it does not tell us anything about what is actually perceived. Do Carmo-Blanco et al. (2019) show that the situation may be even worse: their EEG-based study documents that potential homophones like *l'allocation* 'the allocation' and *la locution* 'the locution' are actually treated differently by the brain, but not told apart by speakers.

Finally, the situation regarding correct discrimination of alleged homophones in Fougeron/Steriade's (1997) study is unclear: stimuli come from two speakers (both Parisian) and participants were able to tell apart *pas d'rôle* and *pas drôle* when exposed to the recording of one speaker, but not when listening to the recording of the other speaker.

What does this experimental evidence suggest in the case of Fr. *p[ɔ̃tʁ]ie* 'pottery'? The question here is not related to any allegedly homophonous sequences that are either mono- or heteromorphemic. As in Fougeron/Steriade's case, schwa is completely deleted and it may well be the case that the phonetic signal contains information identifying the [t-ʁ] cluster as being different from a [tʁ] cluster that is not the result of schwa deletion (like in Fr. *motrice* 'railcar' or *votre* 'your'). This phonetic information may well be the reason for the ensuing syllabification of [t-ʁ] as a sequence distinct from a branching onset, which in turn causes the effect on the preceding vowel. But the syllabification in question is then precisely the one shown in the conclusion that was reached under (7) in absence of experimental evidence: the phonetic absence of schwa does not lead to resyllabification and the only thing that happens is, precisely, the phonetic absence of schwa, with syllable structure remaining untouched. That is, when schwa is deleted its nucleus remains and is empty. It is this empty nucleus that causes the preceding vowel to be -ATR.

This state of affairs raises the question of what it means for a vowel to be in a closed syllable. There seem to be two "closed syllables" in the relevant southern varieties of French: a vowel is checked when followed by a true coda-onset interlude (in primary sequences: *div[ɔ̃]r.cer*), but also when followed by an empty nucleus (in secondary sequences: *p[ɔ̃]tθrie*). This disjunction seems awkward since it fails to express the generalization, i.e. to provide a single reason for the occurrence of all -ATR vowels. The only alternative is to generalize the empty nucleus definition: in

these systems -ATR vowels occur in closed syllables and a closed syllable is one whose vowel is followed by an empty nucleus. Hence sonorant+obstruent sequences also host an empty nucleus: they identify as sonorant+ $\emptyset$ +obstruent (*divorcer* is thus *divor $\emptyset$ cer*).¹⁰

5.2 Word-final consonants

5.2.1 Syllabic status

Cross-linguistically, word-final consonants either behave as codas (i.e. pattern with internal codas) or they do not (Côté 2011a; Scheer 2004, 417–418, 625–664; 2012). Diagnostics for their codahood are their own behavior (they do or do not show coda effects) and the behavior of the preceding vowel (which does or does not show closed syllable effects). The codahood of word-final consonants is a parametric property and hence needs to be established for every language in its own right.

The traditional way of implementing the variable syllabic status of word-final consonants is through extrasyllabicity: word-final consonants are said to be extrasyllabic when they do not behave as codas. In case they do, they are not extrasyllabic and hence undergo regular syllabification, which parses them as codas. When extrasyllabic, they remain unparsed upon syllabification and are later adjoined to some constituent after coda-based processes have applied: cf. e.g. Kenstowicz (1994, 274–275) and Jacobs (1995) for Old French.¹¹

An alternative to the extrasyllabic analysis, where in syllabic terms word-final consonants are either codas or nothing, holds that they are either codas or onsets. Literal implementations of this view are found in Piggott (1991; 1999; 2003) and Rice (2003): in languages where word-final consonants pattern with codas, they are syllabified as codas (which are the final syllabic constituent of the word), while in languages where they do not follow the behavior of codas they are onsets of an empty nucleus.

A non-literal implementation of this insight is found in Strict CV Phonology where syllable structure boils down to a sequence of strictly alternating non-branching

¹⁰ The argument based on southern French ATR alternations is made at greater length in Scheer (2004, 527–530; 2015, 44–48, 109–113). Space limitations preclude further exploration of Strict CV Phonology (Lowenstamm 1996; Scheer 2004) where the closed syllable is a function of the emptiness/contentfulness of the following nucleus: a vowel is located in a closed syllable iff it is followed by a (governed) empty nucleus (e.g. Scheer 2015, 122–125).

¹¹ The older literature also features the appendix (Fudge 1969; Halle/Vergnaud 1980; Kenstowicz 1994, 260–261), a syllabic constituent designed to host consonants at word edges that must not (final consonants that do not behave as codas) or cannot (initial consonants of unsyllabifiable clusters such as /#rt/) be regular onsets or codas. The appendix is essentially a version of extrasyllabicity, except that there is no adjunction of extrasyllabic consonants to some constituent after the application of coda processes since they already belong to a constituent.

onsets and non-branching nuclei: here all word-final consonants are onsets of a (final) empty nucleus. What makes the difference between the traditional notions of onset and coda is the lateral relationship that consonants entertain with their nucleus: they are onsets if this nucleus is filled, but codas when it is empty. Word-final empty nuclei may parametrically have either status. That is, the coda- or onsethood of word-final consonants depends on the parametric status of the final empty nucleus (Scheer 2004, 625–664; 2012; Scheer/Ziková 2010).

Following the coda vs. onset view, we illustrate the parametric variation at hand in Romance, where some languages fall on the coda side, while others treat final consonants as onsets.

5.2.2 Final consonants are codas

In the Italian native lexicon, final consonants are not allowed (cf. Devoto 1961, among others). A number of function words allow coronal sonorants in final position (*per* ‘for’, *con* ‘with’, *il* ‘the’) and final consonants of all kinds occur in loanwords (cf. Devoto 1961; Passino 2008, among others). This indicates that they sit in a closed syllable and hence word-final consonants are codas. Final consonants show a pattern of lengthening before vowels in derivation and phrasal domain indicating that they are treated as codas. Gemination can be interpreted like a strategy that avoids resyllabification of codas and provides them with a following onset that licenses them. Bafille (2003) offers detailed evidence, and focuses on central and southern Italo-Romance varieties where word-final consonants also behave as codas.

Spanish word-final consonants, like internal codas, are restricted to sonorants – /-l/, /-n/, and /-r/ (*papel* ‘paper’, *camión* ‘truck’, *amor* ‘love’) – as well as to the obstruents /-s/, /-θ/ (*mes* ‘month’, *pez* ‘fish’), /-x/ (*reloj* ‘watch’) and /-d/ (*virtud* ‘virtue’), which can be realized as [ð], [θ], [t] or be deleted (Colina 2012, 145; Hualde/Eager 2016). Hualde (1999) describes the behavior of word-final consonants in non-assimilated recent loans. Debuccalization of /s/ and liquid gliding in internal codas which occur in a number of Spanish dialects spoken in southern Spain and Latin America also apply to word-final consonants (cf. Núñez-Cedeño 1997, among others). Likewise, among the varieties of Occitan, the segments allowed in final position in Provençal obey the same distributional restrictions as internal codas, allowing only [j w r s] and nasals homorganic to the following consonants (Sauzet 2004, 35; 222 Occitan). Italian, Spanish, and Occitan thus feature processes that target true codas, i.e. both internal codas and word-final consonants that have coda status.

These word-final codas, however, exhibit specific properties, among them metrical weight. Occitan final sonorants count for weight and may undergo a number of lenition processes typical of codas, while obstruents may be considered onsets of an empty nucleus (Sauzet 2004). Although this remains a subject of debate (cf. Piñeros

2016), it has also been argued since Harris (1983) that Spanish is a quantity-sensitive language, final codas, except /-s/, generally attracting stress. The same holds for Portuguese (Carvalho 1989b; Wetzels 2007). European Portuguese, in particular, adds to metrical weight two other phenomena – vowel reduction and resyllabification – that support a finer analysis of the syllabic status of post-vocalic segments, and challenges the commonly assumed representations of complex rhymes. Leaving aside binding-based models like Levin's (1985) X-bar theory of the syllable, these allow for two possibilities only: VV vs. VC (or VcV vs. VCv in Strict CV, c and v being empty positions). However, Portuguese exhibits four types of rhymes according to the criteria in Table 2.4 (cf. Carvalho 2011).

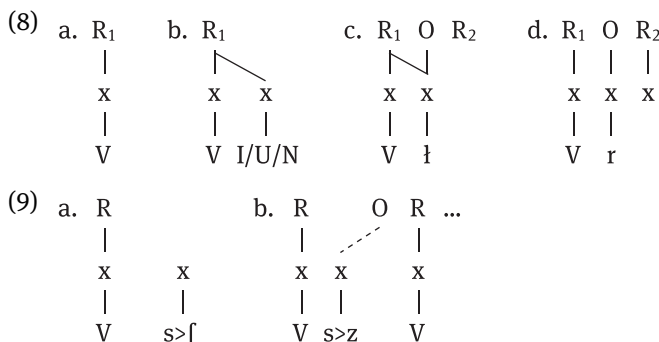
Table 2.4: Portuguese rhymes.

	I /V/(+/s/)	II /V/+/I U N/	III /V/+/l/	IV /V/+/r/
a. Word-final stress	–	+	+	+
b. Vowel reduction	+	–	–	+
c. Resyllabification	+	–	–	+
d. ± /s/	+	+	–	+

Paroxytones ending in [V(s)] (e.g. *mata*, *matas* ‘forest_{SG/PL}’) and oxytones ending in [Vj], [Vw], [VI], [VN] and [Vr] (*matai* ‘kill_{IMP,PL}’, *calhau* ‘pebble’, *casal* ‘couple’, *maçã* ‘apple’, *matar* ‘kill_{INF}’) are the unmarked stress patterns. Pretonic [V], [Vs] and [Vr] undergo vowel reduction (*m[u]rar* ‘inhabit_{INF}’, *g[u]star* ‘like_{INF}’, *c[u]rtar* ‘cut_{INF}’), as opposed to [VI], [VU] (*c[o]itado* ‘poor guy’, *l[o]uvar* ‘praise_{INF}’) and [VI/N] (*v[o]ltar* ‘go_{INF} back’, *c[õ]ntar* ‘relate_{INF}’). Final /s/ and /r/ are resyllabified (*nó[z]amamos* ‘love_{1PL}’, *ma[r]alto* ‘high sea’, but not so for [I], [U] (*v[ɑ̃]* *agora* ‘go now’, *m[ɑ̃w]* *amigo* ‘bad friend’) or /l/, /N/ (*s[ɑ̃]* *amargo* ‘bitter salt’, *l[ẽ]* *azul* ‘blue wool’). All those rhymes except /VI/ ([Vɫ] with a strongly velarized vowel) can be closed by /s/ (which is often the plural or the 2nd person singular suffix): *matas* ‘forest_{PL}’, *kill_{2SG}*, *vais* ‘go_{2SG}’, *maus* ‘bad_{PL}’, *lãs* ‘wool_{PL}’, *mãos* ‘hand_{PL}’, *mares* ‘sea_{PL}’.

If only two main types of complex rhymes are assumed to exist, the above differences should be seen as an effect of the intrinsic content of features, that is of mere stipulations, as the same segments do not behave alike from language to language: in Spanish, for example, types II and III can be argued to be non-existent, /I U I N r/ (plus /θ~d/) all belonging to type IV. The reasons for the behavior of European Portuguese post-vocalic segments are thus to be searched for within syllable structure.

The autosegmental formalism opens a perspective for a straightforward solution. Let us assume that the four types of syllables follow from how the O(nset)R(hyme)-tier and the feature tier interact through a skeleton of pure timing units (x):



These configurations permit four generalizations which account for the data in Table 2.4. First, if only rhymes anchored to x-slots count for quantity, unmarked stress is arguably triggered by the penultimate R-x association; stress thus falls on R_1 in (8b–d). Second, only “light”, i.e. non-branching, rhymes are likely to undergo vowel reduction, which therefore does not apply to (8b, c).¹² Third, segments unassociated with R remain or are syllabified as onsets before /V/, as in (8d) and (9b) respectively. Finally, /s/, which can occur after any anchored R, as in (8a, b, d), remains unsyllabified before a consonant and word-finally since its x-slot does not associate with any syllabic position, as shown in (9a); it does, however, associate with a following empty onset, i.e. before a vowel, as in (9b). ([ʃ] and [z] are the two respective allophonic realizations of /s/.)

Thus, only (8d) represents “true” onsets. In fact, among the commonly accepted codas of European Portuguese, /r/, and only /r/, behaves like any consonant followed by a schwa: cf. *bate* ‘beat_{3SG}’, *pague* ‘pay_{3SG}’, *passe* ‘pass_{3SG}’, *come* ‘eat_{3SG}’, *vale* ‘valley’ etc. Furthermore, unlike (8c) and (9a), (8d) generally involves vowel epenthesis: *mar*[^ə], *bat*[^ə], *pagu*[^ə], *pass*[^ə]. It is worth noting that <-z> (= Sp. /θ/), albeit phonetically identical to <-s> in modern Portuguese, should be viewed as an instance of (8d), not of (9a). This dispenses with the need for a cyclic approach to pluralization (*paz* ‘peace’ → *pazes* ‘peace_{pl}’, along with *mar* ‘sea’ → *mares* ‘sea_{pl}’).

5.2.3 Final consonants are onsets

In Proto-French (the language spoken in the north of France that was already different from Late Latin but also from Occitan and Francoprovençal, before the onset of written testimony) and Old French (the same language a little later, now documented by written testimony), word-final consonants were onsets: preceding vowels freely

¹² Final /Vr/ syllables escape vowel reduction as well. This is easily explained within Carvalho’s (2017) account of sonority categories but will be left out due to lack of space.

diphthongized and word-final consonants did not participate in coda lenition (loss of /s/, vocalization of /l/).

In the evolution from Latin, tonic vowels in open syllables diphthongized in Proto-French. Unlike in other Romance languages, diphthongization affected all vowels (e.g. Lausberg 1969, 152; Zauner 1944, 49–50).¹³ It also occurred before word-final consonants, even when they were already word-final in Latin (hence there is no way to set up an analysis whereby diphthongization was carried out before the loss of the final vowel). Items without final vowel in Latin include MEL > OFr. *miel* ‘honey’, FEL > OFr. *fiel* ‘bile’, QUID > OFr. *quei* (ModFr. *quoi*) ‘what’, APUD HOC > OFr. *avuec* (ModFr. *avec*) ‘with’ (e.g. Bourciez/Bourciez 1967, 65–84). At the time when the different waves of diphthongization occurred, word-final consonants were thus onsets.

The same conclusion is reached when looking at consonantal lenition that occurred later on in internal codas but left word-final consonants unaffected: the loss of /s/ (followed by compensatory lengthening of the preceding vowel) and /l/ vocalization which are observed in the Old French period. Examples are TESTA(M) > OFr. *teste* > ModFr. *tête* ‘head’ for the former, and TALPA(M) > OFr. ModFr. *taupe* ‘mole’ for the latter. Typical alternations in Old French (preserved with analogical leveling here and there in Modern French) triggered by the plural marker -s illustrate the syllabic status of word-final consonants: in *cheval/chevau-s* ‘horse_{sg/pl}’ the lateral remains unvocalized in word-final position but vocalizes in the plural because it comes to stand before the /-s/, i.e. in an internal coda (Gess 1998). Also, unlike in internal codas, the final /-s/ itself is not deleted.

It is worth noting that the opposite path is also attested: in Catalan lenition affected final /n/ and /r/ (VINU(M) > *vi* ‘wine’, DURU(M) > *dur* [du] ‘hard’) but left their internal counterparts unchanged (PUNCTA > *punta* ‘tip’, PORTA > *porta* ‘door’). /s/ and /l/, however, behave alike in the two positions.

Finally, it needs to be mentioned that since the late 12th century, phonological processes applied across word boundaries in Old French, giving rise to external sandhi. The behavior of word-final consonants provides further illustration of their onset status: they were pronounced before a pause and before a vowel (*apres, petit, vif, avec*; in the latter context fricatives were also voiced: *vi*[v], *apre*[z]), but were lost when the following word was consonant-initial (*apre, peti, vi, ave*) (Nyrop 1914, 308–309). The crucial diagnostic here is their behavior before a pause (pronounced), as opposed to when they are followed by a consonant (eliminated). In true word-final position before a pause, i.e. when uninfluenced by following words, word-final consonants remain unaffected by coda lenition. Elsewhere, their syllabic status depends on the following word (resyllabification): onset before vowel-initial words, coda before consonant-initial words.

¹³ Only *ī* and *ū* appear not to participate in diphthongization, but in fact they may also have undergone this process, producing [ij], [uw] which remained invisible in writing (Straka 1979, 233).

5.2.4 Word-final devoicing

In a number of past and present Romance languages, word-final obstruent devoicing is active: Catalan, Occitan, Old French, Friulian, Romansh, Walloon, and other Gallo-Romance and Gallo-Italic varieties (Mascaró 1987; Recasens 1993; Sauzet 2004; Rheinfelder 1953, 290; Francard/Morin 1986; Baroni/Vanelli 2000, among others). Final devoicing generates paradigmatic alternations between voiceless and voiced consonants in nominal and verbal paradigms (Cat. [gris] ‘grey_{M.SG}’ / [ˈgrizə] ‘grey_{F.SG}’, Oc. [sap] ‘know_{3SG}’ / [ˈsabi] ‘know_{1SG}’) and interacts with other processes in interesting ways. In Catalan, final devoicing interacts with regressive voice assimilation, so that voiced consonants block the devoicing of final voiced obstruents ([ˈlob.gran] ‘big wolf’, cf. [ˈloɔp] ‘wolf’, [ˈloβa] ‘wolf_F’, [ˈloɔp.ˈtrist] ‘sad wolf’, Bermúdez-Otero 2001). In Friulian, only vowels preceding devoiced obstruents are long ([la:t] ‘gone_M’ cf. *lade* ‘gone_F’ and [lat] ‘milk’, Baroni/Vanelli 2000), whereas in Nissart paragoge does not block final devoicing (*Niçar*[te] ‘inhabitant of Nice_{M.SG}’ *Niçar*[da] ‘inhabitant of Nice_{F.SG}’ (Dalbera 1994, 171–172). In the Badioto variety of Ladin, final devoicing generally applies in the language, but it is blocked in first person singular present, thus distinguishing it from the third person (*perd*, *perdes*, *pert* ‘lose_{1/2/3SG}’, Laura Vanelli, p.c.).

5.2.5 Final clusters

Not all Romance languages allow clusters in word-final position. Ibero-Romance, eastern Occitan, Middle French, middle and southern Italo-Romance dialects impose restrictions on final consonants and disallow consonant clusters. Italian does not feature word-final consonants and clusters in its native lexicon. Recently, however, the once systematic repairs by deletion and epenthesis only take place in less formal and more regionally marked registers. Among the Romance languages that allow word-final clusters, namely French, Romanian, western Occitan, Romansh and northern Italo-Romance, sonorant+obstruent clusters are generally accepted (Fr. *porte* ‘door’, Rm. *colb* ‘dust’, Dalm. [ˈjualb] ‘white’, Bol. [ka:rg] ‘loaded’, western Lengadocian [sɛrp] ‘snake’, Aquitano-Pyrenean [pɔrk] ‘pork’). In some Italo-Romance dialects, sonorant+obstruent clusters are broken up by a vowel if the obstruent is voiced and non-homorganic with the preceding sonorant: ORBU(M) > Reggiano of Novellara [orɔb] ‘blind’ vs. VIR(I)DE(M) > [verd] ‘green’ (cf. Bol. [orb], [vaird], Malagoli 1910).

Sonorant+sonorant clusters occur in French, Romanian, and Romansh (Fr. [bɔʁn] *borne* ‘milestone’, Rm. [lɛmn] *lemn* ‘wood’, Rom. [viərm] *vearm* ‘worm’) but are repaired by anaptyxis in other varieties (FORNU(M) > Bol. [ˈfauren] ‘oven’). A less usual repair strategy is found in eastern Occitan, where the various Alpine dialects spoken in the High and Maritime Alps (Nice, Barcelonnette, Puget-Rostang), resort to

fortition of the final sonorant: (IBERNU(M) > [ivert] ‘winter’), VERME(M) > [verp] ‘worm’) to repair sonorant+sonorant clusters. Bolognese also repairs sonorant+[v] (NERVU(M) > [nerov] ‘nerve’ / CARNE(M) > [kɛ:ren] ‘meat’, cf. ORBU(M) > [orb] ‘blind’). In these dialects [v] seems to behave like a sonorant, a pattern documented elsewhere, e.g. by Cyran/Nilsson (1998) for Slavic and Butskhrikidze (2002) for Georgian. There is also phonetic evidence suggesting that Italian [v] is in fact an approximant (Rispoli/Savy 1995).

Obstruent+obstruent clusters occur in French (*contact* ‘contact’), Romanian (*copt* ‘ripe’), but in Romansh and Francoprovençal varieties only when deriving from hardened glides (NIVE(M) > Sur. [nejf] > [nekf] ‘snow’, CRUCE(M) > Sur. [krouʦf] > [krokʃ] ‘cross’). The phonological status of these hardened glides in Romansh is debated (Kamprath 1987; Montreuil 1999; Savoia 2015, 187–201). Northern Italo-Romance usually repairs word-final obstruent+obstruent clusters, but some exceptions are on record (Bol. *tavd* ‘lukewarm’, [paɲdg] ‘rat’; cf. neighboring dialects *taved*, *pandeg*).

Final obstruent+sonorant clusters are generally avoided in Romance and repaired by paragoge or anaptyxis MACRU(M) > Bol. [‘mɛ:ger] ‘slim’, Rom. [metr] > [‘meter] ‘meter’. They are found in French (*quatre* [katʁ] ‘four’, *livre* [livʁ] ‘book’), where the liquid, however, may be dropped ([kat], [liv]). These clusters also occur in some varieties spoken in the Maritime Alps that belong to the Ligurian group ([aagr] ‘sour’, [awtr] ‘other’, Dalbera 1994, 67). Notwithstanding the pattern of anaptyxis described for Romansh, some unrepaired final obstruent+sonorant clusters may also be found in this language, as discussed by Anderson (2016, 172), among others.

Finally, /s/+C clusters are generally admitted, and this is also true in case C is an obstruent in languages that otherwise do not allow for obstruent+obstruent clusters. /s/+C clusters where C is a sonorant are treated as obstruent+sonorant and repaired in northern Italo-Romance and Romansh (Imolese [‘æzən] ‘donkey’, cf. Bottiglioni 1919).

On a more general note, Romance thus complies with the implicational hierarchy proposed by Cyran (2010, 288) whereby final obstruent+sonorant implies final sonorant+obstruent. In addition, it is interesting to note the place of clusters with a flat sonority slope (obstruent+obstruent, sonorant+sonorant), which are less problematic than obstruent+sonorant and do not necessarily pattern together (e.g. Bolognese repairs final sonorant+sonorant while accepting final obstruent+obstruent).

5.2.6 Resyllabification

Romance varieties are characterized by a number of sandhi processes (an exhaustive overview is provided in Sampson 2016), many of which affect syllabification.

We have previously described epenthesis (relevant segments henceforth in bold) taking place when clusters are not syllabifiable in sandhi in Romance varieties such as Piacentino (Gallo-Italic) [kwæ:tar] ‘four’, [‘kwæ:tra”spetʃ] ‘four mirrors’, Usse-

gliese (Francoprovençal) [u'sastal^{va}] 'he got up', [falul^{va}] 'let him get up' < LEVARE 'get up_{INF}' , Teraman (upper-southern Italo-Romance) [nən'vu:jə] 'I don't want', [nnə'mbru:jə] 'I don't cheat', Walloon (Gallo-Romance) [ɛnsi'kɔl], Fr. *une école* 'a school' vs. [lis'kɔl], Fr. *l'école* 'the school'. In these varieties, the vowel/zero alternation pattern at hand results in a different syllabic affiliation of the unsyllabifiable segment after epenthesis.

Another type of resyllabification occurs when a word-final consonant is pronounced in the onset of the following vowel-initial word. This pattern was illustrated in Portuguese (cf. 5.2.2) and Old French (cf. 5.2.3). The latter describes the genesis of Modern French liaison, which is discussed in a massive body of literature (Encrevé 1988; Durand et al. 2011; Côté 2011b): the word-final <-t> of *petit* 'small' is pronounced before vowel-initial words as in *petit enfant* 'small child', but not before consonant-initial words as in *petit café* 'small coffee' or before a pause *il est petit* 'he is small'.

As for sigmatic dialects of Occitan, Sauzet (2012) assumes resyllabification on the basis of sigmatic plurals that surface as voiced, regardless of word-final devoicing applying in the language (*los autres òmes* [lu,zawtre'zɔmes] 'the other men'). Also, word-final plosives resyllabify: *trauc escur* [traw.kes'ky] 'dark hole', Oliviéri/Sauzet 2016). Spanish word-final consonants are commonly assumed to undergo resyllabification across a word boundary before a following vowel, (/los#otros/ 'the others' is realized as [lo.'so.tros], Harris 1969, 59, among others). In many varieties of Spanish segmental processes that apply to codas interact in interesting ways with resyllabification (an exhaustive recapitulation is proposed by Strycharczuk/Kohlberger 2016). As these authors observe, the behavior of Spanish resyllabified codas, so-called "derived onsets", has been at the heart of a theoretical debate concerning the question how resyllabification and segmental processes may interact to produce distinct outputs for lexical and derived onsets.

In Italian, as mentioned in 5.2.2, autochthonous word-final consonants are limited to sonorants in function words and undergo resyllabification (Nespor/Vogel 1986). By contrast, other coda consonants present in borrowed lexical words undergo gemination before vowel-initial words (*tram elettrico* [tram.me'let.tri.ko] 'cable car') (Chierchia 1986; Passino 2006, among others). That is, an onset is generated without the consonant losing its original syllabic affiliation.

5.3 Final remarks

Although diachronic change from Latin to Romance did not modify the maximal syllable template, it resulted in dramatic diatopic differences in both surface phonotactics and possible syllabification at the phonological level across Romance-speaking areas.

The extreme variety of syllable-related phenomena found in Romance has fed phonological thinking and contributed greatly to building and refining phonological theory. As a matter of fact, the wealth of the phenomena, the richness of the data, some of which are still waiting to be brought to light, make it a good laboratory for testing phonological theories and contributing to phonological typology. Given space restrictions, it is therefore illusionary to do justice to all scholars who have worked on syllable structure in Romance and to all the theoretically relevant Romance data. We have thus made a selection that we hope succeeds both in illustrating the basics of syllabification in Romance and in giving a taste of the many pieces of data that do not fit well within standard assumptions. It is our contention that seriously addressing these data, within any phonological framework, is bound to greatly contribute to our understanding of the syllable as a phonological object.

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Daniel Recasens

3 Processes affecting vowels

Abstract: The chapter deals with several processes affecting vowels in Romance. Some of these processes operate on stressed vowels, i.e. metaphony and vowel harmony, diphthongization, lengthening, changes in quality and merging. Others involve unstressed vowels, namely, vowel reduction as well as syncope, and epenthesis, which are touched on very briefly. The chapter closes with changes which may occur in two-vowel sequences within the word domain and across a word boundary such as the gliding of high vowels and the deletion of central vowels. Not only synchronic processes but also diachronic developments (i.e. sound changes) are subject to investigation depending on their relevance, and their theoretical implications are emphasized.

Keywords: vowel harmony, vowel diphthongization, vowel lengthening, vowel reduction, vowel sandhi

1 Introduction

The present chapter deals with several major processes affecting vowels, which depict a very rich scenario in Romance, i.e. vowel harmony (Section 2), vowel diphthongization (Section 3), vowel reduction, syncope and epenthesis (Section 4), and vowel lengthening (Section 5). Most of these processes are related to each other in many respects. Thus, as pointed out later on in the chapter, stressed vowel diphthongization depends on vowel duration and therefore may operate exclusively in open syllables where vowels are longer than when appearing before coda consonants in closed syllables. On the other hand, shorter unstressed vowels may reduce (i.e. shorten even more and undergo articulatory undershoot) and delete. Likewise strict vowel metaphony (i.e. stressed vowel raising induced by an unstressed close vowel) and vowel diphthongization may also be related, as revealed by data for the dialects of Italy showing that stressed open-mid vowels may either raise or diphthongize in this metaphonic contextual scenario. Somewhat tangentially we also touch upon changes in vowel quality which have taken place in Romance, and upon vowel merging and the problem of unstable vowel contrasts (Section 6), as well as upon the conversion of hiatuses into diphthongs or a single vowel whether word internally or across a word boundary (Section 7). Other relevant issues will not be dealt with since they are covered in much detail in other work: vowel nasalization

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and prosthesis (Sampson 1999; 2010); non-systematic consonant-to-vowel and vowel-to-vowel assimilations (Recasens 2014).

The chapter reviews not only synchronic developments but diachronic ones as well depending on their relevance. Regarding the provenance of vowel qualities in Romance from their Latin etymological origins, the following correspondences hold (except for Romanian and Sardinian): $\bar{i} = [i]$; $\bar{e} = [e]$; $\bar{e} = [\varepsilon]$; $\bar{a} = [a]$; $\bar{o} = [ɔ]$; $\bar{o}, \bar{u} = [o]$; $\bar{u} = [u]$. Special attention is paid throughout the chapter to hot topics which have attracted the scholars' attention in recent times.

2 Vowel harmony

Metaphony is a subclass of vowel harmony processes operating more frequently in the dialects of Italy than elsewhere in Romance by which an unstressed close vowel occurring mostly in word-final position causes a preceding stressed mid vowel to raise. Thus, for example, in Servigliano, a locality placed in the Marche region of Italy, $/\varepsilon/$ raises to $[e]$ in the plural form $['pe:di]$ of $['p\varepsilon:de]$ ($< PĒDE(M)$) 'foot', and $/o/$ closes to $[u]$ in the masculine form $['lu:pu]$ ($< LŮPU(M)$) 'wolf' while staying unmodified in the feminine cognate $['lo:pa]$ ($< LŮPA(M)$). The Romance languages also exhibit cases where stressed vowels trigger systematic aperture shifts in unstressed vowels and therefore may be characterized as truly harmonic, as exemplified by the raising of $/-a/$ to $[-\varepsilon]$ in paroxytone words with stressed $/\varepsilon/$ in Valencian Catalan mostly in the dialectal domain south of Valencia (e.g. Cat. *terra* ($< TĒRRA(M)$) 'land' realized as $['t\varepsilon r\varepsilon]$). In view of these cases we prefer to use the cover term 'vowel harmony' for the vowel-to-vowel assimilatory changes described in this chapter, while referring more specifically as metaphonic to those changes in stressed vowel aperture induced by an unstressed close vowel. To the extent that they are phonological and thus apply systematically across the lexicon, vowel harmony (and metaphonic) processes differ from more occasional vowel-to-vowel assimilations which may occur in a given language or dialect. This section will not only refer to synchronic instances of vowel harmony but also to instances of vowel harmony which were productive in the past and are no longer productive nowadays (e.g. there are traces of old metaphony exerted by $[-i]$ in dialects from Northern Italy, as exemplified by the alternation $['tu:zi]/['to:zo]$ ($< TŌNSU(M)$) 'boy_{PL/SG}' in Central Veneto). In 2.1–2.4 the main vowel harmony patterns will be described on a language-by-language basis with reference to several operational notions listed in (a) through (d) below.

- (a) Regarding directionality, vowel harmony may be regressive or progressive and thus proceed leftwards or rightwards, respectively. An example of the former direction is the change of stressed $/\varepsilon/$ into $[e]$ before final $[-i]$ in Servigliano $['pe:di]$ and an example of the latter the replacement of final $[-a]$ by $[-\varepsilon]$ after stressed $/\varepsilon/$ in Valencian Catalan $['t\varepsilon r\varepsilon]$ (cf. above).

- (b) The articulatory characteristics of the input and output vowel segments need to be identified, as well as whether the relevant vowels bear stress or not and occur in an open or a closed syllable. As exemplified in Section 2.1, the original vowel trigger may not be transparent if it has undergone further changes after causing harmony to occur, and there may also be problems in identifying whether a given vowel shift has been induced by a contextual vowel or by a contextual consonant.
- (c) Vowel harmony may operate on paroxytones and proparoxytones, and its domain may be restricted to the syllables available within the stress foot or extend over one or more syllables beyond it. Its application may be continuous and thus operate on a syllable-by-syllable basis or else discontinuous and thus jump across syllables, and may be blocked or facilitated by vowels or consonants located between the trigger and the target vowels.
- (d) Attention needs to be paid to the morphological dimension of vowel harmony in cases where the triggering vowel is the marker of a productive morpheme, as in Southern Italian where masculine nouns and adjectives end in [-i] if plural and in [-u] if singular. Thus, for example, in Northern Salentino, in contrast to the feminine form ['fred:a] 'cold', the masculine singular and plural forms ['frid:u] and ['frid:i] show metaphony (Calabrese 1985).

2.1 Italy and Rhaeto-Romance

2.1.1 Metaphony

Through Italian metaphony, target stressed /e o/ raise to [i u], and /ε ɔ/ either raise to [e o] or break into a falling or a rising diphthong with a first close vocalic element, when harmonized by unstressed [-i] and/or [-u]. Examples of /e o/ and /ε ɔ/ raising may be found in (1), rising diphthong formation from /ε ɔ/ in (2), and falling diphthong formation also from /ε ɔ/ in (3c). Raising of all four mid vowels is known as 'Sabine metaphony' and occurs mostly in Central Italy (cf. the examples in (1)), while a hybrid setting that combines raising of /e o/ and diphthongization of /ε ɔ/ is often referred to as 'Neapolitan metaphony' and is found in Southern Italy for the most part (cf. the examples in (2)). The present section deals mostly with vowel raising and Section 3 with mid vowel diphthongization in harmonizing environments.

- (1) Servigliano in the Marche (Loporcaro 2016)

/e/	['ve:de]/['vi:di]	'see _{2/3PRS.IND} '
/o/	['korsa]/['kursu]	'run _{F/M.SG} '
/ε/	[a'pɛrta]/[a'pɛrtu]	'open _{F/M.SG} '
/ɔ/	['mɔrta]/['mortu]	'dead _{F/M.SG} '

- (2) Northern Salentino, where [-e] > [-i] (Calabrese 1985)

/e/	['pes:i]/['pis:i]	'fish _{M.SG/PL} '
/o/	['tori]/['turi]	'tower _{M.SG/PL} '
/ɛ/	['lɛnta]/['ljentu]	'slow _{F/M.SG} '
/ɔ/	['mɔrta]/['mwɛrtu]	'dead _{F/M.SG} '

This scenario is far from general though (Maiden 1987). Regarding the target stressed mid vowel, metaphony may affect either /e o/ or /ɛ ɔ/ instead of the four vowels at once. There appears to be a preference for the process to operate on the close-mid vowels over the open-mid vowel cognates in Southern and Northern Italy areas (Gargano in Apulia, Southern Veneto). The reverse is the case in specific Central and Northern Italy zones (areas of Lazio, Tuscany and Umbria, Lombard Alps) as well as in Surselvan, where metaphony from [-i], [-u] has operated historically only on /ɛ ɔ/, as shown by the forms ['griɛs] (< GRÖSSU(M)) 'thick' and [um'viɔrn] (< HIBĚRNU(M)) 'winter'. Moreover, among open-mid vowels, metaphony may affect /ɛ/ rather than /ɔ/ in areas of Tuscany. With regard to syllable type, the process applies typically on stressed mid vowels placed in both open and closed syllables though it may operate on vowels located in open syllables alone (areas of Tuscany, Umbria and Lazio, Northern Gargano, Western Abruzzo, Northern Apulia).

As to the unstressed vowel trigger, stressed mid vowel metaphony is generally induced by both [-i] and [-u]. Whenever there is a single close vowel trigger, this vowel is regularly [-i] (Northern Italy dialects, Northern Apulia, Eastern Abruzzo) whether because the close front vowel is more aggressive than its close back vowel cognate regarding the process application (cf. 2.5) or else since [-u] merged with [-o] into [-o] before vowel harmony applied. It may also be the case that the unstressed close vowel trigger varies depending on the target stressed mid vowel; thus, in Northern Apulia, /e o/ raising is induced by [-i] and [-u] while /ɛ ɔ/ raising occurs only before [-i] apparently because the change [-u] > [-o], as in ['muro] MURU 'wall', took place in between (Calabrese 2011, 2637–2639). Moreover, while the unstressed vowel trigger is located generally in absolute word-final position, medial posttonic /i/ may also cause stressed /e o/ to raise (Central Veneto).

In the Piedmontese Alps, canton Ticino, and areas of the Romagna, Lazio, Abruzzo, Molise and Neapolitan, stressed /a/ may be the metaphonic target in addition to the stressed mid vowels. Interestingly enough, the conditions on the metaphony of /a/ are often quite restricted and conform to essentially the same conditioning factors that operate on mid vowel targets: /a/ raising and fronting into a mid vowel realization often applies only in open syllables and before [-i] (also before [-u] in Neapolitan). Thus, ['ka:nə] (It. *cane* 'dog') alternates with ['kɛ:nə] (It. *cani* 'dog_{PL}') in Abbruzzo and the Bay of Naples, and analogous alternations occur in Northern Italy in lexical forms in which the loss of the word-final vowel (i.e. [-i] in the examples that follow) renders the metaphony trigger opaque: [nas]/[nɛs] 'nose_{SG/PL}' in Lago Maggiore in Lombardy, [kamp]/[kɛmp] 'field_{SG/PL}' in Valsesia (Schmid 2016, 477; Rohlf

1966, 43). This particular vowel inflection resembles Old High German umlaut by which stressed short /a/ raised to [e] before an unstressed close front vowel or glide (*gast-gesti* ‘guest_{SG/PL}’).

Proparoxytones exemplify the operational notions referred to in Section 2’s paragraph (c). Whenever bounded by the foot domain, the metaphonic effect may be continuous or discontinuous. Continuous metaphony accounts for the raising of the medial posttonic mid vowel provided that the stressed vowel raises as well, as in the case of [‘ordeno]/[‘urdini] ‘to order_{I/ZIND}’ in Central Veneto (Walker 2011, 116). In other dialectal domains, metaphony from [-i] and [-u] (areas of Central Italy) or just from [-u] (areas of Southern Italy) affects the medial posttonic vowel independently of whether the stressed vowel has been metaphonized or not (Maiden 1988; 1997, 9–10); thus, in the former dialectal domain posttonic [e] raises both in words with a metaphonized stressed mid vowel ([‘vituvu] vis-à-vis [‘veteva] ‘widower/widow’) and in those with an unmodified stressed low vowel ([‘asunu]/[‘asini] ‘donkey_{M,SG/PL}’ vis-à-vis [‘asena] ‘donkey_{F,SG}’). Moreover, also in areas of Central Italy any word-final vowel may be copied by the medial posttonic vowel, as exemplified by the lexical pair [‘alama]/[‘aleme] ‘soul_{SG/PL}’ and the paroxytones [‘persaka] ‘peach tree’ / [‘perseke] ‘peach_{PL}’ (generic) / [‘persuku] ‘peach’ / [‘persiki] ‘peach_{PL}’ in which, in addition to copy harmony of the medial posttonic vowel [e] (< PĚRSĪCU(M)), stressed /ɛ/ has shifted to [e] in the two latter forms ending in [-i], [-u] (Servigliano; Walker 2011, 264). This copying mechanism is prone to be implemented in lexical items in which [l] or [r] occur between the posttonic and final unstressed vowels (Castel Giorgio in Umbria [‘tʃuk:oro] (It. *zucchero*) ‘sugar’, [‘neʃpala] (It. *nespola*) ‘medlar’; Maiden 1988), which suggests that these two consonants facilitate the implementation of metaphony whenever non-close vowels are involved since both the alveolar lateral and the alveolar rhotic are produced with more tongue body lowering and retraction than other dentals and alveolars. Lexical forms exhibiting discontinuous metaphony and thus a metaphonic effect on the stressed vowel but not on the medial posttonic vowel are found in areas of Lazio and in Apulia and Neapolitan; thus, in Ascrea (Lazio), [‘mɔrtse] ‘die_{3SG,PRF}’ alternates with [‘mɔrtseru] ‘die_{3PL,PRF}’ where stressed /ɔ/ but not posttonic [e] has been metaphonized (Walker 2011, 171–172). If not bounded by the foot domain, the metaphonic effect triggered by the word-final close vowel operates not only on the preceding stressed vowel but on the pretonic unstressed vowel(s) as well (Valle dell’Aniene in Lazio [do‘lore]/[du‘luri] ‘pain_{SG/PL}’; Maiden 1988). Metaphony in paroxytones may be blocked by a vowel which is placed between the trigger and target vowels, which is typically the open vowel /a/ (Central Veneto [la‘voravi] ‘work_{PRF,2SG}’ instead of *[la‘vuravi]; Walker 2005, 927).

The relationship between the metaphony trigger and the vowel target outcome may be lost. Thus, in the dialectal domain where Sabine metaphony occurs, [-u] may remain distinctive from [-o] or else the two vowels may have merged into [-o], which causes the metaphonic outcome to co-occur with final [-o] in specific words (Old Romanesco *castiello*). On the other hand, in dialects where [-e] has shifted to

[-i] after metaphony such as Northern Salentino, the metaphonic output takes place in words ending in an etymological close front vowel but not in those in which [-i] has derived from [-e], as revealed by the pairs ['tori]/['turi] 'tower_{SG/PL}' or [pa'reti]/[pa'riti] 'wall_{SG/PL}'. Loss of the target-trigger correspondence also occurs in dialects in which after triggering metaphony the unstressed final vowels have reduced to [ə] (Neapolitan [nə'po:tə]/[nə'pu:tə] 'nephew_{SG/PL}') or have been deleted (Pd. [man]/[mɛn] 'hand_{SG/PL}'; Benincà/Parry/Pescarini 2015, 190). Difficulties in considering as metaphonic a change in stressed mid vowel aperture may also arise when the change in question is attributable at least in part to a contextual consonant. Thus, /ɛ/ raising in the case of the suffix form [-el] -ĒLLU vis-à-vis [-ela] -ĒLLA in Valsesia (Piedmont) may be ascribed to both final [-u] and [ʌ] or [j] derived from -LL-, all the more since the same vowel shift occurs quite systematically before other palatal consonants ([pur'tʃel] (< PORCĒLLU(M)) 'pig', [vetʃ]/[vɛdʒa] (< VECLU/-A from VĒTULU/-A) 'old_{M/F}'; Maiden 1987, 48).

2.1.2 Other vowel assimilation cases

In several dialectal areas of Italy, regressive assimilation induced by a close vowel may operate on pretonic mid vowels whether the vowel trigger is stressed (Garfagnana in Tuscany, Servigliano, Poschiavo, Eastern Lombardy, and also Friulian where medial pretonic /a/ may block the process application), or either stressed or unstressed ([e] and [o] raising in forms such as [vi'ni] 'come_{INF}' and [kuntsu'ma] 'consume_{INF}' from Valle dell'Aniene in Lazio; Maiden 1988).

Stressed more open vowels may also trigger progressive harmony. Thus, in canton Ticino, [-a] assimilates to stressed /ɛ ɔ/ in Monte Carrasso ([pa'dɛɛ] 'pan', [pɔrtɔ] 'door' vis-à-vis [ga'lina] 'hen') and to essentially any stressed vowel in Claro where medial posttonic vowels are transparent regarding the process application in proparoxytones (Schmid 2016, 478). Delucchi (2016) offers a fairly extensive description of progressive harmony processes affecting [-a] in Swiss Italian dialects. Other instances of progressive harmony are similar to the metaphonic cases described in Section 2.1.1 in that they involve close(-mid) vowels, such as [-e] raising after stressed /i/ in Friulian (Schmid 2016, 478) and [-e], [-o] raising after unstressed /i u/ in the Marche (Sánchez Miret 1999).

2.2 Iberian peninsula

There are at least four major vowel harmony scenarios on the Iberian peninsula, three of which are regressive and triggered by a word-final unstressed vowel and the fourth one is progressive and induced by a stressed vowel.

In the Asturias/Cantabria region of Northwestern Spain, we find regressive metaphonic processes in paroxytone words which parallel those occurring in Italy: unstressed [-u] causes stressed /e o a/ to close in Lena ([ˈnena]/[ˈninu] ‘kid_{F/M}’, [ˈkoja]/[ˈkufu] ‘cripple_{F/M}’, [ˈgata]/[ˈgetu] ‘cat_{F/M}’); a centralized close back vowel causes centralization of stressed /i e a o u/ to take place in Pasiego, and also in Tudanca where both [-u] and [-i] act as metaphony triggers (Hualde 1989). Metaphony is bounded by the stress foot in Lena and Tudanca, and in proparoxytone words it affects the stressed vowel but not the medial posttonic in Lena and both vowels in Tudanca; in Pasiego, on the other hand, metaphony is not bounded by the stress foot and therefore applies to pretonic and posttonic vowels alike. Closing assimilation may also proceed from a stressed close vowel onto any pretonic mid vowel in the geographical area of interest (Tudanca [kuˈθina] (Sp. *cocina* ‘kitchen’), Pasiego [kuxiˈria] (Sp. *cogería*) ‘I would catch’).

In Eastern Andalusian Spanish there is a regressive harmony process by which unstressed word-final [-ɛ], [-ɔ], which are the open counterparts of /e o/ after deletion of final /s/, cause stressed /e o/ to lower in paroxytones and proparoxytones. Thus, the plural forms of Sp. [ˈnene] *nene* ‘kid’ and [ˈmono] *mono* ‘monkey’ are [ˈnɛnɛ] and [ˈmɔɔ] (Henriksen 2017). This lowering effect may also operate on the posttonic and pretonic unstressed vowels and thus within and across foot domains, most especially if the vowels involved are identical, e.g. [moˈnotono]/[mɔˈnɔɔ] (Sp. *monótono(s)*) ‘monotonous_{SG/PL}’ and [koˈhin]/[kɔˈhinɛ], [kɔˈhinɛ] (Sp. *cojín, cojines*) ‘pillow_{SG/PL}’.

European Portuguese has another regressive harmony process induced by non-close vowels on stressed mid vowels, which is no longer productive. By virtue of it, stressed /ɛ ɔ/ raised to [e o] when followed by [-o] (ũ) and stressed /e o/ lowered to [ɛ ɔ] before [-a]. Thus, /ɔ/ ò stayed open-mid in *grossa* ‘big_F’ and raised to [o] in *grosso* ‘big_M’, while /o/ ô stayed close-mid in *formoso* ‘beautiful_M’ and lowered to [ɔ] in *formosa* ‘beautiful_F’.

Progressive vowel harmony induced by a stressed open-mid vowel on word-final [-a] applies in the Valencian dialect of Catalan, which is spoken in Eastern Spain. Depending on the dialectal area, the open vowel target shifts to [ɛ] and/or [ɔ] when preceded by stressed /ɛ/ and/or /ɔ/, respectively, e.g. [ˈtɛɛ] (Cat. *terra* ‘land’, [ˈkɔɔ] (Cat. *cosa*) ‘thing’. A posttonic close vowel blocks the process application in proparoxytones, e.g. there is no vowel harmony in words like *tètrica* ‘tetrical_F’ and *còmica* ‘comic_F’. Moreover, in a more restricted dialectal zone within the same Valencian Catalan speaking region, the harmony domain may extend to pretonic /a/, which shifts to [ɛ] before stressed /ɛ/ and to [ɔ] when followed by stressed /ɔ/, e.g. [ɛˈfɛkte] (Cat. *afecta*) ‘(it) affects’, [kɔˈsɔɔ] (Cat. *cassola*) ‘saucepan’. On the other hand, to the south of the Western Catalan dialect spoken in Western Catalonia, a pretonic mid vowel raises before a stressed or unstressed close vowel; e.g. Cat. *ferir* ‘wound_{INF}’ realized as [fiˈri], Cat. *delicat* ‘delicate’ produced as [diliˈkat] (Jiménez/Lloret 2010).

2.3 Sardinian and Romanian

Regressive metaphony of stressed open-mid vowels applies productively in Logudorese Sardinian. Through this metaphonic action, target /ɛ ɔ/ raise to [e o] before unstressed [-i], [-u] while staying open-mid elsewhere ([ˈpɛ:ðɛ] ‘foot’ / [ˈbe:ni] ‘come_{SG.MP}’). On the other hand, there is progressive harmony of unstressed [-e] (> [-i]) induced by stressed /i u/ in Central Sardinian (Schmid 2016, 478).

Regressive metaphony is also at work in Romanian where the plural marker [-i], which is manifested through palatalization of the final consonant of the stem, causes stressed /a/ to shift to [ə] (Rm. [ˈkarte]/[ˈkərtsɨ] *carte/cărți* ‘book_{SG/PL}’) and the diphthongs [ɛa] and [ɔa] issued historically from stressed /e/ and /o/ to simplify into [e] and [o] respectively, e.g. Rm. [ˈseərə]/[serɨ] *seară/seri* (< SĚRA(M)) ‘evening_{SG/PL}’, Rm. [ˈpɔartə]/[portsɨ] *poartă/porți* (< PŎRTA(M)) ‘gate_{SG/PL}’. Likewise, the plural ending [-e] triggers the change [ɛa] > [e], as shown by the lexical pair Rm. [feˈreastrə]/[feˈrestre] *fereastră/ferestre* (< FENĚSTRA(M)) ‘window_{SG/PL}’ (Chitoran 2002).

2.4 Other cases

Other vowel harmony processes have been paid less attention in the literature. In French varieties there is unstressed mid vowel closing triggered by a following close (-mid) vowel as in *bête* [bet] ‘stupid’ / *bêtise* [beˈtiz] ‘stupidity’, *aimer* [eˈme] ‘love_{INF}’ / *aimable* [eˈmabl] ‘pleasant’, *potée* [poˈte] ‘hotchpotch’ / *poterne* [pɔˈtɛrn] ‘postern’, *dévo*t [deˈvo] / *dévo*t [deˈvɔt] ‘devout_{M/F}’ (Nguyen/Fagyal 2008). In Brazilian Portuguese, on the other hand, pretonic /e o/ may shift to [ɛ] and [ɔ] before stressed /ɛ/ and /ɔ/, respectively, and pretonic /e o/ may raise before stressed and unstressed /i u/ ([pɛˈlɛ] *Pelé* (proper name), BPor. [biˈbie] *bebia* ‘drink_{1/3SG.IMPF}’, [kuˈmidu] *comido* ‘eat_{PST.PTCP}’; Hualde/Chitoran 2016; Hancin 1991).

2.5 Interpretation

Based on the different metaphonic outcomes of close-mid and open-mid vowels and the frequency of occurrence of the syllable types involved, it has been suggested that metaphony in Italy may have started out affecting close-mid vowels in open syllables after which it extended to open-mid vowels and closed syllables (Maiden 1987). This hypothesis would be in line with the existence of presumable remnants of metaphony of stressed /e o/ triggered by [-i] (ĩ) in Western Romance, e.g. Catalan *vint* (< VIGINTI) ‘twenty’, Spanish *hice* (< FĒCI) ‘make_{1SG.PRET}’ (Lausberg 1970, 249).

Another issue is whether the metaphonic scenario found in Italy, Northern Spain, Logudorese Sardinian and Romanian should be attributed a perception- or production-based interpretation. According to some scholars metaphony happens in order to im-

prove the perceptibility of a height property that is difficult to identify both because the trigger is an unstressed close vowel (and thus particularly short and weak regarding intensity) and the target vowel is stressed (Walker 2005). The fact that metaphony applies regressively also matters in so far as regressive assimilatory processes may reflect phonemic preplanning independently of the articulatory constraints on the production of the phonetic segments involved. This perceptual account also appears to be in line with the fact that in some instances metaphony may be a long-distance and discontinuous process, which cannot easily be assigned an articulatory interpretation since vowel-to-vowel coarticulatory effects become too weak if induced by an unstressed vowel and exerted on a target vowel which is located too far away from the trigger. However, the perceptual account has difficulty coping with the fact that absolute word-final vowels may not be particularly weak, as revealed by their being resistant to assimilation and reduction and prone to lengthen while at the same time often bearing highly relevant morphological information (cf. Barnes 2006 and Section 4). More in accordance with a production-based explanation would be cases of continuous harmony induced by a stressed vowel onto an adjacent unstressed vowel or between adjacent unstressed vowels. These could include Valencian Catalan harmony given that open-mid vowels may be longer and more intense than close-mid ones and even than /a/ in Catalan, and are especially open in the Valencian dialect. The production account is also in accordance with the harmony trigger being /i/ rather than /u/ in specific dialectal regions since, in comparison to other vowels, the close front vowel has been shown to be more resistant to coarticulation and more prone to exert coarticulatory effects onto other phonetic segments (Recasens 2014).

Several aspects remain open for further research. There is the possibility that vowel harmony is facilitated by favorable phonetic characteristics of the trigger and/or target vowels and thus, for example, by the especially close phonetic realization of close-mid vowels in specific dialects. More work is also needed on the phonetic realization of those vowel segments located between the vowel trigger and the vowel target in instances of discontinuous metaphony in light of experimental data showing that these vowels may not be fully opaque articulatorily (Gafos/Dye 2011), as well as the articulatory implementation of those vocalic segments that block metaphony triggered by an unstressed close vowel such as the antagonistic open vowel /a/.

3 Vowel diphthongization

Historical stressed mid vowel diphthongization in the Romance languages conform to three main types: an apparently spontaneous, non-contextually conditioned diphthongization process (cf. (a) below); two diphthongization processes which appear

to have been conditioned by a following palatal consonant (b) or by a word-final unstressed close vowel (c).

- (a) In French, Northern Italian dialects and Francoprovençal (and also in Ladin), unconditioned mid vowel diphthongization in open syllables, where vowels are longer than in closed syllables, has yielded rising diphthongs with an on-glide out of open-mid vowels and falling diphthongs with an off-glide out of close-mid vowels. These developments may be exemplified for French: /ɛ/ > [je] (rising diphthong) (*piéd* (< PĚDE(M)) ‘foot’); /e/ > [ej] (falling diphthong) > [oj] > [oɛ] > [we] > [wa] (*toile* (< TĚLA(M)) ‘cloth’); /ɔ/ > [wɔ]/[wo] > [we] > [wɔ] > [ø œ] (*peut* (< PÖTET) ‘can_{3SG}’); /o/ > [ow] > [ew] > [øw] > [ø œ] (*seul* (< SÖLU(M)) ‘alone’). In Rhaeto-Romance dialects, /e o/ in open syllables turned into a falling diphthong after which the off-glide could be reinforced by means of a plosive in Surmiran and Upper Engadinian, as exemplified by [nekf] (< [nejf] < NĚVE(M)) ‘snow’ and [krokʃ] (< [krowʃ] < CRŮCE(M)) ‘cross’; ↗20 Rhaeto-Romance: Friulian, Ladin, and Romansh.

In other Romance languages, open-mid /ɛ ɔ/ diphthongized whether in open syllables as in Tuscan Italian (*piede* (< PĚDE(M)) ‘foot’, *nuovo* (< NÖVU(M)) ‘new’), or else both in open and closed syllables as in Spanish (*pie* (< PĚDE(M)), *rueda* (< RÖTA(M)) ‘wheel’, *fiesta* (< FĚSTA(M)) ‘feast’, *punte* (< PÖNTE(M)) ‘bridge’). Only /ɛ/ diphthongized in Romanian (*piatră* (< PĚTRA(M)) ‘stone’). A special case is that of Friulian and Vegliote where diphthongization applied to /e o/ (also to /i u/ in Vegliote) in open syllables and to /ɛ ɔ/ in open and closed syllables. More modernly, stressed close(-mid) vowels in open syllables have shifted to falling diphthongs in the Central and Southern Italy regions Abruzzo, Molise, Apulia, Campania and Naples, e.g. [fa'rejnə], [f'ejlu] and [vajnu] with original /i/ (It. *farina*, *filo*, *vino*) ‘flour’, ‘thread’, ‘wine’, and [f'owsə] and [l'awna] with original /u/ (It. *fuso*, *luna*) ‘spindle’, ‘moon’. The phonetic development of diphthongs generated out of stressed mid vowels in Romance is analyzed in detail in Recasens (2004).

- (b) Open-mid vowel diphthongization into a rising diphthong triggered by an immediately following palatal consonant may have taken place whether in addition to the unconditioned diphthongization processes referred to in (a) (French, Northern Italian dialects, Francoprovençal) or not (Occitan, possibly Catalan). The resulting diphthong may have monophthongized at a later date, e.g. Cat. *six* < *[sjejs] (*[sejs] < [seks] < SĚX) ‘six’, where therefore the second glide originates through vocalization of the syllable-final velar in the sequence [ks]. In Spanish and Portuguese, on the other hand, the palatal consonant may have blocked the spontaneous diphthongization of stressed /ɛ ɔ/; thus, in Spanish there is [e] in *espejo* ‘mirror’ derived from SPĚCULU(M) with etymological /ɛ/ and [o] in *hoja* ‘leaf’ derived from FÖLIA with etymological /ɔ/. An analogous closing action may have operated on stressed /e o a/ in several Romance languages, e.g. /e/ Sp. *jibia* (< SĚPIA(M)) ‘cuttlefish’, Fr. *cil* (< ČĹIU(M)) ‘eyebrow’; /o/ Sp. *puño* (< PŮGNU(M)) ‘fist’, Fr. *lutte* (< LŮCTA(M)) ‘fight’; /a/ Sp. *leche* (< LACTE(M)) ‘milk’.

- (c) In addition to /e o/ raising, mostly in Southern Italy (e.g. Neapolitan, Apulian, Salentino) stressed /ε ɔ/ in open and closed syllables have undergone metaphonic diphthongization into the falling diphthongs [ʲie] and [ʲuɔ] or their rising counterparts mostly when followed by [-i] and [-u] (the same change may also operate just before [-i] possibly in open syllables). The difference between falling and rising diphthongs may be exemplified with the following lexical forms taken from dialects of Southern Italy where unstressed [-i], [-u] have reduced to [ə]: [ʲviɛç:ə] [-u] ‘old_{M.SG}’ (Agnone, Molise) / [ʲvɛrmə] [-i] ‘worms’ (Neapolitan); [ʲgruɔs:ə] [-u] ‘big_{M.SG}’ (Agnone, Molise) / [ʲkwɛrpə] [-u] ‘body_{M.SG}’ (Carbonara, Puglia). The two unstressed close vowels also trigger metaphonic diphthongization of /ε ɔ/ into [je/ε wo/ɔ] in Central Italy regions (Savoia/Maiden 1997, 18). In proparoxytones, stressed /ε ɔ/ may diphthongize before a posttonic close vowel regardless of the quality of the final vowel in Sicily and Calabria ([ʲuɔmini] (< HŌMINES) ‘men’, [ʲpiɛkura] (< PĒCORA) ‘sheep’; Papa 1981, 39). On the other hand, in Abruzzo, Molise and Western Campania there is metaphonic diphthongization of /a/ in the same conditions which cause the vowel to raise, i.e. in open syllables before unstressed [-i], though instances of /a/ diphthongization may occur in closed syllables as well (Teramo [ʲsiɛndə] It. *santo* ‘saint’, [ʲfiɛt:ə] It. *fatto* ‘fact’; Rohlf 1966, 44–45). Moreover, in specific dialectal areas stressed /a/ has turned into mid front in closed syllables and [je je] in open syllables ([ʲkiɛnə] (< CANE(M)) ‘dog_{PL}’ / [ʲtɛt:ə] (< TRACTU(M)) ‘feature_{PL}’ in Agnone in Molise; Maiden 2015), which suggests that vowel diphthongization has operated on an intermediate mid front vowel realization rather than directly on /a/.

Several hypotheses have been raised in order to account for the three diphthongization processes just reviewed. First, there is the view that the diphthongs in (a) have been generated spontaneously through vowel lengthening and tensing in open syllables (cf. Section 5). Vowel duration may also account for why open-mid vowels are more prone to diphthongize than close-mid vowels and why diphthongization affects oxytones and paroxytones rather than proparoxytones. Regarding the dialects of Italy, this hypothesis states that (Sabine) metaphony by raising was prior to (Neapolitan) metaphony by diphthongization in areas where only the latter holds nowadays, and therefore that /ε/ and /ɔ/ became [je] and [wo] through the developments /ε/ > [e] > [je] and /ɔ/ > [o] > [wo]. Diphthongization could apply because the metaphonic rule was rendered opaque via the merger of final unstressed [-u] and [-o] into [-o], and was implemented through some sort of hypercharacterization seeking to preserve the distinction between /e o/ and /ε ɔ/ which was in risk of being lost due to the metaphonic closing of /ε ɔ/ (Loporcaro 2011a).

An alternative hypothesis holds that the so-called spontaneous open-mid vowel diphthongization was instead metaphonic and thus conditioned by the raising of the stressed vowel onset whenever a posttonic close vowel followed (Schürr 1970). Along these lines the Tuscan diphthongization would have commenced in metaphonic envi-

ronments and just in open syllables, and later on it would have extended into other contextual environments and closed syllables; therefore, Sabine metaphony would have derived from Neapolitan metaphony through monophthongization (Maiden 2015). In dialects of French and Northern Italy where stressed vowels were especially long in open syllables, metaphonic diphthongization generalized to all open syllables but not to closed ones. Moreover, according to this view, / $\epsilon \text{ } \text{ɔ}$ / diphthongization before a palatal consonant (cf. (b) above) would parallel metaphonic diphthongization induced by a word-final close vowel such that languages like Occitan represent an older diphthongization stage in which diphthongs were limited to metaphonic contexts. According to Sánchez Miret (1998; 1999; 2010), a problem with this metaphonic account of / $\epsilon \text{ } \text{ɔ}$ / diphthongization lies in having a contextual close vowel or palatal consonant trigger stressed mid vowel raising at its onset instead of at its offset; alternatively he holds that / $\epsilon \text{ } \text{ɔ}$ / diphthongization came to exist through lengthening under stress and that this lengthening process has been compensatory in dialects of Southern Italy where metaphony was triggered by word-final unstressed close vowels.

Stressed mid vowel diphthongization in Romanian deserves close scrutiny. Romanian parallels other Romance languages in that / ϵ / diphthongized without any apparent contextual cause, e.g. *iarbă* (< HĚRBA(M)) ‘herb’, *piatră* (< PĚTRA(M)) ‘stone’. The Romanian case is puzzling because the close-mid vowels /o/ (derived from /o ɔ/) and /e/ (derived from /e ɛ/) diphthongized into [qa] and [ɛa] before word-final [-e], [-a], which may be reconciled with a metaphonic account in words ending in [-a] ([sɛarə] *seară* (< SĚRA(M)) ‘evening’, [pɔartə] *poartă* (< PÖRTA(M)) ‘gate’) but less easily in those ending in [-e] ([sɔare] *soare* (< SÖLE(M)) ‘sun’, [pjɛtre] *pietre* (< PĚTRA(M) ‘stone_{pl}’)). The possibility that diphthongization was conditioned by the final vowel and thus metaphonic has been explored in an acoustic V-to-V coarticulation study showing that the best context for stressed /e/ diphthongization is [-a] while that for stressed /o/ diphthongization is [-e] followed by [-a], which appears to conform at least in part to the metaphonic explanation (Sánchez Miret 2013). An alternative interpretation has been proposed that the outcomes [qa] and [ɛa] are not metaphonic but arose through the spontaneous opening of an open-mid vowel nucleus at the time when stressed mid vowels were realized as [e o] before [-i], [-o], [-u] and as [ɛ ɔ] before [-e], [-a] (Loporcaro 2016, 79–82).

There is still a fourth purely phonetic diphthongization type which may affect any vowel and should be attributed to the coarticulatory characteristics of the adjacent consonant. In this case the more prominent the acoustic vowel transitions, the greater the chances that an intrusive glide-like segment may be heard in a CV or VC sequence, which may result in the generation of a diphthong in the end (Recasens 2014). Prominent anticipatory effects exerted by consonants produced with some tongue body lowering and backing such as dark /l/ (i.e. [ɫ]) or the alveolar rhotic, mostly but not only if realized as a trill, may give rise to rising diphthongs with [j] (Oc. dialects [pjalɔ] (< PILU(M)) ‘hair’, [vjarðo] (< VIRIDE(M)) ‘green’, Fr. *cierge* CEREU(M) ‘candle’) or to falling ones with [w] (Surselvan [vawɫta] (< VOLVITA(M))

‘vault’, Northern Por. [ˈsiwrβɐ] (< SILVA(M)) ‘forest’). On the other hand, prominent anticipatory and carryover effects exerted by (alveolo-)palatal consonants on vowels may trigger the insertion of [j] before or after the consonant (Northern Por. [vˈbejʎɐ], Por. *abelha* (< APICULA(M)) ‘bee’, Ln. [peˈkejɲu] Sp. *pequeño* ‘small’, OFr. *chièvre* (< CAPRA(M)) ‘goat’). Labials and velars trigger [w] insertion in the two directions but mostly at vowel onset in CV sequences whenever the vowel is back rounded, which is in line with the prominence of the release of the labial and velar plosives in this contextual vowel condition (Vivaro-Alpine Oc. [kwa] (< COLLU(M)) ‘hill’, Lim. Oc. [pwɔrk] (< PORCU(M)) ‘pig’). Nasalized vowels may break into falling diphthongs whose quality depends on the spectral changes induced by oronasal coupling in oral vowels of different degrees of tongue height and fronting, e.g. Sur. [paw̃] (< PANE(M)) ‘bread’, Por. [kẽw̃] *cão* (< CANE(M)) ‘dog’).

4 Vowel reduction, syncope and epenthesis

It is often the case that in given languages or dialects the vowel inventory is less crowded in unstressed than stressed position. In phonology, one or more vowel phonemes may change their quality when unstressed, the final outcome being a diminution of the vowel units in the atonic vs. tonic subsystems. In principle, phonological vowel reduction may be considered to result from a phonetic mechanism by which, in comparison to stressed vowels, unstressed ones shorten and may become more centralized and thus schwa-like through articulatory undershoot.

4.1 Vowel reduction mechanisms

Two major mechanisms of phonological vowel reduction have been identified (Crosswhite 2004):

- (a) peripheralization or contrast-enhancing, which involves the elimination of non-corner vowels through changes such as /e/ > [i], /o/ > [u] and /ɛ ɔ/ > [a],
- (b) prominence reduction, which avoids particularly long or otherwise salient vowel qualities and may be achieved through
 - (b1) open-mid vowel raising (also referred as tensing),
 - (b2) vowel centralization into schwa.

The Romance languages may choose one or more than one of these vowel reduction mechanisms. There are language/dialects applying only strategy (a). This is the case for Sicilian, several dialectal zones in Southern Italy and Southern Corsica where the five vowel system /i e a o u/ (/i e ɛ a ɔ o u/ in Northern Salento) is reduced to [i a u] in unstressed position through mid front vowel raising to [i]

and mid back vowel raising to [u], e.g. Northern Salento ['pes:i] (It. *pesce* 'fish'), [ku'm:entu] (It. *convento* 'convent'). Another example is Bergün Romansh where the seven vowel system is also reduced to [i a u] through different quality changes: /e/ > [i], /o/ > [u] and /ε ɔ/ > [a] (cf. Lutta 1923 and ↗20 Rhaeto-Romance: Friulian, Ladin, and Romansh).

Other languages apply strategies (b1) or (b2). Languages/dialects falling under (b1) raise /ε ɔ/ into [e o]. This is so for Western Catalan ([mɛl] 'honey' / [me'los] 'mellow', [sɔl] 'sun' / [so'let] 'little sun'), Standard Italian, Friulian and Brazilian Portuguese, which exhibit the vowel phonemes /i e ε a o ɔ u/, and also Occitan with /i e ε a ɔ u y/. On the other hand, in languages/dialects falling under (b2) one or more vowels undergo centralization into [ə], as for Old French where schwa replaced etymological [e] in all unstressed positions (*devoir* (< DEBERE) 'duty') and etymological [a] word finally (*porte* (< PORTA(M)) 'door'), and for Romansh varieties such as Vallader where [a] shifts to [ə] everywhere and [e] is realized as [ə] only after stress (Schmid 2016, 476). Preference for centralization of all vowels or all vowels except for /a/ is found in dialects of Southern Italy (cf. 4.2).

There is still another group of languages/dialects with a mixed vowel reduction scenario. In some, mid front and/or open vowels undergo centralization (process (b2)) and mid back vowels raise along the peripheral pathway into [u] (process (a)), as for Eastern Catalan (/e ε a/ > [ə], /o ɔ/ > [u]) and European Portuguese (/e ε/ > [ə], /a/ > [e], /o ɔ/ > [u]). In spite of reducing /e ε a/ to [a], it seems that Alguerese Catalan parallels Eastern Catalan in that unstressed [a] derives from an older vowel variant [ə] perhaps due to contact with Sardinian (i.e., /e ε a/ > [ə] > [a]). Another mixed scenario is that of dialects exhibiting mid vowel raising (process (b1)) and peripheralization (process (a)). Thus, the Northern Mantuan vowel system /i i y e ø ε a ʌ ɔ o u/ reduces to [i y e a u] in unstressed position through the changes /i e/ > [i], /ø/ > [y], /ε ʌ/ > [e] and /ɔ o/ > [u] (Walker 2011, 199–200).

It should be noted that, in addition to being contrast-enhancing perceptually, peripheralization may be also considered to be a case of prominence reduction by which vowels shorten and acquire a lower intensity level, i.e. close vowels are shorter and less intense than close-mid vowels. On the other hand, the so-called tensing of /ε ɔ/ into [e o] may also result from prominence reduction in so far as close-mid vowels are shorter and less intense than open-mid ones. Whether prominence reduction yields schwa or full peripheral vowels could be related to language-dependent differences in degree of phonetic vowel reduction, which in turn could be associated with factors such as stress prominence and degree of vowel compression within the stress foot.

4.2 Word position

Vowel reduction may depend on syllable position within the word and with respect to stress. There appears to be a trend in the Romance languages for vowel reduction to operate after stress rather than before stress, which could account for why in metaphonic processes medial pretonic vowels assimilate in height while medial posttonic vowels may assimilate completely to the word-final unstressed vowel trigger (cf. Maiden 1988 and 2.1). This trend for vowel reduction to operate posttonically rather than pretonically is available in several Italian dialects exhibiting the seven vowel system /i e ε a o ɔ u/. Thus, pretonic [i ə a u] coexist with posttonic [ə] in Neapolitan and with posttonic [ə a] in Apulian from Gargano and Molisan, or else most of Southern Italy has [ə a] pretonically and only [ə] posttonically (Loporcaro 2016). In Lazio, the contrast may be between pretonic [i e a o u] and posttonic [e] or [i] (Preta), or else between pretonic [i a u] and medial posttonic [ə] (Veroli) (Maiden 1988).

Word-final position is ambiguous regarding phonological vowel reduction (Barnes 2006). On the one hand, word-final vowels have deleted pervasively in several Romance languages/dialects after undergoing severe shortening and undershoot (cf. Section 4.3) and, as stated above, the vowel inventory is often smaller in this position than before stress. On the other hand, reduction through peripheralization may affect unstressed mid vowels located in word-final position alone. An illustrative case of this latter trend is that of Brazilian Portuguese where /ε ɔ/ shift to [e o] in unstressed position except word finally where /ε e/ raise to [i] and /ɔ o/ raise to [u]; also in European Portuguese, while /o ɔ/ reduce to unstressed [u] across the board, /e ε/ change to [ə] but for the word-final position where mid front vowel reduction yields [i]. In Northwestern Spain, the unstressed vowel inventory /i e a o u/ shrinks to [i a u] word finally in Leonese and parts of Asturian through the changes [-e] > [-i] and [-o] > [-u], while mid vowel raising applies to the mid back vowel alone in Pasiego ([-i], [-e] > [ə], [-o] > [u]). Likewise, in Campidanese Sardinian mid vowel raising causes /i ε a ɔ u/ to become [i a u] word finally. Again it is debatable whether peripheralization should be seen as a mechanism of vowel contrast enhancing or as a form of extreme vowel reduction (cf. above). The open vowel /a/, on the other hand, may take distinctive qualities word finally which are not found in other unstressed positions within the word domain. In areas of the Western Catalan dialect, which shows the same unstressed vowel system as Spanish ([i e a o u]), [-e] may raise to [i] and [-a] may shift to [ɑ] or [ɛ]. The open vowel also has a wide range of phonetic realizations word-finally in Occitan of which [o] predominates, and it raises to [-e] (and to [i] when closed by a consonant) in Friulian. Overall, all these changes suggest that unstressed vowels may become perceptually more contrastive word finally than word internally, which, as pointed out by Barnes (2006), could be related to a trend towards their reinforcement through segmental lengthening and overarticulation.

4.3 Vowel deletion and epenthesis

Unstressed vowel syncope may be considered an extreme case of vowel reduction. In the transition from Latin to the Romance languages, (centralized) unstressed vowels could be deleted at a period in which those languages must have been stress timed and thus had especially prominent stressed syllables at the expense of the unstressed ones. Syncope was most pervasive in French, Northern Italian dialects and Romansh; thus, for example, all etymological word-final vowels except for [-a] dropped in most dialects of Northern Italy. Among the remaining Romance languages, unstressed vowel syncope operated to a greater extent in Catalan and Occitan than in Spanish and Portuguese and even less robustly in Eastern Romance (Romanian, Central and Southern Italy, Sardinian). An interesting event which complies with this language hierarchy is the case of several Catalan dialects where schwa, which is the unstressed allophone of /e ε a/, is highly stable phonetically and therefore, in contrast with French and Northern Italian dialects, does not delete word-internally, not even in fast speech. There has been a more modern vowel reduction and syncope wave in European Portuguese where unstressed vowels may be subject to extreme shortening which often results in their devoicing and complete deletion, as well as in Southern Italy where deletion may operate on the reduced outcome [-ə] of all vowels in conjunction with related changes such as vowel diphthongization in open syllables (cf. Section 3).

The frequency of occurrence of vowel syncope in Romance depends on word position as well. Vowel elision has not applied in word-initial syllables as a general rule since phonetic segments are strengthened in this position through an increase in constriction degree for consonants and in jaw opening for vowels. Nevertheless, syncope in word-initial syllables may operate on /e o/ in open syllables in Emilia Romagna and rural Piedmontese and on [ə] in French and European Portuguese, e.g. Pd. [f'nɛsta] (< FENESTRA(M)) 'window', Fr. [dmɛ̃] *demain* 'tomorrow' (Loporcaro 2011b, 59–60). Regarding position with respect to stress, there is a strong trend for unstressed vowels to delete after stress, which seems to be in accordance with the tendency for word-medial vowels to reduce posttonically rather than pretonically (cf. 4.2); thus, for example, in Ascrea, medial unstressed vowels delete more often after stress than before stress (Maiden 1988). When occurring before stress, the unstressed vowels most susceptible to syncope are those immediately preceding the stressed vowel or intertonic (Loporcaro 2011b, 59).

A problematic issue is the source of word-final vowels occurring after consonant sequences in languages/dialects which have deleted unstressed vowels pervasively, namely, whether those vowels correspond to the original Latin vowels and thus did not delete or else were added after unstressed vowel deletion took place. This is the case for the so called 'supporting vowels' occurring immediately after the last consonant or between the two adjacent consonants in an obstruent+liquid sequence, as for example [i] in Friulian (*dopli* (< DUPLU(M)) and [e] in Ladin ([l'me:ger] (< MACRU(M)),

crible (< CRIBLU(M)) and Old French (*veintre* (< VINCERE), *diaule* (< DIABOLU(M))). It should be stated in this respect that Italian speakers often add a paragogic [e] after a word-final consonant as in loanwords such as *sport* and *tram*.

Vowel epenthesis may be implemented word-initially in order to facilitate the production of consonants subject to strict articulatory and aerodynamic demands such as the alveolar trill (Gasc. *arres* (< RES ‘thing’) ‘nothing’; cf. chapter on *a* prosthesis in Sampson 2010) or a /sC/ cluster (Sp. *escudo*, Old Tuscan *iscudo* < SCUTU(M)). It may also take place between two heterosyllabic consonants thus generating a CVC sequence (BPor. [futʃiˈbow] Eng. *football* ‘soccer’, Southern Italian dialects [ˈsoleka] It. *solco* ‘furrow’), and in syllable initial obstruent+rhotic sequences in Spanish and French (Sp. *prevé* ‘foresee_{3SG}’, Fr. *poudrer* ‘powder_{INF}’; Colantoni/Steele 2005).

5 Vowel lengthening

A major development in the transition from Latin to Romance was the loss of the phonemically contrastive long/short vowel distinction. In Romance languages such as French and Northern Italian dialects (and more modernly in Southern Italy as well), vowel length was tied to syllable structure, i.e. stressed vowels were longer in open syllables and shorter in closed syllables. This relationship between vowel length and syllable type accounts for why mid vowels could raise and diphthongize in open syllables and lower and centralize in closed syllables (cf. Sections 4 and 6). Vowel lengthening did not occur generally in proparoxytones due to the fact that stressed vowels were too short, i.e., phonetic segments and vowels in particular shorten as the word becomes longer (consider however Rom. [ˈmejder] (< MĚTERE) ‘put_{INF}’, It. *tiepido* (< TĚPIDU(M)) ‘warm’, Fr. *œuvre* (< ŌPERA) ‘work_{PL}’). There are no traces of stressed vowel lengthening in open syllables in languages belonging to the Daco-Romance and Ibero-Romance language families where stressed open-mid vowel diphthongization has taken place both in open and closed syllables (cf. Section 3).

Differences in vowel duration as a function of syllable type also explain why vowel length may be phonemically distinctive in several dialects belonging to the Northern Italy-Rhaeto-Romance complex. The vowel length distinction occurs in oxytones and paroxytones in Cremonese ([pe:l] (< PILU(M)) ‘hair’ / [pel] (< PELLE(M)) ‘skin’, [pa:la] It. *pala* ‘shovel’ / [ˈspala] It. *spalla* ‘back’), Emilian, Northern Alpine Provençal, Romansh and Ladin, or only in oxytones in Friulian (*nêv* [ne:f] (> NIVE(M)) ‘snow’ vs. *cjase* [ˈcaze] (< CASA(M)) ‘house’, *alt* [alt] (< ALTU(M)) ‘high_M’) and Lombard Milanese ([pe:s] (< PENSU(M)) ‘weight’ / [pɛs] (< PISCE(M)) ‘fish’, [me:s] (< MENSE(M)) ‘month’ / [mɛs] (> MEDIU(M)) ‘half’, [la:t] (< LACTE(M)) ‘milk’ / [lat] (< (AL)LATU(M)) ‘gone’). This vowel length scenario is complicated by the fact that in some of these dialects (Bolognese, Milanese, Friulian) short vowels may have lengthened before consonants favoring an increase in preceding vowel duration such as sonorants and

liquids in particular. There is some debate as to how this vowel length distinction must have arisen. According to one hypothesis the fact that the short/long vowel contrast in oxytones cooccurs with the presence of an underlying voicing distinction in the following obstruent (longer vowels before an underlying voiced obstruent, shorter vowels before an underlying voiceless obstruent; cf. the Lombard Milanese examples ending in [s] cited above) has led some scholars to suppose that vowel lengthening was triggered by active voicing in the following obstruent after which the voicing contrast could be neutralized into a voiceless realization (Hualde 1990). Another hypothesis relating stressed vowel length to unstressed vowel deletion states that contrastive vowel length in dialects such as Friulian and Ladin arose through vowel lengthening in closed syllables of words which had become oxytones after Latin paroxytones deleted their final vowel (Vanelli 1997, 280; Salvi 1997, 287). Finally, it has been contended that the key factor which has caused stressed vowels to lengthen in open syllables was degemination, i.e. the change from Latin geminates to non-geminates involved some compensatory lengthening of the preceding vowel (Loporcaro 2015; Morin 2003). This explanatory account also holds that vowel systems with distinctive vowel quantity only in oxytones such as those of Milanese and Friulian represent a further development with respect to those allowing phonemically long vowels in paroxytones as well, which follows from the fact that adding syllables to the right of the stressed syllable contributes to shortening its vowel nucleus (Loporcaro 2015; 2011b).

Deletion of final /s/ has triggered compensatory vowel lengthening in Auvergnat and Limousin Occitan ([pe]/[pe:] 'foot_{SG/PL}', [sã:'ta:] (< CANTAS) 'sing_{2SG}' / ['sã:tɔ] (< CANTAT) 'sing_{3SG}', [tawlb] Oc. *taula* / [taw'la:] Oc. *taulas* 'table_{SG/PL}'; Oliviéri/Sauzet 2016, 323–324). In these and other examples the vowel length contrast has acquired the morphological role of the consonant after it was deleted.

6 Changes in vowel quality and vowel merging

Changes in stressed vowel quality may be tied to syllable structure with essentially longer mid vowels raising in open syllables and shorter mid vowels lowering or becoming centralized in closed syllables. Thus, for example, in Western Abruzzo, /ɛ/ raises to [e] in open syllables and /e/ opens to [ɛ] in closed syllables, and the latter change also applies in Piedmontese in addition to /e/ > [ə] in closed syllables of paroxytones ending in [-a] and in proparoxytones ([sək:a] *sĭcca* 'dry_F', [vəsku] It. *vescovo* 'bishop'; Hastings 1997; Parry 1997, 239). The presence of /e ø o/ and /ɛ œ ɔ/ in French is also syllable-position-dependent in similar terms though not consistently, as in [pø] *peut* 'can_{3SG}' / [pœv] *peuvent* 'can_{3PL}', [so] *sot* / [sɔt] *sotte* 'silly_{M/F}' and [le] *laid* / [lɛd] *laide* 'ugly_{M/F}' (so-called *loi de position* 'law of position'). It deserves to be investigated whether the centralization of stressed /e/ into /ə/ in Old Eastern Catalan and /œ/ in Landais Gascon was also tied to

syllable structure in analogous ways to those just described; more modernly Old Eastern Catalan /ə/, which still remains in the Balearic islands, opened to /ɛ/ ([ˈpɛrə] < *[ˈpərə] *pera* (< PĪRA(M)) ‘pear’). The trend for vowels to raise in open syllables also accounts for the shift of stressed /a/ to [e] in this syllable condition in Old French, as exemplified by *mer* (< MARE(M)), *père* (< PATRE(M)) and perhaps *cher* (< CARU(M)) and *chèvre* (< CAPRA(M)) where, as advocated by Bartsch’s law, /a/ closing could also be attributed to the coarticulatory action of the preceding (alveolo-)palatal consonant [ç] which was later replaced by [tʃ] (> [ʃ]).

A related issue is the instability of the phonological contrast between neighboring vocalic sounds. This may lead to vowel merging, as has happened between stressed /a/ and /ɑ/ or /ɛ/ and /œ/ in French, and between stressed /e/ and /ɛ/ in Roussillonais Catalan. Instability of a phonological distinction does not have to end up in a merger though, as indicated by the considerable variation involved in the pronunciation of /e/ and /ɛ/ and /o/ and /ɔ/ depending on lexical item, speaker and subdialect in Tuscan Italian (Renwick/Ladd 2016).

7 Vowel sequences

The resolution of sequences of two vowels belonging to the same or successive words presents some interesting characteristics, which may differ among Romance languages.

Word-internally the formation of rising diphthongs out of /iV, uV/ sequences depends to a large extent on the level of destressing of the vowel sequence itself and thus on segmental shortening. In spoken Catalan, for example, the chances that hiatuses undergo diphthongization increase with distance from the lexical stress and the strong word-initial syllable. Thus, diphthong formation does not occur in *diable* ‘devil’, *violí* ‘violin’ or *idioma* ‘language’ but it may in *violinista* ‘violin player’ and *biblioteca* ‘library’ (in these and other words appended below the stressed vowel is underlined and the hiatus is marked in boldface). In addition, word-final position favors diphthongization in open or closed syllables mostly but not only if the non-close vowel is unstressed, a trend which may be attributed to the avoidance of proparoxytones ([-jo] in *acció* ‘action’, [-jə] in *gràcia* ‘grace’), and bisyllabic oxytones generally keep the hiatus unmodified (e.g. [iɔ] in *miol* ‘cry of a cat’, [ia] in *criat* ‘servant’). Non-prosodic factors may also be involved, i.e. rising diphthong formation is much less frequent in sequences with [u] than in those with [i] and is not likely to occur when the close vowel is preceded by a consonant such as the alveolar trill which is produced with an antagonistic gesture to that of [i] (Cat. [ja] *radial* ‘radial’, [ia] *Sarrià* (place name), [ua] *actual* ‘current’). Spanish obeys many of these constraints on the application of the diphthongization process.

It has been hypothesized that Romance languages are likely to favor /iV/, /uV/ diphthongization word internally, the higher the frequency of occurrence of rising diphthongs in the language under consideration (Chitoran/Hualde 2007; Cabré/Prieto 2006). This would explain why Romanian and Portuguese are least favorable to rising diphthong formation while French and Spanish dialects are most favorable (e.g. bisyllables may diphthongize in the two latter languages as in the case of Fr. *nier* ‘deny’ and *tuer* ‘kill’). Other factors appear to be also involved however in ways which are poorly understood such as the language’s rhythmic pattern. Thus, Portuguese which is supposed to be resistant to hiatus diphthongization may form rising diphthongs out of bisyllabic oxytones, i.e. [ia]/[ja] *piar* ‘chirp_{INF}’, [i_ɔ]/[j_ɔ] *pior* ‘worst’, [ua]/[wa] *suar* ‘sweat_{INF}’, *voar* ‘fly_{INF}’ (Mateus/ d’Andrade 2002, 49).

The probability that a vowel gets deleted in V#V sequences is also inversely related to prominence level and thus distance with respect to sentence stress. Thus, in Brazilian Portuguese, [-e] (/a/) may delete in the sentence *ela compra uvas caras* ‘she buys expensive grapes’ but not in *coma uvas!* ‘eat_{SG.IMP} grapes!’ (Bisol 2003). Regarding schwa elision, placement as V1 or V2 appears to be another relevant factor. Thus, for example, in Eastern Catalan the schwa may drop in [‘V#ə] sequences rather than in [ə#‘V] ones where deletion occurs essentially when [ə] belongs to a functional word ([‘aə] > [a] *està alarmat* ‘s/he is alarmed’, [ə‘a] > [a] *casa alta* ‘high house’, [ə‘ɔ] > [ɔ] *aquesta hora* ‘this hour_F’). However, contrary to the Catalan case, [i] and [e] may delete before a word-initial vowel mostly if unstressed but not after a word-final vowel in Eastern Portuguese (*fort(e) abrigo* ‘strong shelter’, *a filh(a) orava* ‘the daughter prayed’) and [-a] even if stressed may drop before any word-initial vowel in Chicano Spanish (*cas(a) humilde* ‘humble house’, *vendr(à) Homero* ‘Homer will come’; Hutchinson 1974). In Italian, where schwa is not present, deletion of word-final vowels is restricted to determiners and pronouns (*lo/la* ‘the’, *uno* ‘a(n)’, *quello* ‘that’; Garrapa 2009).

Distance to stress is also involved in hiatus diphthongization across a word boundary. Thus, in spoken Spanish, we have [ai] in *empresa híbrida* ‘hybrid enterprise’ and often [aj] in *empresa inútil* ‘useless enterprise’. Moreover, as revealed by the vowel deletion process reported above, languages appear to differ regarding the extent to which they favor the formation of falling or rising diphthongs out of V#V sequences with a close vowel: while European Portuguese favors the formation of rising diphthongs ([wa] *salto alto* ‘high jump’, [ja] *grande área* ‘big area’; Vigário 2003, 103), Catalan favors falling diphthongs and does not allow for diphthongization of /iV, uV/ in comparable sequences such as *quarto alt* ‘high room’ and *pati ample* ‘wide courtyard’.

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4 From vowel weakening in Romance to French schwa

Abstract: This chapter, which has a focus on French, explores a number of strategies used in weak structural positions across Romance languages which conspire to reduce vowels or ultimately lead to their loss. We offer an interpretation of raising, gliding, and centering in terms of a framework based on unary elements, as defended in Dependency Phonology and other frameworks. We argue that most instances of weakening can be interpreted in terms of element loss, although syllabicity, centering, and dependency reversals can also play a role. As a consequence, there emerges a concept of weak phonological schwa as an empty vowel. We test this theoretical approach on French schwa, show its drawbacks, and consider alternative treatments. In light of the intra-speaker, inter-speaker, and inter-dialectal variation observed in data extracted from the PFC (*Phonologie du français contemporain*) corpus, we suggest that, with the exception of southern French varieties, French schwa is not best interpreted as an empty vowel and that a more concrete theoretical alternative is called for.

Keywords: vowel weakening, weak unspecified vowel, schwa, Dependency Phonology, elements, phonological variation, PFC

1 Introduction

Weakening and strengthening processes in different structural positions are widespread across the languages of the world, including Romance languages (73 Processes affecting vowels). In this paper, we explore various types of vowel weakening, and investigate whether an analysis of French schwa as a weak unspecified vowel is warranted.

First, in Section 2, we look at processes of gliding, raising, and centering, and, second, in Section 3, we offer a discussion of deletion paths and the complex nature of schwa. In these two sections, we present a theoretical account of weakening processes inspired by a unary framework, that of Dependency Phonology (Anderson/Jones 1974; Anderson 2011). Our aim is to show that many reduction processes can be elegantly handled by positing representations within which elements are lost or suppressed in

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weak structural positions. There emerges a concept of *weak phonological schwa* which refers to a vowel that is in some way unspecified (an empty nucleus) and that can be lost (or not realized) in a range of positions. Within modern phonology, this is the way French schwa is usually conceived, with notational differences which do not affect the insight that schwa should be represented as a structurally defective vowel.

In Section 4, we look at French schwa in detail and conclude that, apart from southern French, the evidence for treating it as a phonological empty nucleus is not as strong as it may seem. In Section 5, we argue that French schwa is a multi-faceted phenomenon. Analyses that essentially duplicate the history of French (as reflected in its spelling) – wherein a weak phonological schwa emerged which could be syn-copated in various positions – are too abstract and do not fare well when confronted with data from extensive corpora. More concrete alternatives which allow for intra-speaker, inter-speaker, and inter-dialectal variation are argued to be preferable to the traditional phonological accounts, however seductive the latter may appear to be at first sight.

2 Vowel weakening: gliding, raising, and centering

Vowel weakening can take place in many different guises, and the major types involve changes in quantity or quality, or loss in certain contexts. However, one type of change which also reduces the saliency of vowels – and is often forgotten in the literature – is loss of syllabicity. Loss of syllabicity is very widespread within Romance languages with the close vowels often becoming glides or weak elements within diphthongal units. Thus, in Reference French, the vowel-glide alternations exemplified in (1) have frequently been noted (Durand/Lyche 1999, 41):

(1) Fr.	/i/ > [j]	[ni]	<i>nie</i>	‘deny _{1SG} ’
		[nje]	<i>nié</i>	‘deny _{PST.PTCP} ’
	/y/ > [ɥ]	[ty]	<i>tue</i>	‘kill _{1SG} ’
		[tɥe]	<i>tué</i>	‘kill _{PST.PTCP} ’
	/u/ > [w]	[ʒu]	<i>joue</i>	‘play _{1SG} ’
		[ʒwe]	<i>joué</i>	‘play _{PST.PTCP} ’

Not all varieties of French, however, behave in the same way. Midi French, for example, favors dieresis (e.g. [nie]) in contexts where syneresis (e.g. [nje]) is predominant in Reference French. Moreover, while the pronunciations summarized in (1) are well attested in Reference French, the likelihood of having a glide when a suffix with an empty onset is added to a stem is not the same for all vowels and all words. [i] has proven more likely to become [j] than [u] to become [w] and, in turn, [i] and [u] have proven more likely to become glides than [y] (Klein 1991), which indicates

a hierarchy of sonority internal to the close vowels. Loss of syllabicity is not limited to the close vowels and very often when mid vowels lose their syllabic status, they are also raised. Thus, one can observe pronunciations such as the following in many varieties of Spanish: *teatro* [tjatro] ‘theater’, *baúl* [baul] ‘trunk’, *aprecio a Eulalia* [apreθiəaɣulalja] ‘I appreciate Eulalia’, or *tomado* [tomaðo]/[tomaɔ]/[tomaɥ] ‘take_{PST}’ (Real Academia Española 2011, 347–349 et passim).

Examples such as the preceding ones confirm that there is a hierarchy of sonority within vowel systems such that, as we move from open vowels to close vowels, we decrease sonority. The sonority hierarchy for vowels can be summarized as follows: [a > ɛ > e > o > i u], provided we limit ourselves to the most frequent vowels across Romance languages. However, we have just noticed in connection with gliding in Reference French that further differentiation is necessary when systems become more complex: in particular, [i] ([palatal], [acute]) appears to be more consonantal or less resonant, and therefore weaker, than [u] ([velar]/[round], [grave]).

To reach a better understanding of the processes involved in weakening, we examine, first of all, what might be called an ideal case of reduction (cf. Anderson 1996 for further discussion and for the basis of the theoretical interpretation we outline below). According to Pettersson/Wood (1987), in informal uses of contemporary Bulgarian there is a process of reduction of unstressed vowels which can be illustrated as in (2):¹

(2) Bul. a.	/i/ > [i]	име	/’ime/	[’imi]	‘name’
		имена	/ime’na/	[imi’na]	‘name _{PL} ’
b.	/e/ > [i]	село	/’selo/	[’selu]	‘village’
		села	/se’la/	[si’la]	‘village _{PL} ’
c.	/a/ > [ə]	работа	/’rabota/	[’rabutə]	‘work’
		работник	/ra’botnik/	[rə’botnik]	‘worker’
d.	/ə/ > [ə]	кръчма	/’krəʃma/	[’krəʃmə]	‘tavern’
		кръчмар	/krəʃ’mar/	[krəʃ’mar]	‘barkeeper’
e.	/u/ > [u]	буква	/’bukva/	[’bukvə]	‘letter’
		буквар	/buk’var/	[buk’var]	‘ABC’
f.	/o/ > [u]	онзи	/’onzi/	[’onzi]	‘that _M ’
		онази	/o’nazi/	[u’nazi]	‘that _F ’

Given six contrastive vowels /i e a ə u o/ in Bulgarian, there exists a process of reduction of unstressed vowels which respectively raises /e/ and /o/ to [i] and [u], and which turns

¹ The examples are taken from Pettersson/Wood (1987, 266). We are using here the transcriptions adopted by Anderson (1996), which substitute [ə] for Pettersson/Wood’s [ǣ]. Recent work by Andreeva/Barry/Koreman (2013) and Gabriel/Grünke (2018) attributes the set of alternations in (2.b) to Eastern Bulgarian dialects.

/a/ into a phonetic schwa [ə].² /i u ə/ remain unchanged, and the vowel that we transcribe ‘[ə]’ therefore functions at two levels: a phonological and a phonetic one.

Before we turn to a phonological account of reduction processes like the ones attested in Bulgarian, let us consider them from a phonetic point of view. Gordon (2016, 155) argues that a proper explanation can be given by invoking “articulatory effort minimization”. Basically, the shorter duration of unstressed vowels allows less time for the tongue and jaw to reach articulatory targets farther from their rest position, and this leads to articulatory undershoot. One result is reduction to a schwa-like vowel in unstressed syllables (as extensively attested in English), but, as Gordon (2016, 155) points out,

[a]rticulatory undershoot can also contribute to an overall raising in the vowel space under temporal duress particularly adjacent to consonants, which are produced with a relatively high jaw position that is more conducive to higher vowel qualities.

Gordon cites the alternations mentioned above for Bulgarian, pointing out that this reduction pattern reflects a blanket upward shift of the vowel space. While we agree with his phonetic explanation, our concern here will be to see whether independently established principles of phonology can mirror the processes involved. In what follows, we offer an account inspired by work in Dependency Phonology (DP)³, and developed in different directions by models such as Particle Phonology, Government Phonology, CVCV Phonology, Radical CV Phonology, and others.

There are two types of primitives in classical DP, which we shall call *elements* here (Harris 1994; Backley 2011). First of all, we posit the existence of two elements |V| and |C|, which express the categorial characterization of segments, and which can be combined. For our purposes, we treat vowels as |V| and, for readers who may be used to different models or features, we can take the V characterization as broadly equivalent to classical binary features such as [+vocalic, -consonantal]. It is on the basis of the |V| characterization of segments that suprasegmental structures are built allowing for the representation of strong vs. weak positions.

The four central elements we need for vowel characterization are those presented in (3), which allow us to specify the articulatory content of vocalic segments:

- (3) I = palatal/acute
- U = round/grave
- A = open/compact
- @ = centrality/energy reduction

² Andreeva/Barry/Koreman (2013) question the /e/ to /i/ merger in some varieties on the basis of a detailed acoustic study.

³ Dependency Phonology is one of the first unary frameworks, articulated in the 1970s (Anderson/Jones 1974; Anderson/Ewen 1987; Anderson 2011).

In a system which has solely three vowels, say /i a u/, these vowels are represented as in (4), where the categorial characterization of each vowel ($|V|$) is related by association to its articulatory value.

(4)	/i/	/a/	/u/
	V	V	V
	:	:	:
	{I}	{A}	{U}

A vocalic system such as Castilian Spanish, /i e a o u/, will be represented as in (5) in DP, where, for convenience, we drop the $|V|$ specification and symbolize the combination of elements by a comma.

(5)	/i/ {I}	/u/ {U}
	/e/ {I, A}	/o/ {U, A}
	/a/ {A}	

A phonological schwa, on the other hand, can be represented as an empty vowel, i.e. solely specified as $\{V\}$. Phonologically, a system such as that of Bulgarian can thus be spelled out as in (6):

(6)	/i/ {I}	/u/ {U}
	/ə/ { }	
	/e/ {I, A}	/o/ {U, A}
	/a/ {A}	

But, of course, the Bulgarian schwa has a phonetic signature: it is a truly central vowel phonetically. We assume that a default realization for an unstressed empty vowel is the element of energy-reduction $[@]$. Physiologically, the supralaryngeal vocal tract configuration associated with the neutral position approximates that of a uniform tube and produces a schwa-like auditory effect of the $[ə]$ type. The resonating characteristics of this configuration are such that it lacks the distinct spectral peaks found in /i u a/ (Anderson/Ewen 1987; Harris 1994; Backley 2011).

How can we then represent vowel reduction in Bulgarian? We only need to say that, in an unstressed syllable, the element $[A]$ (open, compact) is lost,⁴ as exemplified in (7).

⁴ In this paper, we tend to adopt a ‘process’ terminology for descriptive purposes. In many cases, one should reformulate our generalizations to say that certain elements are not licensed in unstressed positions without implying the existence of ‘on-line’ processes and of a directionality that remains to be demonstrated.

- (7) /e/ {I, A} > /i/ {I} (raising)
 /o/ {A, U} > /u/ {U} (raising)
 /a/ {A} > { } (empty element realized {ə}, i.e. [ə] by default)

With this background in mind, we can now examine some examples of vowel reduction in Romance.

Weakening patterns similar to those in Bulgarian are well attested in Catalan (with generalizations taken from Wheeler 2005, 52–77; ↗23 Catalan). Let us start with Western Catalan, which possesses a seven-vowel system of the following type: /i e ε a ɔ o u/. The elemental contrastive representations are found in (8):

- (8) /i/ = {I}
 /e/ = {I, A}
 /ε/ = {I, A}
 /a/ = {A}
 /ɔ/ = {A, U}
 /o/ = {A, U}
 /u/ = {U}

In these representations, we invoke a further concept, that of *head* (shown here by underlining). The mid vowels are analyzed with the same primitives as used before, |I| and |A| for the front vowels and |U| and |A| for the back vowels, but they are differentiated in terms of headedness. The open-mid vowels have a dominant |A|, the close-mid vowels a dominant |I| or |U|. In this variety of Catalan, in unstressed positions, the seven-vowel system is reduced to five: /ε/ and /ɔ/ are respectively raised to [e] and [o], as in *perdre* [pɛrdrɛ] ‘lose_{INF}’ vs. *perdem* [pɛrˈðɛm] ‘lose_{1PL}’, *porta* [pɔrta] ‘carry_{3SG}’ vs. *portem* [pɔrˈtɛm] ‘carry_{1PL}’. All the other vowels within the system stay the same. Our account is fairly simple: within mid vowels in Western Catalan, there is a dependency reversal in unstressed position. Raising occurs by making |A| a dependent and promoting whatever other element it is associated with, |I| or |U|, to head status.

The second dialectal family of Catalan we consider is Eastern Catalan (to the exclusion of Balearic Catalan). In this variety of Catalan, the stressed vowel system is again made up of seven vowels: /i e ε a ɔ o u/, but an extreme process of reduction can be observed in unstressed syllables such that only [i ə u] are usually attested. Non-close non-rounded vowels /e ε a/ are realized as a schwa, while on the other hand, the rounded vowels /ɔ o u/ are realized as [u]. As in all Catalan varieties, underlying /i/ and /u/ are seemingly unaffected by this process of reduction as they always surface as [i] and [u].

With these assumptions in mind, the general pattern of reduction in Eastern Catalan is fairly easy to formalize. In unstressed syllables, all vowels specified as either |A| alone or |A| combined with |I|, which we symbolize as {A, I}, lose this set of elements. As a result /e ε a/ are realized as the empty vowel { }, which results phonet-

ically in {@}, i.e. [ə]. By contrast, in the same contexts, |A| combined with |U| is lost whatever its head status. As a result, /ɔ/ = {A, U} and /o/ = {A, U} merge with /u/ = {U}.

The third Catalan system to be examined here is Balearic Catalan in its Majorcan variety (Wheeler 2005, 53–54). The system here includes schwa as a contrastive element as there are eight vowels in stressed syllables: /i e ε a ə ɔ o u/. To provide a formalization of the processes involved, we will assume the representations given in (9):

- (9) /i/ = {I}
 /e/ = {I, A}
 /ε/ = {I, A}
 /a/ = {A}
 /ə/ = {}
 /ɔ/ = {A, U}
 /o/ = {A, U}
 /u/ = {U}

As in Bulgarian, schwa functions both as an underlying stressable vowel and as the outcome of reduction for /a/ and the mid front vowels. For us, its special nature can be captured by positing that it is specified as just |V| phonologically. Let us recall that we assumed earlier that in unstressed position, an unspecified |V| node would be realized by the element |@|, i.e. [ə]. This time, however, we have to posit a marked realization since the realization of the empty |V| node is a phonetic schwa whatever its degree of stress. We emphasize that Catalan is indeed making a marked choice here since, other things being equal, an unspecified |V| node, under stress, should be instantiated with an |A| element and so realized as some type of open [a].⁵

In unstressed syllables, however, four vowels are attested: [i ə o u] (although in some morphological contexts unstressed [e] is possible, which is treated by Wheeler 2005, 54 as somewhat “deviant”). The main reductions take the following routes: /a e ε/ reduce to [ə]; /ɔ/ is raised to [o]; /i ə o u/ keep the same value (cf. Wheeler 2005, 55 for examples). The reduction processes in unstressed positions in this variety can be described as follows. First, all vowels involving |A| either alone or combined with |I|, which we symbolize as {A, I}, lose this set of elements. Second, any combination of |A| and |U| must end up with |U| as head. In the first case, /e/ = {I, A}, /ε/ = {I, A}, /a/ = {A}, all become the empty set {}, which results phonetically in {@}, i.e. [ə]. In the second case, /ɔ/ = {A, U} is realized as [o] = {A, U} by dependency reversal.

The difference between front and back vowels observable within Catalan dialects can be related to the observations we made earlier on French gliding showing that, other things being equal, the element |U| is higher in sonority than |I| and therefore less prone to weakening. Further, the raisings and centralizations observed in

5 On the connection between |V| and |A|, cf. Anderson/Ewen (1987, 214–215).

Catalan are well attested in other Romance languages with a number of local wrinkles, e.g. in European Portuguese (Bisol/Veloso 2016), Standard Italian, Friulian, and Brazilian Portuguese (↗3 Processes affecting vowels, for wider exemplification, as well as ↗18 Italian, ↗20 Rhaeto-Romance: Friulian, Ladin, and Romansh, and ↗26 Portuguese).

3 Deletion paths and the complex nature of schwa

In the preceding section, we have examined some processes which reduce the saliency of vowels by changing their syllabic status, raising them or centering them. Ultimately, weakening processes can lead to loss. We start with the close vowels once again by considering Quebec French in its Laurentian⁶ variety.

In Laurentian French (LFr), the close vowels /i y u/ are realized as [ɪ ʏ ʊ] essentially within closed syllables and, in other contexts, through harmony. This process, traditionally described as ‘high vowel laxing’,⁷ can be illustrated by the examples in (10):

- (10) LFr /i/ > [ɪ] [vi] *vie* ‘life’ vs. [vɪ] *ville* ‘town’
 /y/ > [ʏ] [fyme] *fumer* ‘smoke_{INF}’ vs. [fɪm] *fume* ‘smoke_{3SG}’
 /u/ > [ʊ] [lu] *loup* ‘wolf’ vs. [lʊʃ] *louche* ‘ladle’

Within the framework we advocate here, these realizations can be mirrored by the addition of the element [ə] in closed syllables, which as an element of energy reduction contributes to a reduced saliency of the relevant vowel. Thus, the contrastive /y/ which surfaces in *fumer* [fyme] will be represented as {V, {I, U}}, whereas in *fume* [fɪm] it will be realized as {V, {I, U, ə}}.

Properly speaking, the phenomenon of laxing belongs in the preceding section, but its inclusion here allows us to point out that laxing is not the only way reduction affects the close vowels of Laurentian French – they are also subject to devoicing (which makes them less sonorous hence less salient) in non-final syllables (Gendron 1966; Martin 2004; Côté 2012). The fricatives are often mentioned as favoring devoicing, e.g. /si/ in *ciment* ‘cement’, /fu/ in *fourchette* ‘fork’, but all obstruents can provide a context for devoicing, e.g. /ki/ in *équiper* ‘equip_{INF}’, /dy/ in *conducteur* ‘driver’, /ku/ in *écouter* ‘listen_{INF}’. Portuguese is another Romance language with devoicing of close vowels, but this time in word-final position before a pause. In European Portuguese,

⁶ Côté (2012) argues that the label ‘Laurentian French’ is more appropriate than ‘Quebec French’ for some of the phenomena described in this section.

⁷ For discussion of high vowel laxing, cf. e.g. Walker (1984), Dumas (1987), and Côté (2012).

however, voiceless vowels can also be syncopated when they occur in unstressed syllables (Massini-Cagliari/Cagliari/Redenbarger 2016, 62).⁸

Of course, syncope can potentially affect all vowels in weak positions. This is an area which is not as well understood as one might wish because it operates at a post-lexical level and often in allegro style, which has been less studied by phonologists (73 Processes affecting vowels). But it is also true that, across languages of the world, schwas are particularly prone to deletion. We have pointed out earlier that a vowel realized as a phonetic schwa can be part of a vowel inventory, can be stressable and, as such, need not be a reduction vowel. How it is represented depends on the structure of the language under investigation. But we also know there are weak phonological schwas which are never stressable, therefore restricted to unstressed positions, and which are deleted in various contexts. Within the framework articulated in Section 2, representing these weak phonological schwas as unspecified {V}s is a transparent way of accounting for their status. Such would be our solution for English contrary to the long generative tradition stemming from Chomsky/Halle (1968), which, on the basis of alternations such as *phot*[ə]*graph*, *ph*[ə]*tography*, treats all schwas in English as derived from full vowels. While we agree that unstressed vowels can be reduced to schwas in English, in many words, schwas do not alternate with anything, e.g. *reck*[ə]*n* or *comm*[ə], and must therefore be part of the phonological inventory. From our point of view, the schwa of Southern British English, for instance, represents an ideal weak phonological schwa: it is not stressable, it is realized by default as a phonetic schwa, and it is deletable in certain contexts, cf. e.g. reductions such as *lat*[ə]*ral* > *lat*'*ral*, *s*[ə]*ppose* > *s*'*ppose*.

Turning now to French, let us recall that, diachronically, schwa stems from the reduction of Late Latin unstressed vowels in open syllables, a phenomenon legitimately regarded as a typical case of vowel weakening. The Latin vowel /a/ was particularly targeted, but all other vowels were affected. In Middle French, weak vowels in hiatus and between consonants start disappearing: *maturum* > *mêur* > *mûr*; *sacramentum* > *sairement* > *serment* (Price 1971, 76). These vowels are assumed to have become phonetic schwas and regardless of their origin, appear as <e> in written documents. The deletion process accelerated word-internally and word-finally in the

⁸ A more detailed unary analysis would have to specify what is common to /i/, /u/, and /y/ with the elements we have postulated so far. As we have no feature [±high], one can wonder what [I] and [U] have in common? They are both non-A (¬[A]). But such a negative definition is arguably not optimal. We could assume, as in the tradition of Government Phonology, that there is another primitive that is at play here: [I] (Kaye/Lowenstamm/Vergnaud 1985; Backley 2011). [I] can be taken to represent unspecified highness (neither palatal/acute nor velar-round/grave) and its realization by default is a vowel of the [i] type. This vowel is often a realization of the weak vowel of English, particularly in American English, but the same happens in Portuguese. In fact, as pointed out by Bisol/Veloso (2016), while many studies have transcribed the reduction vowel of Portuguese as [ə], more recent studies adopt [i] instead (Mateus/d'Andrade 2000; Vigário 2003; Veloso 2010).

16th and 17th centuries, and stabilized in the second half of the 19th century in northern French. The propensity to delete in certain environments, due to phonological and sociolinguistic factors, yields many pronunciations wherein orthographic <e> no longer corresponds to a realized schwa. By the end of the 19th century, for Reference French, no distinction based on schwa was advocated by orthoepists between *cap* ‘cape’ (geographic term) and *cape* ‘cape’ (type of clothing), both [kap], or *calepin* ‘notebook’ and *alpin* ‘alpine’, respectively pronounced [kalpɛ̃] and [alpɛ̃]. By that time, French phoneticians were no longer positing a schwa in the contrastive representation of such words but the reduction approach continued to be defended in some contexts. Thus Paul Passy, who considers schwa as a neutral vowel (phonemically and phonetically), claims for example that all mid vowels tend to reduce to phonetic schwa in unstressed positions (Passy 1887, 31).⁹ The reduction approach was totally abandoned by structuralists like Martinet, who took a radically concrete approach. Martinet combatted the views of some linguists (particularly in the United States) who continued to posit schwas purely on orthographical grounds, and instead treated the presence of schwa as a low-level phenomenon (“a phonetic lubricant”), i.e. the insertion of a vowel in order to facilitate the pronunciation of consonant clusters (cf. Martinet 1969; 1972).

The emergence of generative phonology in the 1960s, at least in its early stages, was going to radically alter the theoretical landscape.

4 Schwa in French: an oddball in the Romance landscape?

4.1 French schwa as a phonologically weak segment

Schane (1968) gives a new life to the historical development of schwa. On the basis of morphophonological alternations, French schwa is analyzed as a lax open central unrounded vowel derived from any open vowel via rules which recapitulate part of the history of French. Many of these schwas are then deleted by late rules of syncope to give schwa-less surface forms. The spelling of French is assumed to provide a guide to the positions where a schwa should appear at some stage of derivation and all varieties of French are assumed to share the same underlying forms. This SPE-inspired generative analysis was soon abandoned, as most of the alternations on which Schane’s treatment is based are not productive and are massively irregular. It was replaced by Dell’s (1973) analysis, which posits a full-fledged underlying vowel, symbolized as /ə/, but whose featural representation is never really elucidated. In light of

⁹ To avoid any confusion, Passy (1887) did not assume that in northern French words such as *cap* and *cape*, *calepin* and *alpin* should be distinguished by the presence/absence of a phonemic schwa.

these different approaches, we need to ask whether the presence/absence of French schwa might still be the result of a reduction process, thus supporting an analysis of the vowel as an underlying unspecified {V}.

If, as Schane, Dell and most linguists after them, we take the written system of French as a guide, we need to examine the behavior of orthographic <e> in clitics (*ce* ‘this_{M.SG}’) and in polysyllabic words: in initial syllables (*demain* ‘tomorrow’), in medial syllables (*soulever* ‘lift_{INF}’), and in final syllables (*chaude* ‘warm_F’). In the northern varieties of French, the vowel is absent in medial and final syllables, while an alternation between presence and absence is observed in clitics and initial syllables.

The bulk of abstract schwa analyses agree on the phonological autonomy of the vowel and propose that schwa is present in the underlying representation, either as a more or less specified segment or as an empty one. In Dell’s (1973) treatment, which became the main reference on the topic, practically all instances of orthographic <e> are analyzed as corresponding to schwas (represented as /ə/), whether or not they are subject to syncope, e.g. *doucement* ‘slowly’ with syncope vs. *fortement* ‘strongly’ without syncope. In the tradition of the standard paradigm of classical generative phonology, a long battery of ordered deletion rules, some obligatory, some optional, handle the possible surface realizations. A late phonetic rule changes all /ə/ into a front mid-open rounded vowel ([œ]), unless they have first been submitted to Closed Syllable Adjustment, e.g. *étiqueter* ‘label_{INF}’ with syncope ([etikte]) vs. *étiquette* ‘label_{NOM}’ where schwa is realized as [ɛ] ([etikɛt]).

With the advent of Autosegmental Phonology, Anderson (1982) provides the first empty node account of schwa and contends that a number of weaknesses of Dell’s (1973) analysis, in particular the lack of generalization of exceptionality features, e.g. the non-deletion of consecutive schwas, may be overcome by a syllabic treatment whereby schwa is posited as a syllabic nucleus devoid of phonetic content. A number of rules operate on the syllabic structures and resyllabify, categorically or variably, consonantal onsets preceding empty nuclei. When resyllabification does not apply, the remaining empty nucleus is assigned the features of [œ] by a late ‘Schwa Spelling’ rule (Anderson 1982, 552).

From the launch of DP, the possibility of representing a schwa-like vowel as an unspecified {V} (an empty nucleus) has been explored as the natural consequence of unary representations (cf. Section 2 and Durand 1986) and has been fully exploited for French within the paradigm of Government Phonology (Charette 1991) and CVCV Phonology (Scheer 1999; 2004). There, schwa is an empty nucleus whose presence/absence is not conditioned by syllable structure but by lateral relations between constituents. All analyses treating schwa as an empty element assume that, synchronically, schwa behaves as a defective segment, with a positive correlation between its weak nature and the observed patterns of presence/absence. Furthermore, they share Dell’s basic assumption as to the nature of the vowel as a correlate of orthographic <e>, thus multiplying abstract vowels in underlying representations with for example *hamster* [amstɛʁ] ‘hamster’ without a schwa and *samedi* ‘Saturday’ categorically real-

ized as [samdi] with one. By over-relying on orthography, they imply that all varieties of French share identical underlying representations. If we consider southern French, for example, orthographic <e> is realized as a weak vowel with alternation restricted to the final syllables (*grande fille* ‘big girl’ vs. *grand(e) amie* ‘good friend_F’). Focusing on orthography leads to a unified treatment which ignores the specificities of each variety and induces positing abstract vowels which never surface.

In our view and as argued in 4.2 and 5, there is strong evidence that French schwa as a label covering a complex set of processes demands a phonological treatment adapted to each variety. Northern French schwa, for example, cannot be an unspecified [V] node as we proposed for Catalan, and one good reason for this is that the symbol /ə/ has no phonetic identity. In French, what is usually called schwa typically surfaces as a mid front rounded vowel (Malécot/Chollet 1977; Walter 1978; Andreassen/Østby 2014). In other words, the two underlying representations /ə/ and /œ/ reflect a phonological opposition and not a phonetic one, and other avenues of description should be pursued.

In the next section, we will mainly restrict the discussion to initial syllables of polysyllables where alternations are regular in northern French. Further, in order to challenge the weakening approach, we will briefly explore the essence of three theoretical alternatives to the nature of the contrastive representation of French schwa¹⁰ which do *not* appeal to the weakening of an abstract segment: schwa as a variant of /œ/, schwa as an epenthetic segment, and two lexical entries for the two alternating forms, one with, one without schwa.

4.2 French schwa without weakening

4.2.1 Schwa as a variant of /œ/

Andreassen (2013) starts from the position that schwa when realized is phonetically identical to /œ/ and, if no phonetic detail sets the vowels apart, a more restricted analysis could be contemplated where schwa is considered as an output variant of /œ/. This one-category approach would lead to a more economical phonological inventory and dispense with a phonetic neutralization rule between underlying schwa and /œ/. Inspired by the works of Walker (1993) and Côté (2008), Andreassen (2013) pursues this line of thought on the initial syllable of polysyllabic words, e.g. *semaine* [sœmɛn]/[smɛn] ‘week’. She investigates whether /œ/ and schwa stand in complementary distribution, taking into consideration phonotactic structure, morphological structure, and lexical information.

¹⁰ We select here from the vast literature on French schwa a few elements which seem pertinent to our presentation. For a more complete overview, cf. Andreassen (2013).

After a thorough examination of the French lexicon, all possible phonotactic environments are tested against Swiss French judgment data (Racine 2008) and Swiss French spontaneous speech data from the PFC (*Phonologie du français contemporain*) corpus (Durand/Laks/Lyche 2002; 2009; Detey et al. 2016, cf. www.projet-pfc.net). The study concludes that the distribution of alternating and non-alternating [œ] cannot be directly extracted from the segmental environment, and that a certain amount of overlap remains which resists pure phonotactic explanations. Also, although morphology seems to impact the presence/absence of schwa, be it underlying or epenthetic (Côté 2000, 85; Côté/Morrison 2007), the hypothesis of a strict morphologically driven distribution of alternating vs. non-alternating [œ] does not fare any better. Both judgment and production data for Swiss French show that alternating and non-alternating [œ]s are allowed in identical morphological environments, e.g. morphologically complex *lev+age* [lœvaʒ]/[lvaʒ] ‘lifting’ vs. *meul+age* [mœlaʒ]/*[mlaʒ] ‘grinding’ and morphologically simple *demain* [dœmɛ̃]/[dmɛ̃] ‘tomorrow’ vs. *demeure* [dœmœʁ]/*[dmœʁ] ‘habitation’ (Andreassen 2013, 82). Combining morphological and phonotactic factors reduces the amount of overlap but does not suffice to handle all exceptions. Andreassen therefore turns to lexical information, which could play a role in the distribution of alternating vs. non-alternating [œ], as Côté (2009) suggests for Laurentian French, where nouns exhibit a higher rate of alternation than verbs. Andreassen examines the impact that nominal vs. verbal suffixes might have on monomorphemic and polymorphemic stems, respectively, but her conclusions go counter to a lexically defined complementary distribution as the global results show no difference in deletion rate in Swiss French between nominal and verbal word classes. It appears however, that monosyllabic morphemes subject to allomorphy or suppletion, e.g. *jet-* in *jeter* [ʒœte]/[zte] ‘throw_{INF}’ and *jeteur* [ʒœtœʁ]/[ztœʁ] ‘thrower’ (cf. *jette* [ʒet] ‘throw_{3SG}’); *ven-* in *venir* [vœniʁ]/[vniʁ] ‘come_{INF}’ and *venant* [vœnã]/[vnã] ‘who comes’ (cf. *vient* [vjɛ̃] ‘come_{3SG}’), are to a large extent subject to [œ] deletion, and that when lexical information is enriched with morphological and phonotactic conditions, a significant amount overlap may be accounted for.

At this point, let us underline that the focus of Andreassen (2013) is the L1 acquisition of schwa alternation, centered around the principle of economy. If the one-category approach comes out as theoretically plausible given the adult judgment data and child production data at hand, it may be that it does not hold when confronted with the totality of data across speaker groups, which would lead us to posit a separate category for schwa.

4.2.2 Schwa as the result of epenthesis

The epenthesis analysis, advocated by Martinet (1972) and Hirst (1985), shares with the one-category approach the advantage of restricting the phonological inventory of the language and eliminating a neutralization rule from the grammar. This analysis

however has been subject to virulent attacks from the tenants of the two-category approach and has been discarded by many as not viable (Dell 1973; Anderson 1982; Scheer 2004). The main argument against the epenthesis analysis rests on the existence of identical primary and secondary consonant clusters (terminology borrowed from Bazylko 1976): *place* [plas] ‘place’ and *pelouse* [pluz] ‘lawn’ are both possible phonetic forms but only the latter alternates, i.e. *[pœlas] vs. [pœluz]. Anderson (1982) rejects the epenthesis solution on the basis of the existence of an alleged wide array of comparable forms; no context, whether phonological or morphological, can be appealed to in order to predict insertion.

To be valid, such a rejection should rely on a thorough study of the lexicon, a task undertaken by Andreassen (2013). All possible C1/C2 combinations were extracted from the lexicon and the results of both Swiss French judgment and production data show that although a certain amount of overlap persists, the epenthesis hypothesis for initial syllables of polysyllables comes out as feasible and thus presents an alternative to the approach whereby schwa is an allophone of /œ/. This conclusion is based on the finding of a phonotactically driven regularity of the distribution /CC/ vs. /C(œ)C/ outside the observed overlap – the latter broadly limited to sibilant+C, e.g. *ski* [ski]/*[sœki] ‘ski’ vs. *secoue* [sœku]/[sku] ‘shake_{3SG}’: for instance, insertion would give the wrong result in context obstruent+liquid, e.g. *clés* [kle]/*[kœle] ‘key_{PL}’, but is possible in sonorant+C, e.g. *mesure* [mœzyʁ]/[mzyʁ] ‘measure’ (for a detailed overview, cf. Andreassen 2013, 106).

The epenthesis solution may be extended to other contexts and gains support from Côté/Morrison’s (2007) analysis of schwa in monosyllables: the authors argue that the underlying status of the vowel in these function words is difficult to defend. First, it cannot be defended on the grounds of lexical contrastiveness, as there exists no contrast between a clitic [tœ]/[t] and a clitic that can only be pronounced [t]. Second, it cannot be defended on the grounds of residual lip rounding, which previously has been proposed as a reflection of an incomplete deletion process (cf. e.g. Barnes/Kavitskaya 2002).

Regardless of what is concluded for schwa in monosyllables, the epenthesis analysis is challenged by psycholinguistics, where the reality of schwa is discussed with reference to word recognition. Through a lexical decision task, Spinelli/Gros-Balthazard (2007) observe that processing cost is higher for reduced schwa items when the remaining secondary cluster corresponds to a primary cluster, e.g. *pelouse* [pluz] ‘lawn’ vs. *renard* [ʁnɑʁ] ‘fox’ – the latter with no primary counterpart. They interpret this result as a reflection of the psychological reality of schwa and the relative ease of restoring the underlying form in the case of schwa absence combined with an illicit primary cluster, e.g. /ʁn/ in /ʁnɑʁ/. In contrast, for *pelouse*, which contains a licit primary cluster /pl/, the pronunciation without schwa, i.e. [pluz] for underlying /pœluz/, enters in lexical competition with a wide range of words having [pl] as a primary cluster, e.g. [plas] for /plas/, thereby slowing down the task of lexical decision.

4.3.3 Schwa presence/absence as the result of two competing lexical entries

While traditional models posit one lexical representation for schwa items, with an underlying vowel (or position) subject to manipulation via phonological rules or constraint interaction, we now witness a growing body of research suggesting that schwa items are represented with two lexical entries, one with schwa and one without. This approach springs out of psycholinguistic research, whereby relative variant frequency and orthographic information have proven important for word recognition and production.

First, concerning relative variant frequency, Bürki et al. (2017) carry out three lexical decision tasks and show that more frequent variants are recognized more quickly than less frequent variants, regardless of variant type. Thus, [pti] might be recognized faster than the full form [pœti], but the canonical form [fœnetʁ] is accessed more quickly than [fnɛtʁ]. Relative variant frequency also correlates with production latencies (Bürki/Ernestus/Frauenfelder 2010), with the more frequent variants produced more quickly, indicating that the two phonological variants are represented in a similar fashion in the production lexicon and in the recognition lexicon (Brand/Ernestus 2017). The strength of the relative variant frequency has been further confirmed by Bürki/Frauenfelder (2012), who investigate the treatment of novel schwa items in production and recognition, and by Brand/Ernestus (2017), who compare recognition accuracy and reaction time for schwa items in native speakers vs. learners of French.

Second, Racine/Grosjean (2000; 2005) reveal an interaction between the phonological and orthographic representation of schwa. While the presence of <e> negatively affects reaction time for items with schwa alternation, e.g. for *fenêtre* ‘window’ non-canonical [fnɛtʁ] is recognized more slowly than canonical [fœnetʁ], it positively affects reaction time for items where <e> corresponds to no vowel, e.g. for *bracelet* ‘bracelet’, presence of schwa (i.e. [bʁasœlɛ]), rarely encountered in the oral input for this word, does not entail any processing cost. The effect of orthographic knowledge is further confirmed by Racine/Bürki/Spinelli (2014), who show that pre-readers spend more time recognizing the variant with schwa in the *bracelet* type of words compared to readers. This result indicates that prior to acquisition of literacy skills, speakers are solely influenced by usage and the frequencies of the variants experienced in the oral input,¹¹ while when having mastered reading and writing, at least to some extent, orthography guides recognition and production alongside phonology proper.

¹¹ Cf. however Andreassen (2013) for a discussion on the importance of structural constraints during L1 acquisition.

4.2.4 Summary

The review of the four major analyses of French schwa shows a clear lack of consensus among linguists, spanning from the most abstract to the most concrete positions. Each theoretical approach can cover part of the data but not its entirety. We are dealing here with two conflicting theoretical approaches: (i) all vowels corresponding to orthographic <e>s are analyzed as weak vowels, typically an unspecified {V}, in all varieties of French – a view rejected here except for southern French; (ii) historical schwas developed into various sub-systems within linguistic communities, thus requiring multiple treatments – a view defended here. To further support our position, we need to turn to a review of variation across francophone communities. In what follows, we examine the behavior of schwa as observed in the PFC corpus (Durand/Laks/Lyche 2002; 2009; Gess/Lyche/Meisenburg 2012; Detey et al. 2016), in order to determine whether arguments can be found within the data in support of the more abstract vs. the more concrete approach.

5 French schwa in light of a large corpus

Among the different objectives of the PFC program, a better understanding of schwa behavior throughout the francophone world is attributed pride of place. Potential schwas are coded both in a reading task and in two types of conversations (Durand/Lyche 2003), providing a solid empirical base for theoretical claims and a unique source of data suitable for statistical studies and regional comparisons. In what follows, through a review of previously analyzed PFC data, we ask whether French schwa shares any feature with the schwas we find in other Romance languages and whether some elements of analysis are common to the whole language family.

One first observation is that a number of “abstract” schwas which have historically been posited within the theoretical literature are not attested within our data. Thus, words such as *cap* and *cape*, with and without a putative final schwa are not distinguished except in southern French where some speakers make a systematic distinction broadly in line with the spelling. Word-internally a word such as *amnésie* [amnezɪ] ‘amnesia’ is never different from *promenade* [promnad] ‘walk’ except again in southern French. A number of putative schwas are thus artefacts of theoretical analyses. This is not to deny, of course, that some cases of alternations remain. Let’s reconsider them again by going back to our definition in Section 3 of schwa as a prototypical weak vowel (formalizable as {}).

- (11) a. a schwa is not stressable
 b. a schwa occurs in weak positions only
 c. a schwa is realized phonetically as a central vowel
 d. a schwa may be deleted in certain contexts

Within our data, only some cases in southern French can be treated as prototypical schwa and represent a good case in point of regionally defined variation (Durand 1988; 1995; 2009; Durand/Eychenne 2004; Eychenne 2006; Courdès-Murphy 2018). Schwa in conservative southern French appears word-finally and word-internally as the first syllable of a suffix. It deletes before a vowel, is stressless, phonetically variable but centrally colored, and it triggers the lowering of the preceding vowel within its domain: *bête* [betə] ‘stupid’, *bêtement* [betəman] ‘stupidly’ vs. *bêtise* [betiz] ‘stupidity’ (Durand 1995). It can thus be treated as an authentic weak phonological schwa. Otherwise, practically all occurrences of orthographic <e> correspond to stable /œ/ ([œ] or [ø]). This regional system is currently undergoing strong pressure from northern varieties and a certain amount of leveling, e.g. absence of final schwas, together with the introduction of novel schwa sites (*je serai* [ʒøʁsø] ‘I will be’) may be observed (Durand 2009; Eychenne 2009; Coquillon/Turcsan 2012; Courdès-Murphy 2018). These changes however do not alter the fact that when schwas can be postulated (as in the above examples) they can be represented as an unspecified vowel (Durand 1995; Eychenne 2006; 2014; Courdès-Murphy 2018).

No variety of northern French however fulfills the four conditions stated in (11). As condition (b) is understood as a corollary of condition (a), we will lump together both conditions. Stress in French is post-lexical and falls on the last syllable of a group. It has been shown however, that the initial and final syllables of a word are metrically strong.¹² Although schwa in northern varieties of French may occur in weak positions, it is not excluded from strong positions as just defined. In word-initial syllables, all schwas present in the output, e.g. *la demande* [ladœmād] ‘the request’, may thus be seen as filling a strong position with the possibility for some of them to be subject to initial stress (Lyche/Girard 1995), as in *le refroidissement* [lœ'kœfʁwadmā] ‘the cooling’. In addition, it is a well-known fact that post-verbal clitics usually bear group stress, e.g. *prends-le* [pʁɑ̃'lœ] ‘take it’.

Given the fact that certain positions are psycholinguistically more privileged than others in the processing system (Beckman 1998), Lacheret/Lyche (2008) investigate the impact of prosody on schwa alternation. They target positions where the presence of schwa is optional in northern French (Dell 1973), i.e. monosyllables and the initial syllables of polysyllables. They propose that maintaining a schwa in a potential deletion site may fulfill the same function as stress, namely that mere schwa presence will single out the relevant syllable within the discourse. A schwa should not then be both present and perceived as prominent, as this would contradict a principle of economy. In order to test this hypothesis, a subset of five PFC surveys in northern France was coded for schwa presence and prominence, with results indicating that the hypothesis holds true for initial syllables of polysyllables but not for monosyllables. The monosyllables examined in the study are much more prone to lose their schwa compared to

¹² Cf. Astésano (2016) for a review.

the polysyllables, and half of the retained schwas in the former group are perceived as prominent probably due to their role in introducing functional sequences, in particular a focus (whether informative or contrastive): *il est né* [_{FOC} *le 5 novembre*] ‘he was born on November 5th’. Two important facts emerge from Lacheret/Lyche (2008): schwa in French is not restricted to weak positions, and it can bear prominence. Furthermore, this study suggests that any analysis of schwa in French should regard schwas in monosyllables and in initial syllables of polysyllables as two distinct categories, thus arguing for two distinct treatments (cf. also Côté/Morrison 2007). We conclude then that French schwa fails the first two requirements of the prototypical weak schwa listed in (11), and turn now to the third, its phonetic realization as a central vowel.

As already mentioned, although the standard phonetic representation of the vowel is a central segment, the literature overwhelmingly stresses the similarities between schwa and a mid front rounded vowel ([ø] or [œ]). For instance, in a perception test study, Dauses (1973) concludes that speakers are unable to discriminate between *jeudi* ‘Thursday’ and *je dis* ‘I say’, suggesting the phonetic merger of the two vowels. An acoustic study by Bürki et al. (2008), measuring F1, F2, and F3 of schwa and [ø œ] in Brunoy (Paris region), Nyon (Switzerland), and Quebec City in the two reading tasks of the PFC protocol, confirms a strong – though never complete – overlap between schwa and the stable vowels. Nonetheless, most PFC descriptions provide massive evidence against an autonomous phonetic realization of schwa. As an example, Côté (2012) argues that schwa has the quality of [œ] in Laurentian French¹³ and does not include schwa in the phonemic inventory of that variety. On the other hand, in multilingual speech communities, we attest more variation. In African varieties, for instance, schwa functions as a stable vowel and may be realized as [e] (cf. Bortal 2012 for the Central African Republic; Boutin/Gess/Guèye 2012 for Wolof speakers of Senegal; Lyche/Skattum 2012 for Mali). In Louisiana French (Klingler/Lyche 2012), schwa is usually realized as [œ] but may undergo a harmony process and surface as [e] or [i], e.g. *venir* [vinir] ‘come_{INF}’. In sum, schwa in French is not realized phonetically as a central vowel¹⁴ and does not conform on this point either to a prototypical weak schwa.

Only the last characteristic of a prototypical weak schwa remains unchallenged: zero/full vowel alternations do occur in certain contexts. This situation compels us to propose a specific definition for French schwa: a schwa in French is a vowel subject to alternation, usually realized as a mid front (rounded) vowel. Absence of French schwa, as thus defined, can then be seen as a weakening process affecting mid front rounded vowels. The definition also entails that in contradiction to earlier claims (in the wake of Schane and Dell’s work), there is no straightforward correspondence between orthographical <e> and phonological schwa. There is no schwa without a

¹³ But cf. Cox (1998) for whom the Canadian schwa is a central non-rounded vowel.

¹⁴ In African varieties of French, the quality of the schwa is highly variable and may be a central unrounded vowel, but for each individual speaker it is identical to the given speaker’s pronunciation of /œ/.

possible alternation, and more specifically, the bona fide schwas are limited to contexts which in the classical treatment of Dell (1973) show optional presence. Since the definition of schwa is based on a possible alternation, it seems to be the case that each variety of French exhibits its own system.

6 Summary

In this chapter, we have examined various processes of vowel weakening in Romance languages. Our aim was to identify similarities and differences within this language family and offer a unifying theoretical account. We argued that most cases of vowel weakening can be interpreted in terms of element loss although syllabicity, centering and dependency reversals can play a role. As a consequence, there emerges a concept of weak phonological schwa as an empty vowel prone to deletion (represented earlier as {}). Our brief survey of the behavior of schwa in a few varieties of French clearly falsifies the claim that there exists a correspondence between orthographic <e> and phonologically weak schwa. Rather, it points to a large number of systems with intra- and inter-speaker variation. While it can be argued that Midi French contains empty vowels word-finally and -medially, there is no argument to be found in the data for a similar analysis of any of the other French varieties, thus invalidating the most abstract positions. Rather, the amount of variation observed across the data points to a more concrete alternative, whereby grammar-internal and grammar-external conditions interact, yielding dynamic sub-systems on a local level.

In conclusion, there are weakening processes in Romance languages and French that can be dealt with by standard phonological tools, including the loss of elements and unspecified positions. But the term French schwa covers a wide range of contexts and processes many of which have nothing to do with weakening or abstract positions.

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5 Palatalization in Romance

Abstract: Palatalization represents one of the phonological processes that restructured the Romance consonantal inventory the most. In this chapter, we examine the phonological and articulatory complexities underlying this process. We mainly deal with palatalization within Calabrese's (2005) feature-based phonological model. We compare this analysis with a number of competing models: those based on articulatory phonetics, perception, phonological grounding, and Optimality Theory. Our take is that Calabrese's constraint-and-repair model is the only framework able to account for the wide spectrum of variation across Romance varieties with a minimal number of theoretical, though phonologically motivated, stipulations.

Keywords: palatalization, coronalization, velar fronting, affrication, constraint-and-repair model

1 Introduction

Among the many phonological processes that have affected and affect consonants in the Romance languages, the assimilatory process of palatalization – a pervasive process that led to a major restructuring of the Romance consonantal inventory – is characterized by complexities that distinguish it from far simpler consonantal assimilatory processes such as labialization and velarization. For example, it is characteristically associated with changes in manner of articulation usually lacking in the latter processes. In this chapter, we will examine these complexities, discuss how they are treated in the literature, and propose an account for them.

Palatalization is commonly triggered by front vocoids (vowels and glides), and targets all types of consonants, but most often velars and coronals. We will use palatalization as the general cover term to refer to all consonantal changes triggered by front vocoids, and analyze it as involving two different changes. First, consonants change in place of articulation and, if not already coronals, turn into coronals (coronalization: e.g. Sut. [ku'reʃa]/[ku'vereʒa]/[ku'reʒa] 'strap' (< CORRIGIA(M) 'shoe-lace'); Clements 1976; 1991; but cf. also Jacobs 1989; Mester/Itô 1989; Lahiri/Evers 1991). Second, palatalized consonants may additionally change in manner and turn into affricates or fricatives (affrication: e.g. It. *ami*[k]o/*ami*[tʃ]i 'friend_{M.SG/PL}'). The two processes will be discussed below by looking at the wide spectrum of variation across Romance.

In what follows, we aim to provide a simplified outline of the general facts characterizing palatalization processes and discuss the theoretical analyses accounting for

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them. In Section 2, we briefly describe the data.¹ In Section 3, we go over the different treatments of palatalization in the past: namely, as a phonological or phonetic (articulatory or perceptual) process. In Section 4, we discuss the rule-based phonological account proposed in Calabrese (2005) for Italian palatalization and show that it can be readily extended to the whole spectrum of Romance. In Section 5, we discuss the competing accounts of palatalization within the Optimality Theory (OT) framework; in doing this, we show that these accounts need to make ad-hoc stipulations that are instead not necessary in Calabrese's account. Section 6 concludes.

2 Data

Latin had the consonantal inventory in Table 5.1:

Table 5.1: Latin consonantal inventory.

	Bilabial		Labiodental	Dental	Alveolar		Velar		Labialized velar		Glottal
Plosive	p	b			t	d	k	g	kw	gw	
Fricative			f		s						h
Nasal		m				n					
Lateral						l					
Trill						r					

This consonantal inventory developed into that of the Romance languages through the action of two palatalization processes, which occurred in two different historical periods and created both palato-alveolar consonants such as [tʃ dʒ ʃ ɲ ʎ] and coronal anterior consonants such as [ts dz s z θ ð]. The first palatalization process occurred between the 1st and 2nd century CE; the second one after the 5th century CE (Tekavčić 1972; Rohlf's 1966). The characteristic properties of the first and second palatalizations are illustrated in (1):

- (1) a. The first palatalization:
- was triggered by the glide [j] (both underlying and derived);
 - affected all consonants;
 - occurred in all Romance languages;
 - has as its output a geminated consonant.²

¹ Cf. also Loporcaro (2010) and Repetti (2016) for excellent descriptions of the history of the Romance palatalization processes and of their synchronic outcomes.

² Eventually, geminated palatals were degeminated in some varieties, as can be seen further below. The intermediate gemination stage is, however, generally accepted because it explains why gemi-

- b. The second palatalization:
- was triggered by close front vowels /i e/;
 - affected only the velar plosives /k g/;
 - did not occur in Sardinian and in Dalmatian;
 - had as its output a short consonant.

The first and second palatalizations are responsible for synchronic alternations in the Romance languages. Note that in many Romance languages such as Italian, labial consonants were not affected in place of articulation, but were only geminated by the first palatalization (but cf. Section 4 for further discussion of labials and voiced plosives). In the following subsections, we will describe the major palatalization-driven realizations in Romance.

2.1 First palatalization

The first palatalization involved all obstruents and was triggered by front vowels, which became glides before back vowels. It mostly affected the verbal system and derivational morphology. Coronal and velar obstruents /t d/ and /k g/ (Tables 5.2a–b) share the same set of palatalized realizations: affricates (e.g. [tʃ dʒ]), fricatives (e.g. [s z ʒ]), or the glide [j]. Palatalized voiced plosives are often neutralized with high front glides; the outcomes of the latter are given in Table 5.2c: they are mainly the affricates [dʒ dz] and the fricative [ʒ].

Table 5.2a: Outcomes of the first palatalization in coronal obstruents /t d/.

/tj/			/dj/		
example		etymon	example		etymon
[tʃ]	Northwestern Friul.	[poʈʃ]	[dʒ]	It.	['radʒo]
[s]	Eastern Friul.	[pos]	[z]	Rm.	['razə]
[ts]	Cal.	['puttsu]	[dz]	Cors.	['meddzu]
[θ]	Com.	[poθ]	[ð]	Com.	['meðo]
[j]	Picard	[ka'ʃø]	[j]		
		CAPTIA TORE(M) 'hunter'			RADIU(M) 'ray'
			[j]		HODIE 'today'

nated palatalized outcomes do not display voicing: e.g. Por. *faço* 'do_{1SG}' < FACIO, Fr. *place* 'square' < PLATEA(M) (Loporcaro 2010, 144; cf. also Meyer-Lübke 1934, 124).

Table 5.2b: Outcomes of the first palatalization in velar obstruents /k g/.

/kj/				/gj/			
example		etymon		example		etymon	
[tʃ]	Tusc.	['brattʃo]	BRACCHIU(M) 'arm'	[dʒ]	Tusc.	[ko'reddʒa]	CORRIGIA(M) 'strap'
[ts]	Lig.	['brattsu]		[dz]	Sur.	[ku'redza]	
[s]	Ven.	[bras]		[ʒ]	Sut.	[ku'vrezʒa]	
[θ]	Com.	['aθa]	ACIE(M) 'ax'	[j], [θ]	Friul.	[ko'rɛ(j)a]	
[ʃ]	Tusc.	['aʃʃa]		[j]			
				[ʃ]	Sal.	[ku'reʃa]	

Table 5.2c: Outcomes of the coronal glide /j/.³

/j/			
example		etymon	
[dʒ]	Tusc.	['maddʒo]	MAIU(M) 'May'
[dz]	Sur.	[dzi'dzin]	IEIUNU(M) 'fasting'
[ʒ]	Fascian	[ʒa'ʒun]	
[j]	Cal.	['maju]	MAIU(M) 'May'
[θ]	Fr.	[me]	
[j]	Cors.	[pe'ju]	PEIORE(M) 'worse'
[z]	Ven.	[pe'zo]	
[x]	Sp.	['xweɣo]	IOCU(M) 'game'

In some languages, labial obstruents did not palatalize at all (Table 5.3a). In some other languages, they palatalize as affricates [tʃ dʒ], complex affricates [ptʃ bdʒ], and fricatives [f ʒ]. Similar realizations are also seen for the labial sonorant consonant [m] (Table 5.3b).

3 Glides underwent a fortition process in most Romance varieties. In Spanish, they became fricatives ([j] > [j̞]). They further were backed before back vocoids ([j̞] > [x]); cf. Recasens (2011).

Table 5.3a: Outcomes of the first palatalization in the labial obstruents /p b v/.

/pj/			/bj vj/		
example		etymon	example		etymon
[pj] ⁴	It.	['sappja]	[bj]	Tusc.	['rabbja] RABIA(M) 'anger'
[pʃ]	OOc.	['sapʃa]	[bdʒ]	OOc.	['robdʒe] RUBEU(M) 'red'
[ʃ]	Sic.	['sattʃu]	[dʒ]	Sic.	['gaddʒa] CAVEA(M) 'cage'
[ʃ]	Fr.	[saʃ]	[ʒ]	Fr.	[ʒaʒ] RABIA(M) 'anger'

Table 5.3b: Outcomes of the first palatalization in the labial nasal /m/.

/mj/			
example		etymon	
[mj]	It.	[ven'demmja]	VINDEMIA(M) 'grape harvest'
[mɲ]	Oc.	[ven'demɲa]	
[ɲ]	Lig.	[ven'deɲa]	
[mdʒ]	Egd.	[vin'demdʒa]	

Finally, non-labial sonorant consonants [l n] palatalized as [ɲ ɲ] or as the glide [j] (Table 5.4).

Table 5.4: Outcomes of the first palatalization in the non-labial sonorant consonants /l n/.

/nj/				/lj/			
	example		etymon		example		etymon
a.	[ɲ]	Fr.	['viɲə]	[ɲ]	It.	['paʎʎa]	PALEA(M)
b.	[j] ⁵	Por.	['viɲe]	[j]	Rm.	[paɲ]	'straw'

4 We assume that the outcomes [jp jv jm] found in Portuguese involve an alternative way of dealing with the complex onset labial + [j], i.e. metathesis instead of gemination (cf. Calabrese 2005 for discussion); cf. *saiba* ['saibe] 'know_{3SG.SUBJ}' < SAPIAT (the voicing of the labial plosive is due to an unrelated, though interacting rule applying in intervocalic position), *raiva* ['rajve] 'anger' < RABIA(M), *vindima* [vĩ'dime] 'grape harvest' < VINDEMIA(M). Another possible strategy of fixing such a complex onset involves deleting the glide [j] as in Venetian [ven'dema] 'vineyard'.

5 The palatal glide may be lost before front vowels (Rm. *vie* 'vineyard' < VINEA(M)), or undergo fortition into an affricate (e.g. Sard. *mu[dz]ere* 'wife' < MULIERE(M)) or a fricative (Fr. *linge* [lɛʒ] 'linen' < LINEU(M)). In Spanish, the glide first became a palatal fricative [j], which palatalized as [ʃ] and finally velarized as [x], regardless of the nearby vowel: e.g. *paja* ['paxa] 'straw' < PALEA(M); *mujer* ['muxeɾ] 'woman' < MULIERE(M) (Tagliavini 1949).

2.2 Second palatalization

The second palatalization involved velar obstruents only. The outcomes were not geminated, and had overall the same realizations as those seen for the first palatalization (Table 5.5), although with a different dialectal distribution.⁶

Table 5.5: Outcomes of the second palatalization in the velar obstruents /k g/.

/ki ke/				/gi ge/			
example			etymon	example			etymon
a.	[tʃ]	It.	[ˈtʃera]	[dʒ]	It.	[ˈdʒenero]	CERA(M) 'wax' GENERU(M) 'son-in-law'
b.	[s]	Fr.	[siʁ]	[j]	Sp.	[ˈjerno]	
c.	[θ]	CastSp.	[ˈθera]	[ð]	OVen.	[ˈðɛnaro]	
d.	[ts]	Mountain Lig.	[ˈtsera]	[dz]	Ven.	[ˈdzenero]	
e.				[j]	Cors.	[ˈjenaru]	
f.				[ʒ]	Fr.	[ʒɑ̃dɛ]	

The second palatalization is characteristically responsible for morphophonemic alternations in inflectional morphology. For example, in Italian nominal morphology, palatalization occurs before the masculine plural suffix /-i/.

- (2) a. It. *ami*[k]o/*ami*[tʃ]i 'friend_{M.SG/PL}'
 b. It. *gre*[k]o/*gre*[tʃ]i 'greek_{M.SG/PL}'

3 The problem

This section deals with the issues that any theory of palatalization must solve.⁷ The issues that will be discussed here are the following:

⁶ A problem for any theory is the palatalization of velar plosives before low vowels. This change is found in some Gallo-Romance varieties and is independent from the first and second palatalizations (e.g. Fr. *chèvre* [ʃɛvʁ] 'goat' < CAPRA(M); *cheval* [ʃə'val] 'horse' < CABALLU(M); *jambe* [ʒɑ̃b] 'leg' < GAMBA). It is often assumed that this change is due to a front pronunciation of the low vowels. The fact that this process in French operated also before /aw/ where a front realization of /a/ is to be excluded given the further evolution of this diphthong into a back rounded vowel (*chose* [ʒoz] 'thing' < CAUSA(M)) bars such a hypothesis (Loporcaro 2010). The fact that palatalization before low vowels cannot be due to their being fronted is further corroborated by the fact that in Friulian velars are also palatalized before /a/ which was never historically fronted: e.g. *cjasa* [ˈtʃaze] 'house' < CASA(M), *cjalcjâ* [ˈtʃalˈtʃa] 'press_{INF}' < CALCARE, *gjal* [ʒal] 'rooster' < GALLU(M) (Vanelli 2005). We will not discuss this development further here.

⁷ In this chapter, we will not deal with the phenomenon of gemination co-occurring with the first palatalization. On this matter, it is enough to say that it was the outcome of the elimination of Latin

- (a) *Coronalization*. How do front vowels and glides modify non-coronal, and especially dorsal, consonants in such a way as to obtain coronal segments?
- (b) *Affrication/fricativization*. How do affricate and fricative consonants result from palatalization processes?

The coronalization of dorsal plosives before front vowels is particularly problematic in all theories of phonology. In what follows, we briefly review the three main sets of theories that have attempted to account for coronalization.

3.1 Articulatory-feature phonological models

An adequate account of palatalization is problematic in phonological models based on articulatory features such as that of Chomsky/Halle (1968). Although it is an obvious case of assimilation, it cannot be treated as such. In these models, vowels such as [i] and [e] are dorsal [-back] segments, and therefore it is unclear how a dorsal consonant can assimilate to them and become coronal. This inability to deal with palatalization also characterizes the latest phonological model of articulatory features: Halle/Vaux/Wolfe's (2000) Articulator Theory (AT). AT accounts for sounds in terms of the activity of the six movable parts of the vocal tract, the so-called articulators: lips, tongue blade, tongue body, soft palate, tongue root, and larynx (cf. also Halle 1995; Sagey 1986). Each articulator is capable of a restricted set of actions of its own, and each of these actions is associated with a particular feature. There are two kinds of features: articulator-bound ones and articulator-free ones. Articulator-bound features such as [round] and [back] are necessarily executed by one and the same articulator; articulator-free features such as [continuant] and [consonantal] are executed by different articulators in different phonemes. The articulator executing the articulator-free features of a phoneme is called the designated articulator (indicated with a plus '+' and the uppercase initial letter, as shown in Figure 5.1a: e.g. [+Labial]).

Every phoneme must have a designated articulator. To exemplify the AT notion of designated articulator, let us consider the distinction between a labio-velar plosive /k͡p/ and a labialized velar /kʷ/. In the case of /k͡p/, the plosive stricture is simultaneously implemented by both the labial and dorsal articulators. In contrast, in the case of /kʷ/, the plosive stricture is implemented only by the dorsal articulator. By using the notion of designated articulator, one can represent the labio-velar plosive /k͡p/ as in Figure 5.1b: it has the two designated articulators [+Dorsal] and [+Labial]. The labialized velar /kʷ/ in Figure 5.1c, instead, has only [+Dorsal] as a designated articulator but not [+Labial],

hiatus configurations involving non-low vowels before other vowels. The prevocalic vocoids became glides. The further removal of the onset clusters with glides triggered a syllabic readjustment that led to gemination (and palatalization); cf. Calabrese (2005) for detailed discussion of this process.

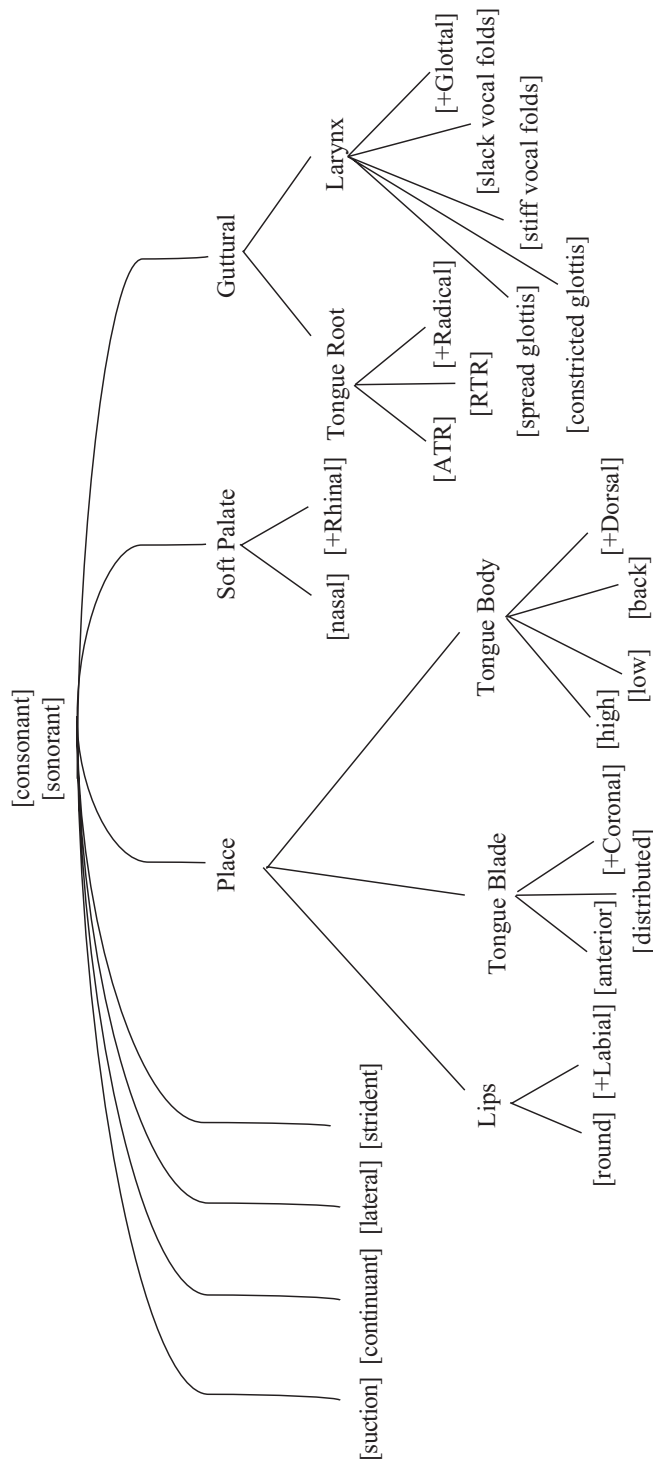


Figure 5.1a: The Articulatory Theory model (Halle/Vaux/Wolfe 2000).

although it is characterized by the labial feature [+round]. The two structures can be compared to the plain dorsal consonant /k/, represented as in Figure 5.1d, which has the designated articulator [+Dorsal] but no labial node.

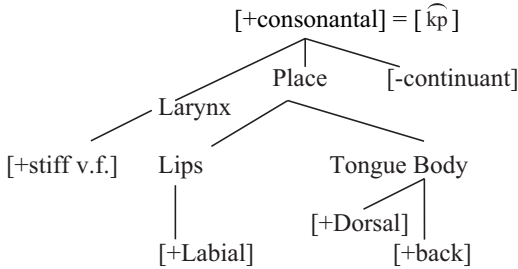


Figure 5.1b: Phonological representation of the labio-velar plosive /k^p/ in the AT model.

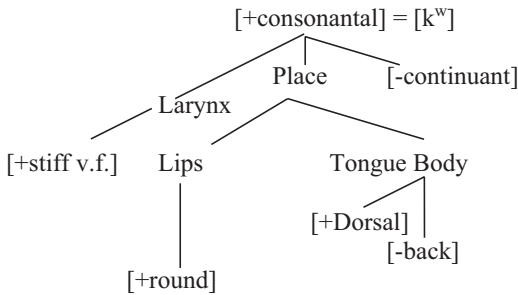


Figure 5.1c: Phonological representation of the labio-velar plosive /k^w/ in the AT model.

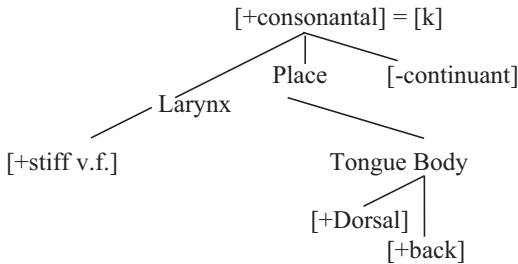


Figure 5.1d: Phonological representation of the plosive /k/ in the AT model.

In this model, assimilatory processes are anatomically constrained. This implication has an obvious appeal, for it unifies under a single heading two otherwise unrelated aspects of speech sounds: their articulatory implementation and their behavior in the phonological process of assimilation. The coronalization process one observes in palatalization, however, remains a problem in AT. Vowels are obtained by the different

displacements of the tongue body, which are then further modulated by the different behaviors of the lips and tongue root. There is no active involvement of the tongue blade, especially in the case of the non-high vowels. Therefore, front vowels in AT are simply [+Dorsal, -back], but do not have coronal features. Therefore, they can trigger fronting of velars but there is no way of directly accounting for why the latter can become coronal [-anterior, +distributed], e.g. via an assimilation process.

3.2 Articulatory phonetic models

Phonetic articulatory models do not fare better in this regard. Consider Recasens (2011), who proposes an account for Romance palatalization processes in Articulatory Phonology, the most recent model of this type. In this model, the articulatory gesture is the basic unit of the phonological representation and its physical actualization. Each gesture involves a group of articulators that act together to form and release a constriction in the vocal tract, such as labial closure, glottal opening, or velar frication. Representations may thus differ in the presence of a gesture (*had* vs. *add*), in the articulator set used (*bad* vs. *dad*), or in the parameters of constriction location or degree (*shad* vs. *sad* vs. *tad*). Phonological changes are expressed in terms of reorganization in the temporal patterning of gestures: gestures may overlap one another to a greater or lesser extent and gestural magnitude may increase or decrease. Gestures never change into, nor add to, other gestures (cf. Browman/Goldstein 1989). Here, we refer to this phenomenon as the *no-tampering condition*.

An articulatory mechanism that is very important for Recasens' analysis of palatalization is *blending*. According to Browman/Goldstein (1992), blending occurs when two gestures that control the same articulator set overlap in time. In this case, each gesture exerts its influence on the articulator, which reaches a position intermediate between the two targets. In Recasens' framework, the formation of the coronal consonants [ʎ ɲ c ʝ ç j] is due to the basic mechanism of gestural blending. Gestural blending operates on sequences composed of a consonant and a front glide or vowel and "yields an articulation produced at an intermediate location between the two original adjacent phonetic segments or else encompassing their closure or constriction areas" (Recasens 2011, 190). Recasens does not provide explicit details of how this mechanism of gestural blending operates in the case of palatalization processes. Here we will attempt to make it more explicit by using an Articulatory Phonology gestural score (Figures 5.2–5.6). In a gestural score, the horizontal dimension represents the duration of the gesture, namely the period of time that the articulator set is actively controlled; the vertical dimension reports the

vocal tract variables, each associated with the corresponding articulators and the descriptor values.⁸

Let us first consider the changes affecting the coronal anterior plosives [t d] in sequences such as /tj dj/. According to Recasens (2011, 190), the palatalization of dental or alveolar consonants into (alveolo-)palatal consonants [ʎ ɲ c ɟ ç ʝ] is implemented through an increase in dorsal contact towards the palate median line and some closure or constriction retraction. Abstractly, the sequences [tj dj] could be represented as in Figure 5.2, where we have a tongue tip alveolar closure followed by a palatal-postalveolar gesture, activated sequentially in time.⁹

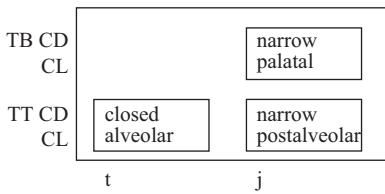


Figure 5.2: Representation of the cluster /tj/ in Articulatory Phonology.

Blending creates the gestural score in Figure 5.3.

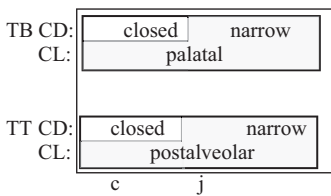


Figure 5.3: The effect of blending. The descriptor values being blended are shaded.

Therefore, blending in this case yields an adjustment of the plosive coronal articulation due to the following palatal glide. Note that blending in this case appears to totally overwhelm the articulation of the plosive that changes from apico-alveolar to lamino-post-alveolar. If this is correct, blending is acting like a rule spreading the coronal features of the vowel regardless of the constriction type of the gestures that are involved in the assimilation – something to be expected given Zsiga's (1997, 231) observation that the elements employed by Articulator Theory and Articulatory Phonology are essentially identical, with the exception of the encoding of gestural timing in the latter. An issue is, however, the fact that, as observed by

⁸ *Articulators*: TB tongue body; TT tongue tip; *Descriptor values*: CD constriction degree (close, critical, narrow, mid, wide), CL constriction location (protruded, labial, dental, alveolar, postalveolar, palatal, velar, uvular, pharyngeal).

⁹ We only consider the change in place of articulation here. Affrication and fricativization must be treated independently in this model, as in the other models discussed in this chapter with the exception of the acoustic one discussed in 3.3.

Recasens, the segments that are the outcome of this process are alveolopalatal and thus articulated simultaneously in the alveolar and palatal zones (Recasens/Fontdevila/Pallarès 1995), as shown in Figure 5.3. Thus, palatalization is also adding a palatal closure. Therefore, in this case, blending yields a consonant which not only includes a newly adjusted tongue blade gesture, but which has also an inserted tongue body gesture (palatal closure), thus violating the no-tampering condition mentioned above.

This problem is also evident in the case of the coronalization of dorsal consonants before front vowels as in the sequence /k/ + /i/ (Figure 5.4), where we have a velar (i.e., in our terms, back) tongue body gesture followed by a palatal-postalveolar gesture, activated sequentially in time.

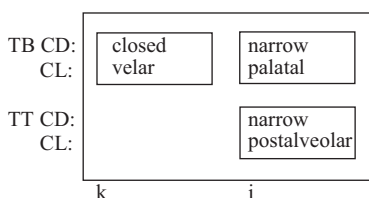


Figure 5.4: Representation of the sequence /ki/ in Articulatory Phonology.

This sequence may undergo velar fronting (e.g. it. ['spɔrko]/['spɔrkʲi] *sporco/porchi* 'dirty_{M.SG/PL}') or coronalization (and eventually affrication). In Articulatory Phonology, both phenomena result from blending. As for velar fronting, the plosive gesture and the vocalic gesture overlap, causing the tongue body to reach a position in between the fully palatal target of the vowel and the velar target of the plosive (where we are assuming that high front [i] includes a palatal-postalveolar narrowing gesture). Crucially there is no tongue tip involvement in the consonant; so, the consonant is a fronted velar:

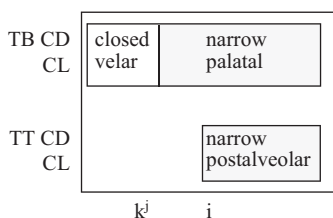


Figure 5.5: Velar fronting in Articulatory Phonology. The shading represents the descriptor values of each articulator involved in blending. In this case, blending affects a temporal portion of the velar constriction location of the tongue body, which therefore is fronted.

As for coronalization (namely, the process whereby the velar plosive becomes a laminal post-alveolar plosive [c]), the blending operation generates a consonant in which the tongue body gesture is changed to palatal, and a brand-new tongue blade gesture is added. Notice that this operation again violates the no-tampering condition of Articulatory Phonology (see above).

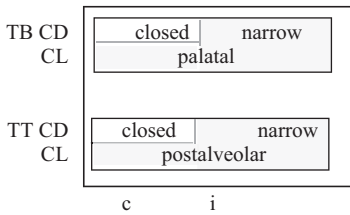


Figure 5.6: Coronalization in Articulatory Phonology. The shading represents the descriptor values of each articulator involved in blending.

In our view, violation of the no-tampering condition suggests that, in the case of palatalization, blending operates in featural terms rather than in gesture overlap. First, it is spreading the palatal features of the vowel regardless of the constriction type of the gestures that are involved in the assimilation. Second, it is adding a tongue blade articulation to the palatal plosive (cf. the promotion operation discussed below). In particular, it is not clear what the motivation is for the addition of the tongue blade closure gesture; rather, it appears to be an arbitrary postulation in this model.¹⁰

3.3 Perception-based models

In order to cope with the issues of the articulatory theories above, Chang/Plauché/Ohala (2001) and Guion (1998) have proposed a model in which palatalization is due to perceptual misidentifications produced in acoustics. Guion (1998) discusses three experiments showing that the rate at which the sequence [ki] is misidentified by listeners of English as [tʃi] is much higher than the misidentification rate of [ka] as [tʃa]. This is interpreted as evidence for two hypotheses: 1) there is an auditory similarity between the velar plosive and the palato-alveolar affricate before a palatal vowel; 2) this similarity is the cause of the change [k] > [tʃ].¹¹ Thus, [ki] may be confused with [ti] at the perceptual level. The proposal is then that this change is not associated with a shift in place of articulation towards the front palate but with the spectral similarity between the velar plosive burst and the frication noise of the palato-alveolar affricate, which share a similar frequency peak about 2500–3500 Hz. More recent research, however, has shown that, in principle, the acoustic equivalence

10 A further issue that Recasens' (2011) model does not seem to be able to account for is how a gradient operation like gestural blending can operate in categorical terms and explain allomorphic alternations such as It. *spor[k]o/por[k]i* 'dirty_{M.SG/PL}' vs. *por[k]o/por[tʃ]i* 'pig_{M.SG/PL}', where access to lexical diacritics is needed (cf. 4.1). It is truly unclear how morphophonological instructions could directly manipulate the modalities of blending operations in the phonetic module.

11 It is also noteworthy that in Guion's (1998) experiments, [ku] was misidentified by listeners as [tʃu], as often as [ki] was misidentified as [tʃi], and that the white noise that was used to mask the stimuli and achieve misidentification may have caused a too low signal-to-noise ratio and created a situation in which the perception of the stimuli was different than that in normal speech conditions (Żygis/Recasens/Espinosa 2008).

hypothesis just referred to can account for the change [k] > [tʃ] if the velar plosive is aspirated but not if unaspirated. Thus, Žygis/Recasens/Espinosa (2008) (cf. also Recasens/Espinosa 2009) show that Guion's findings must be restricted to languages with aspirated velar plosives such as English or German because aspirated plosives exhibit longer and more intense bursts than unaspirated plosives – a property that makes them more similar acoustically to affricates, and cannot be extended to languages where there are no aspirated plosives (cf. Catalan and Polish, for example). Unaspirated [k], which is the prevailing realization in Romance, cannot possibly be confused perceptually with [tʃ]. Furthermore, there is no evidence for reconstructing a stage of Romance in which plosives were aspirated. Hence acoustic similarity cannot account for the coronalization and affrication of velar plosives before front vowels in Romance.

3.4 Phonologically grounded models (Clements 1991)

Clements' (1976; 1991) model (cf. also Hume 1992; Lahiri/Evers 1991; Broselow/Niyondagara 1990) at first sight provides a simple account of coronalization. Features in Clements' model are grounded in phonological behavior. This means that if vowels and consonants interact in an assimilatory way, they must have a common feature; thus, for front vowels to trigger coronalization, they must be assumed to be coronal. However, there are various problems with the proposal that front vowels are coronal. The first obvious issue with this idea is from the point of view of articulatory phonetics, in the light of the fact that there is an anatomical motivation for not identifying front non-high vowels as coronal (Kenstowicz 1994): while coronal consonants are articulatorily implemented by the intrinsic longitudinal muscles of the tongue, front non-high vowels are produced by contraction of the genioglossus, an external muscle that connects the tongue body to the jaw.

There are also phonological problems with the model (cf. Halle/Vaux/Wolfe 2000; Kenstowicz 1994). First, Clements assumes that in consonants [Coronal] dominates the features [anterior] and [distributed]. It is a fact that the outcome of palatalization is usually a consonant that is [-anterior, +distributed]. Front vowels should then be specified with these features. However, it is not clear within his system how these features are implemented in vowels, or even if they exist for vowels. Since in Clements' framework [Coronal] in vowels is directly equivalent to traditional [-back], he must treat [Coronal] as a terminal feature in vowels, whereas it behaves as a non-terminal node in consonants (Halle/Vaux/Wolfe 2000).

Furthermore, if front vowels are assumed to be coronal, one is also forced to assume that what appears to be unitary processes of [back]-harmony found in Turkish (Clements/Sezer 1982), Hungarian (Ringgen/Vago 1998), and numerous other languages, actually involves two distinct harmonic phenomena, one of which spreads

[Coronal] and the other spreads [Dorsal]. Nor is it clear why segments with lexical [Dorsal] or [Coronal] specifications block harmony in such languages (Halle/Vaux/Wolfe 2000).

In what follows, we discuss a recent phonologico-articulatory model for palatalization (Calabrese 2005) and show that it can effortlessly be extended further, thus accounting for palatalization Romance-wide.

4 Palatalization revisited

Calabrese (2005) attempts to account for the change in place of articulation seen in palatalization processes by enriching Articulator Theory described above (3.1) as follows. Calabrese assumes that, in addition to redundant features in primary articulations, there could be redundant passive secondary articulations. The identification of non-contrastive passive secondary articulations is based on the proprioceptive experience of the action of the articulators in the vocal tract. We know that there are certain given orosensory patterns associated with each articulator. Following Perkell (1980, 338), we can say that “these orosensory patterns consist of proprioceptive, tactile, and more complicated air pressure and airflow information from the entire vocal tract”. Calabrese assumes that these non-contrastive aspects need to be represented phonologically. For example, instead of assuming that front vowels and coronal consonants share the same feature (as assumed in Clements’ 1991 model), Calabrese proposes that they share a redundant passive secondary articulation that can participate in assimilatory processes. This can be formally expressed as a correlation between a primary articulatory configuration and a secondary one. For example, consider fronted velars. These consonants are produced by making a dorso-palatal constriction by raising and fronting the tongue body. The raising and fronting of the tongue body that is necessary to produce such a constriction also involves an automatic raising of the posterior part of the tongue blade. The passive raising of the tongue blade causes lateral contact with molars up to the post-alveolar zone (cf. Recasens 1990, 276; Keating/Lahiri 1993, 90). According to Calabrese, this lateral contact of the tongue blade is characterized “proprioceptively” by the speakers as a secondary aspect of $[\text{Tongue Body} + \text{Dorsal}, +\text{high}, -\text{back}]$ sounds. This is formally expressed in the correlation statement in (3).

$$(3) [\text{Tongue Body} + \text{high}, -\text{back}] \Rightarrow [\text{Tongue Blade} -\text{anterior}, +\text{distributed}]$$

A fronted velar should then be represented as in Figure 5.7, with [+Dorsal] as the designated articulator and a coronal secondary articulator (not specified here because of its non-primary status).

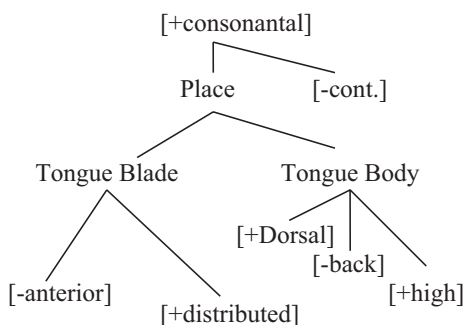


Figure 5.7: AT configuration of a fronted velar.

The relation in (3) appears to be bidirectional, as shown in (4). In palato-alveolar sounds such as [tʃ] and [ʃ], the raising of the blade and the predorsum also causes an automatic raising of the entire tongue dorsum and, thus, an increase of contact area over the entire palatal surface (cf. Recasens 1990, 270). However, this tongue dorsum involvement is secondary with respect to the primary laminal constriction. Thus, palato-alveolar sounds [tʃ] and [ʃ] can be represented as in Figure 5.8 with a designated coronal articulator and a fronted and raised tongue body.

(4) [Tongue Body +high, -back] $\Leftrightarrow$ [Tongue Blade -anterior, +distributed]

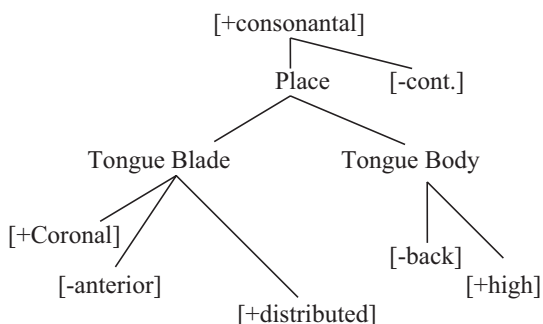


Figure 5.8: AT configuration of palato-alveolar sounds [tʃ] and [ʃ].

At the same time, given (4), the high vocoids [i y] are represented as follows (irrelevant features are not mentioned):

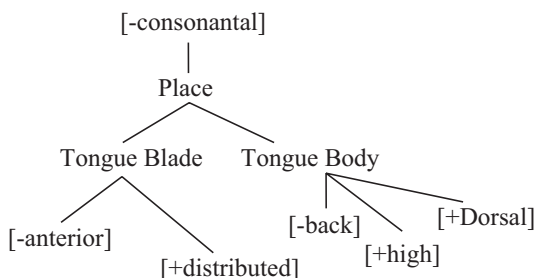


Figure 5.9: AT configuration of high vocoids [i y].

In contrast, non-high vowels are to be represented as in Figure 5.10, where only the dorsal node is present.

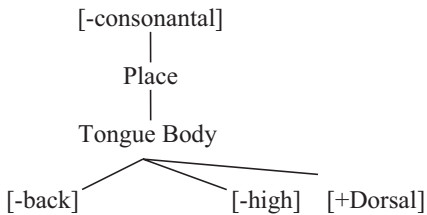


Figure 5.10: AT configuration of non-high vowels.

Evidence for this analysis is provided by the well-known fact that whereas front vowels as a class primarily target velar consonants in palatalization processes (cf. the second Romance palatalization, Tekavčić 1972; or the velar palatalization of Slavic, Chomsky/Halle 1968; Meillet/Vaillant 1924; Vaillant 1950), front close vowels and glides as a class primarily target coronal consonants (cf. Bhat 1978; Czaykowska-Higgins 1988).

Under this assumption, palatalization is argued to result from a multi-step process involving all consonants. Three main steps are identified: *raising/fronting* and *coronalization* (step 1; cf. 4.1); *coronal anteriorization* (step 2; cf. 4.2); *affrication/fricativization* (step 3; cf. 4.3):

4.1 Step 1: coronal raising; velar fronting and coronalization

The first step of palatalization processes results from the featural assimilatory interaction between a front high vowel and a consonant. We may have three different kinds of outcomes depending on the place of articulation of the consonant and the height of the vowel involved. Coronal consonants receive the coronal terminal features of high front vocoids as shown in Figure 5.11.¹² This process is traditionally known as *coronal raising* (Bhat 1978).¹³

The rule above applies to both sonorant and obstruent coronal consonants, and it is triggered only by front high vowels and glides. Sonorant coronal consonants [l n] palatalize into [ʎ ɲ] (cf. Table 5.4: Fr. *vigne* ['viɲə] 'vineyard' < VINEA(M), It. *paglia* ['paʎʎa] 'straw' < PALEA(M)), while the obstruent coronal unvoiced consonant [t] gets raised and undergoes further changes (cf. steps below).

¹² We follow Halle's (1995) proposal that only terminal features are spread in assimilatory processes.

¹³ Note that coronal raising may also lead to [+anterior] affricates and fricatives. A possible account for this would be to assume a rule spreading only the terminal feature [+distributed] of the palatal glide. Spreading of the feature [-anterior] of the high front vocoid is blocked in so far as it would generate a retroflex consonant. Retroflexion requires a [+back] tongue body configuration (cf. Hamann 2003; Stevens/Keyser/Kawasaki 1986; Stevens/Keyser 1989), which is incompatible with the [-back] configuration of the front high vocoid.

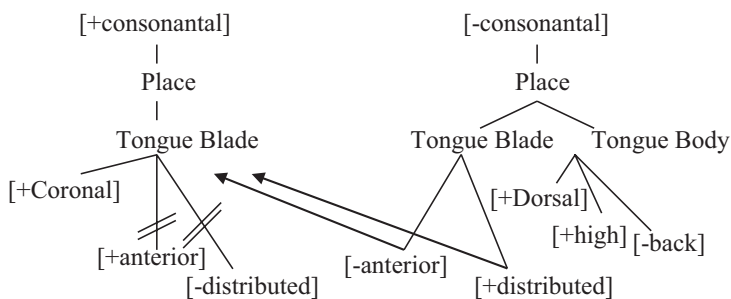


Figure 5.11: Coronal raising. The [-anterior] and [+distributed] features spread back to the preceding consonant.

Dorsal (velar) consonants receive the dorsal terminal feature [-back] of front (both high and non-high) vowels as shown in Figure 5.12. This process is traditionally known as *velar fronting*.

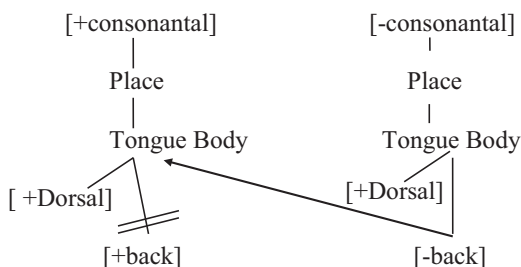


Figure 5.12: Velar fronting. The [-back] feature spreads back to the preceding consonant.

Velars are [+high]; thus, once the rule in Figure 5.12 applies, they are assigned the features [Tongue Blade -anterior, +distributed] by the correlation statement in (4):

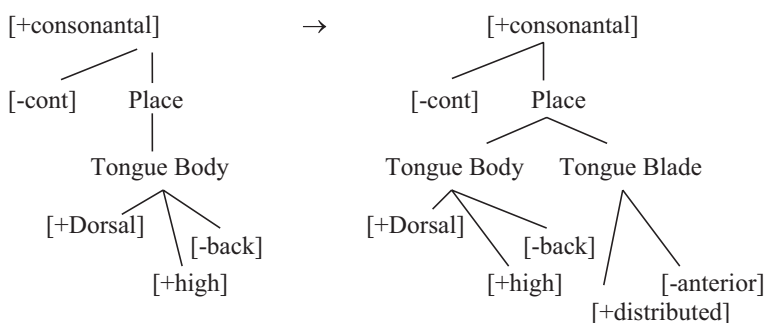


Figure 5.13: Additional feature assignment in a fronted velar by correlation in (4).

At this point, fronted velars change into coronals (*coronalization*); this is the crucial change in place of articulation that we typically see in palatalization processes. Coronalization involves the promotion of the secondary coronal articulation in Figure 5.13 to primary status, i.e. a change in which a non-designated articulator becomes a designated articulator (Figure 5.14). The promotion of a secondary articulator to primary status is a well-attested sound change (cf. Calabrese 2005 for more evidence and discussion; cf. also Clements 1991).¹⁴

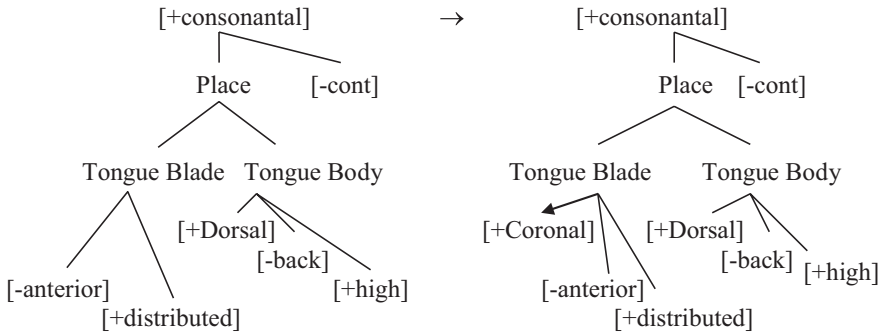


Figure 5.14: Coronalization: promotion of the second articulator [+Coronal] to primary articulator (as signaled by the arrow).

It is important to emphasize that velar fronting and velar coronalization are two separate phonological processes. While coronalization is contingent on velar fronting, the latter is completely independent of the former. Evidence for this comes from Tuscan Italian. In this variety, masculine nouns must be divided into two lexical classes, depending on the outcome of the root-final velar before the masculine plural morpheme *-i*. Nouns of the first class in (5a) undergo velar fronting only (i.e. [k] → [kʲ]); nouns of the second class (5b) undergo velar fronting, coronalization and, finally, affrication (i.e. [k] → [kʲ] → [tʃ]).

¹⁴ This accounts for why the postalveolar palatal plosives [c ʝ], developed from velars, show a larger tongue contact surface than the outcomes of the palatalization of dentals. In fact, in the latter case we are dealing simply with coronal raising (Figure 5.8). In contrast, in the former case, velar fronting + promotion generate a complex segment with both coronal and dorsal closures. Various alternative phonetic theories have tried to account for such complexity. For example, according to Straka (1965), this may be due to the fact that raising the posterior tongue body involves the activation of the sublingual elevator muscles as well as of intrinsic tongue muscles which cause tongue fronting to occur. Scripture (1902) attempts to account for this fact in terms of palate shape: the fact that the palate surface is higher and more curved at the mediopalate and postpalate than in the postalveolo-prepalatal zone renders the formation of a firm and precise linguopalatal target harder at the former location than at the latter; consequently, a consonantal closure or constriction must spread over a relatively large area if performed in the medio-postpalatal zone with the tongue dorsum (cf. also Millardet 1910; Rousselot 1924–1925; Recasens 2011).

- (5) a. Class I: *spor[k]o / spor[k]i* ‘dirty_{M.SG/PL}’
 b. Class II: *por[k]o / por[tʃ]i* ‘pig_{M.SG/PL}’

4.2 Step 2: coronal anteriorization

After coronalization, dorsals look as shown in Figure 5.15:

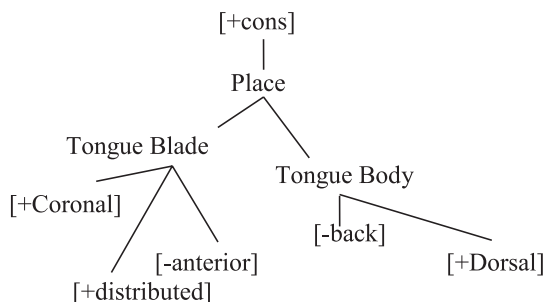


Figure 5.15: Coronalized dorsals.

The configuration in Figure 5.15 represents a multiply articulated plosive with two primary articulators: a coronal and a dorsal one. However, coronal-dorsal articulated segments are highly complex and seem to never surface in plosives (whereas they are far more common in sonorants; cf. Recasens 1990 and Ladefoged/Maddieson 1996; Maddieson 1984). To account for this, Calabrese (2005) assumes the marking statement (or *constraint*) in Figure 5.16 which states that plosives with both coronal and dorsal designated articulators are marked.¹⁵

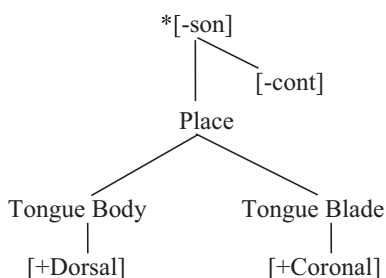


Figure 5.16: Constraints against the co-existence of the dorsal and coronal articulators.

¹⁵ As discussed in Calabrese (1995; 2005), marking statements – and the associated repairs – are grounded in the sensorimotor system. They are the way in which auditory, perceptual and articulatory restrictions and complexities are made legible to the grammatical system.

The constraint in Figure 5.16 accounts for the wide spectrum of variation in the palatalization of coronal plosives and forbids plosives from being endowed with multiple designated articulators. Violations to this constraint may be repaired in two ways. The first strategy removes the terminal designated articulator [+Dorsal]; this creates the configuration in Figure 5.17.

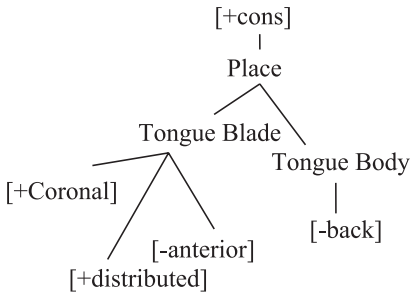


Figure 5.17: Coronalized dorsals after removing the articulator [+Dorsal].

This is a plain palato-alveolar plosive, which eventually undergoes affrication and results in [tʃ] and [dʒ]. The second strategy deletes the dominating articulator node Tongue Body; this creates the configuration in Figure 5.18.

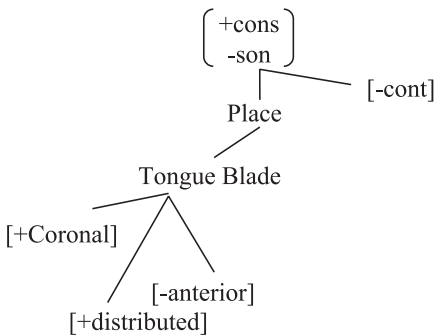


Figure 5.18: Coronalized dorsals after removing the node Tongue Body.

Recall that the correlation statement in (4) expresses an interdependence between [_{Tongue Body} -back] and [_{Tongue Blade} -anterior, +distributed]. Given this interdependence, we assume that, when [_{Tongue Body} -back] is removed, [_{Tongue Blade} -anterior, +distributed] can no longer stay as such; this is stated formally in (6).

- (6) If not [_{Tongue Body} -back], then not [_{Tongue Blade} -anterior, +distributed]

The preferred repair for this disallowed configuration – the one that produces the best outcome in this case – involves changing the feature [-anterior] into [+anterior]. This is shown below.

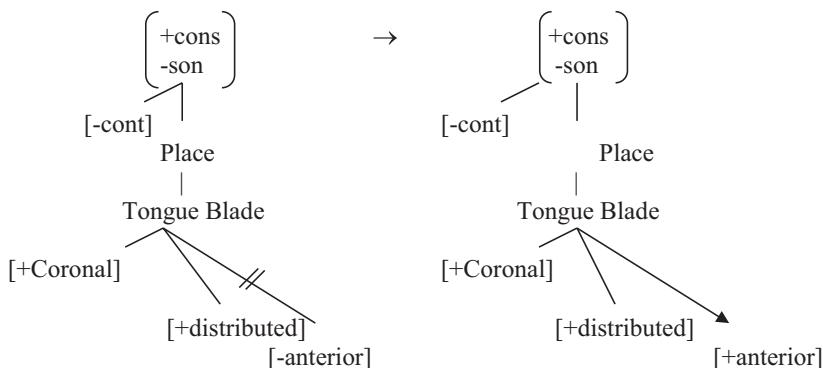


Figure 5.19: Coronal anteriorization.

The operation shown in Figure 5.19 is crucial to account for all the possible outcomes of palatalization across Romance. In particular, this process (which we may call *coronal anteriorization*) is the necessary, preliminary step before actual affrication/fricativization, which leads to outcomes such as [ts s θ] (cf. step 3 in the following section).¹⁶ Evidence for this analysis is seen in the outcomes of the first palatalization in Ligurian, a northern Italian dialect. In this dialect, Latin /tj/ developed into the fricative [ʃ] and Latin /kj/ developed into the fricative [s]: e.g. Lig. *ra*[ʃ]*on* ‘reason’ < RA[tj]ONE(M); *bra*[s]*u* ‘arm’ < BRA[kk]*u*(M). If we just consider the place of articulation of the segments that are the outcome of palatalization, we can observe immediately that we cannot account for the emergence of the alveolar consonant [s] in this process by assuming a depalatalization process that affects an intermediate palato-alveolar consonant [ʃ]. This depalatalization rule, in fact, would have also affected the palato-alveolar [ʃ], which is the outcome of /kj/, and thus caused a merger between the outputs of /tj/ and /kj/. We can account for the Ligurian facts by assuming instead that the difference between the outcomes of /tj/ and /kj/ is due to two different rules: in the case of the coronals, coronal raising (Figure 5.11) applies; in the case of velars, after velar fronting (Figure 5.12) and coronalization (Figure 5.14) apply, the representation in Figure 5.15 may be repaired by delinking the Tongue Body node.

16 Traditionally, the appearance of coronal [+anterior] segments from the palatalization of velar plosives is accounted for by assuming a further process of depalatalization which changes the palatal or palato-alveolar outcomes of palatalization to dental or alveolar consonants. The hypothesis is that we obtain dental/alveolar segments in palatalization processes always through sequences of developments such as:

- (i) a. c → tʃ
b. tʃ → ts

Such a chain of sound changes is not needed in Calabrese’s framework.

4.3 Step 3: affrication/fricativization

Targets of palatalization processes are generally affected in their place of articulation, in that they get raised and fronted (thus eventually becoming coronal). Additionally, plosives typically become affricates or fricatives.

The usual solution to the problem of affrication and fricativization of plosives in palatalization processes found in the literature relies on redundancy rules that change the output of palatalization rules into an affricate. The assumption is that affrication in the palato-alveolar region is predictable and therefore expressed by a rule (Sagey 1986; Lahiri/Evers 1991). Thus, affrication of palato-alveolar plosives is expressed as in (7) where palato-alveolar plosives are characterized by the features [+distributed, -anterior].¹⁷

(7) [_{Tongue Blade} +distributed, -anterior] → ‘affricate’ / ____ (-continuant)

One could propose that a rule such as (7) has a phonetic justification, in that the plosive closure is difficult to execute with the laminal articulation of palato-alveolar plosives. In particular, given the length of the constriction characterizing laminal plosives, the tongue cannot have sufficient mobility to obtain the abrupt release that is crucial for the proper articulation of a plosive consonant (cf. Catford 1977, 152; Lahiri/Blumstein 1984, 142). Still, there is no clear phonetic reason for why there should be affrication in this case.¹⁸ Note furthermore that a purely phonetic account of this adjustment would imply that affrication is beyond the cognitive control of the speakers. This would be incompatible with the possible suppression of affrication that, for example, we see in the laminal palato-alveolar plosive [c] of Czech or Friulian. Speak-

17 This is the position adopted by Steriade (1993; 1994) who assumes that the fricative release of affricates is not a distinctive property, but rather the surface realization of an underlying distinction in point of articulation. In particular, she assumes that individual languages may have the option of realizing laminopalatal plosives with a significantly delayed release, which results in frication noise. In such a framework, affrication of the configuration [+distributed, -anterior] must be stipulated a priori, but no theoretical explanation can be given.

18 Consider for example the frequently quoted passage by Catford (1977, 152):

It is quite easy to make a clear-cut sudden breakaway of the tongue point from the alveolar ridge (in apico-alveolar plosives), but, when the point is lowered and the contact is made with the blade (lamino-alveolar), it is more difficult to break away cleanly. The blade withdraws from the alveolar ridge more slowly, passing through a perceptible moment of approximation when there is an [s]-like central channel between the blade and the alveolar ridge – hence the tendency for lamino-alveolar plosives to be affricated.

This passage implies that affrication is an adjustment meant to fix the problem posed by the laminal type of plosive release. The issue remains, however, of why we have affrication as an adjustment in this case, in particular, there is no explanation of why the blade should withdraw more slowly forming ‘an [s]-like central channel’ in the case of the laminal plosives (cf. also fn. 22).

ers must obviously be able to control this adjustment and produce non-affricated laminal consonants, even if they are difficult articulatorily. Therefore, the adjustment characterizing affrication cannot be an automatic phonetic implementation process that is by definition beyond speakers' control.¹⁹

Calabrese (2005) proposes that this adjustment is due to representational rather than purely articulatory properties of laminal plosives. Affrication is phonological in nature, not phonetic, because it results from repairing a phonologically marked configuration involving the feature [distributed]. The feature [distributed] identifies sounds that “are produced with a constriction that extends for a considerable distance along the direction of the airflow” (Chomsky/Halle 1968, 312). Non-distributed sounds are sounds that instead “are produced with a constriction that extends only for a short distance in this direction” (Chomsky/Halle 1968, 312). Laminal consonants (namely, laminal palato-alveolars and lamino-dentals) are characteristically [+distributed] and are the typical outcome in palatalization, regardless of the underlying place of articulation (Bhat 1978; Lunt 1997; Keating 1988). Recall from (4) that the feature [distributed] of the tongue blade tightly correlates with feature [-back] of the tongue body: when the tongue body is fronted and raised, there is a wide contact area in the articulation of the consonant also involving the tongue blade, i.e. a [+distributed] behavior of the front of the tongue is observed. Crucially, this [+distributed] behavior of the tongue blade becomes problematic when a primary occlusive constriction is implemented with the same articulator (i.e. when the tongue blade is the designated articulator).

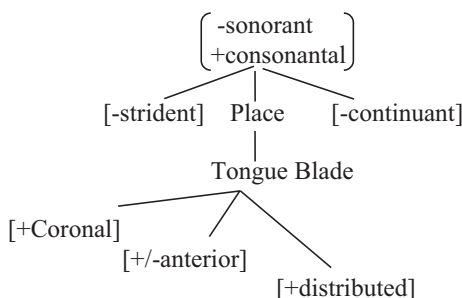


Figure 5.20: AT configuration of a laminal plosive.

The configuration [-continuant, +distributed] is characterized by a high degree of complexity; this comes from the fact that, given the length of the constriction characterizing laminal plosives, the tongue blade cannot have sufficient mobility to obtain the abrupt release crucial for the proper articulation of a plosive consonant. Support

¹⁹ We are therefore assuming that only properties that are grammatically (i.e. phonologically) represented can be under cognitive control. It follows that only articulatory and auditory properties that are encoded in phonological representations and processes can be under cognitive control.

for this can be found in Stevens/Keyser (1989), who claim that the optimal coronal plosive has a short constriction (namely, it is specified as [-distributed]). The complexity of laminal plosives is also supported by the fact that these types of plosives are very rare cross-linguistically (Lahiri/Blumstein 1984; Ladefoged 1964; Chomsky/Halle 1968). In Calabrese's (2005) terms, the high degree of complexity of Figure 5.20 can be formalized as the constraint (8) below.²⁰

(8) *[-continuant, +distributed] / [_{Tongue Blade} +Coronal, ____]

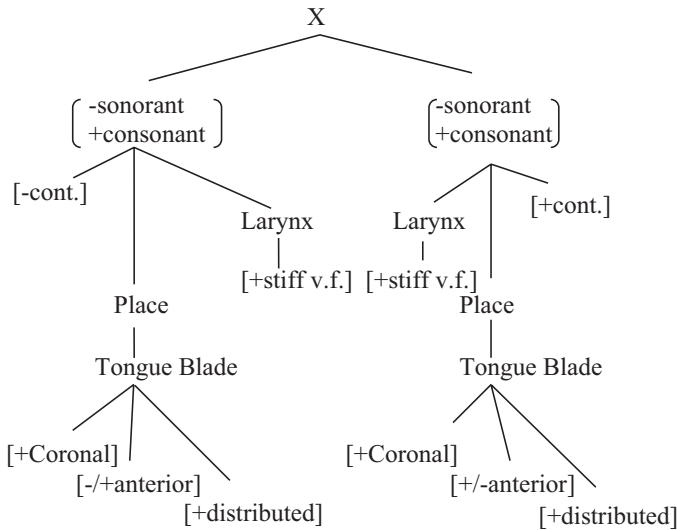


Figure 5.21: AT configuration of affricates.

This complex articulatory unit involving a plosive release with a long constriction may be simplified in two main ways. The first way is by splitting this unit into two simpler units (fission; Figure 5.21): in the first unit, closure is associated with the same long constriction; in the second unit, the long constriction is associated with a fricative

²⁰ Palatal laterals and nasals behave differently than palatal plosives: the laminal configuration of the tongue is not as problematic in their case, as shown by the fact that they frequently occur across languages. Therefore, (8) needs to be restricted to palatal plosives, as below. (The specification [-sonorant] is omitted in the constraint (8) for the sake of simplicity.)

*[-continuant, +distributed]/ [-sonorant, +Coronal ____]

Note that it is not merely the tongue configuration to be an issue here as would be assumed in Catford's phonetic account of fn. 18. His account would, in fact, predict the appearance of an [s]-like central channel in the pronunciation of palatal laterals and nasals, something that is unattested. What matters is the entire phonological configuration of the target segments as implied by the constraint above.

release. Thus, the two simultaneous articulatory maneuvers of total closure and tongue front flattening implemented in laminal plosive production are sequenced in time. The segment obtained in Figure 5.21 is an affricate: [tʃdʒ] (cf. Table 5.2a–c: Northwestern Friul. [poʃʃ] ‘well’ < PUTEU(M), It. [ˈraddʒo] ‘ray’ < RADIU(M); Tusc. [ˈbrattʃo] ‘arm’ < BRACCHIU(M), Tusc. [koˈreddʒa] ‘strap’ < CORRIGIA(M); Tusc. [ˈmaddʒo] ‘May’ < MAIU(M); cf. Table 5.5: It. [ˈʃɛra] ‘wax’ < CERA(M), It. [ˈdʒenero] ‘son-in-law’ < GENERU(M)), if palato-alveolar; or [ts dz], if dental/alveolar after the application of the rule in Figure 5.19 (cf. Table 5.2a–c: Cal. [ˈputtsu] ‘well’ < PUTEU(M), Cors. [ˈmeddzu] ‘half’ < MEDIU(M); Lig. [ˈbrattsu] ‘arm’ < BRACCHIU(M), Sur. [kuˈredza] ‘strap’ < CORRIGIA(M); Sur. [dziˈdzin] ‘fasting’ < IEIUNU(M); cf. Table 5.5: Mountain Lig. [ˈtsera] ‘wax’ < CERA(M), Ven. [ˈdʒenero] ‘son-in-law’ < GENERU(M)) (cf. 4.2).

The second way the illicit configuration in (8) may be repaired is by *delinking* (or *deletion*), where a feature is deleted from the representation. Assume that the feature [-continuant] of the illicit configuration (8) is deleted. After the application of delinking, we then obtain the configuration in Figure 5.22 (where as discussed in Calabrese (1995; 2005), deletion of a feature specification is followed by automatic insertion of its opposite value, [+continuant] in this case):²¹

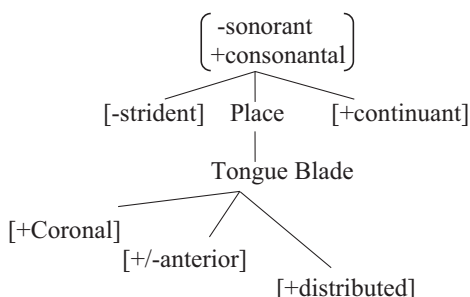


Figure 5.22: AT configuration of the outcome of delinking of [-continuant].

Observe that this configuration contains the [-strident] feature value, since plosives are generally characterized by the feature [-strident] (Stevens/Keyser 1989). Now, the configuration [+continuant, -strident] is highly complex though, and may be marked as illicit.

(9) *[+continuant, -strident]

²¹ Delinking of the feature [+distributed] is not attested. We can account for this fact if we consider that given the correlation (4), in laminal post-alveolar segments, there is also involvement of a raised and fronted tongue body, which is not affected by the repair. Changing [+distributed] into [-distributed] would create a retroflex consonant. Retroflexion would be incompatible with the tongue body configuration characterizing these segments. A prohibition against this would always disallow replacing [+distributed] with [-distributed]; cf. also fn. 14.

If (9) is not active in the language, such a configuration is allowed, thus surfacing as [θ ð] (cf. Table 5.2a–b: Com. [poθ] ‘well’ < PUTEU(M), Com. [‘meðo] ‘half’ < MEDIU(M); Com. [‘aθa] ‘ax’ < ACIE(M); cf. Table 5.5: CastSp. [‘θera] ‘wax’ < CERA(M), OVen. [‘ðenaro] ‘son-in-law’ < GENERU(M)). This is, for example, the case of the Sardinian dialect of Nuoro (Pittau 1972):²²

- (10) Dialect of Nuoro
 [kan‘θone] ‘song’ < CANTIONE(M)
 [lan‘θare] ‘wield_{INF} a lance’ < LANCEARE

If (9) is instead active in the language, such a configuration needs repairing. This may be done by delinking either feature. On the one hand, delinking [+continuant] in the representation in Figure 5.21 does not resolve the issue, since it brings back the representation [-continuant, +distributed] that started the derivation – an operation that we assume is excluded by reasons of economy. On the other hand, delinking [-strident] abides by the constraints at play, and the strident fricatives [ʃ s] therefore come about (cf. Table 5.2a–b: Eastern Friul. [pos] ‘well’ < PUTEU(M), Picard [kaʃø] ‘hunter’ < CAPTIATORE(M); Tusc. [‘affa] ‘ax’ < ACIE(M); cf. Table 5.5: Fr. [siʁ] ‘wax’ < CERA(M)).²³

4.4 Palatalization in labials and voiced plosives

A separate discussion must be held regarding palatalization of labial and voiced plosives. Cross-linguistically, these two classes of sounds undergo palatalization

²² Observe that it is very difficult to hypothesize an intermediate stage /ts/ before the final outcome [θ] in the case of the Sardinian dialect of Nuoro because of the presence of another sound change that occurred probably at the same time as the palatalization process or shortly after it. This sound change affected front glides after sonorants (namely /lj/ and /nj/) and changed them into voiceless alveolar affricates:

lan[ts]are ‘tear apart_{INF}’ < LANIARE
 mu[ts]a ‘wife’ < MULIERE(M)

If there was a deaffrication process that changed an intermediate /ts/ from /tj kj/ into the non-strident [θ], it should have also changed the affricate [ts] from /j/ after /l/ and /n/. But this did not occur.

²³ Changes in manner of articulation also characterize consonantal processes such as fortition and lenition. We point out that, whereas palatalization processes may be argued to be due to assimilation-triggered articulatory adjustments, it is unclear how the same treatment may be reserved for fortition and lenition processes. In fact, as argued by Katz (2016), the changes in manner of articulation of the latter processes are due to totally different phonological mechanisms – that is, to sound intensity increasing inside prosodic constituents, but decreasing at their edges. For recent discussion of lenition/fortition, cf. also Ségéral/Scheer (2008); Honeybone (2008); Kirchner (1998); Gurevich (2003).

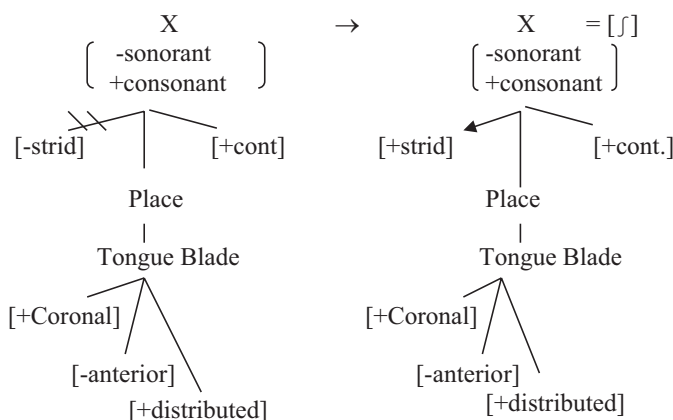


Figure 5.23: AT configuration after repairing the violation of constraint in (9) by delinking.

changes differently from those discussed above. Let us first consider labials. Labials rarely undergo palatalization (cf. Table 5.3a–b: It. ['sappja] ‘know_{3SG.SUBJV}’ < SAPIAT, Tusc. ['rabbja] ‘anger’ < RABIA(M); It. [ven'demmja] ‘grape harvest’ < VINDEMIA(M)) (cf. Bateman 2007; 2010; 2011). In varieties where they do undergo this process, however, labials change to complex segments composed of a non-palatalized labial and a palatal consonant [ptʃ bɔ̃ ɲɔ̃] (cf. Table 5.3a–b: OOc. ['saptʃa] ‘know_{3SG.SUBJV}’ < SAPIAT’, OOc. ['robdʒe] ‘red’ < RUBEU(M); Egd. [vin'demɟa] ‘grape harvest’ < VINDEMIA(M)) or simply to palato-alveolar consonants (cf. Table 5.3a–b: Sic. ['satʃu], Fr. [saʃ] ‘know_{3SG.SUBJV}’ < SAPIAT’; Sic. ['gaddʒa] ‘cage’ < CAVEA(M), Fr. [ʒaʒ] ‘anger’ < RABIA(M); Oc. [ven'demɲa], Lig. [ven'deɲa] ‘grape harvest’ < VINDEMIA(M)). This type of process can be accounted for by the independent rule in Figure 5.24, where only terminal features are spread in assimilation processes (in line with Halle 1995).

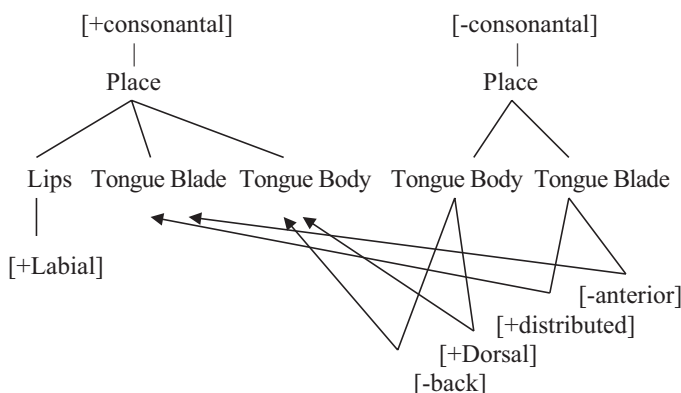


Figure 5.24: Assimilation process of the terminal nodes of the Tongue Body and Tongue Blade nodes. All Tongue Body and Tongue Blade features spread back to the preceding consonant.

Thus, the palatalization of labials generates quite complex segments involving labial and dorsal primary articulations, and a coronal secondary articulation, as shown in Figure 5.25.

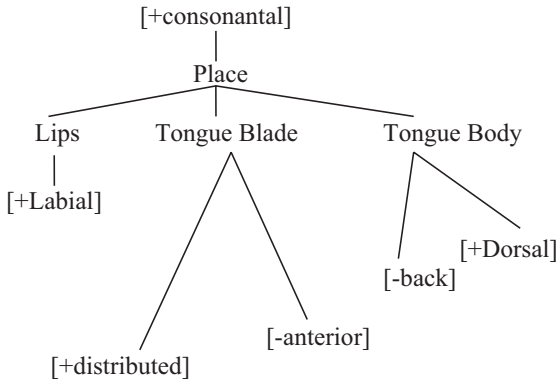


Figure 5.25: AT configuration of palatalized labials.

The fact that in many Romance varieties labials do not undergo a change of place of articulation can be explained by assuming that the application of the assimilation rule in Figure 5.24 is blocked by the grammar having an active constraint against such complex segments. Varieties in which labials do instead undergo palatalization may display two different outcomes. In some varieties, this constraint is not active and therefore the rule in Figure 5.24 applies; the coronal component of the complex segment then undergoes the coronal raising rule in Figure 5.11, and affrication thus generates complex outcomes such as [ptʃ bɔʒ mɔʒ]: e.g., Egd. [vin'demɔʒa] 'grape harvest' < VINDEMIA(M). In other varieties, the constraint is active. The assimilation rule (Figure 5.24) applies, but its output is repaired by delinking the [+Labial] articulator. Subsequently, the derived palato-alveolar segment undergoes the same changes discussed above and surfaces as [tʃ dʒ ɲ]: e.g. Lig. [ven'depa] 'grape harvest' < VINDEMIA(M).

Let us now turn to voiced plosives. Unlike voiceless plosives, in palatalization processes voiced plosives are often neutralized with high front glides, thus surfacing as [j] (cf. Table 5.2a–c: Cal. [ˈraju] 'ray' < RADIU(M), Friul. [ko're(j)a] 'strap' < CORRIGIA(M), Cal. [ˈmaju] 'May' < MAIU(M); cf. Table 5.5: Sp. [ˈjerno] 'son-in-law' < GENERU(M)); for example:

(11) Sicilian

- a. [ˈfuju] 'flee_{1SG}' < FUGIO
- b. [ˈoji] 'today' < HODIE
- c. [ˈjoku] 'game' < IOCU(M)
- d. [ˈpeju] 'bad_{CMP}' < PEIORE(M)

We can account for this fact by assuming the following rule, in which [+consonantal] is changed into [-consonantal] in the structure in Figure 5.26.

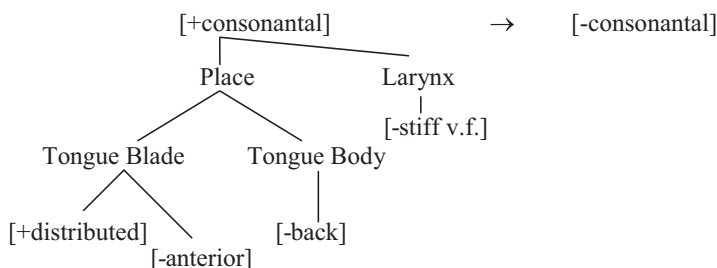


Figure 5.26: Neutralization rule. Voiced palatalized plosives become glides.

The outcomes [ɖʒ z dz ʒ ʃ sʃ] (cf. Table 5.2a–b: It. [ˈraddʒo], Rm. [ˈrazə] ‘ray’ < RADIU(M), Cors. [ˈmeddzu] ‘half’ < MEDIU(M), Cors. [ˈoʃi] ‘today’ < HODIE; Tusc. [koˈreddʒa], Sur. [kuˈredza], Sut. [kuˈreʒa]/[kuˈreja], Sal. [kuˈreʃa] ‘strap’ < CORRIGIA(M); cf. Table 5.5: It. [ˈdʒenero], Ven. [ˈdzenero], Cors. [ˈjenaru], Fr. [ʒɑ̃dʁ] ‘son-in-law’ < GENERU(M)) are due to further processes of fortition applying to the neutralized [j]; some examples follow.²⁴

(12) Salentino

- a. [ˈfufu] ‘flee_{1SG}’ < FUGIO
- b. [ˈoʃe] ‘today’ < HODIE
- c. [ˈfweku] ‘game’ < IOCU(M)
- d. [ˈpeʃu] ‘bad_{CMP}’ < PEIORE(M)

(13) Italian

- a. OIt. [ˈfuddʒa] ‘flee_{3SG.SBJV}’ < FUGIAT
- b. It. [ˈoddʒi] ‘today’ < HODIE
- c. It. [ˈdʒoko] ‘game’ < IOCU(M)
- d. It. [ˈpɛddʒo] ‘bad_{CMP}’ < PEIORE(M)

5 Recent OT-based analyses of palatalization

In the previous section, we have seen how Calabrese’s (2005) rule-and-constraint based model can account for the wide spectrum of micro- and macro-variation in Romance palatalization. In this section, we turn to discuss two recent accounts of

²⁴ Sonorant consonants may also be affected by a change like in Figure 5.24 (with subsequent loss of laterality or nasality ([ʎ] → [j], [ɲ] → [j]), cf. Table 5.4).

palatalization that have been proposed within the Optimality Theory (OT) framework, the current leading phonological theory: Rubach's (1984/2011; 2003) and Bateman's (2007; 2010; 2011). We do this as a chance to make a meta-theoretical evaluation of opposing phonological frameworks, while setting aside their ideological beliefs.

However, before proceeding we need to address the well-known difficulty of evaluating OT-based proposals. This difficulty is due to the complex nature of the theory that allows the OT practitioner to always be able to come up with a new constraint – a violable one, and therefore one that is not testable insofar as its effects can be somehow always overridden by another violable, and not directly testable, constraint. The consequence is that often the analysis, and the evaluation of it, appears to be an exercise in excluding the possible unattested candidates, an exercise which is just governed by good luck, as Clements (2000) noticed, since no one can ever be sure that all the possible options were clearly considered. For this reason, a thorough evaluation of these accounts in the context of this chapter cannot be done, unless the OT-theoretical complexity is reduced so that the actual predictions of the analysis can be evaluated.

In OT (Prince/Smolensky 1993/2004; McCarthy/Prince 1995), rules are rejected as devices for phonological processes. Rather, phonological processes are interpreted as a way to solve language-specific phonological constraints. In this spirit, for example, epenthesis is seen as a way of repairing violations to well-formedness constraints on complex syllable structures. A grammar in Optimality Theory (OT) involves a language-particular ranking of universal constraints (Prince/Smolensky 1993/2004) which come in two types: *markedness constraints* prohibit certain output configurations, whereas *faithfulness constraints* block certain input-to-output mappings. Phonological generalizations are expressed by the interaction, through ranking, of these constraints. Thus, in OT a process $A \rightarrow B / C\_D$ is characterized in the following way (McCarthy 2000):

- (14) a. Some markedness constraint *CAD dominates any faithfulness constraint $F(A \rightarrow B)$ that would block the $A \rightarrow B$ mapping;
 b. No markedness constraint that CBD violates is ranked above *CAD; and
 c. For all $X \neq B$, there is some faithfulness constraint $F(A \rightarrow X)$ or some markedness constraint *CXD that dominates $F(A \rightarrow B)$.

OT proponents claim that, by the complex decomposition of the notion of a phonological process as in (14), deeper levels of explanatory adequacy can be reached in phonology (Prince/Smolensky 1993/2004; cf. Roca 1997; McCarthy 2008). In particular, OT is claimed to be able to (i) account for conspiracies and (ii) provide a direct formal framework for representing universality and markedness, because the constraints are assumed to be universal and related to markedness. As discussed in Calabrese (2005; 2009), (i) and (ii) are not an OT prerogative, rather they are achieved in other models

too. In our view, the true OT prerogative is complexity.²⁵ On one side, OT wildly over-generates. For example, consider the phonological process defined in (14). In order for it to be dealt with in OT, it needs to be decomposed into at least four constraints – the two markedness constraints *CAD, *CXD; and the two faithfulness constraints $F(A \rightarrow B)$, $F(A \rightarrow X)$.²⁶ These four constraints can be freely ranked. This results in $4! = 24$ possible ranking permutations. Each process is part of a factorial typology including the other 23 members. Thus, each process must be included in a large conspiracy with many related processes. There are simply too many solutions to a given phonological constraint, whereas the number of known conspiracies seems to be limited (the ‘too-many-solutions problem’; cf. Steriade 2009).²⁷ On the other side, there is also an internal architectural redundancy of OT. Like other constraint-and-repair models (Calabrese 1988; 1995; 2005; Paradis 1988), OT also has repairs, i.e. operations changing input strings that violate some markedness constraint. They are implemented by GEN, although hidden in this component. So, consider a repair such as $A \rightarrow B$ implemented by GEN. This repair, as all other GEN operations, is punished by a faithfulness constraint, $(A \rightarrow B)$ in this case – as faithfulness constraints are always the negative mirror image of GEN’s operations. So, the same operation is essentially referred to twice in the grammar, although its first instance is hidden in GEN. Thus, there is a pervasive hidden duplication between the operations GEN can perform and faithfulness constraints at the base of OT, violating any reasonable principle of economy. Accordingly, one could consider only the operations that GEN implements in response to markedness constraints and disregard the action of the faithfulness constraints.²⁸

For these reasons, in the following review of OT-based analyses of palatalization we will try to reduce OT-theoretical complexity by putting aside faithfulness constraints, and instead focusing only on the fundamental core of the framework: the markedness constraints and the repairs they trigger.

25 There are also other problems OT faces such as its failing to account for opaque process interactions (Vaux 2008) and for morpho-phonological and language-specific idiosyncratic processes, whose existence is in fact clearly incompatible with the idea that phonological processes revolve around phonological optimization (Paster 2006; Bye 2008). Such problems are irrelevant in the context of this chapter.

26 The number of constraints considered in (14) depends on the logic interpretation of the logical connective *or* in (14c). In our discussion, we interpreted it exclusively, so to consider the minimal number of constraints (and therefore ranking permutations); if *or* were to be interpreted inclusively, the number of constraints would go up to 5, along with the permutations ($5! = 120$).

27 We can name the most important ones: the hiatus conspiracy; conspiracies involving syllabic configurations such as those against complex onsets or complex codas; conspiracies dealing with prosodic structures; conspiracies involving marked segments such as the front rounded vowels or [-ATR] high vowels; conspiracies involving the OCP; conspiracies involving the distribution of features in strings.

28 Note that according to the same general principle of economy, a repair triggered by the violation of a constraint implements the minimal change that fixes the violation. This would prevent OT’s overgeneration.

5.1 Rubach's analysis

Rubach's (1984/2011) investigation deals with palatalization in Slavic languages. Despite the many similarities between the historical palatalization processes in the Slavic and Romance languages, a thorough discussion of Slavic palatalization is not possible here. We will, instead, focus on Rubach's analysis of velar coronalization before front vowels, which is the most problematic palatalization process (cf. 4.1).

(15) $k \rightarrow tʃ / \_\_ i, e$

Rubach (1984/2011) proposes the following markedness constraints (cf. also Rubach 2003 and Rubach/Booij 2001):

- (16) a. PALATALIZATION-e (PAL-e): A consonant and a following mid vowel agree in backness.
 b. AFFRICATION (AFF): *[Coronal, -back, -strident]
 c. POSTERIORITY (POST): *[Coronal, +anterior, -back]
 d. *SOFTDORSAL (*SOFTDOR): Don't be a [-back] dorsal.

Rubach assumes that palatalization is triggered by the constraint PAL-e (16a). PAL-e forces the sequence /ke/ to agree in the feature [-back]; thus, via (16a) the velar is fronted: /ke/ → /k'e/. However, the candidate /k'e/ violates the constraint *SOFTDOR (16d). At this point, the dorsal /k/ changes its place of articulation into coronal by Prince and Smolensky's (1993/2004) universal ranking in (17), in which *LABIAL (don't be a labial) is ranked higher than (») *CORONAL (don't be a coronal). Assuming that the coronal candidate preserves the feature [-back], the constraints AFF (16b) and POST (16c) ensure that the desired output from /ke/ is a [-anterior, +strident] coronal, namely a post-alveolar affricate [tʃ].

(17) *Labial » *Coronal

In some respects, Rubach's analysis is quite close to what we have proposed in the preceding pages. In particular, the constraints POST (16c) and AFF (16b), although quite stipulative in themselves, are equipollent to the correlation in (4). It is to observe, however, that in Rubach's analysis, the coronal articulator is selected as default only because of the ranking in (17). Although theoretically possible in OT, this formulation fails, however, to account for the assimilatory nature of the process. Furthermore, the analysis must assume that the ranking in (17) is fixed and may not vary across languages. If *LABIAL » *CORONAL could be reranked, insertion of a labial articulator could be implemented, so that one would expect labialization as one of the outcomes

of palatalization, which is obviously contrary to the facts.²⁹ Note that pharyngealization and glottalization should also be excluded as possible repairs in addition to labialization. So, one needs to assume that constraints such as *TONGUERoot (No pharyngeals) and *LARYNX (No laryngeals) are ranked higher than *CORONAL, on a par with *LABIAL:

(18) *Labial, *TongueRoot, *Larynx » *Coronal

It follows that (18) would need to be fixed across all languages. This prediction, however, does not seem to be borne out. In many languages, coronal plosives become glottal plosives (e.g. $t \rightarrow ?/_\#$ in English), which would, however, be impossible to account for if (18) could indeed be reranked in the first place. Therefore, the possibility that (17) and (18) are cross-linguistically constant cannot be true. In order to prevent pharyngealization and glottalization from occurring in palatalization processes, Rubach's theory would need to add new (potentially ad-hoc) constraints, which would not only complicate an already very complex analysis, but also resort to unmotivated auxiliary hypotheses.

5.2 Bateman's analysis

Bateman's (2007; 2010; 2011) analysis uses articulatory phonology within the OT framework, along the lines of Gafos (2002) and Davidson (2003; 2004). Bateman bases her analysis of palatalization on the notion of gestural blending (Browman/Goldstein 1992) as in Recasens (2011), discussed here in 3.2. Recall that gestural blending occurs because the gestures using the same tract variable are attempting to force it to perform two tasks (namely achieve two targets) simultaneously; it is therefore impossible for this to happen without the gestures perturbing each other's movements. If the overlap is greater than minimal, the constriction is undershot. The result is (a) a shift in the *location* of the constriction to some place between the two coordinating gestures; and (b) a change in the *degree* of the constriction (Bateman 2007, 202). Bateman accounts for the blending interaction between tongue blade and tongue body (namely the trigger of palatalization processes) on the basis of two assumptions. First, she assumes that gestural blending occurs when the interacting gestures are produced with the same major articulator; second, she assumes that the tongue blade and tongue body are sub-articulators of a single major articulator: the tongue. This close connection between the tongue sub-articulators is the main reason behind coronal and dorsal

²⁹ Assuming OT, DEP_[+strident] and DEP_[-anterior] must always be very low. In fact, if DEP_[+strident] and DEP_[-anterior] were ranked higher than AFF (26b) and POST (26c), one would expect labialization as one of the outcomes of palatalization.

consonants undergoing palatalization more easily and freely across language (either independently of each other or together in the same language).

In her analysis, Bateman follows Gafos (2002) in accounting for the interactions between consonantal and vocalic gestures through the interaction between *gestural landmarks* (instead of Browman/Goldstein's (1992) gestural score; cf. 3.2). Each gesture has five temporal landmarks shown in Figure 5.27: the *onset* of the movement, reached at the beginning of the gestural movement; the *target* location, reached at the maximal constriction; the *center* point of the constriction; the *release* of the constrictions; finally, the *release offset*, reached at the end of the gestural movement. The *gestural plateau* is the portion of time (between target and release) during which the constriction is held; the *c-center* (which stands for constriction center) is the mid-point of the gestural plateau.

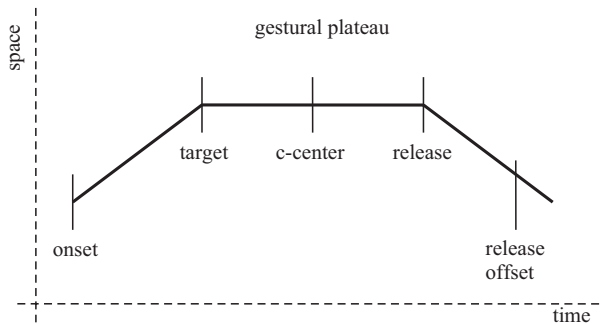


Figure 5.27: Gestural landmarks (from Bateman 2007, 193). The bold line represents the articulator moving through space and time.

Gestural coordination is implemented in the grammar by a markedness constraint that favors coordination of consonantal and vocalic gestures. Following Gafos (2002) and Davidson (2004), Bateman (2007) uses COORDINATION and ALIGNMENT constraints for that purpose. These constraints force selection of candidates that have the landmarks (namely onset, target, c-center, release, release offset) of consonantal and vocalic gestures aligned with one another. For full palatalization processes, she argues for a CV-COORDINATION constraint that controls the tongue gestures of a consonant (C) and a vocoid (V). This constraint states that all the consonants in an onset have a coordination relationship with the nucleus vowel.

(19) CV-COORDINATION-CENTER (tongue): CV-COORD-C (Tongue)

Align c-center landmark of tongue-gesture with onset landmark of V-gesture.

When a consonant occurs before a front vowel, (19) requires the c-center landmark of the consonant to be synchronized with the onset landmark of the following front vowel. This is done as shown in Figure 5.28: the c-center of tongue-gesture (solid line)

is aligned with the onset of V-gesture (dotted line). For example, when the consonant /t/ precedes the front vowel [i], the c-center landmark of the former is synchronized with the onset landmark of the latter by (19). A greater overlap between the two movements then comes about, which ultimately results in realization of the affricate [tʃ], which combines features of the two elements: [t] is [alveolar, closed] and [i] is [palatal, narrow], and they blend together in [tʃ], which is [palato-alveolar, closed-critical] (where [critical] is a blend of the [closed] and [narrow] values of the consonant and the vowel, respectively).

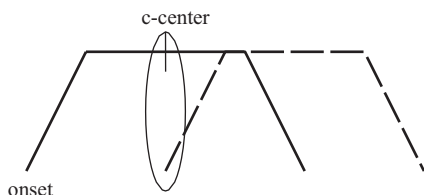


Figure 5.28: Gestural overlap between the articulation of a consonant (solid line) and the articulation of a front vowel (dotted line).

This system works fairly well for palatalization of coronals because the ultimate outcome is alveolo-palatal (which is precisely a blending of coronal and dorsal gestures). However, this is not the case in the coronalization of dorsal consonants. In this case, in fact, the input constriction location of the tongue body is changed from velar to palato-alveolar: e.g. /ke/ → [tʃ], so that the change leads to an involvement of the tongue blade. If a velar plosive has a [velar] constriction location, and the palatalization trigger has a [palatal] constriction location – for example, when the trigger is [e] which is simply [palatal, mid], with no tongue blade involvement – it is unclear why these segments blend to produce a [palato-alveolar] gesture as in [tʃ], in a way overshooting both targets. The obvious outcome of the gesture blending in this case should instead simply be a fronted velar, or perhaps a palatal plosive. Here, we essentially have the same problem we noted in the case of Recasens' analysis in so far as there is the unexpected appearance of a tongue blade gesture in violation of the no-tampering condition.

Bateman tries to solve the problem by following Lee (2000), who proposes that palatal plosives, e.g. [c], require a great articulatory effort, since the front part of the tongue body must make contact with the entire palatal region.³⁰ Lee (2000, 423–424) proposes that in the case of this consonant, an easier articulation is an affricate, [tʃ] even though it overshoots the palatal region.³¹ The problem remains, however, of how tongue blade involvement emerges in this process. The articulatory effort due to the fact that the

³⁰ In fact, the palatal plosive [c], which has active tongue blade involvement, is not the most probable outcome of velar fronting. Rather, a fronted velar is the common and unproblematic allophonic outcome. We put aside this problem here.

³¹ Bateman also postulates that this change is helped by the fact that [c] and the affricate [tʃ] share acoustic properties which make them similar.

front part of the tongue body must make contact with the palatal region could simply be solved by changing the closure to [critical], i.e. by producing a palatal fricative. It is unclear why we need to insert a tongue blade gesture. There is simply no intrinsic motivation for such insertion, and its appearance in Lee's account is nothing more than a stipulation. It is also to observe that by adopting Lee's proposal, dorsal coronalization is no longer assimilatory in nature, which is a fundamentally counterintuitive move.

Furthermore, Bateman's analysis faces other two problems. First, it wrongly predicts that all front vowel gestures affect the preceding consonant regardless of whether this is coronal or dorsal. In this way, Bateman also misses the important generalization that (a) coronals are mostly affected by front glides and high vowels, and not by non-high front vowels; and (b) dorsals are affected by all front vowels (that is, close, mid, and open vowels) and glides (Bhat 1978; cf. also Bateman 2011, 597). In Calabrese's (2005) analysis, this generalization is naturally explained as an effect of coronal raising (cf. Figure 5.11) and velar fronting (cf. Figure 5.12): the former is triggered by the coronal features [-anterior, +distributed], which are found only in high front vowels and glides; the latter is triggered by the feature [-back] found in all front vowels.

Secondly, and most importantly, the constraint in (19) imposes alignment and coordination of the consonantal and vocalic gestures independently of whether the vowel is front or back. Insofar as the tongue blade and the tongue body are sub-articulators of the same major articulator (the tongue), gestural blending should therefore occur in both cases and, in the case of back vowels, should trigger velarization of coronal consonants – namely anti-palatalization processes as exemplified in (20), which would be expected to be at least as common as palatalization, or even coexistent with it. As far as we know, such processes are unattested – and surely they do not co-occur with palatalization.³²

- (20) a. $tʃ \rightarrow tx / \_\_ u$
 b. $tʃ \rightarrow k / \_\_ u$
 c. $t \rightarrow k / \_\_ u$ etc.

A possible solution for this problem is restricting (19) to front vowel gestures. However, the motivations behind (19) being restricted to front vowels would be articulatorily and phonologically unclear. It seems to lack independent motivation, thus appearing highly stipulative.³³

³² It is to observe that given the constraint in (19), if tongue body fronting has an effect on the preceding consonant gesture, tongue body lowering should also have one. And this should also be found in the case of Tongue Root dislocations. As far as we know, such interactions are not part of “palatalization” processes.

³³ The other solution OT provides is resorting to some faithfulness constraints that forbid all possible (and unwelcome) changes. The ranking of these faithfulness constraints would have to be universally fixed, so to exclude all unattested processes – again, an unmotivated stipulation.

In conclusion, we believe that the theoretical infrastructure of rule-based models such as SPE and more recent constraint-and-repair models (Calabrese 2005; cf. also Paradis 1988) can deal with palatalization in a more cohesive, less stipulative way. Rules are not only restricted insofar as they can only insert or delete nodes in well-grounded phonological representations; but also, they operate on the phonological representations directly, without the intricate roundabout of constraints that OT entails. A model containing rules (or rule-like devices like repairs) is, therefore, much more parsimonious, and constrained, and therefore to be preferred to a model such as OT.

6 Conclusions

Romance palatalization is a complex phonological phenomenon. In our overview, we compared a number of analyses that have so far been proposed. Calabrese's (2005) analysis of palatalization seems to be able to account for the wide spectrum of micro- and macro-variation in Romance, as compared to the other competing accounts, which instead need a number of ad-hoc stipulative assumptions. In Calabrese's account, palatalization is seen as a two-step process. First, when preceding a front vocoid, consonants undergo complex phonological processes (*step 1*; 4.1). Coronal consonants are raised (*coronal raising*) and velar consonants are fronted (*velar fronting*), which eventually brings about promotion of a secondary coronal-laminal articulation to primary status (*coronalization*). Coronalization creates complex phonological configurations whereby a wide portion of the tongue body is involved in a primary occlusion of the vocal tract. We have shown that such complex articulations may be repaired in a number of ways, and each variety has its own (*steps 2–3*; cf. 4.2–4.3). In particular, we have seen that some varieties have chosen to apply fission, thus leading to affrication while some others have chosen to delete one of the features involved, thus leading to fricativization. The hope is to have shown how these repair procedures account for the changes in manner of articulation characterizing palatalization processes in a simple and straightforward way, under the starting assumption that the repair operations proposed formalize articulatory aspects of palatalization which may otherwise seem beyond the control of the speaker; this perspective seems compatible with the idea that the speaker has a role in this type of change as proposed in Gess (2013).

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6 Nasals and nasalization

Abstract: The Romance languages have long provided a useful laboratory for the exploration of nasals and nasalization-related phenomena. In this chapter we provide an overview of nasal consonant and vowel systems from three different perspectives: (a) synchronic, (b) diachronic, and (c) typological. The first part focusses on nasal consonant systems today, as well as related assimilation and sound change processes underway. We then look at nasal vowel systems as well as the morphophonology of nasal consonant and vowel alternations. In the second part, our focus is on the historical development of both nasal consonants and vowels from Latin until today. Finally, attention is given to some of the typological characteristics of nasalization processes and their development over time in Romance.

Keywords: nasalization, nasal consonants, nasal vowels, nasal typology, sound change

1 Introduction

In this chapter we provide a synchronic, diachronic, and typological overview and description of nasals and nasalization in Romance languages.

The Romance languages have long been a fertile field for scholars interested in exploring nasals and nasalization – whether diachronically or synchronically, or from phonetic, phonological, philological, sociolinguistic, or typological perspectives. There are many reasons for this broad cross-disciplinary interest. In the first instance, a wide range of nasal-related phenomena have long been observed and studied in Romance, including well-known processes of vowel nasalization in major varieties such as French and Portuguese.

It is also well-known that the Romance languages provide an excellent laboratory for linguistic research in general: they are typically well described, with long written traditions going back centuries, providing helpful textual data over extended periods of time, in addition often to copious synchronic data. Critically, they all derive from Latin originally spoken more than two millennia ago. It was

Note: I wish to thank the editors and Max Wheeler for their kindness and the generous assistance provided to me. All errors remain my own. I have endeavored as much as possible through the use of IPA phonetic alphabet to harmonize different transcriptional and orthographic traditions when citing examples from many different source languages and language varieties. It is not always entirely clear what the precise value of a letter or symbol might be, especially, for instance, in the case of rhotics.

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the language of Rome before becoming the language of the Roman Empire – which at its peak extended across Europe, North Africa, and the Middle East. Latin is extremely well attested with copious written records. Its sound system is also among the best understood of all ancient languages, thanks to a relatively penetrable alphabetic writing system, the evidence of Latin grammarians, meter, a long and continuous written tradition that predates the Common Era, Latin borrowings into other languages as well as comparisons with its Romance daughter languages over time. As a result, we have a time period of approximately two millennia between Latin and Romance languages today with helpful data of various different kinds, including also significant amounts of dialectal data – all of which helps to facilitate the detailed analysis and understanding of processes of change as well as of their outcomes today.

With respect to the development of nasals and of vowel nasalization, detailed work commenced already in the late 19th century. Meyer-Lübke (1890), for example, helpfully brought together relevant diachronic and synchronic cross-linguistic data across the larger Romance context. Uschakoff (1897) explored in detail nasal vowels in Old French while Nobiling (1903) provided a systematic account of nasal vowels specifically in Portuguese. Work continued especially on French, e.g. Straka (1955), Martinet (1969), Rochet (1976), and many others, but also with some focus on Portuguese, e.g. de Lacerda/Head (1966) and Almeida (1976). More recent large-scale cross-linguistic treatments include Hajek (1997) who focusses on developments in northern Italy, as well as in Romance more broadly. Undoubtedly the most detailed and comprehensive account of nasalization-related processes is Sampson (1999) who looks at developments systematically across all branches of the Romance language group.

From a more strictly synchronic perspective, Romance varieties remain frequent objects of study with respect to nasals and nasalization, explored from a range of approaches, such as phonological, e.g. Schane (1968), Tranel (1981), Wetzels (1997), and many others on the formal representation of nasal vowels, as well as a recent expanded focus on experimental phonetic research on nasals and nasalization, e.g. Carignan (2011; 2014), and Delvaux (2009; 2012) on French and Goodin-Mayeda (2016) on Spanish and Portuguese. However, a general cross-Romance overview of the type presented here is somewhat lacking in the literature. We note also ongoing typological interest in nasalization-related phenomena in Romance, that relies on both synchronic and diachronic data, e.g. Ruhlen (1973), Foley (1977), Straka (1955), Hajek (1997), and many others.

2 Nasals and nasalization today

2.1 Nasal consonants

Romance languages typically have a three-place nasal phoneme inventory: /m n ɲ/, e.g.

- (1) Sp. /'mano/ 'hand' /'nana/ 'lullaby' /'aɲo/ 'year'
 It. /'mano/ 'hand' /'nano/ 'dwarf' /'baɲo/ 'bath'

There is some discussion, especially for French, which also has /m n ɲ/, as to whether the velar nasal [ŋ] may in fact be phonemic – as a result of borrowing primarily of forms in *-ing* from English, e.g. *parking* [paʁ'kiŋ], *camping* [kɑ̃'piŋ]. However, there is also significant interspeaker variation noted in French, with alternative pronunciations being common, i.e. with the sequence [ŋg] or the palatal [ɲ] also reported (e.g. Tranel 1987, 127; Grevisse/Goosse 2016, 42; ʔ16 Loanword phonology in Romance). English /ŋ/ in Italian may be develarized, e.g. *meeting* ['mitin] or articulated with a final obstruent (and optional vocalic release): ['mitiŋ(ə)].

In some Northern Italian varieties of Romance, a four-way contrast including the phonemic velar nasal, i.e. /m n ɲ ŋ/, can be found and is stable. In Piedmontese the contrast is easily found intervocalically (with /ŋ/ indicated by a post-nasal hyphen in Piedmontese orthography, e.g. *lan-a* 'wool').

- (2) /'lama/ 'blade' /'kana/ 'cane' /'kaɲa/ 'bitch' /'laɲa/ 'wool'

Morphophonological alternations in Piedmontese show /n/ and /ŋ/ to be closely related, e.g. /'kyɲa/ 'crib' → /ky'ne/ 'rock_{INF}'

Romanian appears at the other end of spectrum in terms of nasal consonant contrast. It is unusual amongst Romance languages in only having two nasal phonemes /m n/, having lost an earlier /ɲ/ which, however, survives in only some dialects (cf. also below).

Phonotactic restrictions on nasal phonemes differ across languages. In Italian only /n/ is traditionally found word-finally and, even then rarely, in the native lexicon, e.g. *in* /in/ 'in' and *con* /kon/ 'with'. However, this traditional situation is affected by the use of well-known abbreviations, neologisms, and loanwords, leading to an increase of both the frequency and range of final nasals, e.g. brand names *COIN* /ko'in/ and *UPIM* /'upim/, as well as loans such as English *slogan* /'slogan/, *tram* /tram/, Arabic *islam* /'islam/, and Latin *idem* /'idem/ 'in the same way' amongst many others. This same influx of forms is of course increasingly felt in other varieties of Romance.

In Spanish /n/ occurs frequently in word-final position in the native lexicon, e.g. *pan* /pan/ 'bread' and *cantan* /'kantan/ 'sing_{3PL}', whereas /m/ is rare, found notionally

only in a small number of loanwords, such as *álbum* /'album/ (pronounced [ˈalβun] by most speakers. Variation in actual pronunciation is widespread, however. Hualde (2005, 176) reports bilabial articulation of final orthographic *m* to be in the minority, with it treated more usually like final alveolar *n*, confirmed also by historically adapted forms such as *Adán* /a'dan/ 'Adam'. He notes that final /n/ itself has a range of pronunciations: while most commonly it is [n], it surfaces as velar [ŋ] in many parts of the Spanish-speaking world (cf. below). More unusual are reports of final /n/ being regularly pronounced instead as bilabial [m], e.g. *pan* [pam] 'bread' in small geographically dispersed pockets of Latin America (Hualde 2005, 176). Beyond Spanish, shift of final /n/ to a bilabial articulation, e.g. *pam* [pam] 'bread', is also reported in a small number of dialects of northern Italy and Istria (Rohlf 1966, 429). The reasons for such a change where it occurs remain unclear.

Much more common, however, than spontaneous final labialization is velarization of /n/ in word-final position. This is found in different parts of the Romance world, including in large parts of the Occitan-speaking area and northern Italy, but, as already noted, especially in Spanish-speaking areas, e.g. *pan* [paŋ] 'bread'. In more advanced varieties of Spanish, variable full deletion leaving only a nasal vowel is also common, e.g. Andalusian [paŋ] ~ [pãŋ] ~ [pā] 'bread'. Everywhere in Spanish, however, plural forms continue to confirm an ongoing alternation with [n] in non-final position, e.g. *panes* ['panes] 'breads' (Hualde 2005, 176). The phenomenon of nasal velarization is discussed in further detail below – from both synchronic and diachronic perspectives.

In Catalan on the other hand, /n/ and /m/ are both common word-finally and are not subject to velarization, e.g. *canten* ['kantən] 'sing_{3PL}' and *cantem* [kən'təm] 'sing_{1PL}'. This is also the case in other varieties of Romance, e.g. in most varieties of French where pronunciation of final schwa is generally avoided, e.g. *canne* [kan] 'cane, reed' and *aime* [ɛm] 'love_{3SG}' rather than formal or regional ['kana] and ['ɛmə].

While palatal /ɲ/ is never word-final in Italian, Spanish, or Portuguese, it is entirely possible in other Romance languages, such as for most speakers of French *digne* /dij/ 'worthy' and in Catalan *any* /aɲ/ 'year'. In Spanish, loanwords with final palatal nasals are modified, e.g. French *champagne* becomes both *champán* /tʃam'pan/ and *champaña* /tʃam'papa/, while Catalan loans with final /ɲ/, especially names, are also modified by depalatalization and final vowel addition is common, e.g. *Company* (proper name) normally becomes [kom'pani] (Hualde 2005, 176). However, in this case simple place shift to /n/ in final position is also possible, e.g. /kom'pan/ – which is fully in line with the native lexicon in which underlying intervocalic /ɲ/ alternates with final /n/, e.g. *doña* /'doɲa/ 'madam' vs. *don* /don/ 'sir'.

Palatal /ɲ/ generally occurs only rarely in word-initial position across Romance, although examples can be found most everywhere, e.g. Italian *gnocchi* /'ɲɔkki/, Spanish *ñoño* /'ɲono/ 'insipid', Catalan *nyaufar* /ɲəw'fa/ 'dent_{INF}' and French *gnouf* /ɲuf/ 'prison' (slang). Unusually, it occurs frequently in initial position as the result of regular place shift in some dialects of Asturian and Leonese, e.g. *ñariz* /ɲa'riθ/

‘nose’, *ñon* /ɲon/ ‘not’ (cf. Spanish *nariz* /na'riθ/ and *no* /no/). Elsewhere, word-initial /ɲ/ is not infrequent in Milanese as a result of sporadic changes, e.g. *gnorant* /ɲu'rāt/ ‘ignorant’ and *gnèrv* /ɲerv/ (alongside *nèrv* /nerv/) ‘nerve’ (Nicoli 1983).

The palatal nasal shows other unusual behavior. In Italian it is short utterance-initially, e.g. *gnocchi* ['ɲɔkki] ‘gnocchi’ but at least in central and southern varieties it is always predictably lengthened at the surface in intervocalic position within and across words, e.g. *bagno* /'bajno/ ['bajno] ‘bath’ and *gli gnocchi* /ʎi#ɲɔkki/ [ʎiɲ'ɲɔkki] ‘the gnocchi’. A similar pattern of lengthening behavior is found for a small number of other phonemes in Italian: /ts dz ʎʃ/ (Chapallaz 1979).

In many Brazilian varieties of Portuguese, the palatal nasal /ɲ/ is prone to frequent reduction to a nasalized palatal glide [j̃] (cf. Hajek 1997, 168; Shosted/Hualde/Scarpace 2012). Elsewhere in the Romance-speaking world, however, [ɲ] may alternate with the sequence [nj], e.g. Chapallaz (1979) reports this to be common for northern speakers of Italian, e.g. *bagno* ['banjo] instead of the expected surface form ['bajno]. Conversely, many northern speakers also merge [nj] into fully palatal [ɲ], e.g. *Germania* [dʒer'maɲa] (without palatal lengthening) for expected [dʒer'manja] ‘Germany’.

2.2 Nasal clusters and assimilation

In Romance varieties without contrastive nasalization, such as Italian, and Spanish, homorganic nasal+consonant clusters are common, e.g. Italian *campo* and *canto*. As a result of predictable place assimilation, we find additional nasal allophones before other obstruents e.g. [ɲ] and [m̃] appearing before velar and labiodental obstruents respectively, e.g. Italian *banco* /'banko/ ‘bank’ → ['banɲo] and *linfa* /'linfa/ → ['linm̃fa] ‘lymph’. In Italian the labiodental nasal appears before both /f/ and /v/, but only before /f/ in Spanish in the absence of /v/, e.g. Italian and Spanish *linfa* ['linm̃fa] but Italian *inverno* [im̃'verno] vs. Spanish *invierno* [im'bjerno] ‘winter’. In the latter orthographic *v* is in fact /b/, leading to bilabial place assimilation instead. An interdental allophone, for instance, also occurs before /θ/ in Spanish and Galician, e.g. *anciano* [aɲ'θjano] ‘elderly’.

Nasal place assimilation across word-boundaries is also normal in Spanish (Hualde 2005) and in Italian (Chapallaz 1979), e.g. It. *con valore* [kom̃va'lore] ‘with value’. The situation in Catalan is a little more complex. Within morphemes homorganic clusters are frequent, e.g. *limfa* ['linm̃fa] ‘lymph’, *omplir* [um'pli] ‘fill_{INF}’, *tancar* [təɲ'ka] ‘close_{INF}’, but one can also find non-homorganic labial+coronal clusters, e.g. *premsa* ['premsə] ‘press’, *ambdós* [əm'dos] ‘both’, and *comte* ['komtə] ‘count’ (Wheeler 2005, 170). In this language nasal place assimilation also interacts with cluster simplification at a word boundary. Underlying nasal+voiceless plosive clusters within the same morpheme are simplified in word-final position through plosive deletion – as part of a larger process of cluster reduction, e.g.

camp /kəmp/ ‘field’ surfaces as [kəmp] with a final nasal. However, derived forms retain the full nasal cluster at the surface, e.g. *campet* ‘small field’ [kəmpət]. Returning to processes across word-boundaries, in addition to reduction of underlying clusters there is also predictable assimilation of /n/, such that *Sant Marc* /sant#mark/ [sənt#mark] ‘St Mark’ surfaces with [m.m] at word boundary alongside *Santa Marta* ‘St Marta’ where the underlying /nt/ cluster in /sant+a/ continues to surface as [nt]: [səntə#mɑrtə]. Place assimilated [ŋ], [m] that arise in derivation before underlying /k/, /p/ clusters do not in most dialects take part in this secondary process at the surface, e.g. *camp nou* /kəmp#nəw/ [kəmp#nəw] ‘new field’ (Wheeler 2005, 237).

Non-homorganic clusters can also be found elsewhere in Romance, e.g. French *samedi* [sam'di] 'Saturday' and Romanian *simt* [simt] 'feel_{1SG}'. Unusual non-homorganic labial nasal+obstruent clusters are particularly common in parts of northern Italy, e.g. Bol. *mdâja* ['mda:ja] 'medal', *stumghèr* [stum'gɛ:r] 'stomach_{INF}'. These occur as a result of historical unstressed vowel deletion, cf. It. *medaglia* [me'daʎʎa] and *stomacare* [stoma'kare] respectively. In the case of *mdâja* there is an alternative form *amdâja* [am'da:ja] with a prosthetic vowel, suggesting that such clusters in word-initial position are difficult for speakers to pronounce and may be subject to phonotactic resolution.

In many central-southern dialects of Italy, voicing and manner assimilation of obstruents in homorganic nasal+obstruent clusters across word boundaries are productive synchronic processes:

- (3) a. Barese ['tɛŋgə] 'I have' but [non 'dɛŋgə] 'I don't have'
 b. Marchigiano ['pjattsa] 'square' but [im'bjattsa] 'in the square'
 c. Neapolitan ['kanna] 'barrel' but [ɲ'ganna] 'in the barrel'
- (Rohlf's 1966, 363–364)

In Sicilian, as elsewhere in central-southern Italy, the process goes one step further, leading to complete nasal assimilation of the following obstruent as the examples in (4) show:

- (4) Sic. a. [diri] ‘say_{INF}’ but [un’niri] ‘not say_{INF}’
 b. [’bafo] ‘kiss’ but [um’mafo] ‘a kiss’
 c. [’gattu] ‘cat’ but [un’ɲattu] ‘a cat’
- (Rohlf’s 1966: 357)

In French and other Gallo-Romance dialects, plosives, especially if voiced, may be nasalized by adjacent nasal vowels or consonants. In Parisian French the process appears to be optional, but in Picard it is well-established, operating in two different contexts:

- (5) Pic. a. word-final assimilation to the preceding nasal vowel
réponne /repɔ̃d/ [re'pɔ̃n] 'answer_{INF}'
 but *répondu* /repɔ̃dy/ [repɔ̃'dy] 'answer_{PTCP}'
 Pic. b. word-medial assimilation to adjacent nasal consonant
rudemint /rydmẽ/ [ryn'mẽ] 'roughly' but *rude* /ryd/ 'rough'
 (José/Auger 2004, 5)

The result as seen in the examples is predictable alternation between voiced plosives and nasal consonants in related forms.

2.3 Nasal velarization again

As already noted, across different parts of the Romance-speaking world, it is common for what appears to be an underlying /n/ to surface as velar [ŋ] in word-final position, e.g. Veneto *pan* [paŋ] 'bread_{SG/PL}', *man* [maŋ] 'hand_{SG/PL}'.

The phenomenon of velarization across different varieties of Spanish has been widely discussed for many years (cf. Goodin-Mayeda 2016 for an overview). It shows considerable variation in terms of both contextual factors at play, whether phonetic and phonological or social, as well as with respect to frequency. In Cuban Spanish, for instance, we find a range of variants in pre-pausal position: [paŋ] ~ [pãŋ] ~ [pã] and even fully denasalized [pa]. Utterance medially before a following vowel, alternation between [ŋ] and [n] is common (cf. Quilis 1993, 239, for details).

While in Spanish dialects, velarization is generally considered to be restricted to word-final position, in many Northern Italian varieties, it occurs regularly in all syllable-final contexts, including word-medially. The result of this process is the appearance of non-homorganic clusters involving alveodental and bilabial obstruents, e.g. ['grande]/[grãt] 'big', ['kanpo]/[kaŋp] 'field'. In those varieties without phonemic /ŋ/, this velar nasal is a predictable allophone of /n/ e.g. Veneto /grande/ ['grãde], /kanpo/ ['kaŋpo]. Such an analysis is confirmed by speakers' written errors in Italian e.g. *canpo* instead of expected *campo* as well as by variety-specific orthographies, such as Veneto *canpo*. In Piedmontese syllable-final velarization before obstruents is reported to alternate with nasal place assimilation (Soffietti 1949). It is not surprising if such variation is also reflected in orthographic practice in this variety, with *canp* and *camp* found in different spelling traditions.

2.4 Nasal vowels and vowel nasalization

French and Portuguese are undoubtedly the best-known Romance languages for having contrastive nasal vowels. Indeed, both are frequently referred to and discussed in the general literature on vowel nasality. Contrastive vowel nasalization is also

known elsewhere in the Romance-speaking area, e.g. in some Spanish, Occitan, and Sardinian dialects as well as in parts of northern Italy, although in many places secondary processes of denasalization, often linked to nasal velarization, are also evident, cf. in northern Italy, Milanese /kã/ but in closely related Bergamasco, denasalized /ka/, and in neighboring Veneto, velarized /kan/ [kãŋ] ~ [kan] ‘dog’.

2.4.1 Nasal vowels in French

French is traditionally described as having four contrastive nasal vowels, /ɛ̃ œ̃ ɔ̃ ɑ̃/ (↗21 French), exemplified as follows:

(6)	/ɛ̃/:	/fɛ̃/	<i>fin</i>	‘end’
	/œ̃/:	/bʁœ̃/	<i>brun</i>	‘brown’
	/ɔ̃/:	/tɔ̃/	<i>ton</i>	‘tone, your _{M.SG} ’
	/ɑ̃/:	/tɑ̃/	<i>tant</i>	‘such’

Examples of nasal vs. oral contrast in French include /fɛ̃/ *fin* ‘end’ vs. /fɛ/ *fait* ‘fact’, with nasal vowels also appearing anywhere in the word, e.g. *enchantant* /ɑ̃ʃɑ̃’tɑ̃/ ‘enchanting’.

French nasal vowels are unusually low in the vowel space – this is somewhat masked by traditional transcriptional practice since open-mid vowels, especially /ɛ̃/, tend to have a more open realization, especially in European French. The nasal vowel system is also smaller than indicated for many speakers, including in Paris, where the front rounded nasal vowel /œ̃/ has now delabialized and merged with /ɛ̃/, i.e. *brun* ‘brown’ and *brin* ‘sprig’ are no longer distinguished and are both /bʁɛ̃/. As a result, these speakers have only three nasal vowels. Vowel height and quality vary across speakers and regional varieties. In some accents /ɛ̃/ shows a tendency to be opened and backed towards /ɑ̃/ which in turn may be moved towards /ɔ̃/ which however shows evidence of opposing patterns, i.e. it may be increasingly close or even opened (cf., e.g. Carignan 2014; Hansen 2001). In New Caledonian French, for instance, there appears to be a general merger of /œ̃/ with /ɛ̃/ which is phonetically backed and central, i.e. [ɛ̃], as well as almost complete overlap with newly closed /ɑ̃/ and /ɔ̃/, pointing to a two-nasal-vowel system as possible for at least some speakers (cf. Lewis 2019). In Canadian French, the four-vowel distinction (i.e. including /œ̃/) is maintained but there is evidence of vowel shift in the other direction – in clockwise direction, with /ɔ̃/ opening to [ɑ̃], while /ɑ̃/ in turn moves forward etc. (cf. Fagyal/Kibbee/Jenkins 2006, 34).

As mentioned in the introduction, there has been considerable discussion of the underlying representation of nasal vowels in French (and in Portuguese) – given alternations such as *bon* [bɔ̃] ‘good_{M.SG}’, but *bon ami* [bɔ̃na’mi] ‘good friend_{M.SG}’ and

bonne [bɔ̃n] ‘good_{F.SG}’ (cf. also below). However, there is no doubt that nasal vowels occur frequently also before nasal consonants in French, e.g. *emmurer* [ãmɥ'ʁe] ‘wall up_{INF}’ (cf. *mur* /mɥʁ/ ‘wall’) and *enherber* [ãnɛʁ'be] ‘grow grass_{INF}’ (cf. *herbe* /ɛʁb/ ‘grass’). Moreover, examples of nasal vs. oral vowel contrast can be found, e.g. *vînm̃es* /vẽm̃/ ‘come_{1PL.PRET}’ vs. *indemne* /ẽ'dẽm/ ‘uninjured’. Nasal vowels can also have assimilatory effects on adjacent segments, including optional nasalization of adjacent voiced plosives, especially in relaxed speech, e.g. *pendre* /pãdʁ/ ‘hang_{INF}’ → [pã̃n].

In French-based creoles, contrastive nasal vs. oral examples before nasal consonants are not uncommon, e.g. /pã̃n/ *pendre* ‘hang_{INF}’ vs. /pan/ *panne* ‘breakdown’. A similar type of prenasal contrast is also found elsewhere in Romance, e.g. Franco-provençal (Nendez Valaisan) /'ãna/ ‘wool’ vs. /'pana/ ‘cream’ (Hajek 1997, 77).

2.4.2 Nasal vowels in Portuguese

The Portuguese nasal vowel system is very different from the one found in French. It has five nasal monophthongs as well as a series of nasal diphthongs:

(7) Por.	/ĩ/:	/vĩ/	<i>vim</i>	‘come _{1SG.PRET} ’
	/ũ/:	/'mũdu/	<i>mundo</i>	‘world’
	/ẽ/:	/'ẽtru/	<i>entro</i>	‘enter _{1SG} ’
	/õ/:	/sõ/	<i>som</i>	‘sound’
	/ẽ/:	/'kẽpu/	<i>campo</i>	‘field’
	/ũj/:	/'mũjt̃u/	<i>muito</i>	‘much’
	/ẽj/:	/bẽj/	<i>bem</i>	‘well’
	/õj/:	/põj/	<i>põe</i>	‘put _{3SG} ’
	/ẽj/:	/mẽj/	<i>mãe</i>	‘mother’
	/ẽw̃/:	/mẽw̃/	<i>mão</i>	‘hand’

/õ/ may be /õw̃/ for some speakers while /ẽj/ may merge into /ẽj/ in some varieties. /ũj/ has limited frequency, occurring only in /'mũjt̃u/ and derived forms.

Contrasts between oral and nasal vowels are easily found, e.g. /'mudu/ ‘dumb’ vs. /'mũdu/ ‘world’. Short consonantal off-glides often appear after nasal vowels, especially before obstruents, e.g. /'mũdu/ is often [ˈmũ̃ˈdu] – a fact used amongst others by some phonologists to argue for an underlying nasal consonant (cf. Parkinson 1988; Mateus/d'Andrade 2000; Bisol/Veloso 2016 for an overview). In word-final position, a slight nasal consonant off-glide is also possible, typically a short velar nasal, or a nasal consonant homorganic with the preceding nasal diphthong, e.g. *homem* [ˈomẽj̃ː] ‘man’.

In contrast to the opened nasal vowels in French, Portuguese is marked by closing, seen in the closed central vowel /ẽ/ and the absence of mid-open vowels /ẽ̃ ɔ̃/ – leading to a system characterized phonologically as [-low]. Allophonic processes

also support this shift: /a/, and in some varieties /ɛ ɔ/ as well, may be raised before nasals to the same height as corresponding nasal vowels, e.g.

- (8) a. c[ɐ]ma ‘bed’ but c[a]ra ‘face’
 b. c[o]me ‘eat_{3SG}’ but m[ɔ]ve ‘move_{3SG}’

In European Portuguese, as a result of secondary developments involving other lexical items, the raised low vowel is now marginally phonemic in prenasal position, but remains allophonic in Brazil (e.g. Massini-Cagliari/Cagliari/Redenbarger 2016, 63). Contextual nasalization is reported to be greater in Brazilian Portuguese than in European Portuguese, e.g. of stressed vowels before an intervocalic nasal consonant: c[ẽ]ma ‘bed’. Sources differ as to whether there is a sufficient nasal assimilation in this context in European Portuguese for it to be marked or noted, with some giving c[ɐ]ma (e.g. Massini-Cagliari/Cagliari/Redenbarger 2016), while others (e.g. Sampson 1999, 177) prefer c[ẽ]ma ‘bed’ but note the lesser degree of contextual nasalization in that variety. On the other hand, in final unstressed position nasal diphthongs are subject to frequent denasalization and reduction in some colloquial varieties spoken in Brazil, e.g. *hom*[ẽj] vs. *hom*[ɪ] ‘man’, *órg*[ãw̃] ~ *órg*[ʊ] ‘organ’ (cf. Schwindt/de Bona 2017, among others).

2.4.3 Short vs. long nasal vowel contrast in Romance

Very rarely one finds evidence of a short-long nasal vowel contrast, as in the Norman French (NorFr.) dialect of Val de Saire (Lepelley 1974, 51):

- (9) NorFr. /plẽ/ ‘full_{M.SG}’ vs. /plẽ:/ ‘full_{M.PL}’
 /mõ/ ‘hand_{F.SG}’ vs. /mõ:/ ‘hand_{F.PL}’
 /kʲer'bõ/ ‘coal_{M.SG}’ vs. /kʲer'bõ:/ ‘coal_{M.PL}’

The contrast is most often the result of a historical vowel lengthening linked to the progressive reduction to [h] and vocalization of an earlier plural-marking /s/, cf. French *main/s* /mẽ/ ‘hand_{SG/PL}’. Examples of morphologically conditioned contrast can also be found as a result of gender-marking in the singular.

- (10) NorFr. /a'mẽ/ ‘friend_M’ vs. /a'mẽ:/ ‘friend_F’

The long vowel in the feminine here is the result of earlier prevocalic stressed vowel lengthening, e.g. [a'mĩ:ə], which has been retained after the loss of the unstressed final syllable. More rarely, examples of lexical contrast without morphological conditioning can also be found, e.g. /vã/ ‘wind’ vs. /tã:/ ‘time’ (cf. Sampson 1999, 126–127).

In Val de Saire Norman what we most likely have in fact is a contrast between phonetically long and extra-long nasal vowels rather than phonetically short and long nasal vowels. In other varieties without such a length contrast, nasal vowels are consistently reported to be longer in phonetic duration than their oral counterparts (e.g. Delattre/Monnot 1968; Delvaux 2012 for French; cf. also Hajek 1997). Perceptual testing shows listeners rely on this additional duration to identify nasal vowels.

2.4.4 Morphophonological alternations and nasal vowels and consonants

Morphophonological alternations involving nasal vowels and nasal consonants can also be found in different varieties of Romance. The best-known example is of course French, where word-final nasal vowels in the masculine alternate — at least at the surface — with [VN] sequences in the feminine, as in the following examples given in isolation:

- (11) Fr. *bon* [bɔ̃] ‘good_{M.SG}’ *bonne* [bɔ̃n] ‘good_{F.SG}’
 bons [bɔ̃] ‘good_{M.PL}’ *bonnes* [bɔ̃n] ‘good_{F.PL}’

In Bergamasco (Berg.), as a result of a historical process of regular vowel denasalization, the gender-based alternation is now between an oral vowel and [VN] sequence, in both singular and plural, e.g.:

- (12) Berg. *bu* [bu] ‘good_{M.SG}’ *buna* [ˈbuna] ‘good_{F.SG}’
 bu [bu] ‘good_{M.PL}’ *bune* [ˈbune] ‘good_{F.PL}’

A similar type of alternation is found in Catalan in the singular, but the addition of the plural marker -s in the masculine leads to the appearance of an underlying /n/ which surfaces before a consonant:

- (13) Cat. *bo* [bɔ] ‘good_{M.SG}’ *bona* [ˈbɔnə] ‘good_{F.SG}’
 bons [bɔns] ‘good_{M.PL}’ *bones* [ˈbɔnəs] ‘good_{F.PL}’

In Bergamasco, which has no such consonantal plural marker, /n/ can appear in the masculine before voiced consonants in some phrases and fixed expressions, e.g. *bondì* [bonˈdi] ‘good day (greeting)’ but not in all, e.g. *bu göst* [buˈgøst] ‘good taste’. It does not normally surface if the following consonant is voiceless, e.g. *botép* ~ *butép* [boˈtɛp] ~ [buˈtɛp] ‘good weather’ (cf. It. *buontempo* [bwɔnˈtɛmpo]).

In derivational morphology, in all of these varieties, however, the nasal /n/ always appears before a vowel-initial suffix, e.g.:

- (14) a. Fr. *pain* /pɛ̃/ 'bread' *panier* /pa'nje/ 'bread-basket'
 b. Berg. *pa* /pa/ 'bread' *panetù* /pane'tu/ 'panettone'
 c. Cat. *pa* /pa/ 'bread' *panet* /pə'nɛt/ 'bread roll'

To deal with these alternations, it is assumed, at least for Bergamasco and Catalan where the phonetic difference between base form and derived forms are otherwise limited, that /n/ is in fact retained underlyingly and predictably deleted at the surface in word-final position, i.e. Berg. and Cat. /pan/ → [pa] 'bread'.

In the case of French, whether there is a sequence of oral vowel + nasal consonant, or a nasal vowel without adjacent nasal in the underlying forms of words with a surface word-final nasal vowel has of course been a matter of lengthy discussion amongst linguists for some time, e.g. Schane (1968), Tranel (1981) and many others. Given the significant phonetic divergence between surface nasal vowel and associated derived VN sequences in this language, coupled with other complications, much of the debate has focused on the issue of relative abstraction when attempting to establish underlying forms and the relations between them. Part of this discussion has focused on nasal *liaison* phenomena in French in which a presumed underlying or so-called latent consonant surfaces in syntactically predictable contexts before a word-initial vowel, e.g. between prenominal adjective and modified noun:

- (15) Fr. *bon* [bɔ̃] 'good_{M.SG}' *bon ami* [bɔna'mi] 'good friend_{M.SG}'

On the other hand, such *liaison* does not occur between modified noun and postnominal adjective:

- (16) Fr. *pain* [pɛ̃] 'bread' *pain allemand* [pɛ̃al'mã] 'German bread'

In the preceding examples involving Fr. *bon* 'good' we see that the nasal vowel alternates with an oral vowel and [n] in *liaison*. However, in some cases, vowel nasalization is retained even when the nasal consonant is present at the word boundary:

- (17) Fr. *mon* [mɔ̃] 'my_{M.SG}' *mon ami* [mɔ̃na'mi] 'my friend_{M.SG}'
ton [tɔ̃] 'your_{M.SG}' *ton ami* [tɔ̃na'mi] 'your friend_{M.SG}'

In *liaison* involving the plural, the nasal vowel is retained as it now appears before an oral consonant [z] and cannot be denasalized nor can [n] appear:

- (18) Fr. *pains* [pɛ̃] 'bread_{PL}' *pains allemands* [pɛ̃zal'mã] 'German bread_{PL}'
bons [bɔ̃] 'good_{M.PL}' *bons amis* [bɔ̃za'mi] 'good friend_{M.PL}'

In Catalan words, we have already seen that an underlying /n/ does not surface in nouns in isolation, e.g. *pa* [pa] 'bread', and this is also true across word boundaries

before a vowel: *pa alemany* ['paələ'maŋ] 'German bread'. However, adjectives with a similar phonotactic history can maintain the nasal before a word-initial vowel in prenominal position, e.g. *bo* [bɔ] 'good_{M.SG}' but *bon amic* [bɔnə'mik] 'good friend_{M.SG}'. It appears therefore that Catalan patterns with French in these two cases. However, Bergamasco is different again: no nasal consonant usually surfaces at a word boundary before a vowel-initial word regardless of word type, e.g. *pa àrabo* /pa#arabo/ 'Arabic bread' and *bu òm* /bu#ɔm/ 'good man'.

A different kind of morphophonological alternation is found in Portuguese involving nasal diphthongs. In the following examples, we see that [ẽw̃] in the singular is linked to three different outcomes in the plural:

(19)		Singular	Plural
Por.	a.	<i>mão</i> [mẽw̃] 'hand'	<i>mãos</i> [mẽws̃] 'hands'
	b.	<i>cão</i> [kẽw̃] 'dog'	<i>cães</i> [kẽjs̃] 'dogs'
	c.	<i>limão</i> [li'mẽw̃] 'lemon'	<i>limões</i> [li'mõjs̃] 'lemons'.

As Bisol/Veloso (2016) note, the unexpected synchronic alternations are much discussed in the phonological literature on Portuguese. They report that items that fall within group (a) which keep the same diphthong in the plural are limited in number, while group (b) with [ẽw̃] → [ẽj̃] is slightly larger. It is group (c) which involves the biggest shift, i.e. [ẽw̃] → [õj̃], that has the largest number of members. Various analyses have been proposed: they typically depend on a high degree of abstraction involving, amongst other things, an underlying nasal consonant that never surfaces (cf. Bisol/Veloso 2016).

3 Nasals and nasalization over time

As previously noted, there is an extensive literature on the historical development of nasal consonants and vowels and nasalization phenomena in Romance (cf. also Sampson 1999 and Hajek 1997 for a detailed treatment). Our understanding of developments is dependent on a range of sources, e.g. careful analysis of medieval texts, comments by native and non-native observers in preceding centuries, as well as use of internal and external comparative data, past and present, drawn from different Romance varieties.

3.1 Nasal consonants from Latin to Romance

Latin is thought to have had at least two nasal consonant phonemes: /m n/. The presence and phonemic status of velar nasal [ŋ] are still matters of discussion. It

is accepted by many scholars that G before N (and possibly before M) was [ŋ], e.g. AGNU(M) ['aŋnu] 'lamb'. Ostensible contrast with /n/ can be found before <N>, given ANNU(M) ['annu] 'year'. However, Vincent (1988) prefers to treat [ŋ] as an overlapping allophone of both /g/ in AGNU and /n/ in words like ANGERE ['aŋgere] 'choke_{INF}' which contrasts with AGGERE ['aggere] 'earthwork_{ABL}'. On the other hand, Rohlfs (1966, 368) also notes alternative pronunciations in Vulgar Latin, which suggest <G> remained oral before <N> in some Romance-speaking areas, e.g. AGNU(M) > Cal. ['ajənə] (cf. also below).

The development of Latin /m/ and /n/ in Romance languages is highly dependent on phonological context. Word-initially, they normally survive untouched, e.g.:

- (20) a. MURU(M) 'wall' > Sp./It. *muro* /'muro/, Fr. *mur* /myʁ/, Rm. *mur* /mur/
 b. NASU(M) 'nose' > It. *naso* /'naso/, Fr. *nez* /ne/, Cat./Rm. *nas* /nas/

Exceptions include: first, the previously noted regular shift from historical /n/ to modern /ɲ/, e.g. NON > *ñon* /ɲon/ 'not' in some varieties of Asturian and Leonese in northern Spain, presumed to be the end result of secondary fortition (Cravens 2002); and second, the result of secondary palatalization and depalatalization, e.g. MERCURI > *miercuri* /'mʲerkuri/ > Aromanian *nyerkure* /'nʲerkure/ and *nerkure* /'nerkure/ 'Wednesday' (Meyer-Lübke 1890, 365–366). Somewhat more unexpected examples of /m/ > /n/ are found sporadically elsewhere in Romance, e.g. MAPPA > Veneto *napa* /'napa/ alongside Italian *mappa* /'mappa/ 'map'. Latin N is also sometimes sporadically palatalized, e.g. previously cited Milanese *gnèrv* /ɲerv/ 'nerve', and NUDU(M) 'naked' > archaic *gnudo* /'ɲudo/ alongside *nudo* /'nudo/ in Italian.

Word-medially, /m/ and /n/ show a series of different developments. In general, Latin /m/ survives today when in intervocalic position in Romance, e.g. AMARE > It. *amare* /a'mare/, Sp. *amar* /a'mar/, Fr. *aimer* /e'me/. However, secondary lengthening of the bilabial nasal is also frequent in some areas, e.g. FUMU(M) 'smoke' > Neap. and Srd. *fummu* /'fummu/. The history of intervocalic coronal /n/ is more variable across Romance (cf. Meyer-Lübke 1890, 403–404). It is retained in French, Italian, and Spanish as in many other varieties, e.g. LUNA(M) 'moon' > Fr. *lune* /lyn/ and It. /Sp. *luna* /'luna/. While in Daco-Romanian spoken in Romania it also generally survives as /n/, e.g. *lună* /'lunə/, in other varieties of Romanian it is regularly rhotacized, e.g. Istro-Romanian *lure* /'lurə/ (Kovačec 1998, 108). Similar rhotacism is found in some Francoprovençal dialects, e.g. Vaudois /'lyrə/. In Gascon and Portuguese intervocalic /n/ is generally lost, e.g. *lua* /'luə/. However, the process applies more broadly in Gascon, e.g. GALLINA(M) 'hen' > *garie* /ga'riə/ but Portuguese *galinha* /ge'liɲɐ/, where palatalization after stressed /i/ has resulted in secondary fortition to [ɲ] (cf. also below). Loss of intervocalic Latin /n/ is also found in some varieties of Sardinian, e.g. LANA(M) 'wool' > /lã(ã)/ (cf. Contini/Boë 1972). In Piedmontese the apparent shift from /n/ to /ɲ/ in *lun-a* /luɲa/ 'moon' is probably not the direct result of simple place shift but the end point of a more complicated vowel nasalization process leading to

velar nasal insertion and assimilation, e.g. LANA(M) > ['lā:na] > ['lāŋna] > ['lāŋŋa] > ['laŋa].

Final /m/ and /n/ in Latin are generally lost, e.g. PANEM 'bread' > It. *pane* /'pane/ and NOMEN 'name' > It. *nome* /'nome/, respectively, but consonant retention (with [m] > [n] place shift) in monosyllables can be found, e.g. CUM 'with' > It./Sp. *con* /kon/, IN 'in' > It. *in* /in/, QUEM 'who_{ACC}' > Sp. *quién* /kjen/. The rhotacized trace of an earlier /n/ in Sp. *nombre* /'nombre/ 'name' is not from final /n/ in NOMEN, but from intervocalic /n/ in *NOMINE(M) (Hajek 1997, 43).

The appearance of a palatal nasal phoneme /ɲ/ in Romance is a secondary phenomenon with multiple sources. Most commonly it derives from assumed secondary /nj/ sequences that arose in Vulgar Latin, as a result of gliding of unstressed front vowels /i e/ before another vowel, e.g.:

- (21) VINEA 'vineyard' > ['vinja] > It. *vigna*, Sp. *viña* /'viɲa/, Por. *vinha* /'viɲe/,
Fr. *vigne* /viɲ/

Subsequent lexical developments, such as the entry of Latinisms and other loans, have resulted in many Romance languages in a new contrast between /ɲ/ and /nj/, e.g. Sp. *huraño* /u'raɲo/ 'unsocial' vs. *uranio* /u'ranjo/ 'uranium', It. *spegniamo* /spe'ɲamo/ [speɲ'ɲamo] 'turn off_{PL}' vs. *spenniamo* /spen'ɲamo/ [spen'ɲamo] 'pluck_{PL}'.

The transformation of the cluster /nj/ to a simple palatal /ɲ/ is by no means universal. In some cases, the cluster was subject to fortition, e.g. Sardinian *binza* /'bindza/. In others the secondary palatal nasal that arose has since been lost, e.g. ['vinja] > ['viɲa] > Rm. *vie* /'vie/.

However, there are other common sources for /ɲ/ as well. The Latin cluster GN also appears today as /ɲ/ in much of Romance as a result of a process of cluster reduction and metathesis, i.e. [gn] > [jn] > [nj] > [ɲ]. Examples include PUGNU(M) 'fist' > It. *pugno*, Sp. *puño* /'puɲo/ Por. *punho* /'puɲu/, cf. also Fr. *poignée* /pwa'ɲe/ 'handle'. Less commonly /-ngl-/ may also appear today as a palatal nasal, e.g. UNGULA(M) 'fingernail' > /ungla/ > Sp. *uña* /'uɲa/ and Por. *unha* /'uɲe/, but It. *unghia* /'ungja/ and Fr. *ongle* /ɔ̃gl/. As previously noted, the Latin geminate /nn/ appears regularly in Spanish as /ɲ/, e.g. ANNU(M) > *año* /'aɲo/ 'year', PANNU(M) > *pañó* /'paɲo/ 'cloth'. The same is true elsewhere in Iberia, e.g. Catalan and Asturian, but not in Portuguese where Latin -NN- survives as short /n/, e.g. /'enu/ 'year'. Portuguese has an additional source for /ɲ/: Latin alveolar N is palatalized after the vowel /i/ when intervocalic, e.g. VINU(M) > *vinho* /'viɲu/ 'wine', but It. *vino* /'vino/ and Fr. *vin* /vẽ/.

The treatment of the palatalized Latin sequence MIA is somewhat different throughout Romance: it survives as such in Spanish, e.g. VENDEMIA(M) 'harvest' > *vendimia* /ben'dimja/ 'vintage'. But it is subject to pre-palatal fortition through gemination in Italian, e.g. *vendemmia* /ven'demmja/ 'grape harvest' and depalatalized in other parts of Romania, e.g. Portuguese *vindima* /vĩ'dime/, Northern Calabrian

/ven'nemmə/. In Sicilian, *MI* appears today as a palatal nasal: *vinnigna* /vin'nɨɲa/ [vin'nɨɲɲa]. More radical shift occurs in French, as a result of a series of secondary sound changes, i.e. post-nasal glide fortition, vowel nasalization and /n/-deletion, e.g. *vendange* /vãdãz/.

Latin nasals /m n/ also contrasted for length in intervocalic position, e.g.

- (22) FAMEM 'hunger_{ACC}' FLAMMAM 'flame_{ACC}'
 CANEM 'dog_{ACC}' CANNAM 'cane_{ACC}'

Latin geminate nasals are retained as such in Central and Southern Italy, e.g. It. *fiamma* /'fjamma/ 'flame' and *canna* /'kanna/ 'cane', but are subject to modification in most other Romance areas. They may undergo simple degemination, e.g. FLAMMA(M) 'flame' > Sp. *llama* /'lama/, Por. *chama* /'feme/, Fr. *flamme* /flam/; ANNU(M) 'year' > *ano* Por. /'enu/ and Veneto /'ano/. In French, Latin /mm/ is today /m/, e.g. INFLAMMARE 'inflamm' > *enflammer* /ãfla'me/, and /nn/ is retained as /n/ when intervocalic, e.g. *ANNATA > /a'ne/ *année* 'year', but deleted when final leaving only a nasal vowel, e.g. ANNU(M) > /an/ > /ã/ *an* 'year'. Palatalization of /nn/ to /ɲ/ in Spanish and other Iberian varieties has been discussed above.

Latin /mm/ and /nn/ can also appear occasionally as partly denasalized in some varieties, e.g. FLAMMA(M) > *fiamba* /'fjamba/ in Central Italy (cf. also below). This is assumed to be hypercorrection – linked to the reverse process of full nasal assimilation in nasal + voiced obstruent clusters which is widespread and regular in much of the Romance-speaking world, e.g. PLUMBU(M) 'lead' > It. *piombo* ['pjombo] > Roman *pjommo* ['pjommo], MUNDU(M) 'world' > It. *mondo*, but Roman *monno* ['monno]. These new geminates may then be reduced, e.g. LUMBU(M) 'loin' > ['lommo] > Sp. *lomo* ['lomo], Cat. *llom* ['lom]. Full assimilation across word boundaries is also possible in some areas, as exemplified previously, e.g. Sicilian ['bafo] 'kiss', but [um'mafo] 'a kiss'. In a parallel process in many of the same areas, nasal + voiceless obstruents may be subject to full voicing assimilation word-medially, e.g. CAMPU(M) 'field' and DENTE(M) 'tooth' > It. *campo* ['kampo] and *dente* ['dente], but Southern It. *cambo* ['kambo] and *dende* ['dende]. Although less common, such voicing assimilation, as previously indicated, is also found in some varieties across word-boundaries, e.g. Marchigiano ['pjattsa] 'square', but [im'bjattsa] 'in the square'.

Secondary heterorganic nasal clusters which developed in some varieties from unstressed vowel syncope show interesting outcomes, e.g. DOMINA(M) > Late Latin *domna* ['domna]. In some cases, there is regressive assimilation leading first to a geminate nasal, e.g. It. *donna* /'donna/ 'woman', and then with predictable secondary developments in specific languages, e.g. Sp. *doña* /'dona/ and Por. *dona* /'dona/ 'madam'. In other cases, there is nasal dissimilation, e.g. HOMINE(M) > OSp. *omne* /'omne/ > Sp. *ombre* /'ombre/ 'man'. French shows particularly unusual properties: there is a tendency for secondary [mn] and [nm] clusters to assimilate uniformly to the labial nasal regardless of cluster position, e.g. FEMINA(M) > Rom. *femna* /'femna/, but

Fr. *femme* /fam/ ‘woman’. Similarly, we find ANIMA(M) > OFr. *anme* /'anmə/ > Fr. *âme* /am/. Pope (1952, 148, 167) suggests an intermediate phase of assimilatory labial gemination. While anticipatory cluster assimilation, e.g. [nm] > [mm], is widely attested in Romance, perseverative assimilation, i.e. [mn] > [mm] is cross-linguistically unusual (Gess 1999).

3.2 On the development of vowel nasalization and nasal vowels

In Latin, evidence of some kind of productive vowel nasalization is generally considered to be restricted to vowels before word-final *m* which was lost early in most cases (cf. Clackson 2008). Instead, the development of contrastive nasalization that we see today in languages such as French and Portuguese is a process that developed over centuries, some time after the breakup of Latin. The bones of the process are simple: vowels are subject to increased contextual nasalization before nasals which at some later point are (typically) deleted – leading ultimately to contrastive nasalization on the vowel, e.g. [VN] > [ṼN] > [Ṽ]. However, there are a number of conditioning factors, and the influence or impact of these may differ across languages. It also needs to be borne in mind that while contrastive nasal vowels in Romance are most often linked to loss of an adjacent nasal, this is not always the case, as previously shown.

In order to better understand the historical development of vowel nasalization in Romance, we need to bear in mind the basic syllable structure in the post-Latin phase most relevant to us here. The Latin vowel-length distinction, involving five short and five long vowels, was replaced by a vowel quality system. Vowel duration or length was now predictable and depended on the interaction between primary stress, and syllable structure. Vowels were lengthened in stressed open syllables, e.g. CANE(M) > ['ka:.ne] ‘dog’ but were short in unstressed position as well as in closed syllables, i.e. before nasal geminates and nasal clusters, e.g. CANNA(M) > ['kan.na] ‘reed’, CAMPU(M) > ['kam.pu] ‘field’. Such a distribution is still found in Italian and elsewhere today. Degemination where it occurred could then lead to the development of a regular vowel length contrast, as was once common in parts of Northern Italy, e.g. conservative Berg. /'la:na/ vs. /'kana/ while the loss of unstressed final vowels could lead to the same length contrast appearing word-finally, e.g. PANE(M) > ['pa:ne] > /pa:n/ vs. ANNU(M) > ['anu] > /an/. These differences, if not masked by additional secondary changes, can be identified by the effect they have on vowel quality and/or nasalization today, e.g. French *laine* /lɛn/ vs. *canne* /kan/ and *pain* /pɛ̃/ vs. *an* /ɑ̃/ (cf. also Hajek 1997, 37–38; Sampson 1999, 39). Our focus here is on developments in stressed syllable position, since this is the context in which nasalization-related processes, including the rise of contrastive nasal vowels, are undoubtedly the most widespread and best described.

3.2.1 French

The development of nasal vowels in French has an extremely complex history (cf. e.g. Sampson 1999, 53–112 for a detailed overview). There is also disagreement among scholars on points of detail in the extensive literature, notwithstanding the copious textual data we have for Old and Middle French. For instance, it is most commonly argued, e.g. by Pope (1952, 167–171) and Straka (1955), that the rise of vowel nasalization in Old French was a gradual process over time that spread in predictable fashion before eventually affecting all vowels. In this view, nasalization occurred first on historical open vowel /a/ before ultimately reaching high close vowels /i y/. Less common is the view (e.g. Rochet 1976; van Reenen 1985) that vowel nasalization developed simultaneously on all vowels. The primary reason for this difference of opinion lies in uncertainties in the interpretation of relevant medieval texts. There is no certainty about whether the changes on which scholars rely reflect the development of vowel nasalization specifically or are reflective instead of vowel quality changes that may have occurred with or without nasalization in Old French (cf. Hajek 1993).

Linked to the development of vowel nasalization in Old French is the fate of the adjacent nasal consonant, e.g. PANE(M) > *pain* [pāj̃n] ‘bread’ and ANNU(M) > *an* [ān] ‘year’. Before proceeding, it is worth noting that the loss of unstressed vowels in French is much greater than in many other varieties of Romance, as seen clearly in orthography, e.g. ANNU(M), CAMPU(M), PANE(M) > Fr. *an*, *champ*, *pain*, but Por. *ano*, *campo*, *pão*, Sp. *año*, *campo*, *pan*, It. *anno*, *campo*, *pane*. The effect of this change was a much greater number of words ending in final nasal consonants and clusters in the history of French than in other major varieties of Romance.

There then appears to have been an early tendency for merger of nasal consonants in final position, seen in Old French spellings, e.g. PLANU(M) and PLANGO > *plain* alongside BAGNU(M) > *bain* ‘bath’, as well as very early alternations such as *Dinan* for *Dinam* (place name). There is some, albeit not completely certain, evidence to suggest that word-final nasals may then have been subject to velarization to [ŋ], as apparently described by some observers from the late 16th and early 17th centuries, before complete deletion occurred (cf. Sampson 1999, 61–62).

In an early phase, before nasal consonants were lost, French had a series of nasalized monophthongs and diphthongs in prenasal position, which survives in current spelling, e.g. TANTU(M) > *tant* [tǣ̃nt], VINU(M) > *vin* [vī̃n], and PLENU(M) > *plein* [plē̃j̃n], PUNCTU(M) > *point* [pō̃j̃nt].

Loss of syllable-final nasals in French is of course pervasive in historical clusters and in primary and secondary word-final position, e.g. TANTU(M) > *tant* [tā̃], IN > *en* [ā̃], BONU(M) > *bon* [bō̃] ‘good’ and *jambe* [zā̃b] ‘leg’. The nasal survives in orthography and as previously seen, is sometimes recoverable in liaison, e.g. *bon ami* [bō̃na’mi] ‘good friend_{M.SG}’.

The development of the French nasal vowel system is also characterized by significant changes over time in terms of vowel quality and number – as a result of

vowel shifts and merger (cf. Sampson 1999, 70–73). Examples include merger of [ɛ̃] and [æ̃] (and partly also of [ɔ̃]) to modern /ɛ̃/:

- (23) PLENU(M) ‘full’ > [plɛ̃n] > *plein* [plɛ̃̃n] > [plɛ̃]
 MANU(M) ‘hand’ > [mã:n] > *main* [mæ̃̃n] > [mɛ̃]
 PUNCTU(M) ‘point’ > [pũjnt] > *point* [pɔ̃̃jnt] > [pwɛ̃]

There was merger too of monophthongal [ɛ̃] and [æ̃] to [ã], e.g.

- (24) VENTU(M) ‘wind’ > ['vɛ̃ntə] > *vent* [vɛ̃nt] > [vã]
 TANTU(M) ‘so’ > ['tãntə] > *tant* [tã̃nt] > [tã]

The process of nasal vowel opening that is characteristic of French today can easily be seen in operation in the few examples just cited (with the exception of predictable closing of /a/ in MANU(M) > *main* /mɛ̃/). Earlier close nasal vowels [ĩ], and [ỹ] were also subject to a similar process. [ĩ] was progressively opened and also merged into [ɛ̃], e.g. VINU(M) > [vĩn] > [vĩ] > [vɛ̃] *vin* ‘wine’. [ỹ] was opened to [œ̃], e.g. UNU(M) > [ỹn] > [ỹ] > [œ̃] *un* ‘one’.

Vowel nasalization was not restricted to pre-coda position in earlier stages of French. Nasalization of vowels before the historical sequence of [nə] (from Latin -NA) was also pervasive, e.g. BONA(M) ‘good_{F.SG}’ > [bõ̃nə]. Nasalization before the intervocalic nasal eventually disappeared, as seen in the very succinct summary table below adapted from Tranel (1987). The consequence of this change is today’s morphophonological alternation between nasal vowel and sequence of oral vowel + nasal consonant in adjectival forms for instance.

Table 6.1: History of French nasal vowels (adapted from Tranel 1987, 74).

	<i>bon</i> ‘good _{M.SG} ’	<i>bonne</i> ‘good _{F.SG} ’	<i>bonté</i> ‘goodness _{F.SG} ’	Historical phenomena
OFr.	[bõ̃n]	[bõ̃nə]	[bõ̃nte]	Vowel nasalization
MFr.	[bõ]	[bõ̃nə]	[bõ̃te]	/n/-deletion in coda position
(Modern) Fr.	[bõ]	[bõ̃n]	[bõ̃te]	Deletion of final [ə]

The nasalization before an earlier intervocalic nasal seen in OFr. [bõ̃nə] often survives in Gallo-Romance varieties closely related to French, even after the loss of final schwa. For instance, PLENA(M) > [plɛ̃na] > Fr. *pleine* [plɛ̃n], but Picard [plɛ̃n] (cf. Flutre 1955).

3.2.2 Portuguese

The history of vowel nasalization in Portuguese differs in important respects from that of French. Whereas in French nasal diphthongs were ultimately resolved as monophthongs, in Portuguese they persist today, differing somewhat in their origins from what we know of French.

In the first instance, as already noted, loss of final unstressed vowels was much more limited in Portuguese than in French. As a result, in most cases vowel nasalization phenomena are found before historical secondary word-final as well as primary medial nasal consonants and nasal clusters, e.g.:

- (25) a. CANE(M) > [kã̃] > [kẽw̃] *cão* ‘dog’
 b. MANU(M) > [mãnu] > [mẽw̃] *mão* ‘hand’
 c. CAMPU(M) > [kãmpu] > [kẽpu] *campo* ‘field’

While loss of final unstressed vowels is pervasive in French (with original final Latin /a/ last to be affected over time), in Portuguese the process was much more limited. As a result, there was a greater frequency of nasals appearing word-medially in the history of Portuguese. Latin intervocalic /n/ was regularly deleted, seen in the development of MANU(M) above. Latin /nn/ on the other hand survives as /n/ in Portuguese, e.g. ANNU(M) > *ano*.

We have already mentioned the characteristic closing of [ã] to [ẽ] in Portuguese. Other typical features include frequent cases of progressive nasalization and previously mentioned nasal glide hardening, often after /i/, e.g. NIDU(M) ‘nest’ > [nĩu] > [nĩũ] > [nĩũ] *ninho*, GALLINA(M) > [ga'lĩna] > [ga'lĩã] > [ga'lĩjã] > [ge'lĩjɐ] *galinha* ‘hen’. Off-gliding of nasal vowels is also a common source of nasal diphthongs, e.g. BENE ‘well’ > [bẽn] > [bẽ] > [bẽj] *bem*, and CANE(M) ‘dog’ > [kã̃] > [kã] > [kẽw̃] *cão*.

Hiatus involving nasal vowels has a series of different outcomes. While identical vowels merged and nasalization survived, e.g. LANA(M) ‘wool’ > [lãna] > [lãã] > [lẽ] *lã*, in other cases, denasalization is typical if the second vowel is more open than the first, e.g. LUNA(M) ‘moon’ > [lũna] > [lũa] > [luɐ] *lua* ‘moon’, CENA(M) ‘supper’ > [sejɐ] *ceia*. In other cases, where the second vowel is more close, nasalized vowel sequences survive as nasal diphthongs, e.g. MANU(M) ‘hand’ > *mão* /mẽw̃/. A somewhat exceptional case is modern /ũj/: its development is, as previously noted, lexically highly restricted, i.e. it is found only in *muíto* /mũjtu/ ‘much’ and related forms, the end result of the phonologization of progressive nasalization after the initial bilabial nasal.

Vowel nasalization before historical intervocalic /n/ (as opposed to Latin /nn/) and subsequent deletion of that /n/ is not of course restricted to Portuguese. It is in fact found elsewhere, e.g. in different varieties of Gascon, Sardinian, and Corsican. Conditions in Gascon appear similar in many regards to Portuguese, e.g. evidence of conditioned denasalization, pointing to similarly early development. Changes in

Sardinian and Corsican appear more restricted and point to a more recent process (cf. Sampson 1999, 282–296).

3.2.3 Romanian

We discuss Romanian briefly here as it is a Romance language with no phonemic nasal vowels today, but for which synchronic evidence allows us to deduce the effects of past nasalization phenomena.

We have previously mentioned the loss of an earlier palatal nasal [ɲ] from the Romanian phonemic inventory, e.g. VINEA > ['vinja] > ['vɨ̃ja] > Rm. *vie* /'vie/ 'vineyard', as well as the rhotacism of historical intervocalic /n/. Such rhotacism is of course much more common in Istro-Romanian, e.g. BENE > *bire* /'bire/ 'well', than in the main Daco-Romanian variety (where the nasal from BENE remained: *bine* /'bine/) spoken in Romania. But even here lexicalized examples point to past rhotacism of intervocalic /n/ and associated vowel nasalization, seen in, e.g. MINUTU > *mărunț* /mə'runt/ 'small, fine', with nasal consonant insertion in the following coda.

The effect of historical processes of vowel nasalization can be observed in specific vowel quality changes in Romanian today, e.g. CANE(M) > *câine* /'kijne/ 'dog' and CAMPU(M) > *câmp* /'kimp/ 'field', where historical /a/ is now close /i/. In effect, we find regular vowel closing to /i i u/ before historical single /n/ and nasal+consonant (NC) clusters, seen in the preceding examples as well as in BENE > *bine* /bine/ 'well', BONU(M) > *bun* /bun/ alongside unclosed vowels in oral DECE(M) > *zece* /'zetʃe/ 'ten' and LOCU(M) > *loc* /lok/ 'place' respectively. There appears to be no vowel-closing effect before Latin /nn/, e.g. ANNU(M) > *an* /an/ or historical /m/, e.g. POMU(M) > *pom* /pom/ 'tree' – a fact which indicates that vowel nasalization was likely never a feature in these contexts.

3.2.4 Denasalization and nasal glide hardening: the rise of the velar nasal in Northern Italy

We have already discussed the presence of velar nasal [ŋ] in Spanish and elsewhere. One question of course is whether the appearance of [ŋ] is the result of simple place shift, e.g. [n] > [ŋ], as is often assumed, or the result of some other process. The evidence from Northern Italy, where nasal velarization is widespread, points to it being the result of secondary hardening of nasal off-glides within a broader process of vowel denasalization, e.g. [ã̃] > [ãŋ] > [aŋ]. In Bolognese, for instance, the appearance of [ŋ] is now systematic at least in the standard urban variety, e.g. [kæŋ] 'dog', while in rural varieties of the dialect heavily nasalized vowels are still common in alternation with [ŋ], e.g. [kæ̃] ~ [kæŋ]. The clearest evidence of the phenomenon is found in the hardening to [ŋ] of nasalized off-glides seen in diphthongs recorded in

19th-century orthography before intervocalic /n/ which is itself always retained, e.g. LUNA(M) ‘moon’ > *louna* [ˈlõwna] > Modern Bol. [ˈlonna], and SPINA(M) ‘thorn’ > *speina* [ˈspějna] > modern [ˈspɛjna] (Hajek 1997, 193–194). The process has been motivated as the result of articulator approximation that occurs as the result of tongue raising and backing in the articulation of off-glides combined with nasalization-related velar lowering (e.g. Hajek 1991).

4 Typological considerations

The Romance languages, particularly French and to a lesser degree Portuguese, have, as noted in Section 1, provided fertile territory for typological research on the development of nasalization phenomena (cf. Hajek 1997 for a detailed overview). Some researchers have focused their attention on Romance languages as a group, e.g. Tuttle (1991) and Sampson (1999), while others, e.g. Ferguson (1974), and Schourup (1973), have included French and sometimes other Romance languages within larger cross-linguistic samples.

Perhaps the most commonly stated nasalization universal is the purported relationship between vowel height and the development of nasalization, contextual and/or distinctive. It has commonly been claimed, e.g. Ferguson (1974), Pope (1952), Schourup (1973), and Straka (1955), working independently but relying either exclusively or to a large degree on purported developments in Old French texts, that nasalization occurs first in the context of pre-nasal open vowels before spreading progressively to mid and then to close vowels, e.g. [aN] > [eN] > [iN]. The basis for such a claim is the reported behavior of equivalent [VC] and [VN] sequences in assonating rhyme. Briefly, in assonance only stressed vowel nuclei are paired, e.g. *vint/pris*, in contrast to perfect rhyme in which both nuclei and codas are paired, e.g. *virginitét/honestét*. According to Pope (1952, 169, 171), the failure of orthographic sequences <aC> and <aN> to appear together in assonating rhyme was a very early development. Instead <aN> appeared in such rhyme only with <aN> and <aC> only with <aC>. Over time the same separation progressively affected mid and then final close vowels. These experts claim this change is the consequence of increasing contextual nasalization, i.e. [ãN] ≠ [aC] and so forth progressively over time until by the 14th century [uN] no longer assonates with [uC].

Detailed re-investigation since the 1980s, e.g. by van Reenen (1982; 1985) and Hajek (1993), has shown however that there is no basis for the vowel height claim. In the first instance textual evidence does not in fact support the claim by Pope (1952) and Straka (1955) that a failure to assonate occurred first between [ãN] and [aC] before affecting any other vowel pair, such as [õN] and [oC] – they merely presumed that open vowels should be preferentially nasalized for articulatory reasons. Van Reenen (1982; 1985), in detailed statistical analysis, shows no

regular vowel-height conditioned spread, nor even phonological conditioning. Instead, he finds morphological conditioning which cannot be accounted for by the vowel height hypothesis. Moreover, the claim of progressive expansion of the vowel height effect from low to high vowels should lead to an increasing number of textual examples of nasal assonance. Instead, van Reenen (1982; 1985; 1987) finds an unexpected decline in [VN] – [VN] pairing over time until it disappears completely.

Of course, we have already pointed above to the difficulties in interpreting textual developments in Old French. Many experts in French historical linguistics (e.g. van Reenen 1982; 1985; Rochet 1976) reject outright a predictable interaction between vowel height and nasalization in French: in this view all vowels nasalized simultaneously.

Further doubt can be cast on the existence of a single universal direction in vowel-height nasalization. Cross-linguistic data from other Romance varieties is conflicting, pointing to two different countervailing tendencies: open > close and close > open.

In the Romance dialects of Northern Italy, there is strong evidence of preferential nasalization of historically short open vowels. Historically short close-mid and close vowels are never affected. For example, in Imolese we find ['kē:na] < ['ka:na] < /'kana/ < CANNA(M) 'cane', ['grē:nda] < ['gra:nda] < GRANDE(M) 'big', but ['pena] < /'pena/ < PINNA(M) 'fin', ['membar] < MEMBRU(M) 'member', ['lɛŋwa] < LINGUA(M) 'tongue', ['ondza] < ['undʒa] < UNGULA(M) 'fingernail' (Hajek 1997). There is clear interaction between nasalization and an earlier process of conditioned vowel lengthening which affects low /a/ before all other vowels.

Elsewhere in Romance there is evidence instead of preferential nasalization of close vowels. In Valaisan Francoprovençal, a phonological process of progressive nasalization after [N] affects only reflexes of earlier long close vowels /i: u:/, e.g. NIDU(M) > /ni:/ > /nēⁱⁿ/ 'nest', NOSTRU(M) 'our_{M.SG}' > /'nu:tre/ > /'nōtre/, but MALE 'bad' /mal/ > /mo:/. A similar phenomenon has been noted since medieval times in the Gallo-Romance dialects of North-West France, e.g. AMICU(M) 'friend' > [a'mĩ(n)]/ [a'mē], but MAGIS 'more' > [me] 'but', and in Portuguese, e.g. MIHI > *mim* /mĩ/ '(to) me' (Hajek/Maeda 2000; Sampson 1999, 185).

Spontaneous nasalization of word-final stressed vowels, widespread in Northern France, is also restricted to reflexes of historical close vowels /i u/ only, e.g. SPICU 'ear of corn' > /e'pi/ > Picard [e'pē], PERDUTU(M) 'lose_{PTCP}' > [per'dœ̃], but MALE 'bad' > [mo].

With regard to /n/-deletion, Cedergren/Sankoff (1975), in a study of the sociolinguistic spread of distinctive nasalization in Panamanian Spanish, report that loss of syllable-final /n/ in the context [VN] is strongly favored when the vowel in question is close. Mid and open vowels are reported to have an inhibiting effect on /n/-deletion.

While a number of typological universals have in recent years been formulated (cf. Hajek 1997; Sampson 1999), it is clear that much remains to be investigated. The

fact that opposing tendencies have been observed points to the need for broader as well as more fine-grained exploration within Romance.

5 Conclusion

Given the close genetic relationship of Romance languages, it would not be surprising if nasals and nasalization phenomena were to show many similarities – whether synchronic, diachronic, or typological. However, we also see how differences across these languages can manifest themselves, and in many cases, we can establish how such diversification occurs and has developed. We see that nasal consonant and vowel systems are not static but instead display ample evidence of change – often in many different ways – over time and underway. For instance, while many varieties of Romance are considered to have three nasal consonant phonemes /m n ɲ/, Romanian appears to have only two having lost the palatal. Others (may) have a fourth, /ŋ/, due to regular internal change, or, as in the case of French and Italian, the appearance of final velar nasals in English loanwords such as *parking* and *meeting*.

The very different structure of nasal vowel systems in French and Portuguese is also striking. Their development and very different properties have long been widely discussed and debated in the linguistic literature, and exploration and analysis of both systems continues. Morphophonological processes show, too, that even when nasal consonants no longer surface adjacent to nasal vowels, their presence still lingers in closely related contexts, e.g. Fr. *bon* [bɔ̃] ‘good_{M.SG}’ vs. *bonne* [bɔ̃n] ‘good_{F.SG}’.

Our detailed knowledge of many different Romance languages, as well as Latin – both at one point in time and across time – is extremely helpful in showing us, through the careful comparison of recorded variation across and within the same language varieties, how different nasal-related phenomena have developed, e.g. the conditioned interaction between vowel height and the spread of vowel nasalization. We see in Northern Italy a marked preference for low vowel nasalization – linked to predictable vowel lengthening, while in Gallo-Romance and elsewhere high vowels seem to be the preferred locus for nasalization. The reasons for such divergence remain unclear, but the continuing exploration of nasals and nasalization in Romance still has a lot to offer for an improved understanding of language typology, sound change as well as phonology, and phonetics more generally.

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7 The evolution of Latin stress into Romance with special consideration of French

Abstract: This chapter describes the major changes that took place in the evolution from Latin stress to the modern Romance languages. Unstressed vowel deletion, which was systematic in the evolution of French, first as syncope and later as apocope, is argued to be the continuous effect of a constraint already operative in Latin: the avoidance of vocalic substance in the weak part of a foot. The constraint first targeted the uneven trochee for syncope and later on in the evolution of French, the syllabic trochee for apocope. The chapter provides an OT analysis of the way in which word-internal and word-final unstressed vowel deletion ultimately led to systematic word-final stress in Old French and shows how, once the last proparoxytonic words had been adapted in three different ways, the change from word-final to phrase-final stress was completed.

Keywords: vowel deletion, vowel and consonant lengthening, uneven trochee, word-final stress, phrase-final stress

1 Introduction

In this chapter, we will describe, from an OT-perspective, the evolution of the Latin stress system into the Romance languages. We will discuss the two major changes that took place in the transition from Classical Latin to Late Latin and that affected the different Romance languages to a variable extent: open-syllable vowel lengthening and foot-based vowel reduction and vowel deletion. Special attention will be devoted to the further evolution of the Latin stress system into French, given that it is, among the Romance family, the language that deviates the most from its source in terms of stress.

This chapter is structured as follows. In Section 2, we first present the basic facts of Latin stress and discuss a previous rule-based (Hayes 1995) account as well as a parallel (Prince/Smolensky 1993/2004) and a serial (McCarthy/Pater/Pruitt 2016) OT account of Latin stress. After that we will first briefly discuss the controversial uneven trochee and then present an OT-analysis of Latin stress based on it. In Section 3, we discuss a number of changes that are shared, to a variable extent, among the Romance languages: stressed-syllable vowel lengthening in open syllables, consonant gemination after stressed vowels in open syllables, vowel shortening, and vowel deletion. After that, we will concentrate on the further evolution of Latin stress into French. Section 4 discusses, from an OT-perspective, the evolution from pre-final to final word

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stress from Latin to Old French. The focus of Section 5 is on the change in the prosodic evolution from Latin to Modern French: the loss of the word as the domain of stress and its replacement by the phonological phrase, a change which has contributed to making French, prosody-wise, the exceptional language in the Romance language family. Finally, Section 6 summarizes the main findings of the chapter.

2 Latin stress

The basic facts of Latin stress are well known. Main stress in words of more than two syllables is on the penultimate syllable if that syllable is heavy, that is, the syllable is closed, as in [or.na'men.tum] ORNAMENTUM 'ornament_{ACC}', or the syllable is open, but has a long vowel, as in [a'mi:.kum] AMICUM 'friend_{ACC}'. If the pre-final syllable is not heavy, i.e. if it is open and contains a short vowel, main stress is on the antepenultimate syllable, as in ['ma.ni.kam] MANICAM 'sleeve_{ACC}'.

In (1), we have provided some examples including foot structure if the forms are analyzed in a rule-based model with a moraic trochee (cf. Hayes 1995), that is, a foot consisting of minimally and maximally two moras. Heavy syllables contain two moras (indicated by $\mu\mu$) and light syllables only one (μ), so a moraic trochee either groups two light syllables or one, single, heavy syllable into a foot. The last syllable of a word is made extrametrical (indicated by angled brackets) prior to the assignment of a moraic trochee (i) at the right word-edge. Final main stress is accounted for by the End Rule Final, which promotes a final foot to the foot with main stress (ii).

(1) Latin stress with the moraic trochee

a.	a	m i :	<kum>	'friend _{ACC} '
	μ	$\mu\mu$		
i. Moraic trochee		(x .)		
ii. End Rule Final	(	x	)	
b.	pe	des	<ter>	'on foot'
	μ	$\mu\mu$		
i. Moraic trochee		(x .)		
ii. End Rule Final	(	x	)	
c.	so	li	<dus>	'solid'
	μ	μ		
i. Moraic trochee	(x	.)		
ii. End Rule Final	(x		)	
d.	a:	ri	<dus>	'dry'
	$\mu\mu$	μ		
i. Moraic trochee	(x .)			
ii. End Rule Final	(x		)	

- e. la: mi <na> ‘plate_{NOM}’
 μμ μ
 i. Moraic trochee (x .)
 ii. End Rule Final (x)

Given that a moraic trochee consists maximally of two moras, the pre-final heavy syllable in (1a) and (1b) forms a single foot. If both the pre-final and the pre-pre-final syllables are light, as in (1c), the two syllables can be joined in a moraic trochee. However, if the pre-final syllable is light and the pre-pre-final syllable is heavy, as in (1d, e), the two syllables cannot be joined in one foot, because an uneven trochee, a foot consisting of a heavy and a light syllable (μμ μ) is ruled out by the foot inventory assumed in Hayes (1995).

An OT-account providing a slightly different footing has been proposed by Prince/Smolensky (1993/2004), following Mester (1994), in which the constraints in (2) are used.

(2) OT-constraints for Latin stress

ALIGN-R MAIN-σ:	The syllable with main stress is right-aligned with the word.
NON-FIN MAIN-Ft:	The foot with main stress may not be final.
PARSE-σ:	Parse syllables into feet.
WEIGHT-TO-STRESS PRINCIPLE (WSP):	A heavy syllable may not be located in the weak part of a foot.
RHYTHMIC HARMONY (RHHRM):	No uneven trochees.

The first constraint in (2) is responsible for the location of the foot with main stress and guarantees that the foot with main stress is at the right word-edge, but, because of the higher-ranked NON-FIN MAIN-Ft constraint, not in absolute final position.¹ The last constraint in (2), RHHRM, which is assumed to be undominated, rules out an uneven trochaic foot, a foot consisting of a stressed heavy and a following light syllable, that is ('HL). Prince and Smolensky (1993/2004, 70) observe that ('HL) feet are marked or even absent in trochaic systems and propose “to ban these on grounds of *rhythmic* structure, which favors length at the end of constituents”. We will come back to this issue in some more detail below.

The ranking assumed by Prince/Smolensky (1993/2004) produces the analysis that is illustrated in the tableaux in (3), where H and L stand for heavy and light

¹ Instead of ALIGN-R MAIN-σ, Prince/Smolensky (1993/2004) used the constraint EDMOST ('σ; R), by which the main stressed syllable should fall as far to the right as possible. ALIGN-R MAIN-σ is entirely equivalent but formulated in lines with the alignment constraints proposed in McCarthy/Prince (1993) and generally used in OT (cf. Kager 1999).

syllables and where, for the constraint ALIGN-R MAIN- σ , the distance between the syllable with main stress and the right word-edge is indicated by the number of syllables that separates the two.

(3) Latin stress with high-ranked NON-FIN MAIN-Ft and RHHRM

a.	/HLL/	RHHRM	NON-FIN	ALIGN-R	PARSE- σ	WSP
	ex: LĀMĪNĀ		MAIN-Ft	MAIN- σ		
	(¹ H)(LL)			$\sigma\sigma$		
	(¹ H)LL			$\sigma\sigma$	*!*	
	(¹ HL)L	*!		$\sigma\sigma$	*	
	(H)(¹ LL)		*!	σ		
b.	/LLH/	RHHRM	NON-FIN	ALIGN-R	PARSE- σ	WSP
	ex: SÖLĪDUS		MAIN-Ft	MAIN- σ		
	(LL)(¹ H)		*!			
	(¹ LL)H			$\sigma\sigma$	*!	
	(¹ LL)(¹ H)			$\sigma\sigma$		
	L(¹ LH)		*!	σ	*	*
c.	/HLH/	RHHRM	NON-FIN	ALIGN-R	PARSE- σ	WSP
	ex: ĀRĪDUS		MAIN-Ft	MAIN- σ		
	(¹ H)L(¹ H)			$\sigma\sigma$	*!	
	(¹ H)L(¹ H)		*!		*	
	(¹ H)LH			$\sigma\sigma$	*!*	
	(H)(¹ LH)		*!	σ		*
	(¹ H)(¹ LH)			$\sigma\sigma$		*
	(¹ HL)H	*!		$\sigma\sigma$	*	

The footing in (3) is different from the footing in (1), not in the location of main stress, but in the footing of the syllables after the main stressed syllable, as illustrated in (4).

(4)	Latin footing	according to (1)	according to (3)
a.	HLH type LĀMĪNĀ	(¹ H) LL	(¹ H) (LL)
b.	LLH type SÖLĪDUS	(¹ LL) H	(¹ LL) (H)
c.	HLH type ĀRĪDUS	(¹ H) LH	(¹ H) (LH)

If, in type c) words, the last syllable had a long vowel, as in words like, [¹de:.si.no:] DESINO ‘cease_{1SG}, give_{1SG} up’, that long vowel could be shortened in pre-classical Latin, a process generally referred to as cretic shortening.

In Prince/Smolensky (1993/2004), cretic shortening is analyzed by assuming that the constraint PARSE- μ , which requires moras to be parsed, is dominated by PARSE- σ in Pre-classical Latin, but not in Classical Latin, and by assuming that WSP is ranked above these two constraints in Pre-classical Latin, but below the two of them in

Classical Latin. The different effects of these rankings for type c) words are illustrated in (5), where the shortening of the final vowel is indicated by H-.

(5) Pre-classical Latin	Classical Latin
Vowel shortening	No vowel shortening
WSP » PARSE- μ because (['] H)(_l LH-) » (['] H)(_l LH)	PARSE- μ » PARSE- σ because (['] H)(_l LH) » (['] H)L(_l H)
PARSE- σ » PARSE- μ because (['] H)(_l LH-) » (['] H) L(_l H)	PARSE- σ » WSP because (['] H)(_l LH) » (['] H)L(_l H)
WSP » PARSE- σ » PARSE- μ HLH DĒSĪNŌ → $\Rightarrow$ [(['] de:)(_l sino)]	PARSE- μ » PARSE- σ » WSP HLH DĒSĪNŌ → $\Rightarrow$ [(['] de:)(_l sino:)]

In Pre-classical Latin, ([']H)(_lLH-) is favored over ([']H)(_lLH) and over ([']H)L(_lH) because under that ranking all syllables are footed without a violation of WSP, whereas in Classical Latin ([']H)(_lLH) is the optimal outcome, given that by that ranking all syllables and all moras are parsed. The Pre-classical Latin footing in (5) is essentially similar to the footing provided in McCarthy/Pater/Pruitt (2016) within a serial rather than parallel version of Optimality Theory: Harmonic Serialism (cf. McCarthy 2010). In Harmonic Serialism, an input is subject to the constraint grammar and may undergo one single modification, if that makes the form more harmonic. The ranking of the markedness constraints determines what the best modification is. The modified input is then subject again to the same constraint grammar and so forth until no further harmonic improvement is possible. Cretic shortening is analyzed by allowing (_lLH) as an intermediate foot in the derivation which is subsequently turned into a (_lLH-) foot with a shortened vowel. The required intermediate steps are given in tableaux (6–8), below, where the constraint MAX- μ disallows the deletion of a mora.

(6) Step 2 after syllabification: de:.si.no: → ([']de:)si.no:

/de:.si.no:/	RHHRM	NON-FIN MAIN-Ft	ALIGN-R MAIN- σ	PARSE- σ	WSP	MAX- μ
$\Rightarrow$ (['] H)LH			$\sigma\sigma$	**		
(['] HL)H	*!		$\sigma\sigma$	*		
H(['] LH)		*!	σ	*	*	
HL(['] H)		*!	σ	**		

- (7) Step 3 after main stress assignment: ('de:)si.no: → ('de:)(si.no:)

('de:)si.no:	RHHRM	NON-FIN	ALIGN-R	PARSE-σ	WSP	MAX-μ
		MAIN-Ft	MAIN-σ			
 ('H)(<u>L</u> H)			σσ		*	
('H) L H			σσ	**!		
('H) L(<u>L</u> H)			σσ	*!		

- (8) Step 4 after secondary stress assignment: shortening ('de:)(si.no:) → ('de:)(si.no)

('de:)(si.no)	RHHRM	NON-FIN	ALIGN-R	PARSE-σ	WSP	MAX-μ
		MAIN-Ft	MAIN-σ			
('H)(<u>L</u> H)			σσ		*!	
 ('H)(<u>L</u> H-)			σσ			*
('H) L H			σσ	**!		
('H) L(<u>L</u> H)			σσ	*!		

The ranking of PARSE-σ above WSP thus allows for a quantity-insensitive foot (LH) in the course of the derivation, which, given that such feet never surface in Latin, is then repaired to become a surface bisyllabic and bimoraic, even trochee.

The analyses of both Prince/Smolensky (1993/2004) and McCarthy/Pater/Pruitt (2016) account for final vowel shortening, but wrongly predict vowel shortening to occur in non-final position, as in for instance pre-main stress LHL-sequences, and both predict a secondary stress on a pre-final unstressed syllable in Classical Latin HLH and HLL words. However, such vowels in Classical Latin were subject to vowel deletion, as in for instance *ĀRĪDUS* ['a:ri.dus] > *ARDUS* ['a:r.dus] 'dry' and *LĀMĪNĀ* ['la:mi.na] > *LAMNA* ['la:m.na] 'plate'. We will not discuss cretic or iambic shortening further here, but note the incorrect predictions of the two analyses, and refer the reader to Jacobs (2003; 2019b) for a more detailed account. A shared characteristic of the three analyses of Latin stress discussed up to this point (Hayes 1995; Prince/Smolensky 1993/2004; McCarthy/Pater/Pruitt 2016) is the use of a moraic trochee instead of an uneven trochee for Latin stress.

The uneven trochee has been subject to debate for a long time. It was originally considered to be universally excluded by the Iambic-Trochaic Law (Hayes 1995), according to which elements contrasting in duration naturally form groupings with final prominence (a sequence of a V-VV-V-VV-VV is thus grouped as "short-long" (iambic) (V-**VV**)(V-**VV**)(V-**VV**) and not as "long-short" (trochaic) V(**VV**-V)(**VV**-V)(**VV**), whereas elements contrasting in loudness are naturally grouped as "loud-soft" trochaic. The original supporting work by Bolton (1894) and Woodrow (1909) and the

claim that the Iambic-Trochaic Law is universal have been relativized in more recent experimental work. Kusumoto/Moreton (1997) showed that speakers of American English and of Japanese differ in the grouping of simple tone sequences contrasting in duration. Whereas the American participants predominantly heard repeating “short-long” groups, many Japanese listeners heard the opposite “long-short” grouping. Iversen/Patel/Ohgushi (2008) conducted a similar experiment with native American English speakers in San Diego and Japanese speakers in Kyoto. In their experiment, 45% of the Japanese listeners strongly preferred the long-short and 26% the short-long grouping. One of the experiments reported on in Molnar/Carreiras/Gervain (2016), modeled on the experiments in Iversen/Patel/Ohgushi (2008), shows a preference for short-long groupings for monolingual Spanish speakers and for long-short groupings for Basque-dominant bilinguals. In-between groups, Spanish-dominant bilinguals and Basque-proficient bilinguals showed no clear biases (cf. also Crowhurst/Teodocio Olivares 2014 on Zapotec and English speakers).

One of the reasons why the uneven trochee was originally excluded from the inventory of possible feet was related to stressed vowel lengthening, which was believed to exist only in iambic languages. Iambic lengthening changes even (LL) feet into uneven (LH) canonical iambs. An example is Chicasaw (Hayes 1995, 209–210; data taken from Kennedy 2017, 291), in which, for instance, underlying /a.sa.bi.ka.tok/ is footed as iambic (a.sa).(bi.ka).(‘tok) after which the first two (LL) feet are turned into (LH) feet, (a.sa).(bi.ka).(‘tok) ‘I was sick’, by vowel lengthening. The absence of lengthening in trochaic languages was taken by Hayes (1995) as evidence for the assumption of a canonical even trochee, syllabic for quantity-insensitive systems, and moraic for quantity-sensitive languages, as in (1). Additional motivation was based on the reverse of iambic lengthening, that is trochaic shortening in languages such as Fijian, where a HL sequence becomes an even trochee through shortening (compare [‘mbu:] ‘grandmother’ with a heavy syllable and HL /mbu:ɲgu/ realized as LL [‘mbu.ɲgu] ‘my grandmother’, cf. Hayes 1995, 145). It turns out, however, that stressed vowel lengthening does occur in trochaic languages, such as Selayarese (cf. Mellander 2003; Mithun/Basri 1986), Chimalapa Zoque (Knudson 1975; Hayes 1995, 104; Hyde 2011, 1055), Standard Italian, and Italian varieties (Loporcaro 2015; cf. also Revithiadou 2004 and Hyde 2011 for a more general discussion).

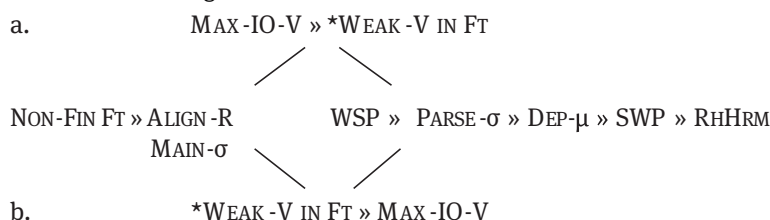
On the basis of these experimental and phonological findings there seems to be no reason to exclude an uneven trochee and we refer the reader to, among others, Repetti (1998) and Jacobs (2019a) for arguments in favor of the uneven trochee based on the dialects of Emilia-Romagna and on Latin. Let us finally observe that an uneven trochee has to be allowed at an intermediate step of the derivation for a Harmonic Serialism OT analysis of trochaic shortening in Fijian or of tri-syllabic laxing in English, if the shortening is analyzed as taking place for foot harmony reasons.

As a starting point for our discussion of the evolution of stress from Classical Latin into the Romance languages and to Modern French we will assume the constraint ranking in (9). In order to describe syncope, the deletion of word-internal unstressed

vowels, two constraints are used: *WEAK-V IN Ft (No vowel in the weak position of a foot; cf. Jacobs 2019a for why reference to the foot is needed), and MAX-IO-V (A vowel should not be deleted). Furthermore, the constraint NON-FIN MAIN-Ft has been replaced by the constraint NON-FIN Ft (a foot may not be final), which will prevent the unwanted secondary stress on a pre-final unstressed syllable in Classical Latin HLL and HLH words.² Finally, in the ranking in (9), the constraint RHHRM is ranked below the constraint PARSE- σ , which allows for the uneven trochee as a possible foot type.

Let us now consider the Latin constraint ranking in (9) in some more detail.

(9) Constraint ranking for Latin



The ranking in (9) is to be interpreted as follows. In (9a), the two top-ranked (left-most) constraints (NONFIN-Ft and ALIGN-R MAIN- σ) dominate MAX-IO-V and *WEAK-V IN Ft which in their turn dominate the other constraints. The only difference between (9a) and (9b) is the relative ranking of the two constraints *WEAK-V IN Ft and MAX-IO-V. The ranking in (9) will produce the footings in (10) for the words illustrated in (4) above. Dependent on the relative ranking of *WEAK-V IN Ft and MAX-IO-V, they will surface either in full or in syncopated form.

(10)	Latin footing	according to (9a)	according to (9b)
a.	HLH type LĀMĪNĀ	('HL) L ['la:.mi.na]	('H) <L> L ['la:m.na]
b.	LLH type SŌLĪDUS	('LL) H ['so.li.dus]	('H) <L> H ['sol.dus]
c.	HLH type ĀRĪDUS	('HL) H ['a:.ri.dus]	('H) <L> H ['a:r.dus]

The two constraints DEP- μ (A mora may not be added in the output) and SWP (the STRESS-TO-WEIGHT PRINCIPLE: A stressed syllable must be heavy) are ranked in that order in (9) given that short stressed vowels in open syllables are not made heavy by, for instance, lengthening the vowel. Let us now turn to the two most important changes that took place in the further evolution of Latin stress into the Romance languages.

² This replacement was argued to be independently required by Jacobs (1999) and McCarthy (2003).

3 From Latin to Romance: lengthening, shortening, and deletion

3.1 Open syllable lengthening, consonant gemination, and vowel shortening

In Classical Latin, long and short vowels occurred in free distribution and were contrastive, as in the minimal pairs in (11).

- (11) Free distribution of long and short Latin vowels
- | | | | |
|--------------|----------------------------|--------------|------------------------|
| ['po:pu.lus] | 'poplar tree' | ['po.pu.lus] | 'people' |
| ['li:.ber] | 'free' | ['li.ber] | 'book' |
| ['le:.go:] | 'delegate _{1SG} ' | ['le.go:] | 'read _{1SG} ' |
| ['fu:.ror] | 'steal _{1SG} ' | ['fu.ror] | 'rage' |
| ['ma:.lum] | 'apple' | ['ma.lum] | 'evil' |

Long and short vowels occurred in stressed and unstressed, open and closed, and final and non-final syllables. Loporcaro (2015) describes the loss of contrastive vowel length in the transition from Latin to the modern Romance languages as resulting from the lengthening of stressed vowels in open syllables (Open Syllable Lengthening; OSL) and the shortening of long unstressed vowels. Loporcaro (2015, 46–51) mentions Iasucthan's hexameters as evidence for OSL early in the 3rd century CE in Africa, as demonstrated by the fact that Classical Latin words like /mi:lite:s/ 'soldier_{NOM/ACC.PL}' and /kapita/ 'head_{NOM/ACC.PL}', that is HLH and LLL, are realized as ['mi:.li.tes] and ['ka:pi.ta] by, respectively, the shortening of a long unstressed vowel and the lengthening of a short stressed vowel, and thus are well-formed HLL dactylic feet.

The effects of OSL are still observable in Standard Italian, in Tuscan dialects and in the majority of central-southern Italo-Romance dialects. In these varieties, stressed vowels in open non-final syllables are lengthened, and occur in complementary distribution with short stressed vowels before geminates, as illustrated in (12) (Loporcaro 2015, 62).

- (12)
- | | | | |
|-----------|----------------------------|----------|-----------------------|
| ['ka:.ne] | 'dog' | ['kan:e] | 'reed _{PL} ' |
| ['va:.le] | 'be worth _{3SG} ' | ['val:e] | 'valley' |
| ['fa:.to] | 'fate' | ['fat:o] | 'done' |

Loporcaro (2015) further shows that in Standard Italian, open syllable vowel lengthening does not affect the word-final syllable, but does affect pre-final and pre-pre-final syllables, as in ['dʒo:va.ne] 'young man', ['a:vi.do] 'greedy' and ['a:ra.bo] 'Arab'. D'Imperio/Rosenthal (1999) have argued that only penultimate lengthening should be considered true phonological lengthening, but that antepenultimate lengthening

in Standard Italian should rather be regarded as phonetic lengthening. The experimental durational evidence presented by Loporcaro (2015), however, does not seem to warrant a distinction between antepenultimate and penultimate vowel lengthening. And even if slightly shorter durational differences could be found, this might well be attributed to rhythmical compression (Lindblom/Rapp 1973; Fischer-Jørgensen 1987; White/Turk 2010), by which the greater the number of syllables in a word, the shorter the individual duration. Loporcaro (2015, 2016) shows that Ligurian and Emilian dialects, such as Genoese and Bolognese, still show traces of earlier trochaic lengthening in proparoxytonic words, such as Genoese [ˈpaː.gwa] (Old Genoese [ˈpeː.gu.ɹa]) < PECORA(M) ‘sheep’ and [ˈlaː.gri.ma] < LACRIMA(M) ‘tear’.

Vowel lengthening in these Italian varieties thus clearly shows that trochaic lengthening is not limited to quantity-insensitive stress systems as has often been claimed (cf. Mellander 2003), but also occurs in quantity-sensitive systems, such as Italian. Hyde (2011, 1072) described trochaic lengthening as a way to avoid a violation of the constraint NON-FINALITY(σ) (“No stress occurs over the final mora of a syllable”). Given that the first stressed syllable in a (LL) trochaic foot has, in his view, stress on the mora of that syllable, lengthening the vowel while keeping stress on the first mora is a means for (LL) to become more harmonic under the condition that NON-FINALITY(σ) is higher ranked than DEP-μ. Given that there seems to be no logical way to differentiate a (LL) foot in a quantity-sensitive stress system from a (LL) foot in a quantity-insensitive stress system, trochaic lengthening seems to be predicted in quantity-sensitive systems in Hyde’s approach as well.

The first re-ranking in (9) necessary to describe stressed vowel lengthening is thus a switching around of the constraints DEP-μ and SWP, as illustrated with the parallel OT tableau for [ˈlaː.gri.ma] in (13).³

(13) Open syllable stressed vowel lengthening

/la.gri.ma/	NON-FIN FT	ALIGN-R MAIN-σ	WSP	PARSE-σ	SWP	DEP-μ	RHHRM
(ˈla.gri)ma		σσ		*	!*		
☞ (ˈlaː.gri)ma		σσ		*		*	*
(ˈlaː)gri.ma		σσ		**!		*	
la.(ˈgri.ma)	!*	σ		*	*		

For the shortening of long unstressed vowels we assume that a constraint *VV-UNSTRESSED, disallowing long unstressed vowels, came to be ranked above the con-

³ In Harmonic Serialism, two steps would be required after syllabification. First footing /la.gri.ma/ as [(ˈla.gri)ma] and then, in a third step, changing [(ˈla.gri)ma] into [(ˈlaː.gri)ma]. In the remainder of this chapter, we will use the less space-consuming parallel OT tableaux.

straint MAX- μ as illustrated for ['mi:.li.te:s] 'soldier_{NOM.PL}' and [ma:.tu:'ti:.num] 'morning' in (14).

(14) Classical Latin			Late Latin Shortening		
MAX- μ	»	*VV-UNSTRESSED	*VV-UNSTRESSED	»	MAX- μ
HLH	›	HLL	HLL	›	HLH
MILITES	→	[mi:.li.te:s]	MILITES	→	[mi:.li.tes]
HHHH	›	HLHH	HLHH	›	HHHH
MATUTINUM	→	[ma:.tu:.ti:.num]	MATUTINUM	→	[ma:.tu.ti:.num]

In some Romance varieties, the higher-ranking constraint SWP is satisfied not by vowel lengthening, but by consonant gemination which also makes the stressed syllable heavy by providing an additional mora. Like vowel lengthening, gemination also applied to both paroxytones and propoxytones, as in the dialect of Senigallia (Loporcaro 2015, 185) and in Southern Emilian Lizzano, as illustrated in (15), taken from Loporcaro (2015, 189).

(15) Satisfying SWP by consonant gemination in Emilian propoxytonic words				
['lag:rima]	'tear'	<	LACRIMA(M)	
['peg:ora]	'sheep'	<	PECORA(M)	
['pev:aro]	'pepper'	<	PIPERE(M)	
['tav:ola]	'table'	<	TABULA(M)	

Loporcaro (2015, 185) observes that the same situation is documented for varieties like 12th–13th century Romagnolo and 13th–14th century Veronese, and mentions that in Carrara, too, gemination affects both propoxytones and paroxytones, as in [sal'vat:iko] 'wild' and [pu'tan:a] 'whore'.

Consonant gemination can be described by assuming that in these varieties a more general constraint than *VV-UNSTRESSED, no long unstressed vowels, that is *VV, no long vowels, dominated the constraint DEP- μ , as illustrated for ['lag:ri.ma] in (16).

(16) Consonant gemination after stressed vowels in open syllables.

/la.gri.ma/	NON-FIN FT	ALIGN-R MAIN- σ	WSP	PARSE- σ	SWP	*VV	DEP- μ	RHHRM
(¹ la.gri)ma		$\sigma\sigma$		*	!*			
(¹ la:.gri)ma		$\sigma\sigma$		*		!*	*	*
¹ lag:ri)ma		$\sigma\sigma$		*			*	*
(¹ la:)gri.ma		$\sigma\sigma$		**!			*	
la.(¹ gri.ma)	!*	σ		*	*			

The loss of contrastive vowel length raises the question as to what extent the Classical Latin stress system was still productive at the time of Open Syllable Lengthening. On the one hand, closed pre-final syllables, stressed in Latin, still are stressed in Modern Italian, as witnessed by the pronunciation of, for instance, German loanwords like *Hamburg* ['ham.bʊɐ̯k] or *Stuttgart* ['ʃtʊt.ɡəʁt] as [am'bur.go] and [sto'k:ar.da] (cf. Sluyters 1992). Long vowels in pre-final open syllables, stressed in Classical Latin, will remain as long vowels in Late Latin. On the other hand, it is clear that the Classical Latin stress system was already starting to become opaque early on by, among other means, early Classical syncope in words like *BALINEUM* 'bath' and *SOLICULUM* 'sun_{DIM}', leading to variable ['bal.ne.um] or [ba'li.ne.um] and [so'li.klum] or [so'li.ku.lum] (cf. Jacobs 2019a for a more detailed account). Let us turn next to the second important change that took place in the transition from Latin to Romance: unstressed vowel deletion.

3.2 Vowel deletion

The constraint *WEAK-V IN FOOT that we saw in (9) above refers to the weak position of the foot as the target for vowel deletion, but it is probably better conceived of as a family of constraints. Given that most older, Classical Latin examples of syncope almost always have an unstressed [i] or [u] that is syncopated, the more general constraint should probably be replaced for that period of time by a more specific one, like *WEAK-V[+HIGH] IN FOOT. In the further evolution of the Romance languages, there is evidence for the more general constraint, especially in the evolution from Late Latin to Old French, and for another more specific constraint *WEAK-V[-LOW] IN FOOT, by which all unstressed vowels, but [a], are affected.

The Romance languages show some variation in the extent to which vowel deletion affected the individual languages as illustrated in (17).

(17) Variable vowel deletion in the Romance languages

Latin	Spanish	French	Italian	Romanian	
¹ GENERU(M)	yerno	gendre	genero	ginere	'son-in-law'
¹ CAMERA(M)	cámara	chambre	camera	cameră	'room'
¹ CUBITU(M)	codo	coude	gomito	cot	'elbow'
¹ COMITE(M)	conde	comte	conte	conte	'count'
¹ CALIDU(M)	caldo	chaud	caldo	cald	'warm'

There is also variation, at different moments in time, with respect to the precise phonological conditioning of vowel deletion. In Classical Latin, for instance, vowel deletion took place if the resulting combination of consonants was allowed by the phonotactic constraints of the language, as in *CALIDUM* > *caldum*, *SOLICULUM* > *soliclum* 'sun_{DIM}' etc. In the next section, we will discuss the further evolution of Late Latin to Old French, where vowel deletion systematically applied and ultimately caused stress to be consistently realized on the final syllable.

4 From Latin to Old French: from pre-final to final stress

The systematic application of vowel deletion in the evolution of Latin to Old French changed almost all Latin proparoxytonic words into paroxytonic words. If, by vowel deletion, ill-formed clusters of consonants resulted, they were brought into conformity with the phonotactics of the language, as for example in 'GALBINU(M), presumably via [dʒalbnu] > [dʒalnu] *jaune* 'yellow' or 'VINCERE via [vintsre] > [veintrə] (OFr. *veintre*) *vaincre* 'conquer_{INF}'. The gradual disappearance of words with stress on the pre-pre-final syllable and the loss of vowel length distinctions ultimately led to a new stress system by which stress was always realized on the pre-final syllable, which can be analyzed as a syllabic trochee at the right word-edge. The constraint ranking for that stage of the evolution of the language is given in (18) and illustrated with the word 'COMES 'count_{NOM.SG}'. Compared with the ranking in (9), the first two constraints, ALIGN-R MAIN-σ and NON-FIN FT have been reordered and the constraint PARSE-σ has been ranked at the top.

(18) Pre-final stress in Early Old French

/ko.mes/	PARSE-σ	ALIGN-R MAIN-σ	NON-FIN FT	WSP
('ko)mes	!*	σ		
☞ ('ko.mes)		σ	*	*
ko.(mes)	!*		*	

The continued activity of the constraint pair, again at first variably ranked just as in (9), *WEAK-V IN FOOT and MAX-IO-V resulted in the reduction and deletion of final unstressed vowels, traditionally referred to as apocope, as illustrated for the change of [ko.mes] via assumed intermediate [kwe.mes] into [kwens] OFr. *cuens* 'count' in (19).

(19) Apocope as a continuation of the *WEAK-V IN FOOT constraint

/kwe.mes/	PARSE-σ	*WEAK-V IN FOOT	MAX-IO-V	ALIGN-R MAIN-σ	NON-FIN FT
('kwe)mes	!*			σ	
('kwe.mes)		*!		σ	*
☞ ('kwens)			*		*
kwe.(mes)	!*				*

Apocope affected all final vowels, except [a], and first reduced them to schwa, which eventually was deleted (Richter 1934, 236, 243–246; Pope 1952, 113–114; Fouché 1958, 501). For this stage of the language, we therefore have to assume a different version of the *WEAK-V IN FOOT constraint, which should not only be limited to non-low vowels, *WEAK-V[-LOW] IN FOOT, but given the reduction of vowels to schwa, be formulated as *WEAK-PLACE[-LOW] IN FOOT, which will take care of the deletion of the place of articulation features of a non-low vowel and will lead to a schwa.

If final vowel deletion would have resulted in ill-formed clusters of consonants, schwa was instead maintained. This occurred before a final group [-nt], as in, *deivent* ‘must_{3PL}’ and *veient* ‘see_{3PL}’, after the affricates [tʃ] and [dʒ], as in *APIU(M) > via [aptʃe] > [atʃə] *ache* ‘celery’ or *SIMIUM via [simdʒe] > [sindʒə] *singe* ‘monkey’, after obstruent liquid clusters, such as *fiertrē* (<FERETRUM) ‘stretcher’ or *feblē* (<FLEBILE(M)) ‘weak’, and after a lateral followed by a nasal (*alne* (ModFr. *aulne*) ‘alder’ or *helme* (ModFr. *heaume*) ‘helmet’).

The consequences of syncope and apocope for the stress system can be illustrated nicely by looking at the way in which later proparoxytonic loanwords were treated. Pope (1952) mentions three different ways in which such loanwords were adapted: by deleting the unstressed pre-final vowel, by shifting stress to the final syllable, or by deleting the entire final syllable.

The first modification can be considered as the continued effect of the *WEAK-V IN FOOT constraint that we discussed in 3.2. Some relevant examples (cf. Pope 1952, 230) are listed in (20).

(20) Proparoxytonic loanword adaptation by the *WEAK-V IN FOOT constraint

Latin	Old French	French	
CA'PITULU(M)	chapitre	chapitre	‘chapter’
'TITULU(M)	titre	titre	‘title’
A'POSTOLU(M)	apostre	apôtre	‘apostle’
'ORDINE(M)	ordre	ordre	‘order’
'LONDINU(M)	Londres	Londres	‘London’
DI'ACONU(M)	diacre	diacre	‘deacon’
'SCANDALU(M)	escandle, escandre	scandale	‘scandal’

The fact that intervocalic [p] in CA'PITULU(M) and A'POSTULU(M), intervocalic [k] in DI'ACONU(M) and intervocalic [t] in CA'PITULU(M), 'TITULU(M) and A'POSTOLU(M) have not been subject to voicing and spirantization clearly shows that these words were introduced into the language after those processes had occurred. It should also be observed that, just as in the case of syncope, if ill-formed clusters of consonants resulted, they were brought into conformity with the phonotactics of the language, as in for example A'POSTOLU(M) [apostle] > [apostrə] *apôtre* or DI'ACONU(M) [djakne] > [djakrə].

The second way of incorporating proparoxytonic loanwords, a stress shift to the final syllable, is illustrated by words such as those in (21).

(21) Proparoxytonic loanword adaptation by shifting stress

Latin	French	
¹ FRAGILIS	fragile	'fragile'
¹ FACILIS	facile	'easy'
¹ FABRICA	fabrique	'manufacture'
¹ UTILIS	utile	'useful'
¹ MOBILIS	mobile	'mobile'
¹ CALICEM	calice	'chalice'
¹ CANTICUM	cantique	'canticle'

Sometimes the two different ways of incorporating proparoxytonic loanwords led to doublets such as ¹*martre* and *mar*¹*tir* (in the *Vie de Saint Alexis*, verse 566) for ¹MARTYRE(M) 'martyr', *a*¹*voltre* and *adul*¹*tere* for A¹DULTERU(M) 'adultery', or ¹*utle* (in the *Quatre Livres des Rois*) and *u*¹*tile* for ¹UTILE(M).

A shift of stress to the final syllable is clearly observed in the *Vie de Saint Alexis* (written in the 11th century, oldest manuscript from the 12th century) where the final syllable of the proper name *Alexis* often occurs in stressed position at the end of the hemistich or at the end of a verse line (Lote 1991, 50). Another example is ¹BALSA-MU(M) 'balm' which appears as *balsemu* in the *Roman d'Alexandre* at the end of verse 5399 and with final stress. That words such as those in (21) are later loanwords can be seen clearly by regarding the regular evolution of, for instance, ¹FRAGILIS, ¹FABRICA and ¹MOBILIS into Old French, where they ended up as *fraile* 'frail', *forge* 'manufacturing' and *mueble* 'mobile, moving'.

This second way of adapting proparoxytonic loanwords is dated later by Pope (1952) and is clearly indicative of the fact that final vowel reduction and schwa deletion had led to a further change in the stress system. After Latin proparoxytonic words had been turned into paroxytonic words by earlier syncope, they then changed into oxytonic words by apocope. This new stress system no longer showed any evidence for a foot and can be described solely by the constraint ALIGN-R MAIN-σ, which requires the main stressed syllable to be the final syllable of the word. In (22) and (23), the new stress system is illustrated for *balsemu* and *mueble*. We have added a constraint CONDITIONS which should be interpreted as a cover term for the phonotactic conditions mentioned above under which the application of apocope was blocked.

(22) Final word stress in OFr. *balsemu*

/bal.sə.mu/	CONDITIONS	*'ə	*WEAK-V IN FOOT	ALIGN-R MAIN-σ
('bal.sə)mu			*!	σσ
 bal.sə ('mu)				
bal.('sə.mu)		*!	*	σ

(23) Final word stress in OFr. *mueble*

/meu.ble/	CONDITIONS	*'ə	*WEAK-V IN FOOT	ALIGN-R MAIN-σ
('muebl)	*!			
 ('mue.blə)			*	σ
mue('blə)		*!		

The third and last way of adapting proparoxytonic words involved the deletion of the entire final syllable. Some relevant examples are *l'MAGINE(M)* > *image(ne)* > *image* 'image', *'VIRGINE(M)* > *virge(ne)* > *virge*, *vierge* 'virgin', *'ANGELU(M)* > *ange(le)* > *ange* 'angel', *'ORGANUM* > *orge(ne)* > *orgue* 'organ', *'ORPHANUM* > *orfe(ne)* > *orfe* (ModFr. *orphelin*) 'orphan', *'PAGINAM* > *page(ne)* > *page* 'page', *'RANCIDUM* > *rance(de)* > *rance* 'rancid', *'PRINCIPE* > *prince(ve)* > *prince* 'prince', and *'MARGINEM* > *marge(ne)* > *marge* 'margin' (Pope 1952, 230; Bourciez 1974, 38; Reinheimer-Rîpeanu 1990). In all these words, the vowel in the pre-final syllable has been reduced to schwa presumably by the same constraint *WEAK-PLACE[-LOW] IN FOOT that reduced final vowels to schwa, as in for instance, *ANIMA* > [anəmə] *aneme* (ModFr. *âme*) 'soul', which still appears as *anima* in the *Séquence de Sainte Eulalie* (shortly after 881) and in the *Vie de Saint Léger* (ca. 1000), but appears as *aneme* in the *Vie de Saint Alexis* (11th century).

Again, the different ways of adapting proparoxytonic words could lead to double forms such as *pampe* (*pampe(ne)* < *'PAMPINU(M)*) 'vine branch' beside *pampre* (*pampre* < *pampne* < *pamp(e)ne* < *'PAMPINU(M)*) (Bourciez 1974, 38) or *ange* (*ange(le)* < *'ANGELUM*) beside *angle*, *angre* (*ang(e)le* < *'ANGELUM*). Pope (1952, 228–229) observes that not all of these words are really loanwords, but sometimes words of a liturgical nature, which may have retarded their normal evolution. This last way of eliminating proparoxytonic words is dated late (12th century) by both Pope (1952) and Bourciez (1974), probably because words like *virgene*, *aneme*, *angele* still appear as such in the *Vie de Saint Alexis*. According to Bourciez (1974, 37–38) their disappearance took place at a moment “où la loi de l'accent se faisait encore sentir” ('when the [Latin] stress rule was still felt'): “La voyelle pénultième a été conservée sous forme d'e, tandis que la finale tout entière s'est effacée; la voix était devenue incapable après avoir proféré une syllabe forte, de se prolonger distinctement sur deux syllabes faibles” ('The

penultimate vowel was retained as *e*, whereas the entire final syllable was deleted; the voice had become incapable after pronouncing a strong syllable to produce two more weak syllables’).

Let us illustrate with *virgene* how the ranking in (24) with just one constraint added, MAX-σ, protecting syllables from deletion and ranked below ALIGN-R MAIN-σ, allows for a straightforward account of final syllable deletion in these cases.

(24) Final syllable deletion in words like *virgene*

/virdʒənə/	CONDITIONS	*!ə	*WEAK-V IN FOOT	ALIGN-R MAIN-σ	MAX-σ
(¹ virdʒ).nə	!* σ			σ	*
(¹ vir.dʒə)nə			*	σ!σ	
vir.(¹ dʒənə)		!* σ	*	σ	
² (¹ vir.dʒə)			*	σ	*
(¹ virdʒ)	!* σ				**
(vir.dʒə) ¹ nə		!* σ			

In this section, we have discussed the major changes that led to Old French becoming an oxytonic language, with main stress invariable on the last full syllable (that is, a syllable not containing schwa) of a word. In the next section, we will discuss the last, but major change, that took place in the evolution of Latin to French: giving up the word as a domain for stress.

5 French as the odd man out: from word to phrasal stress

The most important prosodic change that took place in the historical evolution of French and that singles French out from among the other Romance languages is the change in the stress domain. Marchello-Nizia (1995, 174) puts it as follows:

il y a eu, et c’est un des changements importants qu’a subis cette langue, le passage d’une accentuation de mot à une accentuation de groupe de mots. On est passé d’un état où chaque mot [...] avait une autonomie accentuelle, où la frontière entre les mots était discernable, où surtout l’accent avait un rôle distinctif, à un état où dans l’énoncé les mots sont liés prosodiquement [...].

‘There has been, and this is one of the most important changes this language has undergone, a shift from a word stress to a group stress. From a stage, where each word [...] had its own stress, where the boundaries between words were detectable and where, moreover, stress had a distinctive role, the language changed to a stage where in an utterance words became prosodically linked [...].’

This change has been studied by numerous scholars, among others, Pope (1952), Kukenheim (1971), Vance (1997), and Adams (1987). Rainsford (2011) provides a detailed overview of most of the literature and argues that when word-final stress became the general pattern, that is, once all proparoxytonic words had been lost, a reanalysis from word to phrasal stress was possible. As long as there were still proparoxytonic words, even if limited to loanwords such as the ones we discussed above, a larger stress group than the word, or phrasal stress, was impossible. Rainsford follows in this respect Peperkamp/Dupoux (2002) and Peperkamp (2004), who suppose that phrasal stress cannot exist in languages in which stress is surface observable (that is, stress can be inferred from bare utterances, in which word boundaries are not marked), but which contain lexical items with irregular stress patterns, even loan words. To put it slightly differently, once stress had only a demarcative function and once there was no longer any evidence for rhythmic stress, a reanalysis of word to group stress could take place. Rainsford (2011, 240) dates the emergence of group stress between the mid-12th century and the mid-13th century. On a collected corpus, Rainsford applies two grammars to generate stress for phonological phrases containing the head noun of the noun phrase and one other prosodic word. One grammar is a final word-stress grammar with a clash resolution rule that removes the first of two clashing syllables, the other one assigning initial secondary and final main stress to the phonological phrase. Nearly 90% of the cases could be generated by either grammar. Rainsford (2011, 34) also discusses the disappearance of the last proparoxytonic words adapted by deletion of the final syllable, and states that it is not clear

whether the orthographic forms [that is, forms such as *angele*, *aneme*, *virgene* in the *Vie de Saint Alexis*, HJ] represent true proparoxytones in the 11th and 12th centuries. [...] While there could be orthographic influence from church Latin, it is also possible that such proparoxytone forms were still a comparatively recent loss in the 11th century.

We completely agree with Rainsford on this point. Although the versification in *La Vie de Saint Alexis* clearly suggests an 11th- and 12th-century pronunciation of these words as [virdʒə] ‘virgin’, [andʒə] ‘angel’, and [imadʒə] ‘image’, a comparison of the pronunciation of the English words *virgin*, *angel*, *image* and *verge* is instructive. The word *virgin* [vɜːdʒɪn] has to come from French *virgene* and not from a form like *vierge* or *virge* because in that case there would not have been a trace of the [n] in the English, just as in the English word *verge* [vɜːdʒ] coming from French *verge* (< VIRGA(M)). The presence of [n] in *virgin* stands in contrast to its absence in English *image*, indicating that at the beginning of the 11th century, in any case prior to 1066, *virgene* and *angele* still were proparoxytones, while *imagine* no longer was one. The loss of proparoxytones was thus still a change in progress in the 11th century.

The final change in the stress system of French can then be understood as a replacement of the constraint ALIGN-R MAIN-σ, which requires the main stressed syllable to be the final syllable of the word, by a constraint requiring the main stressed syllable to be the final syllable of the phonological phrase. The constraint ALIGN-WORD-R

MAIN- σ thus became ALIGN-PHON-PHRASE-R MAIN- σ .⁴ A nice illustration of the new stage of the language, where words have given up their “autonomie accentuelle” (cf. Marchello-Nizia 1995, quoted above), is provided by the pun observed in Pope (1952, 230): *habitaculum* ‘a place to dwell’ – *habit à cul long* ‘item of clothing with a long backside’. Whether or not the French, or their Old French ancestors, are or were really stress-deaf, the necessary conditions for a reanalysis of the stress system, from word to group stress, were met when, with the disappearance of the last proparoxytonic words, the last evidence for rhythmic stress had disappeared from the language and when stress came to serve only a demarcative function. From that moment on, French came to stand out among the Romance languages, and still does so today, as the only Romance language in which stress is not centered on the word.

6 Conclusions

In this chapter, we have described the evolution of the Latin stress system into the Romance languages. After a brief overview of Latin stress, we discussed a rule-based and two OT-based accounts of Latin stress (Hayes 1995; Prince/Smolensky 1993/2004; McCarthy/Pater/Pruitt 2016). The latter two predict a secondary stress on vowels in a pre-final unstressed syllable in Classical Latin HLH and HLL words that were, instead, subject to vowel deletion. A shared characteristic of these three analyses of Latin stress is the use of a moraic trochee and the avoidance of the presumably disfavored uneven trochee for Latin stress. We then argued that experimental and phonological findings provide no reason to exclude the uneven trochee from the inventory of possible feet and briefly presented an OT analysis of Latin stress using this foot form. After that, we described the changes that were common to most of the Romance languages: vowel lengthening of stressed vowels in open syllables and shortening of long unstressed vowels. Both consonant gemination and vowel lengthening took place in paroxytonic as well as in proparoxytonic words and have been analyzed as two different ways of satisfying the SWP constraint. Vowel deletion has been analyzed as the continuous effect of the constraint disfavoring vocalic substance in the weak position of a trochee. The systematic application of syncope led to a first change in the stress system in the evolution of Latin to Old French, as stress then consistently fell on the pre-final syllable. The further activity of the same constraint reduced and deleted

⁴ One reviewer, referring to Dalola (2014), points out that prosodic effects are cumulative in discourse (in French for instance phrase-final devoicing is longer than word-final devoicing) and suggests with respect to the change from word stress to phrasal stress that the lowest word level was eliminated as a possible domain for prominence lengthening. While this may provide some grounding for the two ALIGN constraints, it still seems to be the case that the elimination of the word level was only possible once all proparoxytonic words had disappeared from the language.

final vowels, and eventually led to Old French becoming a language where stress was always realized on the final syllable of a word. The changes in the stress system have been illustrated in more detail by looking at the three different ways in which later borrowings from Latin were adapted. The disappearance of the last remaining proparoxytonic words that took place somewhere in the end of the 11th and the beginning of the 12th century paved the way for a further reanalysis of final word stress to final group stress.

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8 Comparing and deconstructing speech rhythm across Romance languages

Abstract: This chapter provides an overview of speech rhythm research across Romance languages and dialects, and discusses, for these varieties, an array of phonetic, segmental phonological and prosodic properties thought to give rise to differences in the rhythm percept. The comparative approach allows for a consideration of the relative similarity or divergence of critical phonological and prosodic structures between closely related varieties, and how these might impact on perceived rhythm. The difficulties in pinning rhythm down are discussed in a background overview of speech rhythm research, and a multi-systemic, multi-parametric approach is advocated. The frequent presentation of Romance languages as prototypically ‘syllable-timed’ is also scrutinized, particularly in light of the considerable variation across Romance varieties.

Keywords: speech rhythm, rhythm metrics, rhythm class hypothesis, ‘stress-timing’, ‘syllable-timing’

1 Introduction

Romance languages have typically been presented as the poster language family for what is still commonly referred to as ‘syllable-timed’ rhythm (e.g. Dauer 1983; Ramus/Nespor/Mehler 1999, among many others). This generalization was reinforced in work investigating the ‘rhythm class hypothesis’, which drew strongly on the idea that the rhythm percept emanates from a bundle of phonological properties that impact on localized timing, and collectively, repeated over a stretch of speech, impart a particular rhythmic ‘signature’. This research also made extensive use of Spanish and Italian to prove its point. It is perhaps a corollary of this research on the classification of individual languages that a general association was made for Romance as a language family. Since varieties within a language family share, or at least are assumed to share, a common linguistic ancestor, they are assumed to share those properties from which rhythm is deemed to emanate. The rhythm class hypothesis has long been disproved, at least in production, but some of the general assumptions remain. Thus, while some Romance varieties are described as possibly ‘stress-timed’, or of ‘mixed’ or ‘unclassifiable’ rhythm, there is an implication that these are somehow deviations from the norm, not least because their timing properties do not appear to fit so neatly into the default paradigm.

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This chapter aims to dispel this impression of homogeneity among Romance varieties, and indeed of the possibility of any straight-forward classification. First of all, we discuss the theoretical background to rhythm studies in Romance, detailing key turns and developments in general rhythm research and scrutinizing assumptions made, before setting out a multi-systemic, multi-parametric approach. Then, an analysis of the research on six major varieties of Romance – Italian, Spanish, Catalan, French, Portuguese and Romanian – and some of their sub-varieties, is presented, drawing attention to ambiguous or conflicting results, and also to evidence for diversity in rhythm between closely related varieties. The chapter concludes with some thoughts about why there is heterogeneity, and possible avenues for future research in this area.

2 Background on speech rhythm research

What linguists have referred to as speech rhythm has proven to be an elusive phenomenon, and attempts at its analysis, adopting different methodological means, have often invited controversy and dissenting views. Cutting across these positions, and as a reasonable heuristic for understanding the frame of reference in this chapter, rhythm may be understood to refer to the sequential organization of a series of recurring events, i.e. in what manner do they follow on from each other, and to what extent and how are they grouped? In the context of connected speech, this translates as referring to the sequential distribution of syllables, themselves groupings of articulatory gestures, and to the sequential distribution of larger ‘events’, or groupings of syllables. These units are marked by variable degrees of prominence, which in turn is most saliently cued on the syllable nucleus (typically a vowel). Thus, intrinsic to this sequential organization is the duration of said vowels, but also the duration of any intervening consonantal material, and how these vary throughout the sequence. The relevant sources of variation – for example, whether these are globally controlled or emerge from an interlacing of phonological and prosodic constraints – is hotly debated. Other phonetic cues to prominence, such as intensity and vowel quality, are also of relevance, although have typically been neglected in speech rhythm studies, which have largely prioritized the temporal aspects of rhythm to the virtual exclusion of all others.

The main aim of the present chapter is to survey research on rhythm across varieties of Romance, and not to seek to resolve differences in the theoretical understanding of speech rhythm more generally; however, an explanatory overview is needed. An outline is given of the theoretical issues surrounding the study of speech rhythm more widely and, following Post/Payne (2018), a brief critique of the main ‘waves’ of research in this area. As well as providing a backdrop to speech rhythm in Romance, this also sets out the motivation for the approach adopted in this chapter, which is ‘multi-systemic’ and ‘multi-parametric’ (cf. Post/Payne 2018).

There is a long history to the observation that languages are perceived to vary in their rhythmic organization (cf. Armstrong 1932; Lloyd James 1940, for early discussion). In what Post/Payne (2018) identify as the “first wave” of speech rhythm research, the idea was advanced that divergence in the rhythmic percept was rooted in languages privileging different phonological units (mora, syllable or foot). In other words, the perceived difference was attributed to an inherent categorical difference between languages with respect to rhythm. Early attempts to identify the acoustic basis of this divergence (Pike 1945; Abercrombie 1967; Ladefoged 1975) sought to find evidence for the claim that languages tend towards isochrony in the production of the particular unit that they privilege, and that this can be captured through acoustic measurements of duration. The view also gave rise to the well-worn (and since proved inaccurate, or at best inappropriate) terminology of classifying the percept of speech rhythm as ‘stress-timed’, ‘syllable-timed’ or ‘mora-timed’, according to whether for a particular language the privileged unit was the syllable (as claimed for a clutch of Romance languages e.g. French, Italian and Spanish), the foot (as claimed for e.g. English and German), or the mora (as claimed for e.g. Japanese). The schematic representation in Figure 8.1 (taken from Gabriel/Meisenburg/Selig 2013, 169) neatly captures the supposed difference between a so-called ‘syllable-timed’ language (top row) and a so-called ‘stress-timed’ language (bottom row), with syllable-based isochrony in the former, and foot-based isochrony in the latter.

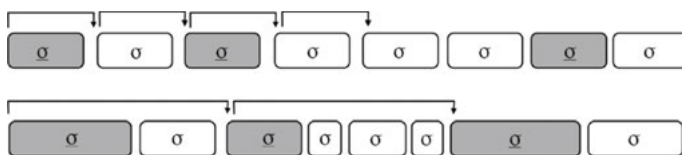


Figure 8.1: Schematic representation of ‘syllable-timing’ and ‘stress-timing’ (Gabriel/Meisenburg/Selig 2013, 169).

Considerable time and effort were invested in finding this acoustic ‘proof’ of unit-based isochrony, without success (cf. Cutler 1991, for a review). The isochrony ‘belief’ has, however, rather stubbornly continued to exert an influence over rhythm research in the form of a persistent emphasis on typologically defined categories, which helped fuel the, by now somewhat infamous, ‘rhythm class hypothesis’. Though this assertion has now been discredited, at least in its strong version of strict classification, many assumptions on which it is based and the terminology it both adopted and reinforced continue to flourish in much of the literature to this day.

At the same time, the percept of a rhythmic difference *of some sort* between speech utterances from different languages is strong and supported by subsequent psycholinguistic research, including in new-born infants (Nazzi/Bertoncini/Mehler 1998; Nazzi/Jusczyk/Johnson 2000). This apparent robustness in the perceptual

domain helped drive a “second wave” of speech rhythm research, investigating and proposing alternative explanations for the source of this perceptual difference in speech production (cf. Bertinetto 1981; Dauer 1983; 1987; Roach 1982; Dasher/Bolinger 1982). Rather than seeing rhythm as being generated along a single parameter or timing (e.g. of unit-based isochrony), these scholars proposed that differences in the rhythmic percept emerge from the phonetic implementation of distinct bundles of language-specific phonological and other linguistic properties. These include, but are not limited to, phonotactic properties such as complexity of syllable structure, and the degree of variability between stressed and unstressed syllables (e.g. via vowel reduction). Those languages that had been thought to be ‘stress-timed’ were noted as having a greater range of syllable structures, a propensity for heavier syllables to attract stress, and a tendency for the vowels in unstressed syllables to be ‘reduced’. These, and other properties, when combined, would naturally impact on the way that prominences in a sequence of speech would be conveyed. By contrast, those languages that had been deemed ‘syllable-timed’, were those which also had a preponderance of open and/or simple syllable structures, and less evidence of vowel reduction. Non-temporal properties were also considered to be relevant, including pitch accents (Dauer 1983, following Bolinger 1965).

The hypothesis also inspired the formulation of various sets of ‘rhythm metrics’, designed to quantify the claimed greater variability of duration in vocalic and consonantal intervals and the claimed smaller overall amount of vocalic material in ‘stress-timed’ languages. The incentive for developing these interval measures (Ramus/Mehler 1999) also came from research showing that infants attend to rhythmic differences from birth (Nazzi/Bertoncini/Mehler 1998). Since linguistic analysis, be that e.g. lexical, phonological, or prosodic, is not available to the new-born infant, infants’ response to claimed differences between languages can only depend on differences that can be captured objectively from the acoustic stream. Ramus/Nespor/Mehler (1999, 270) claim that “the infant primarily perceives speech as a succession of vowels of variable durations and intensities, alternating with periods of unanalyzed noise (i.e. consonants)”. On the basis of this, Ramus/Nespor/Mehler (1999) developed three measures of rhythm that can be extracted purely on acoustic grounds, depending only on the ability to distinguish periods of vocalic-ness and non-vocalic-ness (i.e. vocalic and consonantal intervals). These measures are: i) the standard deviation of vocalic intervals (ΔV); ii) the standard deviation of intervocalic (i.e. consonantal) intervals (ΔC); and iii) the proportion of total utterance duration which comprises vocalic intervals (%V). Thus, ΔV and ΔC effectively measure how much global variation there is in the duration of vocalic and consonantal intervals, respectively, while %V measures how vocalic an utterance is, the idea being that the percept of rhythm is conveyed by the temporal co-ordination of vocalic intervals, and these measures help quantify the degree of regularity in this co-ordination. Rate-normalized versions for ΔC and ΔV , namely Varco-C and Varco-V, were developed later (by Dellwo 2006 and White/Mattys 2007a respectively).

Around the same time, but independently from Ramus and colleagues' work, Low and colleagues (Low/Grabe/Nolan 2000; Grabe/Low 2002) developed an alternative set of rhythm metrics, based on their Pairwise Variability Index (PVI) that Nolan had proposed for Low's (1994) MPhil (Master of Philosophy) research. This calculates the difference in duration between a pair of successive measurements, taking the absolute value of the difference and dividing it by the mean duration of the pair. While also based on vocalic and consonantal intervals, these differ from Ramus/Nespor/Mehler's metrics – which capture global variations in duration – in that they quantify the variability between successive pairs, thus capturing the local alternations between e.g. lexically stressed and unstressed syllables. A speech-rate-normalized version for vocalic intervals, nPVI-V was also developed, first suggested by Deterding (1994), following Low's original raw PVI paper (1994).

Both sets of metrics were applied to a large set of languages with varying degrees of success in showing distinctions between claimed prototypically 'syllable-timed' and 'stress-timed' languages. Spanish and Italian were shown to be differentiated by these metrics from e.g. Dutch and English, with a higher proportion of vocalic intervals and lesser durational variability. Perhaps partly because of the predominance of French, Spanish and Italian in these cross-linguistic comparisons, the aim of which has largely been to test the validity of the metrics and advance ideas about the nature of speech rhythm, Romance as a language *family* has arguably come to be thought of as 'syllable-timed'. This is problematic as it glosses over the wide phonological, prosodic and phonetic variation in Romance languages and dialects, largely ignoring those that do not fit neatly into the syllable-timing category such as European Portuguese and Romanian. It also smoothes over significant regional variation even in those languages which have been the object of frequent investigation, as we shall outline further on. An inherent danger in any kind of typological classification is that, in the rush to categorize, it may fail to identify subtle, or even not so subtle, distinctions.

Alternative approaches have critiqued linear segmental models, proposing a hierarchical basis to temporal organization and hence rhythm. In their 'adaptive oscillator model', Port and colleagues (Port/Cummins/Gasser 1995; Cummins/Port 1998; Cummins 2002) view speech rhythm as emanating from the hierarchical organization of temporally coordinated prosodic units, and the coupling of oscillators at different prosodic levels. Similarly, Barbosa (2002) proposes a coupled-oscillator system for syllables and stress groups, and adapts McAuley's (1995) Entrainment model, originally developed for rhythm perception, for modeling rhythm production. The strength of coupling between the two oscillators is said to determine how 'stress-timed' a language is perceived to be. Barbosa later (2007) expands this model to include several more levels of dynamic coupling between linguistic and acoustic sub-systems. Zellner Keller (2002) also seeks to simulate rhythm through a temporal structure that harmonizes segmental, syllabic and phrasal layers. Implicit in these approaches is the importance of variable speech style and rate in generating a vari-

able strength of coupling between different levels. As such, they run counter to claims of strict typological classification of languages, and enable instead the modeling of variable rhythms within a single language, albeit with language-specific tendencies for any given rate and style.

Inspired by Cummins and Port's work (1998) on the coupling of oscillators at different prosodic levels, Bertinetto/Bertini (2008) approach rhythm in terms of languages differing in how vocalic and consonantal gesture are coupled in the articulatory flow, both at the intra-syllabic (or phonotactic) level and at the sentential level (Bertinetto/Bertini/Zhi 2012), where sentence prominences are said to play a crucial role. Following the observation that some languages permit a much larger segmental overlap than others, they distinguish between 'controlling' and 'compensating' languages. 'Controlling' languages, such as Italian, control the articulatory effort per segment, and hence have similar segmental durations; 'compensating' languages, like English, permit greater gestural overlap in unstressed syllables and hence less even durations. To quantify these differences, they transformed the raw PVI into what they call the 'Control/Compensation Index' (CCI), by dividing the duration of each vocalic or consonantal interval by its number of segments to account for phonotactic complexity.

Thus, by this second wave of research, although the idea of unit-based isochrony has been rejected, the idea of rhythm typology persists,¹ since typological classifications – albeit more blurry ones that are susceptible to performance factors such as style and rate – can emerge through an analysis of each of these properties. Nevertheless, the theoretical perspective is broadened. Firstly, in this second wave of research, the search for possible correlates of prominence organization and the ensuing rhythm percept is cast more widely. Secondly, it highlights the *complexity* and hierarchical nature of properties potentially contributing to the rhythm percept, and the significance of these being properties that persist throughout an utterance. In effect, the hypothesis attempts to capture differences in the degree to which languages use duration – and potentially other types of cues not captured in the duration-based metrics – to convey prosodic organization and prominence, at different levels, and proposes that these may be experienced in a synthesized, i.e. not purely piecemeal, way. Insofar as this treats speech rhythm as a construct composed of multiple parts and experienced through a stretch of connected speech (not as analyzed in an isolated word or two), it brings to the fore an aspect of speech which is commonly overlooked in favor of more localized phenomena. If we loosely define rhythm as alternation and repetition of events over a sequence, our analysis and indeed experience of rhythm must be principally concerned with speech as it is *in flow*, rather than as it is at an isolated slice. It is only over a relatively extended

¹ Grabe/Low (2002), for example, conclude on the basis of their data that a strict categorical distinction between stress timing and syllables timing cannot be defended, but a 'weak categorical' distinction can be made between some languages, while other languages cannot be classified as 'stress-' or 'syllable-timed' at all.

stretch of speech that the multitude and layered nature of properties contributing to speech rhythm can be manifested.

In more recent years, in what Post/Payne (2018) characterize as the ‘third wave’ of rhythm research, there has been a proliferation of rhythm-related research, applying the metrics to a wider range of languages, in different linguistic contexts, looking at dialectal variation within language (e.g. White/Payne/Mattys 2009; White/Mattys/Wiget 2012), speech styles (e.g. Payne et al. 2010, who compare adult-directed speech with child-directed speech), L1 and L2 acquisition (e.g. Stockmal/Markus/Bond 2005; Mok/Dellwo 2008; Li/Post 2014) and speech disorders (e.g. Liss et al. 2009). It has also brought the further modification of metrics, for example to normalize for speech rate (e.g. VarcoV and VarcoC) or their application to other units such as feet or the accental phrase (Dellwo/Wagner 2003; Dellwo 2006; Ferragne/Pellegrino 2004; Nolan/Asu 2009; White/Mattys 2007a; Obin et al. 2012).

At the same time, while closer scrutiny of the phenomenon in both perception and production has brought a greater understanding of the multiple parts at play, and of the complexity of the object of study, it has also ushered in dissatisfaction with and criticisms of previous approaches, particularly with regard to assigning languages to a particular rhythm class. There has also been a questioning of the adequacy, and even legitimacy, of metrics in capturing speech rhythm (cf. Arvaniti 2009; 2012; Rathcke/Smith 2015). Metric scores are noted to vary widely over different types of elicitation, different material within a single language, different speakers and speech contexts, with the result that nothing resembling robustly predictable scores for languages, let alone for putative rhythm *classes*, can be reliably established. The documented inconsistency in the metric-generated scores has led some scholars to question or even reject outright the use of interval-based metrics, either as lacking in explanatory power, or indeed, more fundamentally, as mistaken in conceptual approach. Some have questioned whether the notion of speech rhythm is even truly meaningful, arguing that the impression of rhythm in speech is a metaphorical extension of a phenomenon that exists externally to language (e.g. Nolan/Jeon 2014), or that what appears to be the rhythmic differentiation in perception is in fact more straightforwardly the perception of difference in key prosodic parameters (White 2014).

As Post/Payne (2018) argue, some of this criticism of metrics arises from an implicit, but unnecessary, assumption that the metrics are intrinsically tied to the rhythm class hypothesis. As a consequence, since the idea of rhythm classification itself has mostly been discredited, the metrics themselves may appear discredited by association. In contrast, Post/Payne (2018) argue that the metrics should be taken for what they are, i.e. a neutral tool for measuring and comparing certain timing characteristics that are shaped both by language-specific phonological, prosodic and phonetic attributes and by performance-specific attributes, many or all of which may contribute to the percept of rhythmic difference. There is no necessary implication of invariable categories in the speech stream or even how these are perceived, or

indeed that the percept is based on durational attributes alone. They undoubtedly, and probably inevitably, provide an incomplete picture of speech rhythm in production, and are to be carefully interpreted for a specific context. So, spontaneous speech in language X cannot, without due caution, be easily compared to formally elicited speech in language Y. Caution, in particular, must be paid to the equivalence or non-equivalence of labeling decisions that arise from different styles and rates of speech, such as decisions on whether to label a portion as a vowel or glide (and indeed whether to label glides themselves as vocalic or consonantal). Inconsistency in such decisions also renders the quantitative comparison across studies, even for comparable speech styles, as somewhat opaque to interpretation.

Beside any possible inconsistency in the implementation of given phonological material, variation in the phonological material itself is also important. As Prieto et al. (2012) point out, absolute metric values are not reliable absolute measures of rhythm characteristics, and so caution is needed in any comparison across languages. They find, for example, that the consonantal measures are almost wholly dependent on the phonotactic properties of the particular materials being used, while among vocalic measures, %V is at least partly dependent on these properties, but also sensitive to higher order prosodic timing properties and so needs to be interpreted with some caution. In contrast, the measures of vocalic variability, ΔV , nPVI-V and especially VarcoV, appear to be the most robust in capturing timing differences independent of phonological material. Insofar as local timing properties, shaped by e.g. vowel reduction and phonotactics, vary cross-linguistic and thus may contribute to cross-linguistic differences in the rhythm percept, all the metrics may have something to say about perceived rhythm. However, these properties need to be carefully controlled for. Even for the same speaker, adopting the same style of speech, certain metric values can differ merely as a result of different lexical (and hence phonological and phonotactic) material. Thus, either sufficiently long stretches of speech, containing material that is representative of what is broadly typical in terms of phonotactics or a mixture of elicitation techniques (cf. Gabriel/Kireva 2014a and Gabriel/Stahnke/Thulke 2015) should be used.

Local phonological and phonotactic properties are not the only source of temporal variation. Variation in rhythm, at least as measured by the rhythm metrics, can arise between closely related varieties of what is thought of as a single language. For example, Singapore English, which Tongue (1974) had described as sounding relatively 'syllable-timed', was subsequently found to have lower vocalic variability (using nPVI) than Southern Standard British English (Low/Grabe/Nolan 2000), although the difference was subtler than that between Spanish and English (Grabe/Low 2002). A similar finding was made for Taiwan English (Jian 2004). A larger difference in VarcoV and %V was found between Southern Standard British English and Welsh Valleys English (White/Mattys 2007b), also described as sounding more 'syllable-timed' (Mees/Collins 1999); Welsh Valleys English scores lay somewhere between Southern Standard British English and Castilian Spanish. Variation in rhythm has also been

observed between different registers of the same variety of a language by the same speaker, for example switching between adult-directed speech (ADS) and child-directed speech (CDS). Payne et al. (2010) measured vocalic and consonantal variability in the ADS and CDS of English, Spanish and Catalan speakers, and found CDS in all three languages to be more even-timed for both vocalic and consonantal intervals than in the ADS of the same speakers.

The second wave of research arguably focused our attention too much on local timing characteristics emerging from phonotactics and word-level prominences. Prieto et al. (2012), in their study of English, Spanish and Catalan, show how differences in prosodic timing phenomena affect the metrics and argue that these make a fundamental contribution to the rhythm percept. As they note, the view that the durational correlates of prominence play a specific role is not new (cf. Fant/Kruckenbergh/Nord 1991; Beckman 1992; Cummins/Port 1998; Barbosa 2002). Differences in certain metrics between English on the one hand and Spanish and Catalan on the other, *when syllable structure was held constant*, were attributable to the far greater durational marking of prosodic heads and edges in English. Certain metrics (%V, and the non-normalized measures of vocalic variability, ΔV and rPVI-V) were strongly affected by syllable structure, and indeed differences in these metrics between e.g. English and Catalan/Spanish reflect differences in phonotactics and distributional statistics for certain syllable structures. Other metrics, notably nPVI-V and VarcoV (i.e. the rate normalized measures of vocalic variability), were not affected by syllable structure and yet nevertheless showed strong cross-linguistic differences between English and Catalan/Spanish. Thus, while phonological factors such as phonotactics and vowel reduction may contribute to differences in rhythm percept, phrase-level prosodic timing properties also play an important role. As Prieto et al. (2012, 699) note: “Rhythmic organization could be understood as the perceptual result of a finely organized multisystemic durational system that differs across languages.” It is curious to note that often local timing systems group with phrase-level timing systems (i.e. English has both complex syllable structures and vowel reduction, and phrase-level lengthening cues), though the one does not necessarily entail the other, and as we shall see, they may not correlate.

Critical scrutiny of the claims of both the first and second waves of rhythm research reveals that speech rhythm, as subjectively experienced, firstly is not rigidly cast – performance factors in any given speech context will alter the rhythm – and secondly cannot be pinned down by a small set of factors in any language, or probably even by the same factors across languages. Duration may be an important component in the signaling and structuring of prominence in a language like English, while pitch may play a more important role in another, and indeed the interaction of pitch and duration may vary cross-linguistically in this role (cf. Arantes/Barbosa 2006; Cumming 2010). A broader set of phonological and prosodic structures needs to be considered, e.g. durational marking of phrasal prominences and edges (cf. Prieto et al. 2012), as well as non-linguistic factors that influence the implementation of those structures

(e.g. speaking style), in order to identify and understand any cross-linguistic differences. As Post/Payne (2018, 132) summarize:

speech rhythm is *multi-systemic*, since it involves the complex interaction of structural properties of linguistic systems; it is *multi-componential*, since it encompasses the linguistic component as well as (neuro)biological and performance components [...]; but it is also *multi-parametric*, since the organization and contrasting of rhythmic events in time is signaled by multiple acoustic parameters, including duration, but also fundamental frequency and intensity.

It is in the spirit of this framework that the research on rhythm in Romance varieties is surveyed and evaluated.

3 Studies on rhythm in Romance varieties

This section presents a detailed overview of rhythm research in six major varieties of Romance: Italian, Spanish, Catalan, French, Portuguese and Romanian – and some of their sub-varieties. Though very closely related, these varieties are said to differ in their rhythmic type. Italian, Spanish and French are conventionally described as ‘syllable-timed’, Romanian and European Portuguese as ‘stress-timed’, Brazilian as ‘mixed’, and Catalan as ‘intermediate’ in its rhythmic type. Closer inspection reveals these simplistic labels to be somewhat problematic, especially when regional variation is included. Consideration of longer domain prosodic timing properties yields a clearer picture of the differences between varieties, and of conflicting results within a given variety, further underlining the complexity of the phenomenon under investigation.

3.1 Italian

Italian – at least the standard variety – has long been described as ‘syllable-timed’ in its rhythm percept, and this classification has also been extended to northern varieties (Russo/Barry 2008). Indeed, some notional form of standard Italian has often been included in studies investigating the idea of rhythm *classes*, as a canonical ‘syllable-timed’ language (Ramus/Nespor/Mehler 1999; Dauer 1983; Ramus/Dupoux/Mehler 2003; Bertinetto 1981; Schmid 2014), or *controlling* language (cf. Bertinetto/Bertini 2008, at least at the intra-syllabic level). As we have seen, among the often-cited characteristics of so-called ‘syllable-timed’ languages are that they have a smaller variety of syllable types, and less evidence of vowel reduction, and these two characteristics purportedly lead to syllables being more similar to each other in duration and a larger proportion of utterances being vocalic in nature. With respect to syllable type, CV syllables, uncontroversially, *do* dominate in Italian: around

55–60% of syllables are CV (Schmid 1999 and Bortolini/Zampolli 1979, respectively). The phenomenon of vowel reduction, however, is not categorically present or absent. Stress-mediated variability in vowel duration is more evident in Italian than in, for example, Castilian Spanish,² another poster language for ‘syllable-timing’, which in turn is different from Argentinean Spanish (Gabriel/Kireva 2014a; Kireva/Gabriel 2015a). Italian vowels are phonetically longer in stressed open syllables (*fata* ['fa:ta] ‘fairy’; *lato* ['la:to] ‘side’) than in closed syllables (*fatta* ['fat:a] ‘do_{PTCP,F}’; *pasto* ['pasto] ‘meal’), or in unstressed syllables, and this is especially true for paroxytonic words (D’Imperio/Rosenthal 1999). Perceptually, it has been claimed that longer vowel duration is the most important cue for lexical stress in Italian (Bertinetto 1981). There is also evidence of a small degree of phonetic shortening and centralization of vowels in unstressed syllables (Savy/Cutugno 1997), although this is of a limited nature, particularly with respect to ‘stress-timed’ languages such as English (cf. Bertinetto/Fowler 1989, who in a perceptual study find that Italian listeners are not very tolerant of unstressed vowel shortening). We would therefore expect vocalic variability scores (e.g. ΔV , VarcoV) to be higher for Italian than for Spanish (cf. also Russo/Barry 2004), and this appears to be the case (Ramus/Nespor/Mehler 1999; Ramus/Dupoux/Mehler 2003). With regard to the vocalic proportion of speech (as measured by %V), while this would be expected to be high in a language dominated by CV syllables, as White/Payne/Mattys (2009) have argued, the presence of geminate consonants, unique to certain varieties of Italo-Romance, including Standard Italian, should lead us to predict a *lower* %V score than would otherwise be expected for a Romance language, in addition to potentially leading to greater durational variability in consonant intervals. However, the evidence, at least that from metric-based studies, does not robustly support this. In Ramus/Nespor/Mehler (1999) and Ramus/Dupoux/Mehler (2003), %V is also (slightly) higher for Italian than for Spanish.

One problem with trying to ‘read’ the metrics is that they are sensitive to multiple factors, and also across metrics to different things. It is therefore difficult to make definitive statements about relative perceptual effects based on the metrics, especially where they are contradictory and where differences are small. Another problem with making generic judgments about a particular language, whether that is Spanish or Italian, is that general investigations on speech rhythm have tended to gloss over which variety of a language has been used, or whether indeed this was even controlled for. That this could be a critical factor for studies of Italian is indicated by the fact that it has been suggested that southern varieties of Italian – at least mainland southern varieties – tend towards ‘stress-timing’ (cf. Grice et al. 2005; Russo/Barry 2004; Romito/Trumper 1993; Trumper/Romito/Maddalon 1991).

² As Schmid (2014) points out, unlike Spanish, Standard Italian – at least for some speakers – also has a smaller inventory of vowels in unstressed position than in stressed position.

Regional varieties of Italian are strongly influenced by co-existent Italo-Romance varieties. These, while usually referred to, in sociolinguistically normative terms, as Italian dialects (to differentiate from Italian ‘proper’), are the autochthonous varieties that have been continuously used and are descended directly from Latin, so are sister dialects to Italian. Less research has been carried out on the prosodic and general rhythmic properties of these Italo-Romance varieties, with the notable exception of Schmid (1999; 2014), who conducts a typological comparison of mostly syllable-level characteristics (e.g. syllable complexity and vowel reduction). He concludes that northern varieties (‘dialects’) are more typologically marked in terms of their vowel systems and syllable structure, with the exception of Venetan dialects, which pattern more closely with Tuscan, Neapolitan and Sicilian dialects in this respect. He reports that these ‘syllable-based’ dialects show a higher %V than those he terms as rhythmically ‘word-based’, e.g. Torinese, Friulian and Milanese (though with %V in Sicilian at the lower end of this group). Consonant interval variability is also low in Venetan. In terms of vocalic variability, the PVI is sensitive to vowel reduction in Neapolitan. The survey of dialects, then, does not produce a straight-forward continuum of greater ‘stress-timing’ indices from north to south, largely because it is focused almost entirely on syllable structure, and as others have pointed out, timing properties at the level of the phrase are likely to play an important role in the rhythm percept, and this may or may not be visible in all the metrics.

While these claims have not, to our knowledge, been tested perceptually, certain phonetic, phonological or prosodic features of southern varieties would make them likely contenders of generating a so-called ‘stress-timing’ percept. In some southern varieties of Italian, e.g. Neapolitan, reduction processes of word-final unstressed vowels increase the contrast between stressed and unstressed syllables (Russo/Barry 2004). This is reported to be a gradient and complex phenomenon, which not only includes shortening that is variable by degree, but also non-durational processes of weakening such as centralization, devoicing and deletion. Where vowels are elided, not only does this create more syllables of the non-CV type and increase %C (thereby reducing %V), it also contributes to the complexity of consonant clusters, and hence to increased duration, and variation in duration, of consonantal intervals. This process of creating heavy or super-heavy syllables is not licensed in Standard Italian (which is based on a central variety of Italo-Romance), potentially marking a pivotal factor in the divergence of rhythmic percept between the standard and some southern varieties. As we discuss below, we find a similar process of consonant clustering in European Portuguese, which stands in contrast to Brazilian Portuguese where clusters may be simplified by vocalic intrusion (Frota/Vigário 2000; 2001; Frota/Vigário/Martins 2002).

A further factor that may contribute to the rhythm percept, and which differs markedly between varieties of Italian (and between Italian and other Italo-Romance dialects) is the variable phonological presence, and variable phonetic manifestation, of geminate consonants. As with vowel elision leading to the creation of clusters, this

also potentially contributes to lesser or greater variability in consonantal intervals, and variation in the proportion of consonants in any given utterance, or %C. Standard Italian³ and central and southern Italo-Romance varieties have lexical geminates, although the incidence may be higher in some southern Italo-Romance varieties, where /b/ and /dʒ/ tend to be geminated intervocalically or between a vowel and a sonorant. Regional varieties of Italian may be heavily influenced by those Italo-Romance varieties that co-exist locally with Italian, leading to a continuum of *italiano popolare* and regionalized Italian forms, such that incidence and manifestation of lexical geminates in the non-Italian Italo-Romance variety can surface in Italian. Hence, in southern varieties of Italian, a word like *roba* ‘things, stuff’ can be produced with a geminate [bː]: [rɔbːa], and the duration of geminates is typically phonetically longer than in Standard Italian. By the same token, the absence or shortening of lexical geminates in northern Italo-Romance varieties may be evident also in northern regional varieties of Italian that co-exist with these non-Italian varieties (Bertinetto/Loporcaro 2005). However, the influence of non-Italian varieties on how Italian is produced is sensitive to a multitude of sociolinguistic and discourse factors. In more controlled speech, northern speakers – aware, from orthography, of lexical geminates in Standard Italian – may inadvertently exaggerate this contrast, through greater durational marking or other means such as pre-aspiration (cf. Stevens 2011).

The situation is further complicated by the presence of post-lexical processes of gemination (known in Italian as *raddoppiamento (fono)sintattico*, RS, ʔ18 Italian) in Standard Italian (as spoken in the central and southern regions of Italy) and central and southern varieties of Italo-Romance (Loporcaro 1997). In the standard (in its idealized form), there is a productive process of word-initial consonant gemination after oxytonic words (e.g. *virtù palese* [virtuˈpːaleze] ‘obvious virtue’) and a finite set of lexical items that trigger gemination in the first consonant of a following word (e.g. *a Parigi* [apːaˈridʒi] ‘in/to Paris’). Italo-Romance varieties in southern Italy have only the latter form of RS (with varying sets of non-oxytonic trigger words), and the Italian spoken in the same areas as these will typically also show this form of RS only. Degree of lengthening varies as a function of variety, and as Payne (2000; 2005) has shown, at least for central varieties of Italian, also as a function of consonant type and position in relation to lexical stresses. Neither northern varieties of Italian nor northern Italo-Romance varieties have post-lexical gemination of either kind. Therefore, for what is ostensibly the ‘same’ language, and for a production of an utterance containing the ‘same’ sequence of lexical items, as a result of variation in phonetic and phonological processes, there can be considerable differences in the vocalic vs. consonantal composition of the phrase, and in variability of consonantal and intervocalic intervals. These differences can be between two speakers from dif-

³ In its somewhat idealized form, since Standard Italian is very rarely spoken without some form of regional influence.

ferent dialectal backgrounds, or from the same dialectal background but with different degrees of dialectal influence on their Italian, or between two productions by the same speaker in different sociolinguistic contexts.

It has been suggested that the lengthening of vowels in non-final open stressed syllables, and the lengthening of consonants following vowels in final open stressed syllables (productive RS) both stem from a unified bi-moraic constraint on all stressed syllables (cf. also Vincent 1988 for his analysis of stress-conditioned RS in the development from Latin). Schmid (2014) points out that this cannot ‘explain’ the presence of geminates entirely, since geminates also occur after unstressed vowels. At the same time, it is notable that lexical geminates are also phonetically longer, and the geminate contrast phonetically greater, after a stressed vowel (Payne 2000; 2005). Thus, while it may not be exclusively so, phonetic duration is nevertheless closely associated with the marking of prosodic prominence in (Standard) Italian.

However, as we have already emphasized, segmental, syllable structure and lexical stress considerations are only one aspect to be considered. The multi-parametric, multi-systemic framework espoused in the introduction advocates for the need to look at other properties of speech, in particular the structure of the wider prosodic domain, including the marking of phrasal prominence and edges. As discussed, Prieto et al. (2012) show the importance of phrase-level timing properties in their study of Spanish, Catalan and English. With regard to Italo-Romance varieties, there is evidence for variation in this level of prominence marking, e.g. Frota et al. (2007) found particularly strong marking of IP-boundaries in the Italian of Neapolitan speakers, one of the southern varieties of Italian claimed to be ‘stress-timed’. The importance of examining the gestural timing properties at different levels of organization echoes the approach that underpins the controlling/compensating model (Bertinetto/Bertini 2008), in turn inspired by Cummins/Port’s (1998) model. While shown to be strongly ‘controlling’ at the intra-syllabic level, even Pisan Italian showed greater tendency towards ‘compensating’ behavior at the sentential-accentual level, especially for spontaneous speech (Bertinetto/Bertini/Zhi 2012), indicating a possible non-conformity between different levels.

Although the claims need to be substantiated through perceptual testing, a handful of speech production studies have investigated temporal and non-temporal properties in different varieties of Italian. The first of these, Barry et al. (2003), conducted a comparison of pre-recorded and pre-labeled spontaneous speech from two southern varieties (from Bari, in Puglia, and Naples, in Campania) and one central Italian variety (from Pisa, in Tuscany).⁴ Though the findings from this study were inconclusive, this may be due to differences in the way the recordings were labeled, and also differences in speech rate.

⁴ In a wider comparison with Bulgarian and German.

A later, more controlled study (White/Payne/Mattys 2009) was conducted on speech from a northern variety (from Padova, in the Veneto) and a 'lower' southern variety (recorded in Palermo, in Sicily), applying the two metrics shown to be most discriminative between languages and between varieties of English (White/Mattys 2007a; 2007b), %V and VarcoV. They also applied VarcoC, to examine the potential impact of differences in consonant gemination between northern and southern varieties. In addition to these rhythm metrics, they conducted two further analyses: i) of higher level prosodic timing, comparing degree of phrase-final lengthening, and ii) of spectral vowel reduction in unstressed vowels. Vocalic variability in both varieties was found to be higher than reported Spanish scores, but aside from a difference in speech rate (with Sicilian Italian significantly faster), and a tendency for consonant variability to be higher in Sicilian Italian, they found no statistical difference, for any of the metrics, between Venetan and Sicilian. However, they report a far greater and significant effect of phrase-final lengthening in Sicilian (where syllables were 104% longer finally than in other positions, compared with Venetan, where they were only 38% longer), a degree of difference comparable to that between English and Spanish. Evidence was also found of unstressed spectral vowel reduction in both varieties, but especially in Sicilian Italian, where vowels were differentially more centralized in pre-nuclear position. Thus, Sicilian Italian marks different parts of the intonational phrase more robustly than Venetan Italian, using both durational and spectral means. These results suggest a greater prosodic contrast in Sicilian Italian, which the metrics used failed to detect. The authors note that PVI metrics may prove more sensitive to this kind of contrast, capturing as they do successive alternations of prominence. They advocate "further investigation of a broader spectrum of standard Italian varieties and, for comparison, dialects, [...] to provide a clearer picture of rhythm variability in Italian" (White/Payne/Mattys 2009, 152), and perceptual testing to determine whether listeners distinguish varieties based on these differences in prosodic marking.

3.2 Spanish

As has been mentioned, Castilian Spanish has traditionally been presented as prototypically 'syllable-timed' in comparative studies of rhythm (Ramus/Nespor/Mehler 1999; Grabe/Low 2002). The predominant syllable type is CV, and overall there is a low degree of syllable complexity. While there is some lengthening associated with lexical stress (or, alternatively put, a degree of unstressed vowel reduction) in Spanish, particularly in word-final position, this has been found to be small (e.g. Delattre 1966; Hualde 2005). Ortega-Llebaria/Prieto (2007) report stressed syllables to be, on average, 7 ms longer in penultimate position, and 15ms in final position. This difference is smaller than in Italian, and a lot smaller than in English (Turk/White 1999). Nevertheless, despite its small size, Spanish speakers were found to use this

difference as a cue to stress (Ortega-Llebaria/Prieto 2011), which reveals also the limitations of using cross-linguistic comparisons in assessing the perceptual weight of such timing variations. This raises a question about subjectivity of the rhythm experience: if stress-related vowel duration alternations are very small in Spanish, this may contribute to the strong percept of it as being even-timed by speakers of e.g. English, or even Italian (which lengthens stressed vowels more), but Spanish speakers appear to have a more heightened awareness of these small differences, and therefore are arguably less likely to hear it as durationally 'flat'.

With regard to phrase-level temporal variations, these were also found to be relatively small (Ortega-Llebaria/Prieto 2011), with word-final syllables on average only 6 ms longer, when pitch-accented, and no lengthening found in penultimate syllables. Final lengthening is reported to be also somewhat inconsistent: Frota et al. (2007) found only 40% of phrase boundaries to be marked by final lengthening (compared with 100% of boundaries for Catalan, in the same study).

Prieto et al. (2012), found consistently much lower vocalic variability in Spanish (and Catalan, cf. below) than in English, for both nPVI and VarcoV. The focus of their study was to test for cross-linguistic differences over and above phonotactic differences. Since the differences prevailed even when syllable structure was controlled for, they conclude that these timing differences are relatively – though not entirely – independent of syllable structure and reflect stable differences cross-linguistically in prosodic timing phenomena. The authors attribute these differences to differences in lengthening effects at the level of the phrase. This is first seen with lengthening of accented syllables, with much larger effects found in English than in Spanish (and Catalan) (confirming qualitative observations from Hualde (2005, 273). In a comparison between Spanish and Catalan, they found a tendency for Catalan to show more lengthening on accented syllables and nuclear stressed syllables. It is also seen with lengthening of syllables at the end of intermediate and intonational phrases, which is consistently greater in English than in Spanish (and Catalan, cf. below). The differences between Spanish and Catalan were subtler, but Spanish showed less final lengthening than Catalan. For all indices therefore, Spanish – at least the Castilian variety – proved to show the least amount of marking of prosodic prominences and boundaries, and would appear to stand out among Romance varieties in its relative lack of durational variability, earning its traditional status as a prototypical 'syllable-timed' language.

As with Italian, timing properties are not consistent across varieties of Spanish, however. There have been several studies on different varieties of Spanish, describing characteristics and presenting metric scores that point more towards uneven timing. In many cases, the greater unevenness in temporal properties may have arisen through the effect of contact with other languages, be these other Ibero-Romance varieties, other varieties of Romance more broadly, or languages beyond Romance. Carballo Calero (1979) describes Galician Spanish (presumably due to the influence of the co-existent Ibero-Romance variety Gallego) as having a greater degree of vowel

reduction in unaccented syllables (e.g. *A Coruña* > *A Cruña*), and greater pitch variation on accented syllables than in Castilian Spanish, especially in the southwest of Galicia. Kireva/Gabriel (2015b) examine another contact variety of Spanish shaped by contact with another Ibero-Romance variety, Portuguese, spoken by bilingual Spanish and Portuguese residents of a border town, Olivenza, in present-day Spain but formerly in Portugal. They find evidence that, in certain respects relating to both phonotactic and higher-level prosodic properties, Olivenza Spanish has converged with the local Olivenza variety of Portuguese, for example in its non-systematic reduction of unstressed vowels, and increased final lengthening (at least in interrogatives). Rhythmically, this is manifest in the higher vocalic variability of this variety than for Castilian Spanish. As one would expect, in turn, Olivenza Portuguese also shows convergence towards Spanish, showing less incidence of unstressed vowel deletion than in Standard European Portuguese.

For a variety shaped by contact with a non-Iberian Romance variety, Gabriel/Kireva (2014a) and Kireva/Gabriel (2015a) look at the prosodic transfer of historically Italian features in the Porteño variety of Spanish, as spoken in Buenos Aires (cf. also Colantoni/Gurlekian 2004). They report that Porteño Spanish exhibits dramatically higher vocalic variability (VarcoV and nPVI-V) and a higher proportion of vocalic material (%V) than Castilian Spanish, patterning more like Italian. Further analysis reveals that this is mostly due to greater lengthening of accented and pre-boundary syllables, also a feature of Italian. Kireva/Gabriel (2015a) confirm these findings in a later study also for semi-spontaneous speech. Their findings overall support McMahon's (2004) transfer hypothesis whereby L1 prosody features in the speech of Italian immigrants were transferred into their L2 Spanish. Elsewhere in Latin America, O'Rourke (2008) describes divergences from 'syllable-timing' for Peruvian Spanish (Lima and Cuzco – possibly under the influence of a non-Romance language, Quechua, especially for Cuzcan Spanish), and Nolan/Asu (2009) point more generally to differences between Peninsular Spanish and Mexican Spanish.

Contact between Spanish and another non-Romance language is investigated by Gabriel/Kireva (2014b), in their study of Bulgarian Judeo-Spanish. Standard Bulgarian is characterized by complex syllable structure and unstressed vowel reduction, both spectral and durational (cf. Dimitrova 1998; Sabev/Payne 2019) and is typically regarded as having 'stress-timing', though less markedly than English (Dimitrova 1998). Gabriel/Kireva (2014b) report evidence of the influence of Bulgarian in both of these features. Firstly, Bulgarian Judeo-Spanish presents unstressed vowel reduction, unlike other varieties of Judeo-Spanish, and unlike Castilian Spanish, but like Bulgarian. Secondly, in their greater degree of vocalic variability, especially for nPVI, Bulgarian Judeo-Spanish rhythmic properties are closer to those of Standard Sofian Bulgarian, and pattern almost identically to those of the Bulgarian spoken by the same speakers.

Broadly speaking, cross-variety differences in prosodic timing result in differences that may be captured by the rhythm metrics. However, beyond auditory impressions,

what this means perceptually is not known, and further investigations are needed to ascertain whether the reported differences in production translate into robust perceptual differences, across different speech registers and rates.

3.3 Catalan

Catalan has long occupied a special place in the research on speech rhythm, having famously been claimed to be an ‘intermediate language’ in the rhythm classification stakes, nestling somewhere between the categories of ‘syllable-timing’ and ‘stress-timing’, with properties supposedly belonging to both types. The question of how to model or even categorize this intermediate, or mixed, percept has eluded any type of answer, plausible or not, as Prieto et al. (2012) point out. The principal motivation for this on-the-fence classification comes from predictions based on the phonologically-derived hypothesis of rhythm, since Catalan is distinct for showing ‘mixed’ phonological properties (Nespor 1990). A set of features marks it out as different from Spanish. Although the predominant syllable type is CV, Catalan shows greater syllable complexity than Spanish, and a higher proportion of closed syllables, partly as a result of historic loss of final unstressed vowels (e.g. Sp. *caballo* vs. Cat. *cavall* ‘horse’). Catalan also has stress-related vowel reduction, whereby the seven-vowel system is reduced to only three in unstressed position (cf. Mascaró 2002).

While overall the rhythm metrics for Catalan have tended to place it close to Spanish (Ramus/Nespor/Mehler 1999), and usually roughly within the general ‘syllable-timing’ zone, there has been contradictory evidence about its classification, depending on the metrics used (cf. Ramus/Nespor/Mehler 1999; Low et al. 2000; Gavalda-Ferré 2007; Payne et al. 2012; Prieto et al. 2012), with some measures (notably nPVI-V and VarcoV) indicating a strong similarity to Spanish in its marked distinction from English, and others (notably %V and ΔV) indicating differences with Spanish. While contradictory results do not naturally uphold the ‘intermediate’ hypothesis, they have long pointed to the need for closer analysis, especially knowing that different metrics are sensitive to different factors.

While the metrics do not paint a straightforward picture, neither do they provide any evidence for Catalan clustering with so-called ‘stress-timed’ languages. Given the systematic processes of vowel reduction in Catalan, we might expect greater difference. However, as Prieto et al. (2012) and others (Gavalda-Ferré 2007; Ortega-Llebaria/Prieto 2011) show, vowel reduction is only very weakly marked by duration, and is correlated instead primarily with vowel quality changes. Gavalda-Ferré’s study makes a very striking comparison between the Eastern Catalan dialect, which has a full system of vowel reduction, and the Western Catalan dialect, which has a very restricted system, finding no rhythmic distinction (at least as temporally defined) between the two.

Nevertheless, certain metrics do reveal a moderate difference between Spanish and Catalan, with Catalan scoring, e.g. more highly for nPVI-V and VarcoV (Payne et al. 2012; Gavalda-Ferré 2007). We can attribute these partially contradictory scores to the differences displayed in Catalan at the level of prosodic timing. As mentioned in the section above on Spanish, while Catalan patterns very clearly with Spanish in having much smaller lengthening effects than English in the marking of phrase-level prominences and edges (Prieto et al. 2012), Catalan nevertheless shows a higher degree of prosodic lengthening than Spanish. The findings on Catalan are a very clear indication that vowel reduction does not have to entail durational variability and that durational variability does not solely or necessarily depend on segmental phonological and phonotactic properties of a language.

3.4 French

Though early statements concerning the existence of a rhythm typology described French as ‘syllable-timed’ (cf. Abercrombie 1967), investigations by e.g. Dauer (1983) and Wenk/Wioland (1982) clearly demonstrated a lack of syllable isochrony. Investigations into longer-domain prosodic timing have proved more successful in capturing rhythmic characteristics. Wenk/Wioland (1982) proposed that French be described as ‘trailer-timed’, with rhythmic groups regulated by the group-final syllable (as opposed to ‘leader-timed’, like English, where they are regulated by the group-initial syllable). Fletcher (1991) measured the duration of French prosodic groups comparable to English feet and, as well as confirming the lack of syllabic isochrony, found timing patterns in longer-domain units to be similar to languages purportedly of different rhythm type. Vaissière (1991a; 1991b) describes French rhythm as being multi-layered, with three separate perceptual units, the breath group, the prosodic word, and the CV syllable, any one of which can be the most salient, depending on speech style. The lack of lexical stress means that prosodic-group boundaries can be particularly important, leading Vaissière (1983; 1991b) to label French as a ‘boundary language’, compared with a ‘stress language’ such as English, where lexical stress competes with final lengthening as the prosodic group’s most salient feature. Wagner (2007), using a technique for showing on which prosodic level rhythm appears for a specific language, argued that French shows a more phrase-global rhythm than languages such as German or English.

Nevertheless, the syllable in French may in itself be particularly salient due to the relative uniformity of its structure, e.g. it contains little vowel reduction and is mostly CV, and as a result of there being no lexical stress. Indeed, many investigations using the rhythm metrics have shown low durational vocalic and consonantal variability (e.g. Grabe/Low 2002; Ramus/Nespor/Mehler 1999; White/Mattys 2007a). While V% for French is close to that of Spanish (both being high), vocalic variability

is somewhat higher than in Spanish. This presumably reflects the higher degree of phrase-final lengthening than in Spanish (Delattre 1966). When combined, these properties cohere with the view that French is ‘less-stress-based’ (Dauer (1983) or more ‘syllable-timed’ (Grabe/Low 2002), rather than simply being more a ‘boundary language’ or ‘trailer-timed language’. Thus, as with other Romance languages, timing at the segmental level, heavily influenced by phonotactic structure and word-level prosody, fails to provide a complete picture of rhythm in French, or even explain the rhythm metric scores.

Until more recently, investigations into French rhythm focused on standard varieties. Obin et al. (2012) point out the limitation of the rhythm metrics for describing differences between standard, regional and contact varieties, and propose alternative measures based on timing (regularity of the accentual phrase) and tempo (articulation rate). For this they identified prominent syllables and accentual phrases, and use a set of metrics extended from the PVI measures (AP, rPVI, nPVI) to assess durational regularity in consecutive accentual phrases, along with articulation and speech rate. They compare two standard varieties (those spoken in Paris and Lyon), with two ‘weakly regional’ varieties spoken in Switzerland and Belgium but close to the French border (Geneva and Tournai), and two ‘strongly regional’ varieties (as spoken by L1 French speakers in Neuchâtel, in Switzerland, and Liège, in Belgium). They also include 3 contact varieties: as spoken by L1 Swiss German speakers in Neuchâtel, by L1 Sango speakers in Central African Republic, and by L1 Wolof speakers in Senegal. These L1s are distinguished by a range of prosodic properties, including properties affecting vocalic and consonantal intervals.

The authors report that the traditional rhythm metrics (based on segmental intervals) fail to group standard, regional and contact varieties in the predicted way. For example, for %V, while regional varieties cluster together, standard varieties are very divergent from each other, as are contact varieties. For nPVI-V, standard varieties cluster, as do contact varieties, while regional varieties are very dispersed. The authors find, instead, that the longer-term timing measures more consistently align with expectations. Contact varieties show a slower speech rate and much higher variability in the duration of APs than non-contact varieties. Within the latter, standard and weakly regional varieties cluster in terms variability, while strongly regional varieties show much less variability. For speech rate, all regional varieties cluster together at a moderate rate, while standard varieties cluster at a much higher rate. They conclude that the long-term metrics are more effective in capturing similarity of properties within types of variety, and differences between types, along a continuum: standard varieties (slow tempo and moderately regular timing), to regional varieties (slow tempo and regular timing), to contact varieties (slow tempo and irregular timing).

3.5 Portuguese

An understanding of rhythm in Portuguese has been somewhat elusive, attracting interest not least because of claims of ‘stress-timing’ (i.e. not the claimed prototypical rhythm of Romance), or indeed of different types of ‘mixed’ rhythms. European varieties of Portuguese had traditionally been considered ‘stress-timed’ and Brazilian varieties either ‘syllable-timed’ or a mixture of ‘stress-timing’ and ‘syllable-timing’ (Abaurre 1981; Cruz-Ferreira 1983; Parkinson 1988; Carvalho 1989). However, these were based on impressionistic or phonological analyses alone, and later, empirical, investigations have modified these, revealing neither variety to be ‘stress-timed’ or ‘syllable-timed’. Applying the rhythm metrics developed by Ramus/Nespor/Mehler (1999), Frota/Vigário (2000; 2001) claim to confirm the classification of European Portuguese, at least in the standard variety (Standard European Portuguese), as a mix of ‘stress-’ and ‘syllable-timing’, with ‘stress-timing’ for consonants and ‘syllable-timing’ for vowels, but reclassify Brazilian Portuguese as ‘syllable-timed’ in the consonant domain and mora-timed for vowels. They argue that ‘mixed rhythm’ is not the same as ‘intermediate rhythm’, and claim that the existence of these languages with ‘mixed rhythms’ supports “the notion of rhythmic classes against the scattering of languages along a rhythmic continuum” (Frota/Vigário 2001, 247). However, with his coupled-oscillators approach, Barbosa (2000; 2002) demonstrates that rhythmic variation in Brazilian Portuguese is dependent on speech styles and rate, among other factors, casting doubt on the absolute nature of any fixed rhythmic type for a given variety.

At the level of segmental phonology, phonotactics and syllable structure, insofar as these make any contribution to the rhythm percept (see the section on Catalan for challenges to this assertion), the scope for rhythmic variation among varieties of Portuguese is not insignificant. European Portuguese is much more strongly characterized by unstressed vowel reduction than Brazilian Portuguese (Morais Barbosa 1965; Mateus/Delgado-Martins 1982; Câmara 1970) which instead is characterized by processes of vowel epenthesis (Câmara 1972; Silva Neto 1977). These have opposite effects on the sequences of consonantal and vocalic intervals, with vowel reduction in European Portuguese leading to the creation of more clusters (and hence variability in consonantal intervals, and less proportional vocalic-ness in an utterance), and vowel epenthesis in Brazilian Portuguese leading to a reduction in clusters and therefore consonantal variability, and theoretically an overall increase in vocalic-ness. Furthermore, vowel reduction in European Portuguese, when it does not lead to complete deletion, further enhances the contrast between stressed and unstressed syllables and, as Frota/Vigário (2000) note, stressed syllables are more closely associated to intonational pitch movements in European Portuguese than in Brazilian Portuguese (though cf. Barbosa 2008 for evidence of pitch accents being more frequent than commonly supposed in Brazilian Portuguese, at least in spontaneous speech). These properties point towards a percept of ‘stress-timing’ in European Portuguese, and ‘syllable-timing’ in Brazilian Portuguese.

In quantitative investigations of European Portuguese and Brazilian Portuguese, it was confirmed that consonantal variability is distinctly higher, and %V lower, in European Portuguese than Brazilian Portuguese (Frota/Vigário 2000; 2001). As already discussed in relation to Catalan, these measures are the ones most sensitive to phonological properties, phonotactics and syllable structure, and indeed European Portuguese and Brazilian Portuguese are characterized strongly by differences in these respects. With respect to vocalic variability, which Prieto et al. (2012) and others (e.g. White 2014) have argued may be a more significant distinguishing factor in the rhythm percept, in that they relate more closely to higher order differences in prosodic timing, Frota/Vigário's study (2001) suggests this measure does not robustly distinguish EP from BP. Interestingly, in a later perceptual study Frota/Vigário/Martins (2002) report that the two varieties cannot be distinguished when the speech stimuli are filtered in such a way as to leave only timing properties. A distinction can only be heard when intonational pitch information is also available. This may be because, despite distinct pitch-related differences between Brazilian Portuguese and European Portuguese – with Brazilian Portuguese having a richer pitch accent distribution, for example – any differences in the durational marking of pitch prominences and boundaries may not be so different. It is thus possible that rhythmic discrimination between the two varieties may depend on non-durational means of marking prosody. This would support claims (e.g. Arvaniti 2009) that rhythm is not merely a matter of timing, and the argument made by Post/Payne (2018) that a complete account of rhythm must be 'multi-parametric'.

The claim of 'mixed' rhythm (e.g. Frota/Vigário 2000; 2001) appears to be based on the fact that the vocalic variability scores align with neither the 'stress-timed' reading of consonantal variability and %V for European Portuguese, nor the 'syllable-timed' reading of these for Brazilian Portuguese. The evidence presented earlier in this chapter, that vocalic variability is sensitive to different kinds of timing phenomena related to prosodic structure, however, could go some way to explain these apparent anomalies. The categorical, classificatory status of rhythm, based on phonological and phonotactic properties, has been strongly contested, at least in the domain of production (cf. Arvaniti 2009). Categorical effects may still arise, under certain laboratory conditions, in the perceptual domain, though in 'real life' speech perception much will undoubtedly depend on other factors, including variability introduced by e.g., speech context, non-linguistic performance factors, the linguistic background of the speaker etc. But within the general enterprise of trying to understand the percept of rhythm there has been an implicit assumption that differences in the rhythm percept are *holistic*. Whether these differences are robust, categorical, scalar, highly variable etc. is a separate matter; the point is that languages or varieties of a language have impressionistically been described as sounding *different* in an ill-defined way but one which relates to sequential production. It is hard to conceive of what a mixed rhythm would sound like, and therefore what this means, except for its low amenability to being classified. While the rhythm percept may indeed emanate from a range of

properties in different components, it is not being claimed that listeners experience these distinct components individually.

What may be being referred to as ‘mixed’ may emanate from a non-alignment of ‘local’ and ‘global’ timing phenomena, with ‘local’ referring to phonological and phonotactic properties and ‘global’ to higher order prosodic structure (i.e. to different levels of prosodic timing in a hierarchical model). Within an oscillator model (cf. Cummins/Port 1998; Barbosa 2002), this would presumably have an impact on how the oscillators are coupled. While it is the case that in languages like Castilian Spanish or Standard Southern British English the local and the global tend to align, in the sense that Castilian Spanish has low variability and Standard Southern British English has high variability at both levels, theoretically the two levels do not have to align in this way, not least because they depend on quite different structural considerations.⁵ It may even be that the close alignment of these levels in languages that have received a particularly large amount of attention in the rhythm literature is partially to blame, if blame is the right word, for what is arguably an over-emphasis on phonological and phonotactic factors, an over-emphasis which has attracted criticism, arguably also overly-emphasized, regarding the attention to timing factors more generally. Castilian Spanish and Standard Southern British English have been viewed as prototypical perhaps because of an internal coherence between different levels of timing properties. In this regard, Portuguese – like many other languages – is more ‘tricky’ to pigeonhole. ‘Mixed’ may be the right term, if it simply means mixed timing tendencies.

These considerations may also throw useful light on the analysis of other varieties of Portuguese. Cruz (2013) and Cruz/Frota (2014) report greater evidence of ‘stress-timing’ characteristics for central and especially southern varieties of European Portuguese: low %V and high consonantal variability, with little difference for vocalic variability. However, they point out that, depending on the metrics used, these varieties again present contradictory results. Varco, in particular, appears to tell a different story from the metrics developed by Ramus/Dupoux/Mehler (2003). Interestingly, when Cruz/Frota (2014) also apply VarcoV as a measure of vocalic variability, they report a very low vocalic variability for southern varieties (lower than in Standard European Portuguese – no Varco scores are available for Brazilian Portuguese), which does not fit well with the ‘stress-timing’ analysis. We note here that VarcoV (and nPVI-V) were the only metrics to differentiate Catalan and Spanish, with a higher score in Catalan, explained by stronger durational marking of prosodic phrases. It is of empirical interest whether this raft of so-called ‘mixed rhythm’ scores reported across Portuguese varieties conceals important differences at different levels of the phonology. Portuguese rhythm

5 It would, however, be of interest to consider whether alignment of these two levels is more common and thus, in some sense, more “natural” (or “unmarked”), and, if so, whether diachronically there might be pressure to bring about alignment.

is clearly complex. A more stratified approach (“multi-systemic”), together with consideration of non-temporal parameters (“multi-parametric”), could help understand Portuguese rhythm more widely (cf. Post/Payne 2018).

3.6 Romanian

While much of Romanian phonology is ‘Romance’, in the sense of developing from Latin, there have been a large number of borrowings from other languages: it has been estimated that core native vocabulary accounts for around only 35% (Maneca 1966). Although a large number of these are relatively recent borrowings from other Romance languages, notably French (cf. Schulte 2009; Renwick 2012; for an overview), the influence of neighboring Slavic languages, as well as e.g. Albanian, Turkish, and Hungarian, whether through borrowings or otherwise, is noteworthy, and has affected Romanian phonology (cf. Rosetti 1954; 1986; Dimitrescu 1973; Hall 1974; Mallinson 1988; Petrucci 1999).

Probably due to non-Romance influences (rather than, say, through unstressed vowel deletion as in Portuguese), Romanian has fewer constraints on clusters than e.g. Italian or Spanish (Chitoran 2002, 14; Marin 2019), allowing up to three consonants in an onset, and up to two, and occasionally even three in the coda, with many permissible obstruent and sonorant clusters (*zdreañă* [ˈzdrɛantsə] ‘rag’, *jgheab* [ʒgɛab] ‘trough’, *lemn* [lemn] ‘wood’, *mreaǝ* [ˈmrɛaʒə] ‘toils’, *jneapăn* [ˈʒnɛapən] ‘juniper’, *strâmt* [strimt] ‘tight’). The output of a historical process of unstressed vowel reduction, contributing to the ‘creation’ of mid central vowels (cf. Renwick 2012 for a detailed investigation) is no longer a marker of stress, since these vowels now function as full vowels, contrasting with non-central vowels. However, Renwick (2012, 172) reports that stressed vowels are phonetically longer, as are vowels in open syllables, contributing to large durational differences in vocalic intervals. Manolescu/Olson/Ortega-Llebaria (2009) also report phrase-level focal lengthening. A further possible marker for unstressed position may be vowel devoicing, since the occurrence of this is mentioned in an empirical investigation by Mairano/Romano (2011) as a hindrance to segmentation.

There is relatively little work investigating rhythm in connected speech in Romanian, and what little exists is rather patchy and inconsistent. Non-scholarly sources, such as Wikipedia, which are subject to varying degrees of unreliability, describe it as ‘syllable-timed’. This is possibly an over-simplistic assignment based on the fact that Romanian is Romance, and that rhythm in Romance is incorrectly viewed to be prototypically ‘syllable-timed’. Insofar as the scholarly literature has addressed it, Romanian rhythm has often been treated as ‘unclassifiable’ (e.g. Grabe/Low 2002; Mairano/Romano 2011). It is not clear what the motivation for this labeling is, although it is likely to be along similar lines as for the attribution of Portuguese rhythm being labeled as ‘mixed’, i.e. metric scores that defy easy classification. In their comparative

study of rhythm in 21 languages, Mairano/Romano (2011) report much higher vocalic variability (ΔV) for Romanian (six speakers) than for Spanish and Italian in the same study, and even higher than for English, though just below the score for Portuguese. Grabe/Low (2002, based on one speaker) also report higher vocalic variability (nPVI-v) for Romanian than for Spanish, but lower than for English. In this respect, it appears to cluster with 'stress-timed' languages. However, consonantal variability (as measured by ΔC and PVI-C) is low, on a par with or lower than Spanish and lower than for Italian. By comparison, Grabe/Low (2002) report a somewhat higher degree of consonantal variability, using nPVI-C (though still significantly lower than for Portuguese). They also report a relatively high %V, again more indicative of 'syllable-timing'.

Without more detailed studies examining higher order prosodic timing properties in Romanian, it is not clear what might lie behind these apparently contradictory results (other than, of course, evidence against the rhythm class hypothesis). The low scores on consonantal variability are somewhat surprising, given the complexity of Romanian syllable structure. One avenue for investigation might lie in inter-gestural timing details in Romanian clusters, since large gestural overlap could feasibly account for less variability among consonant intervals, although recent work suggests that Romanian clusters do not display a single overriding temporal organization, and there is evidence that suggests speakers vary the timing of their cluster productions according to frequency and, in a sense, how 'Romanian' these are perceived to be (Marin 2013; 2019). Thus, the low variability of consonant intervals remains a puzzle, and merits further investigation in its own right (irrespective of its putative role in the rhythm percept). Further investigation is needed also with respect to vocalic variability, particularly as we know different measures may be sensitive to different kinds of temporal variability. Regional variation may also be a confounder here, since Transylvanian varieties reportedly lengthen stressed vowels more markedly (Martin Maiden, Oxford, personal communication). Finally, to our knowledge, Romanian has not been included in any perceptual studies, and so discriminability from other Romance varieties with purportedly different, or at least more clear-cut, rhythmic percepts is not known.

4 Conclusions

Can we generally characterize rhythm in Romance? In evaluating whether there are rhythmic properties that can be said to be uniquely, or even consistently, 'Romance', the answer must be in the negative. The general literature on speech rhythm has, at least in places, given the misleading impression that what is meant by the term 'syllable-timed' can be attributed to Romance languages as a whole. This impression is erroneous because it implies homogeneity within the set of Romance dialects that does not exist. It prioritizes certain varieties (e.g. standard varieties of Italian and

Spanish) over others (e.g. varieties of Portuguese, southern varieties of Italian, Romanian), thereby distorting what is really a picture of considerable heterogeneity.

We might suppose that the existence of a common historical ancestor, Latin, would constrain the degree of divergence between varieties, since for many linguistic features there are obvious similarities between present day Romance varieties, giving a certain structural cohesiveness to the set of these varieties, such that we may recognize a certain *Gestalt* Romance quality in languages as diverse as Romanian, Brazilian Portuguese and Sardinian. On the other hand, it is by all accounts much harder to find a single feature that is *exhaustively* pan-Romance, and the search for one is likely to be particularly fruitless when we consider prosody, that part of speech least likely to be orthographically notated and most vulnerable to unconstrained diachronic and geographical variation. This is perhaps even truer when applied to higher-order prosodic timing characteristics, where differences in the marking of prominences and edges of accentual phrases may be expected to be particularly susceptible to divergence across varieties. Given that – by many accounts at least – the percept of rhythm arises from a confluence of multiple properties, in principal, divergent developments in any one of these properties could bring about a significant divergence in terms of the resulting rhythmic percept.

Indeed, we should naturally expect variation across Romance languages and dialects. As discussed, variation in rhythm can arise between closely related varieties of what is thought of as a single language, or between different registers of the same variety of a language by the same speaker. Thus, it should not necessarily be expected that Romance dialects, even with a large amount of common linguistic ‘inheritance’ in terms of phonological structure, should have identical or even similar rhythmic properties. Future research could usefully consider the full extent of diversification across varieties, looking into the many gaps in the existing empirical research. These gaps are both in terms of specific varieties which remain without proper, or even any, investigation, and in terms of a critical deconstruction of what lies behind the measures. There are multiple sources of temporal variation in speech, including multiple layers of linguistic properties, applying to both localized and longer domains. A proper teasing apart of these properties pertaining to different levels is required, together with analysis of individual properties, in both production and perception.

A linear model that prioritizes e.g. phonotactic structure and presence vs. absence of vowel reduction, may be expected to make predictions of relatively limited divergence across Romance, whereas a non-linear, hierarchical (as proposed by Cummins/Port 1998; Barbosa 2002) or multi-systemic (cf. Post/Payne 2018) model, is able to integrate temporal divergence at the phrase level, as well as factoring in the effects of speech rate and style. An over-reliance on the segmentally rhythm metrics will only ever yield a partial picture, perhaps even a distorted one. The role of factors that are less rooted in language-specific patterns, such as speech style and rate, need to be integrated into the model, to reveal the range of variation for a given language or sub-variety, and move away from a strict classificatory approach which fails to stand

up to investigation. Furthermore, since the phonetic signaling of prominence is rarely, if ever, limited to temporal means, further comparative investigation of non-temporal properties such as FO, spectral reduction and intensity, is needed.

One important aspect this chapter has only touched upon is the role of perception, and the question of subjectivity of the rhythm experience. The all too ready classification of French, Italian and Spanish – and often by extension, Romance in general – as ‘syllable-timed’, betrays a largely monolithic approach to perceptual evaluation, with insufficient acknowledgement of how the native language of the listener affects rhythm perception. Fletcher (1991) and Wenk/Wioland (1982) make the point that Anglophone judgments of French are influenced by their expectations of English prosody. Vaissière (1991b, 109) remarks that to a native speaker of French, French rhythm is “much more obvious than the rhythm in English, where the stream of units of information is thrown into disorder by the intrusion of a recurring strong stress. [...] The language-specific rules of French may indeed not be obvious to non-natives”. Miller (1984) also reports a perceptual experiment suggesting that English and French listeners perceive rhythm differently. Similarly, as we saw in 3.2, while English listeners may experience vowel duration alternations in Spanish to be very small, leading to a strong percept of even-timing, Spanish speakers have a more heightened awareness of these small differences, and hence may not experience Spanish as even-timed.

In a series of studies investigating the phenomenon of non-native rhythm perception, Dupoux and colleagues find evidence that listeners’ experience of prominence depends on the prosodic phonology of their native language (cf. Dupoux et al. 1997; 2008; Dupoux/Peperkamp/Sebastián-Gallés 2001; 2010; Dupoux/Peperkamp 2002; Peperkamp 2002). For example, they found that unlike speakers of Spanish, speakers of French exhibited ‘stress deafness’, i.e. they found difficulty in distinguishing minimal pairs of disyllabic nonsense words with variable stress placement. The authors attributed this difference to the fact that French, unlike Spanish, lacks phonologically contrastive stress.

The effect of native language prosody may be even more far-reaching, influencing the perception of rhythm beyond the context of language. Native language has also been shown to influence responses in non-speech rhythm experiments (Fraisse 1982; Patel 2007), and to influence the production of rhythmic behavior (i.e. performance) in non-speech activities such as music (Wang/Payne 2018).

Thus, not only have Romance varieties diverged considerably with respect to the phonological and prosodic properties that give rise to the rhythm percept, but this very divergence means that speakers of individual varieties have quite different perceptual expectations, and experience the rhythmic structure of their own language, and of others, quite differently. Further work is needed if we are to determine the heterogeneity of the Romance *perceptual* space, alongside an understanding of the heterogeneity in production.

Finally, given the apparent implicit expectation that Romance varieties should share a similar rhythmic percept, in addition to considering why this is not the case

synchronically, i.e. which properties are sufficiently different in present day varieties, it is also of interest to consider how this heterogeneity came about diachronically. A fruitful avenue for future research would be to consider which key phonological or prosodic changes, historically, ultimately brought about diversification in the rhythm across Romance.

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Philippe Martin

9 Intonation

Abstract: When described in the Dependency Incremental (DI) instead of the Autosegmental-Metrical (AM) framework, the phonological descriptions of sentence intonation in various Romance languages appear very similar, with the exception of French. In the DI framework, non-emphatic melodic movements located on stressed vowels indicate dependency relations between prosodic words, leading incrementally to sentence-level prosodic structure. The singularity of French, in terms of phrasing, i.e. of segmentation into accentual phrases, is due to the lack of lexical stress present in the other Romance languages.

Keywords: intonation, prosodic word, accentual phrase, prosodic structure, stress rules

1 Introduction

In the context of speech, intonation may refer to a large number of fields, some of which are not directly related to linguistic description. For example, prosodic variations manifested by melodic height, speech rate, rhythmic changes, intensity, and vowel quality indicate, in a voluntary or involuntary manner, speaker emotions, attitudes, actual or affected socio-geographic origin etc., none of which can be hidden in the speech production process, although they can be simulated.

The prosodic events described in this chapter pertain to different linguistic phenomena:

- (a) sentence modality, i.e. declarative, interrogative and their variants, imperative, surprise, implication and doubt,
- (b) phrasing, i.e. sentence segmentation into minimal prosodic units,
- (c) prosodic structure, i.e. hierarchical grouping of minimal prosodic units, and
- (d) information structure, i.e. focalization encoded by prosodic events.

The focus is on Romance languages with particular consideration of French, the odd one out in this group.

1.1 Intonation is always present

Sentence intonation is always present in linguistic communication, even in silent reading or monolog, either with changes of melodic height generated by vocal fold vibrations during phonation, or with melodic changes perceived “in our head” in silent reading or monolog. We cannot produce speech without intonation. Likewise, we

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cannot process language, whether in oral or written form, without decoding the sentence intonation intended by the speaker or recovering, even if approximately, the intonation intended by the writer.

While the image of speech sound can be kept in short-term memory for some 20 to 30 seconds for isolated sentences followed by silence, this limit is reduced for continuous speech to about 3 seconds. This constraint forces listeners to process linguistic data quickly in order to not lose any information. It also explains the need to have a fast procedure for segmenting and hierarchizing the speech continuum, as the available morphosyntactic markers may turn out to be too complex to process in real time. The mere existence of sentence intonation as a parsing tool may stem from this constraint on short-term memory, providing a simple and easy process for segmenting and structuring speech units before syntactic analysis is activated.

Given the limits of short-term memory, it is not possible to remember long lists of words, or to process the information contained in these groups, without structuring the lists by way of hierarchical grouping. Remembering long lists of digits found in telephone or credit card numbers requires the segmentation of this information into small chunks, eventually grouped into two or more levels, in order to form a structure, i.e. a hierarchical grouping of digits. In these cases, as digits lack any morphological information, only prosody will give the listener enough information to restore the intended structure of the data. In reading, this role is devoted to graphic indications such as blanks separating groups of digits or words, and possibly to punctuation marks. In speech, although many grammatical tools may be available to recover a structure from the sequence of words, sentence intonation provides a simpler and more efficient mechanism leading in a next step to the sentence's syntactic and information structures.

1.2 Sentence modality

Sentence modality defines, in a very broad sense, the speaker or writer's attitude towards the audience, the listener or the reader. The simplest categorization of modality uses only two classes, declarative (telling something) or interrogative (asking something). Modality markers can be in the text (e.g. the interrogative *est-ce que* in French) or in sentence intonation, carried by a melodic contour located on the last stressed syllable of the sentence, or both. Pertaining to sentence intonation only, in many Romance varieties declarative modality is indicated by a falling low and falling final melodic contour, whereas interrogative modality is usually signaled by a melodic high rising contour.

Although large numbers of variants could be considered, adding an insistence feature bearing on either the sentence's content or its context allows for the consideration of four variants. An insistent declarative modality defines the imperative, characterized by a declarative falling contour with a larger melodic span. Likewise, a sur-

prise modality appearing as an insistent interrogative is indicated by a rising contour with a larger melodic excursion. When insistence bears on the context of the sentence, the modality variants are respectively implicative for the declarative and expressive of doubt for the interrogative. Both of these context-insistence modalities are characterized by a rise-fall melodic pattern inserted at the beginning of the terminal contour for the declarative, and at the end of the contour for the interrogative (Martin 2015).

1.3 The minimal intonation unit

In lexically stressed languages such as Italian or English, whether we read a text aloud or silently, we segment speech not into words, but into sequences containing a content word (noun, adverb, verb or adjective) together with its associated grammatical word(s). These sequences are called stress groups and contain a single pitch accent (realized essentially by syllabic duration and melodic variation) whose location in content words is defined in the lexicon as the stressed syllable.

In French, deprived of lexical stress, the actual phrasing, i.e. the segmentation into stress groups, depends strongly on the speech rate adopted by the speaker or the reader. At a slow speech rate, all words, whether content or grammatical, can be stressed on their last syllable, whereas at a fast speech rate, up to 10 or 12 syllables can be merged together into a single stress group containing more than one content word. A medium speech rate typically results in stress groups with only one content word, as in lexically stressed languages.

Minimal prosodic units are defined by stress groups, with only one (non-emphatically) stressed syllable. Stress is placed on the last syllable of the stress group for French, and, for the other Romance languages, on a syllable specified in the lexical representation of a content word.

1.4 Analyzing Romance intonation

Whereas comparative linguistics deals with phonetic, phonological, lexical and syntactic data, few scholars have compared prosodic features such as stress location, not to mention the properties and grammar of intonation events that reveal sentence prosodic structure. One notable exception is Paul Garde (1968/2013) who gives simple and convincing word stress placement rules in various language families, including Romance. Another example is the collection of research papers conducted in the AMPER project framework (Dorta 2007), devoted to the prosodic description of many Romance languages. In-depth descriptions of varieties of Spanish intonation can also be found in Prieto/Roseano (2010). Furthermore, several online atlas projects were launched aiming to provide researchers with a wide array of examples from several Romance languages (cf. Prieto/Borràs-Comes/Roseano 2010–2014).

Comparison of prosodic features in Romance has also been the subject of two recent books. One of them, edited by Sónia Frota and Pilar Prieto (Frota/Prieto 2015), is devoted to the analysis of intonation in nine Romance languages within the framework of Autosegmental-Metrical (AM) intonational phonology. These individual chapters compare phonetic and phonological features of Romance intonation, frequently blending both types of properties. The other one, Martin (2015), conducts its comparisons in the Dependency Incremental (DI) prosodic structure framework, aiming to better separate the phonological description of prosodic properties from their phonetic variations. The DI framework aims to characterize the strong phonological similarities between prosodic systems in the languages considered (Portuguese, Spanish, Catalan, Italian, Romanian) as well as the important differences found in French.

As both the AM and the DI frameworks define the minimal prosodic unit as a single word or a group of words with one main stress marked with a pitch accent, the stress rules in Romance languages are briefly discussed in the following section.

2 Stressed syllables

2.1 Stressed syllables in Latin

Knowing the stress rules of Latin constitutes a prerequisite for our understanding the stress rules across the Romance languages. Indeed, it is remarkable that the position of lexical stress in most Romance languages can be traced back to Latin despite twenty centuries of sound change.

Classical Latin had five phonological vowels, /i e a o u/ (the vowels included in today's Latinate computer fonts). Each vowel could be short or long so that the vocalic system included five short and five long vowels. In addition, Latin had three diphthongs, /aj oj aw/, written <ae oe au>. The stress rule in Latin is as follows (Alkire/Rosen 2010, 5–8): stress is located on the penultimate syllable if this syllable is heavy, i.e. is a diphthong, a long vowel or a syllable ending in a consonant. If the penultimate is light, stress falls on the antepenultimate syllable. If the penultimate syllable is not closed by a consonant and is not a diphthong, stress is predictable only if we know whether its vowel is long or short, which is a property of the lexicon. If the word has only two syllables, stress falls on the penultimate, and if it has only one syllable, this unique syllable is stressed if the word is a noun, an adjective, an adverb or a verb.

The following examples illustrate these different cases. The word *in.fer.no* has its second syllable closed by the consonant *r* and is therefore heavy, so the penultimate is stressed: *infer.no*. In *a.mi.ca* 'friend_F', the syllable *mi* contains a long vowel, and stress is therefore located on the penultimate: *ami.ca*. In *au.ro.ra* 'dawn', the syllable *ro* contains a long vowel, so stress falls on the penultimate: *auro.ra*. In *a.ni.ma* 'soul', the syllable *ni* has a short vowel, which is why stress falls on the antepenultimate: *ani.ma*.

The word *spi.na* ‘thorn’, finally, has only two syllables. Since there is no other possibility, its first syllable, whether light or heavy, is stressed: *spina*.

2.2 Stressed syllables in Romance languages

The position of stress in Romance languages is restricted to a three-syllable window at the right edge of the word. The window can actually reach up to six syllables due to the adjunction of pronouns to verbs in Italian (e.g. *fabbricamicelo* ‘make it for me there’), but it generally goes to three syllables for nouns, adjectives, adverbs and other grammatical categories. The process of stress placement is the same for all categories and is based on, first, the morphological analysis of nouns, adjectives, adverbs and verbs into (prefix) + stem + (suffixes) + (inflections) and, second, the Latin stress rules applied to the stem.

Suffixes and inflections can be classified as stressable and unstressable (Garde 1968/2013). The stress rule for Romance languages (except French) is very simple: the last stressable morphological element (stem, suffix, inflection) of the word determines the position of the stressed syllable. Segmental homophones may belong to distinct grammatical categories or to the same category. An example often quoted in Italian is *sono cose che capitano, capitano* ‘these are things that happen, captain’, where the first *capit-ano* ‘happen_{3PL.PRS}’ is a verb stressed on the fourth syllable from the end (the verbal inflection *-ano* is not stressable), whereas the second *capitan-o* ‘captain_{M.SG}’ is a noun (with the unstressable inflection *-o*), which is therefore stressed on its penultimate syllable (↗18 Italian).

Since Italian orthography does not indicate stress (except in word-final position), segmental homophones belonging to the same grammatical category can be ambiguous but are distinguished by their stress position. Some examples in Italian are *principi* ‘prince_{M.PL}’ and *principi* ‘principle_{M.PL}’; (il) *turbine* ‘whirlwind_{M.SG}’ and *turbine* ‘turbine_{F.PL}’ (plural of (la) *turbina*); *agito* ‘shake_{1SG}’, *agito* ‘act_{PST.PTCP}’ and *agitò* ‘shake_{3SG.PRET}’.

2.3 Stressed syllables in French

In French the position of lexical stress evolved gradually to the last syllable of content words as all posttonic syllables were lost (Väänänen 1981). The function of lexical stress as marker of a morphological boundary as in the other lexically stressed Romance languages became redundant, as lexical stress was always final. It then became more frequent for speakers to skip some of the expected stress locations when speaking, as in *la petite armoire violette* ‘the little purple cupboard’, which can receive one, two or even three stressed syllables: *la petite armoire violette*, *la petite armoire violette*, *la petite armoire violette* or *la petite armoire violette*, depending on speech rate. In order to pronounce (or even to read silently) *la petite armoire violette* with

only one final stressed syllable on *violette*, one has to use a (very) fast speech rate, whereas a slower pace would lead to the pronunciation of three stressed syllables as in *la petite armoire violette*.

We can conclude that there is no clearly defined limit to the number of syllables and words that can be pronounced in French with only one final stressed syllable. The pronunciation of long words (long due to their orthography) will help discover where the limit stands. Long words such as the well-known examples *anticonstitutionnellement* ‘against the constitution’ (8 syllables) or *intergouvernementalisation* ‘inter-governmentalization’ (10 syllables) seem difficult if not impossible to pronounce or even read silently with only one final stressed syllable and would possibly be realized as *anticonstitutionnellement* and *intergouvernementalisation* (cf. also Jun/Fougeron 2002; 721 French).

It has been shown that it is not the number of syllables that matters, but the time needed to pronounce them (Martin 2014). The data obtained from fast speech-rate speakers show that the maximum interval between consecutive stressed syllables (in flowing speech) could not exceed some 1250 ms. In *parler jeune* productions in French (young people’s speaking style), sequences of 8 syllables pronounced in 1150 ms with only a single final stress (Lehka/Le Gac 2004), and up to 13 syllables in 1450 ms have been observed (Martin 2009).

While 1250 ms (the value retained here) is the maximal duration between consecutive stressed syllables in connected speech, a minimal duration between two consecutive stressed syllables can also be established and will define a minimal duration of stress groups (therefore containing only one syllable, including a gap of silence whose duration added to the unique syllable duration would effectively reach the 250 ms level). This limit can be established by selecting natural or synthetic cases of consecutive stressed syllables, as, for example, *par le fait que* ‘by the fact that’, i.e. cases of stress clash. It is often mentioned in the literature that these cases require a kind of acoustic gap between consecutive stressed syllables (Di Cristo 2016), usually but not always implemented by the presence of some consonants after the first or before the second stressed syllable, as in *une tenue stricte* ‘a strict outfit’. However, it is experimentally easy to reduce the gap with a sound editor until the first implied syllable ceases to be perceived as stressed while nothing of its acoustical structure has been modified by removing the silent part only. This limit is about 250 ms, since below this value, the first word in the sequence will lose its perceived final stress and will become part of the newly formed stress group. For example, the perceived deaccentuation of *fait* in [*par le fait [que]*] will merge the stress group *par le fait* with the second stress group *que* to form the new stress group [*par le fait que*]. Similar observations can be made for the other Romance languages.

3 Two prosodic structure models

For Romance languages except French, the position of (non-emphatically) stressed syllables is defined in the lexicon. For French, stress is placed on some word-final syllable, and is constrained by the 250 to 1250 ms time window existing between consecutive stressed syllables in connected speech. Since stressed syllables carry melodic contours which indicate the sentence-level prosodic structure, stress rules are an essential part of a prosodic grammar of Romance languages.

There are some differences in terminology pertaining to minimal prosodic units. For proponents of the syntactic approach, where the prosodic constituents are derived indirectly from the syntactic structure (Selkirk 1986; Nespor/Vogel 1986/2007), the prosodic unit higher than a word is called a Phonological Phrase. For advocates of the intonational approach, where the prosodic constituents are based on intonation and final lengthening (Beckman/Pierrehumbert 1986), the prosodic unit larger than a word is called an Accentual Phrase (AP). Furthermore, minimal prosodic units have also been designated as Prosodic Words in the intonational approach (Jun 1998).

As both the AM and the DI models rely on the intonational approach, whenever appropriate the segmental part of the prosodic minimal unit should be called AP, and its suprasegmental counterpart Prosodic Word (PW). The AP pertains to the text of a stress group, the PW to its intonation, i.e. the perceived variations of height, duration and intensity, and the stress group to both segmental and suprasegmental aspects. However, authors frequently use AP as including the stress group's suprasegmental content as well. Details about the changes of denomination in the AM and Optimality Theoretic frameworks can be found in Féry (2018).

At the AP level, pitch accents associate with the stressed syllables of content words (nouns, verbs, adverbs or adjectives). Therefore, each AP in a sentence contains one content word together with its associated grammatical words (conjunctions, pronouns, articles etc.). For non-lexically stressed languages such as French, an AP can contain more than one content word, depending on speech rate as well as on the normal alignment with some syntactic unit. Non-predictable stress (i.e. non word-final) in French can affect any syllable in an AP and is frequently located on the first syllable of content words (Léon 1993). It has been called *accent didactique* or *accent d'insistance* and it can be realized by various means including the lengthening of initial consonants (*fff*ormidable ! 'great!').

3.1 The AM model and the ToBI transcription system

The AM approach is built around an abstract phonological model aiming to represent the contrastive elements of an intonational system. These elements are linear strings of tonal autosegments, associated with positions in the metrical structure (heads of

constituents, stressed syllabic positions) and phrasal boundaries (cf. Gussenhoven 2004, 123–142).

In this model, tones represent the linguistically relevant points of a fundamental frequency (F0) contour, which is the acoustic counterpart of laryngeal frequency, and these linguistically relevant tones are assumed to be contrastive. They reflect pitch modulations that co-occur with prominent syllables and phrasal boundaries. The association of tones with prominent syllables and phrasal boundaries presupposes the existence of a metrical structure, which provides the necessary information: (i) prominence relations among constituents (heads) and (ii) position of phrasal (and other constituent) boundaries.

Prosodic structure hierarchically organizes Prosodic (or Phonological) Words (PW) into Accent (or Phonological) Phrases (APs). These are supposed to contain one content unit surrounded by one or more grammatical items. They bear a melodic high (H*) or low (L*), rising (e.g. L*+H) or falling (e.g. H*+L) pitch accent (tone T*) placed on the metrically strong syllable of the lexical word.

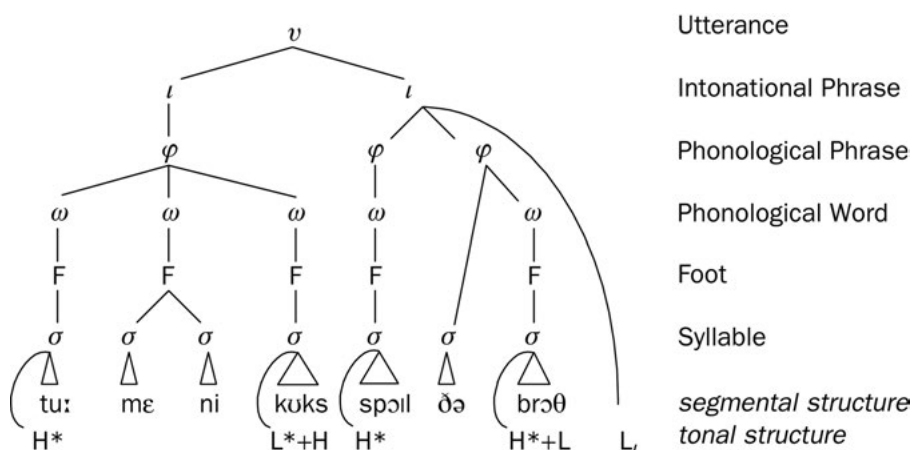


Figure 9.1: AM prosodic structure for the example *Too many cooks spoil the broth* (Gussenhoven 2004, 124).

In a complex prosodic structure, a first grouping of PWs forms an intermediate phrase (ip), terminated by an intermediate (H or L, rising or falling) boundary tone (T-). The merging of these ips constitutes an Intonational Phrase (IP or ι , as in Figure 9.1) ending with a higher-level boundary tone, which can be high (H%) or low (L% or L_t , as in Figure 9.1). Finally, the sequence of IPs forms the prosodic structure (PS) of the utterance (v), terminated by a boundary tone of an even higher level, which is often referred to as terminal conclusive contour in the literature (Martin 2015, 214–248). A given PS does not necessarily present all these levels of hierarchy. It can be “flat”, as an enumeration of PWs organized in a single level. A two-level PS groups the PW into

IPs, and the IPs into the utterance (ν). A three-level PS groups the PWs into ips, the ips into IPs, and the IPs into the utterance (ν).

ToBI (Tones and Break Indices) is one of the most popular transcription systems in use today. The system transcribes only prosodic events assumed to be pertinent in the AM model. To annotate sentence-prosodic events, the ToBI transcription system (Beckman/Elam 1997) comprises four tiers: (i) an *orthographical* tier; (ii) a tier of *break indices*, noted from 1 to 4 on a perceptive scale related to the degree of cohesion perceived between units; (iii) a tonal tier where pitch events (i.e. pitch accents and boundary tones) are assigned, and (iv) a comment tier.

In an attempt to use universal features, pitch events are noted by high (H) and low (L) tones, which are interpreted phonetically as tonal targets determining the inflections of the pitch contour. The attribution of H and L tones rests on phonological definitions, together with a few phonetic variations. However, the time parameter plays no role in ToBI. Table 9.1 summarizes a set of widely used pitch accents and boundary tones. An underlying phonological system is associated to every sequence with the following elements:

Table 9.1: Pitch accents and boundary tones used in ToBI transcription.

Specific pitch movements on stressed syllables (pitch accents)	
H*	high pitch target (<i>peak accent</i>)
L*	low pitch target (<i>low accent</i>)
L*+H	falling rising pitch movement (<i>scooped accent</i>)
L+H*	rising pitch movement (<i>rising peak accent</i>)
H+!H*	high tone followed by a terraced fall (<i>downstep</i>)
Phrase accents (intermediate boundary tones)	
L-	low, on the boundary of an intermediate constituent
H-	high, on the boundary of an intermediate constituent
!H-	high and going down (<i>downstepping</i>)
Boundary tones	
L%	low and sentence-final
%L	low and sentence-initial
H%	high and sentence-final
%H	high and sentence-initial

3.2 The DI model

As in the AM approach, the hierarchical grouping of stress groups as minimal prosodic units defines the prosodic structure. The DI approach *a priori* dissociates APs (i.e. the segmental content of stress groups) from PWs (i.e. their suprasegmental shape). These groupings, formed dynamically along the time axis, are indicated by prosodic markers instantiated by melodic contours located on stressed syllables of APs having no emphatic function. In certain configurations, melodic contours located on the final syllables of APs, if not stressed, are part of a complex prosodic marker together with the melodic change located on the stressed syllable. If the last syllable of an AP is stressed, the complex contour results from two distinct melodic movements occurring on a single stressed syllable. Referring to the AM classification of prosodic events, a complex contour merges a PW pitch accent and a phrase boundary tone.

PW melodic movements located on the stressed syllables of accentual phrases are not realized at random. The acoustical characteristics in terms of rise or fall, high or low, long or short, encode phonological features that indicate dependency relations between prosodic words. These dependencies operate rightward, i.e. towards another prosodic word carrying a specific contour planned later by the speaker. The dependency indicates that the given PW or group of PWs has to be merged with a later occurring PW on which it depends. For example, in French, the occurrence of a well-documented contour usually called *continuation majeure* (following Delattre 1966), presupposes the occurrence of a *terminal conclusive* contour later in the sentence. In terms of dependency relations, the *continuation majeure* depends on the assumed future occurrence of a final conclusive contour ending the sentence, i.e. it has a rising contour so that the listener can anticipate the occurrence of a falling terminal conclusive contour later in the sentence.

Dependency relations indicate to the listener how and when to merge prosodic syntagms (a group of PWs) ending in a *continuation majeure* and a *terminal conclusive* contour to form the overall prosodic structure. Dependency relations are not limited to the grouping of *continuation majeure* and *terminal* contours. They function as well at lower levels of the prosodic structure, where another type of contour, the *continuation mineure*, indicates a relation of dependency towards a *continuation majeure*. In the classical example given by Delattre *si ces œufs étaient frais j'en prendrais* 'if these eggs were fresh, I would take some of them', the dependency markers on the three PWs are *si ces œufs* (*continuation mineure*), *étaient frais* (*continuation majeure*), and *j'en prendrais* (*terminal conclusive*).

3.3 DI prosodic grammar

The object of prosodic grammar is to determine the pertinent phonological features of PW contours and to discover the rules indicating the dependency relations between PWs. Another important point pertains to the time-linear properties related to the encoding and decoding of prosodic structure. Considering that prosodic events instantiated by melodic contours occur not simultaneously but one after the other on the timeline instantiated by the sequence of syllables, it is necessary and sufficient to evaluate the dependency relation between two consecutive prosodic words, provided a dependency grammar involving phonological contours has been established (Martin 2015). Table 9.2 summarizes the classes of prosodic events assumed in the DI model.

Table 9.2: Classes of prosodic events instantiated by PW melodic contours (cf. Martin 2015, 79–85).

C0 ↓	terminal conclusive contour (declarative case), falling and low
Ci ↑	terminal conclusive contour (interrogative case), rising and high
Cc ↗	complex contour, flat or slightly falling on the stressed syllable of the AP and rising on its final syllable
C1 ↗	rising and exceeding the glissando threshold (i.e. above the rate at which melodic change allows for the perception of melodic variation rather than a static tone)
C2 ↘	falling and exceeding the glissando threshold
Cn →	neutralized, falling, flat or rising with respect to the glissando threshold, perceived as a static tone.
C0n ←	appearing after C0 in theme-rheme configurations

C0 and Ci correspond to the designated terminal element in the AM model, C1 to the *continuation majeure* and C2 to the *continuation mineure*. The actual classification of contours Cn, C1, or C2 depends on the way the glissando threshold is evaluated (and in particular the value of the coefficient used in the computation of the threshold, cf. Rossi 1971). The grammar of prosodic dependence is defined by the following rules for the Romance languages other than French.

Dependency to the right

Cc → C0

C1 → {Cc, C0}

C2 → {Cc, C1}

Cn → {C2, C1, Cc, C0, C0n}

Dependency to the left

C0 ← C0n

Figures 9.3 and 9.4 show the metrical trees and ToBI transcription corresponding to this example, congruent to syntax (Figure 9.3) and based on stress levels (Figure 9.4). Linguistic prominence, as perceived and annotated in metrical phonology, is partially determined by the relations between nodes in a branching tree, in which the right node is strong (S) and the other node or nodes on the left are weak (W). The labels S and W have no inherent phonetic realization and only have meaning relative to the rest of the labels in the tree, i.e. a strong node is stronger than its weak sister node. The most prominent syllable in a phrase is the one which does not have any weak nodes (but only the root node R) above it. This syllable is called the Designated Terminal Element, the last syllable in the examples. The ToBI annotation is obtained from the acoustic analysis.

Figures 9.6–9.10, below, display the acoustic analysis of similar sentences read in Spanish, Catalan, European Portuguese, Romanian, and French, in order to illustrate the mechanism of local dependency relations leading to the (re)construction of the prosodic structure, using the same set of melodic contours and the same prosodic grammar. The resulting prosodic structures also show different cases of non-congruence with syntax, the reasons for which are explained below.

Table 9.3 details for the Italian example the sequence of accentual phrase merges along the time scale, as specified by the grammar of rightward dependency indicated by the melodic contours on stressed vowels observed in Figure 9.2. These are, respectively, C2 falling above the glissando threshold on *due alpinisti*, Cc below the glissando threshold on the stressed syllable of *tedeschi* and rising above it on the last

Table 9.3: Sequences of merges of successive APs along the time scale (top to bottom). The first Cc determines the grouping of *due alpinisti* and *tedeschi*, then C1 merges *hanno trovato* and *il cadavere*, whereas the second C1 places *di un uomo* on the same level as the group *hanno trovato il cadavere*, a configuration not congruent with syntax. Finally, C0 unites all groups to form the resulting prosodic structure.

Accentual phrase	C2	C1	Cc	C0
due alpinisti	due alpinisti			
tedeschi			due alpinisti tedeschi	
hanno trovato	hanno trovato			
il cadavere		hanno trovato il cadavere		
di un uomo		di un uomo		
in un ghiacciaio				due alpinisti tedeschi hanno trovato il cadavere di un uomo in un ghiacciaio

syllable, C2 on *trova*to, C1 on *cad*avere and *di un u*omo, and, finally, C0 terminal conclusive falling and low on *ghiaccia*io. The software WinPitch (cf. Martin 2015, 259–271) automatically provides the glissando values and the glissando thresholds for each contour.

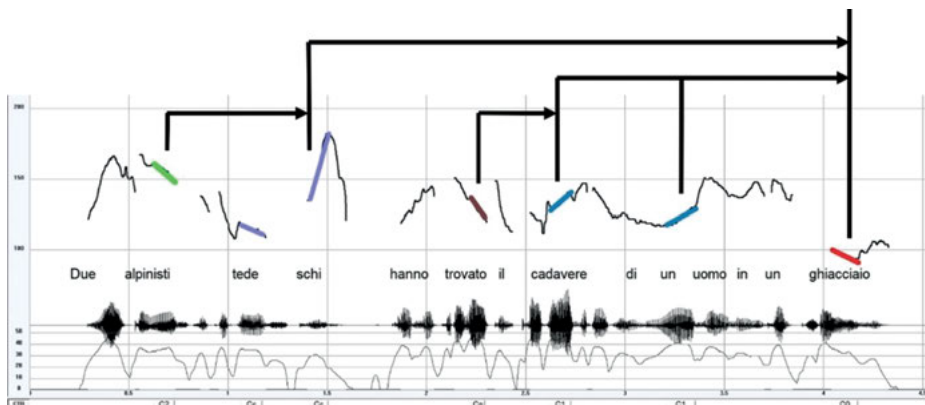


Figure 9.5: The Italian example annotated with the DI approach, using melodic contours rather than tone targets with ToBI: *Due alpinisti* (C2 ↘) *tedeschi* (Cc ↗) *hanno trovato* (C2 ↘) *il cadavere* (C1 ↗) *di un u*omo (C1 ↗) *in un ghiacciaio* (C0 ↘) ‘Two German mountaineers found the body of a man in a glacier’.

The prosodic structure indicated by the sequence of contours is represented by a tree with squared branches. The arrows indicate the direction of the dependency relations between APs, as defined by the melodic contours. The corresponding prosodic bracketing is [[C2 Cc] [[C2 C1] [C1]] C0].

The Spanish realization (Figure 9.6) defines the prosodic structure as [[[C2 C1] [Cn C1] Cc] C0]. The melodic rise on the stressed vowel of *alema*nes is above the glissando threshold and therefore transcribed as C1 and not as Cc.

The similar example in Catalan (Figure 9.7) does not present any complex contours (Cc), as C1 contours are used instead. The resulting structure has one less level than the Spanish and Italian ones: [[C2 C1] [Cn C1] [C1] C0].

The European Portuguese speaker (Figure 9.8) uses two complex contours on *alema*ães and *de um ho*mem and no C1 contour, placing the groups *dois alpinistas alemães* and *encontraram o cadáver de um homem* on the same level in the prosodic structure with the sequence [[C2 Cc] [Cn Cn Cc] C0].

The Romanian speaker realized a slightly different sequence of contours, producing the bracketing [[C2 C1] [Cn Cn C1] C0] (Figure 9.9).

For the French speaker (Figure 9.10), the structure is [[C2 C1] [C2 C1] [C1] C0].

The observed variations in these different realizations can be explained by certain characteristics of the reading process. As the eye span during reading does not exceed some 20 to 30 characters (Rayner/Slattery/Bélanger 2010), the restitution of the partial

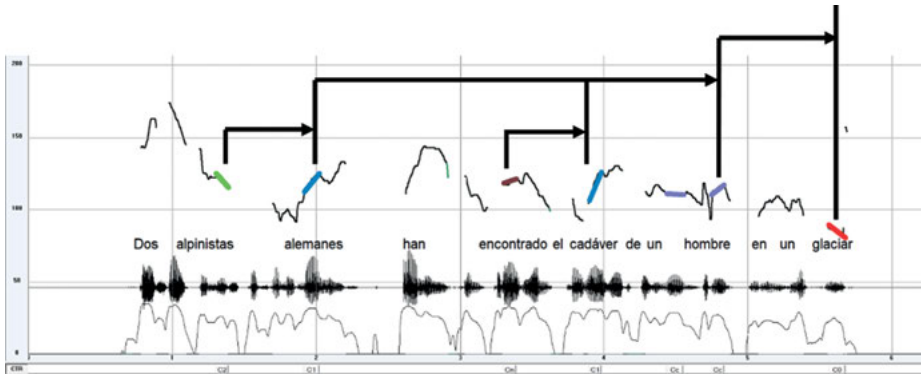


Figure 9.6: The equivalent example in Spanish of a prosodic structure built by increments along the time axis *Dos alpinistas alemanes han encontrado el cadáver de un hombre en un glaciar* 'Two German mountaineers found the body of a man in a glacier'.

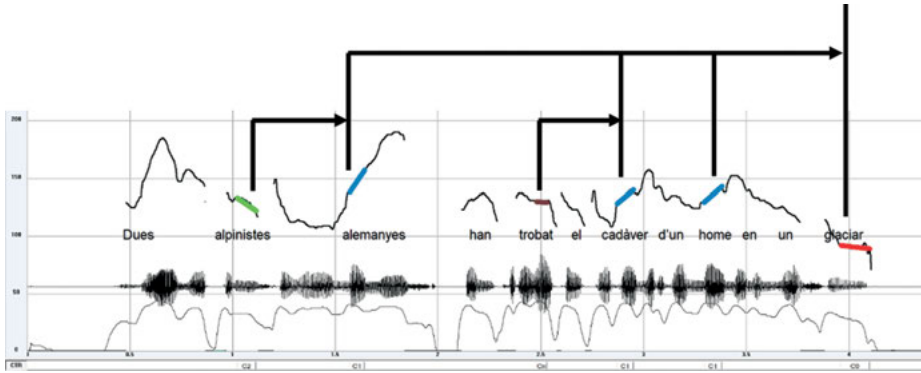


Figure 9.7: The same example in Catalan of a prosodic structure built by increments along the time axis *Dues alpinistes alemanyes han trobat el cadàver d'un home en un glaciar* 'Two German mountaineers found the body of a man in a glacier'.

prosodic structure is elaborated from the first elements of the verbal group, namely for the French example from *ont trouvé* and *le cadavre* before becoming aware of the fact that the actual object is *le cadavre d'un homme* and not *le cadavre* alone. As at this stage the prosodic preplanning involves only the first two elements, the reader cannot go back in time when the third element of the group is discovered. The only solution is to use a prosodic *ajout* ending with the same C1 rising contour as the one ending with *ont trouvé le cadavre*. Only if the reader has seen and briefly analyzed the text beforehand can the planning of prosodic structure map the complete verbal group with the realization *ont trouvé* (C2) *le cadavre* (Cn) *d'un homme* (C1), which would be congruent with syntax (Martin 2018). The observed variations between realizations may stem from the familiarity of the reader with the examples, where the syntactic

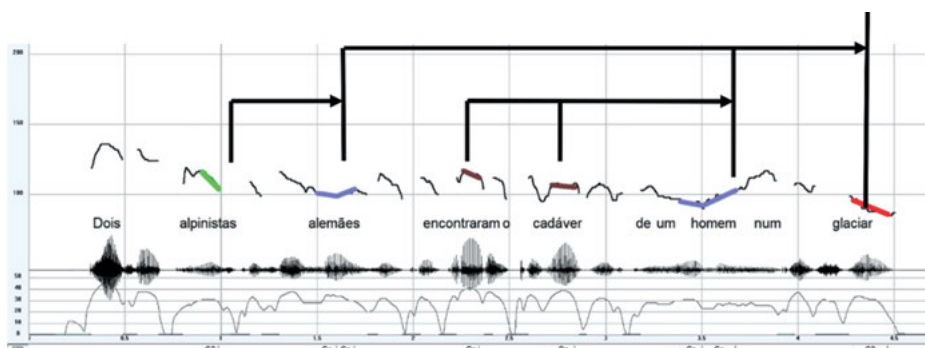


Figure 9.8: The example in European Portuguese of a prosodic structure built by increments along the time axis *Dois alpinistas alemães encontraram o cadáver de um homem num glaciar* ‘Two German mountaineers found the body of a man in a glacier’.

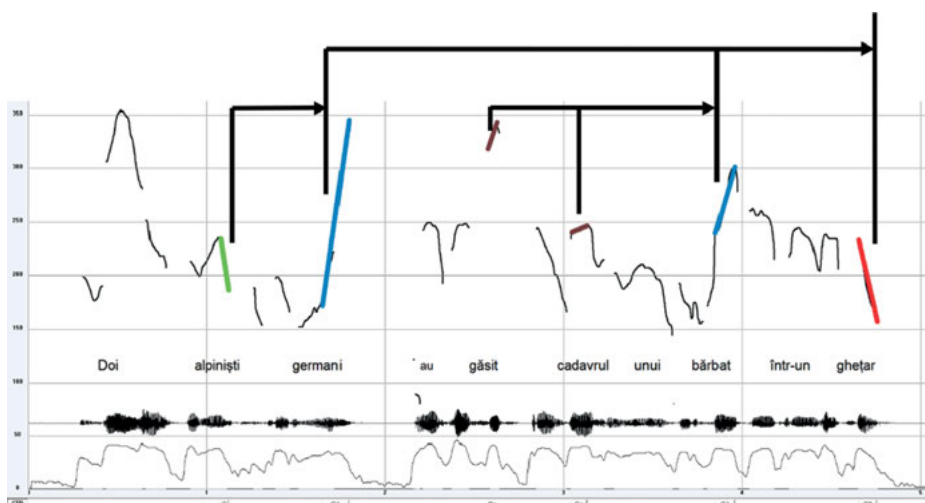


Figure 9.9: The example in Romanian of a prosodic structure built by increments along the time axis *Doi alpinisti germani au gasit cadavrul unui barbat intr-un ghetar* ‘Two German mountaineers found the body of a man in a glacier’.

structure may have been discovered in advance during practice repetitions. At a first pass, typical realization will be as shown in Fig. 9.10 for French, but when reading for the third time as in Fig. 9.9 for Romanian, the prosodic structure would have a better chance of being congruent with syntax.

It may appear surprising that Romance languages (except French; cf. Section 4) would use the same phonological melodic contours and the same grammar of intonation to encode prosodic structure, leading to the suggestion that the melodic con-

is, from bottom to top, AP – ip – IP. Prosodic events are often transcribed with the ToBI transcription system, which may lead to mixing phonetic and phonological facts, as non-boundary pitch accent targets are not assumed to carry a defined function in the prosodic structure (other than marking a syllable as stressed). Therefore, it is sometimes difficult to distinguish what relates purely to the phonetic surface as, e.g. the alignment properties of pitch accents of different varieties of Spanish (Prieto/Roseano 2010; cf. also Hualde/Prieto 2016), and what belongs to phonology, namely assumes a function in the expression of information structure or marks sentence modality.

It may also be noted that annotation in the ToBI system is often determined by small changes in fundamental frequency (the acoustic counterpart of melodic change), which may not be perceived by listeners. Small variations in pitch may be transcribed as H or L tone targets while no real perceived prosodic events would support this notation. However, from the analysis of a sufficient number of examples, sets of well-formed tone sequences can eventually be found. Once formalized, they constitute a prosodic grammar for the language (or variety thereof) under consideration.

Seen from a DI perspective, prosodic structure has a well-defined function: to hierarchically organize PWs produced and perceived along the time scale by the speaker and the listener. While phrasing aligns APs onto syntactic units, the prosodic structure itself has its own constraints and function, the aim of which is to map a syntactic structure to it, and not the other way around. Analysis of spontaneous speech “errors” (i.e. incompletions, repetitions, rephrasing etc.) provides many arguments in favor of the local pre-existence of the prosodic structure over syntax (Keating/Shattuck-Hufnagel 2002; Martin 2015). The classes of melodic movements are predefined and based on both function and perception value, namely Cn – C2 – C1 – C0 – C0n for French and Cn – C2 – C1 – Cc – C0 – C0n for the other Romance languages. In many cases, prosodic structure has the same number of levels as in the AM model. This is always the case for French, whereas other Romance languages may have an extra level.

As opposed to AM-based intonational phonology, no distinction is made between pitch accents and boundary tones. The complex contour Cc found in all Romance languages (except French) combines the AM pitch accent and a boundary tone. The realization of the complex contour Cc depends essentially on the complexity of the PS and the dependency relations defining it. In the AM model, pitch accents do not interact with each other, whereas in the DI framework they indicate a dependency of one AP on another one located further along in the sentence (rightward dependency). It is therefore easy to distinguish in the data what belongs to phonology (the perceived melodic movements of the contours ensuring the dependency relations) and what belongs to the phonetic description (i.e. variations that do not pertain to this function).

If the prosodic structure is elaborated, even partially, before the syntactic structure, what drives the speaker in phrasing and assembling stress groups into a prosodic structure? Recent experimentation pertaining to brain waves suggests that

stressed syllables may synchronize the listener's identification of APs stored in long-term memory (cf. Martin 2018). The incremental building process assembling stress groups into various levels as indicated by selected melodic contours would then proceed from the speaker's knowledge of syntax (or absence thereof). Analyses of spontaneous data support this view, showing how phrasing constraints may influence the speaker's choice of one syntactic pattern over another.

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10 Corpus phonology

Abstract: This chapter provides an overview of corpus phonology, which has recently emerged as a relatively autonomous field at the interface between phonology and corpus linguistics. After providing some background information about the development of this research endeavor, I distinguish between two types of corpora, namely *speech corpora* and *phonological databases*, and provide an overview of the tools and statistical methods that can be used to transcribe, annotate and analyze such corpora.

Keywords: corpus, database, categorical data, count data, generalized linear (mixed-effects) models

1 Introduction

Although *corpus phonology* has emerged over the last decade or so as a relatively autonomous field (Durand/Gut/Kristoffersen 2014; Durand 2017; Laks 2008) at the interface between phonology and corpus linguistics, it is grounded in a long research tradition that can be traced back to the first half of the 20th century. In this chapter, I would like to identify a few landmarks regarding this approach to doing research in phonology, so that students and researchers who are interested in analyzing phonological corpora, but who may not necessarily know how to deal with them, have sufficient knowledge about this field to start carrying out their own analyses, depending on the nature of their data and the type of research questions they seek to answer.

This chapter is organized as follows. I will first provide some background information about the development of this field (Section 2) and will then offer a critical discussion of the notion of ‘phonological corpus’ (Section 3). Finally, I will give an overview of the most important quantitative methods that can be used to analyze such corpora (Section 4) and I will offer a few brief concluding remarks in Section 5.

2 Phonology as an empirical science

Researchers working in the field of *corpus linguistics* (Biber/Conrad/Reppen 1998; Kennedy 2014) share the belief that linguistics is an empirical science, and that linguistic generalizations must be drawn from (large) collections of data instead of

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isolated examples.¹ This is by no means an uncontroversial point of view, but it seems to be gaining wider and wider acceptance in an era where we are witnessing what Winter/Wedel (2016, 80) call a “data gold rush”. The idea that linguistic generalizations should be based on solid language data is certainly not novel and will probably sound like a truism to many readers. It must be noted, however, that in phonology just as in the other branches of linguistics, the relationship between theory and data has been somewhat troublesome throughout the history of our discipline.

The American structuralist tradition in the first half of the 20th century was essentially concerned with the development of explicit inductive methods to uncover the phonological, morphological and syntactical structure of the World’s languages (Bloomfield 1933; Harris 1951; Hockett 1955). As such, the notion of *corpus*, understood as a representative sample of a language, played a fundamental role:

Investigation in descriptive linguistics consists of recording utterances in a single dialect and analyzing the recorded material. The stock of recorded utterances constitutes the corpus of data, and the analysis which is made of it is a compact description of the distribution of elements within it. The corpus does not, of course, have to be closed before analysis begins. Recording and analysis can be interwoven, and one of the chief advantages of working with native speakers over working with written texts [...] is the opportunity to check forms, to get utterances repeated, to test the productivity of particular morphemic relations, and so on. (Harris 1951, 12)

In this approach, building a corpus was a necessary preliminary step, and no linguistic analysis could proceed without a corpus. The structuralists’ contribution to the development of an empirical language science is well known (Chater et al. 2015), though not always acknowledged, but there is another important pioneer whose legacy seems to have been largely forgotten. The German neurologist Eberhard Zwirner, together with the statistician Kurt Zwirner, published a book entitled *Grundfragen der Phonometrie* (Zwirner/Zwirner 1936, ²1966), which was translated into English only much later and appeared under the title *Principles of Phonometrics* (Zwirner/Zwirner 1970). In this book, they laid the groundwork for a research program which bears many similarities to what we nowadays call “corpus phonology”.

Zwirner/Zwirner’s phonometrics is built upon two core principles. First, as in the structuralist tradition, the analysis of the sound structure of languages must be based on real speech sampled and annotated according to a strict methodology. Moreover, in order to be able to account for the variation found in naturally occurring speech, linguistic analyses must be based on statistics. E. Zwirner sought to strike a middle ground between the work of experimental phoneticians such as Edward Wheeler Scripture (Scripture 1906), who considered that speech could not be segmented into discrete units, and phonologists such as Nikolaj Trubeckoj (1939/1958), who argued that phonetics and phonology were two different fields, with different methods and goals. E. Zwirner explicitly acknowledged the distinction between *langue* (language)

¹ This section is based on Eychenne (2016, 9–32).

and *parole* (speech) in the Saussurean tradition (Saussure 1916) and proclaimed the “autonomy and superiority of linguistics, which is alone qualified to elucidate linguistic facts by its own form of experience and by a procedure of proof peculiar to it” (Zwirner/Zwirner 1970, 89). At the same time, he considered that the abstract linguistic system and its concrete realization in speech are inseparable.

Discussion of the relationship of phonemics to phonetics [is not] a matter of two different objects: language structure *and* speech act, which then on their part require two independent sciences [...]. Instead, it is a matter of two aspects from which one and the same object can and must be treated.
(Zwirner/Zwirner 1970, 78–79, emphasis in the original)

It is not that there are, first, perceptible sounds and, secondly, imperceptible sound-norms. The *same* linguistic structures can be considered from the viewpoint of their non-evident, normative structure – that is, from the viewpoint of linguistics – and also from the viewpoint of their realization in a particular, unrepeatable conversation.

(Zwirner/Zwirner 1970, 91, emphasis in the original)

Zwirner/Zwirner (1970) developed an explicit methodology for annotating and conducting a qualitative and quantitative analysis of a phonometric corpus. As innovative as it was, Zwirner/Zwirner’s program did not gather much following in phonology. One can only speculate about why this is so, but the fact that the English translation of their book only appeared in 1970 probably played a role. At about the same time, Noam Chomsky and Morris Halle published their monumental work, *The sound pattern of English* (Chomsky/Halle 1968), which kicked off the development of a new research program known as *generative phonology*. This program offered a complete shift of perspective, focusing more on theory development and promoting a deductive approach to linguistic facts, taking the tacit grammatical knowledge of “an ideal speaker-listener, in a completely homogeneous speech community” (Chomsky 1965, 3), as its object of study. The importance of this scientific enterprise, which remains highly influential to this day, is hard to deny as it allowed a lot of progress in our understanding of many aspects of phonological structure, including stress, tone and process interaction, to name just a few. On the other hand, it seems that it introduced a rather peculiar way of dealing with linguistic data. The native speaker’s intuition was swiftly replaced by the linguist’s own intuitions (after all, all linguists are native speakers; I’m a linguist, therefore I’m a native speaker!), and the use of second-hand data became common practice. Some linguists have understandably voiced concerns about this state of affairs, showing that theoretical claims were sometimes based on normative, artificial or even factually inaccurate data (cf. for instance Morin 1987), but to little avail. This attitude towards data is perhaps best illustrated with Chomsky’s influential interpretation of the ‘Galilean style’ in scientific research, an expression he borrowed from the physicist Steven Weinberg, who, in turn, borrowed it from the philosopher Edmund Husserl. A footnote in Chomsky (2002, 189, fn. 4) refers to Weinberg (1976, 28–29), and it is worth quoting the original paragraph from which Chomsky’s excerpt is taken to give a bit more context:

We have all been working in what Husserl called the Galilean style; that is, we have all been making abstract mathematical models of the universe to which at least the physicists give a higher degree of reality than they accord to the ordinary world of sensation. As our knowledge increases, the abstract mathematical world becomes farther removed from the world of sensation.

(Weinberg 1976, 28)

Chomsky's interpretation of this Galilean style is that it is perfectly fine to discard recalcitrant data that disagree with theory:

[Galileo] dismissed a lot of data; he was willing to say: "Look, if the data refute the theory, the data are probably wrong." And the data that he threw out were not minor. (Chomsky 2002, 98)

Admittedly, as pointed out by Carr (2000), it is almost always necessary to idealize data to a certain extent in order to be able to explain them. In addition, it is clear that postulating abstract mechanisms and entities can often lead us to a better understanding of the phenomena under analysis, and this is indeed how I understand Weinberg's quotation above. For example, syllables and feet have no direct physical correlate, and yet they seem necessary (or at least useful) to explain a wide range of generalizations about the typology of metrical systems found in the world's languages. But Chomsky's interpretation of the 'Galilean style' goes much further than that and it shows that he is more interested in theory development (more specifically, in attaining what he called *explanatory adequacy* in Chomsky 1964, which he considers as the highest level of success for linguistic analysis) than in accurately accounting for linguistic facts at the most fundamental level (*observational adequacy*, the lowest level of success). Chomsky's interpretation of the 'Galilean style' seems to be based on a rather idiosyncratic understanding of the scientific method (Behme 2014) and it must be emphasized that his presentation of Galileo's work (via Weinberg and Husserl) is far from being unanimously accepted. Indeed, Moran (2012) points out that Husserl downplayed to a large extent Galileo's contribution to the development of an empirical physical science and portrays him as a Platonist:

Husserl presents Galileo as a Pythagorean Platonist mathematician, who perfected the ideal of exact measurement (and applied it to the recalcitrant area of motion), but who was aware that nature only imperfectly lives up to that ideal. Husserl's primary claim is that Galileo, in order to make nature more responsive to mathematics, had to *idealize* nature itself. Husserl does not comment on Galileo's use of the telescope or his other technological achievements [...] Husserl completely plays down empirical discovery, the empirical method and induction. For him, the real breakthrough is that nature conforms to purely a priori ideal rules.

(Moran 2012, 81–82)

Indeed, Galileo's contribution to modern science is presented under a very different light by another physicist, Richard P. Feynman, in his introduction to physics:

[P]hysics, as do all the sciences, depends on *observation*. One might also say that the development of the physical sciences to their present form has depended to a large extent on the

emphasis which has been placed on the making of *quantitative* observations. Only with quantitative observations can one arrive at quantitative relationships, which are the heart of physics. [...] Many people would like to place the beginnings of physics with the work done 350 years ago by Galileo, and to call him the first physicist. Until that time, the study of motion had been a philosophical one based on arguments that could be thought up in one's head. Most of the arguments had been presented by Aristotle and other Greek philosophers, and were taken as "proven". Galileo was skeptical, and did an experiment on motion which was essentially this: He allowed a ball to roll down an inclined trough and observed the motion. He did not, however, just look; he measured *how far* the ball went in *how long a time*.

(Feynman 2011, chapter 5–1, emphasis in the original)

It appears that after all, Galileo is not so much remembered outside of linguistics for discarding recalcitrant data, but for introducing quantitative methods based on the observation of natural phenomena (cf. also Chater et al. 2015).

As the lines above have hopefully made clear, the development of corpus phonology, which started around the turn of the 21st century, should not be understood as a new or revolutionary approach; it is simply the continuation of a much earlier tradition, grounded in the belief that phonology is an empirical science. As such, it shares many concerns and methods with other subfields of linguistics such as variationist sociolinguistics (Weinreich/Labov/Herzog 1968; Labov 1994; 2001; 2010; 2011 Socio-phonetics), laboratory phonology (Pierrehumbert/Beckman/Ladd 2000) as well as natural language processing (Manning/Schütze 1999), and it has benefited from continuous progress in the development of new statistical methods (Gries 2015). It might in fact be difficult to draw a clear line between variationist sociolinguistics, laboratory phonology and corpus phonology; they should rather be seen as three more or less independent attempts at re-initiating a research program similar to Zwirner/Zwirner's (1936/1970) phonometrics (albeit implicitly) using the tools and methods which have become available with the advent of the computer.

3 Corpora in corpus phonology

Although all corpus phonologists hold the view that phonological evidence should be drawn from corpus data, not everyone agrees on the very definition of 'phonological corpus'. Here, I will adopt a broad definition and define a phonological corpus as any structured dataset, built according to explicit principles, which contains at least coded data resulting from an interpretative process at the phonological level. It may also include (audio or video) primary data, non-phonological data useful for using the phonological data (e.g. syntactic or pragmatic annotations), and metadata. This definition encompasses two types of corpora currently in use, which I will refer to as *speech corpora* and *phonological databases*, respectively.

3.1 Speech corpora

I will take as a starting point what Gut/Voorman (2014) define as a *phonological corpus*:

A phonological corpus is [...] a representative sample of a language that contains

- primary data in the form of audio or video data;
- phonological annotations that refer to the raw data by time information (time-alignment); and
- metadata about the recordings, speakers and corpus as a whole.

(Gut/Voorman 2014, 16)

Primary data (or raw data) correspond to a set of audio or video files which have been organized into a relatively homogeneous and coherent whole. Although the data may have been gathered with a specific goal, Gut/Voorman (2014) argue that this is not a necessary condition, and indeed many corpora are used to test hypotheses for which they were not designed in the first place. We can identify two broad types of primary data, namely *naturalistic* and *experimental*, which are probably best understood as the two ends of a continuum (Chaudron 2003, 763–765). Naturalistic data, such as guided interviews and conversations with a peer, can yield (relatively) spontaneous forms of speech, at the expense of comparability since there may be discrepancies among subjects in terms of fluency, lexical and grammatical richness, or talkativeness among other factors. On the other hand, experimental data allows for a very precise comparison of a number of subjects by rigorously controlling and selectively manipulating the linguistic variables of interest. This comes at the expense of authenticity and representativeness, since this can increase the subjects' feeling of linguistic insecurity and may therefore not accurately reflect their linguistic competence in a real communicational setting. A good compromise is to adopt a hybrid approach and collect both naturalistic and experimental data.

A *phonological annotation* represents time-aligned textual information associated with the primary data. Annotations can take many forms, such as orthographic transcriptions, phonetic transcriptions using the International Phonetic Alphabet or, more generally, any kind of symbolic coding that might provide useful information about the content of the primary data. Needless to say, annotations need not be strictly phonological and may denote information about any level of linguistic structure (parts of speech, syntactic constituents etc.). Figure 10.1 illustrates a partial hierarchical annotation of a portion of speech signal in the program Praat (Boersma/Weenink 2019), which is perhaps the most widely used program for this task. Each layer of annotation is represented on an autonomous *tier*.

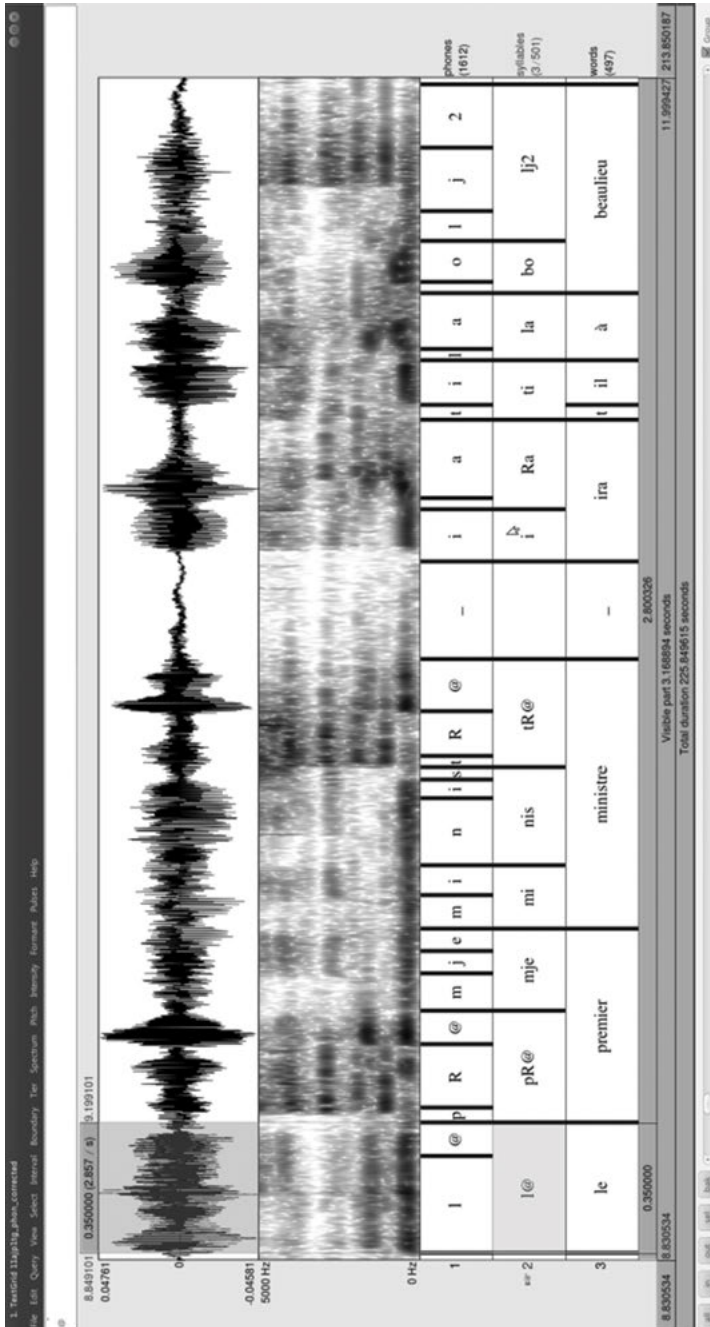


Figure 10.1: Annotation of the French sentence *Le premier ministre ira-t-il à Beaulieu ?* ‘Will the Prime Minister go to Beaulieu?’.

Finally, *metadata* are information that link primary data and phonological annotations together or indicate structural relations about the data. Depending on their nature, they can help users manage, organize and/or make use of the corpus. Typical examples of metadata include the subjects' age, gender, occupation and linguistic background.

Although there is no doubt that all corpora that follow Gut/Voorman's (2014) guidelines are indeed *bona fide* phonological corpora (cf. also Durand 2017), it seems to me that this definition is unnecessarily narrow. I will therefore refer to Gut and Voorman's type of corpus as a *speech corpus*.

Speech corpora can be annotated, managed and analyzed using a number of freely available tools. In addition to Praat, which has already been mentioned, we can cite among others ELAN (Sloetjes 2014), Phon (Rose 2014), EXMARaLDA (Schmidt/Wörner 2014), ANVIL (Kipp 2014), Phonometrica (Eychenne/Courdès-Murphy 2019; <http://www.phonometrica-ling.org>). These programs differ in terms of the platforms they run on (Windows and/or macOS and/or Linux), the features they offer (annotation, metadata management, extraction of concordances etc.), as well as other characteristics such as performance and ease of use. Some of these programs are also geared toward a specific community of researchers. For instance, ANVIL has extensive support for annotating videos, and as such it is widely used by researchers working on interaction, whereas Phon offers a range of features for specialists of language acquisition. Clearly, there is no one-size-fits-all tool for speech corpora, and readers are encouraged to try several of them and see what works best for their workflow. Praat is a good choice for data annotation and phonetic analysis, but it has no built-in support for metadata and it is very limited when it comes to analyzing large annotated corpora. Phonometrica was specifically developed to address these limitations.

There are now a variety of speech corpora available for Romance languages. In the area of first language research, we should begin with C-ORAL-ROM (Cresti/Moneglia 2005), a reference corpus which contains annotated recordings of spontaneous speech from four Romance languages (French, Italian, Portuguese, and Spanish). More specialized corpora have been developed for the analysis of specific languages, often putting a strong emphasis on the description of geographic, social, and/or stylistic variation. The project *Phonologie du français contemporain* (PFC; Durand/Laks/Lyche 2002; <http://www.projet-pfc.net>) is a large database that consists of recordings and annotations from over 400 subjects from French-speaking countries around the world. Likewise, the *Rhapsodie* treebank (Lacheret-Dujour/Kahane/Pietrandrea 2019; <http://www.projet-rhapsodie.fr>) is a corpus of spoken French annotated with prosodic and syntactic information. The *Corpus di italiano parlato* (Cresti 2000) contains annotated transcriptions, as well as a subset of the corresponding recordings, from spoken Italian. For Spanish, the project *Fonología del español contemporáneo* (FEC) (Pustka et al. 2018) aims at developing a corpus built according to the same methodological principles as

PFC's. Finally, the *Spoken Portuguese corpus* (<http://catalogue.elra.info/en-us/repository/browse/ELRA-S0345/>) contains recordings and aligned transcriptions from Portuguese speakers from Brazil and Portugal, as well as from several countries and regions in Africa and Asia where Portuguese is an official language (Angola, Cape Verde, Guinea-Bissau, Mozambique, São Tomé and Príncipe, Macao, Goa, and East Timor).

The area of second language research has also been a burgeoning field for the development of speech corpora (Colantoni/Steele/Escudero 2015; Gut 2014) and there exist many corpora for different combinations of learner population(s) and target language(s). The *Leiden Learner Corpus* (<https://www.universiteitleiden.nl/en/research/research-projects/humanities/leiden-learner-corpus>) contains, among other things, speech data of Dutch learners of French, Italian, Portuguese and Spanish. For French, the project *Interphonologie du français contemporain* (IPFC; Detey/Kawaguchi 2008; <http://cblle.tufs.ac.jp/ipfc>), which adapted the survey protocol from the PFC project to sample populations of learners of French as a foreign language, contains data from 16 populations of learners. The *French Learner Language Oral Corpora* (<http://www.flloc.soton.ac.uk>) provides several sub-corpora of early learners of French with English as a first language. The *Corpus parlato di italiano* (<http://elearning.unistrapg.it/osservatorio/corpora.html>) is a collection of transcriptions of interviews of English-speaking, German, and Japanese learners of Italian. The *Interfonología del español contemporáneo* (IFEC; Pustka et al. 2018) is an initiative which seeks to develop a corpus similar to IPFC, but which targets learners of Spanish. Finally, the *Spanish learner language oral corpora* (SPLLOC; <http://www.splloc.soton.ac.uk>) contains recorded material from English learners of Spanish, as well as native speakers of Spanish, recorded across a similar range of tasks (including interviews, narratives and pair discussions).

These corpora vary greatly in terms of scope, state of completion, methodology and availability. Nevertheless, they do illustrate the vitality of the field and the increasing importance of speech corpora in phonetic and phonological research.

3.2 Phonological databases

Although speech corpora are probably the main type of phonological corpora, a number of researchers who explicitly claim to work in corpus phonology rely on phonological databases in addition to, or instead of, speech corpora. A phonological database usually takes the form of a large phonetized lexicon, typically containing several thousands of entries. Phonetic forms may be more or less narrow, representing a more or less concrete level of phonological annotation, and other sources of linguistic information may also be available (orthographic form, lemma, part of speech, syllabic structure, frequency, among others). Such corpora are usually used as an approximation of the mental lexicon of a speaker/hearer of a given language.

While they have been in use in psycholinguistic research for a long time, phonologists have started to realize the potential that they offer for phonological research. Indeed, phonological databases have played an important role in improving our understanding of under-documented languages. For example, Alderete/Bradshaw (2013) develop a comprehensive analysis of the phonotactic constraints of roots in Samoan (a Malayo-Polynesian language), and Alderete/MacMillan (2015) offer a detailed account of the generalizations concerning reduplication in Hawaiian (another Malayo-Polynesian language). In addition, Wedel/Jackson/Kaplan (2013) and Wedel/Kaplan/Jackson (2013) used phonological databases from nine languages (American English, British English, Cantonese, Dutch, French, German, Korean, Slovak and Spanish) to test an old hypothesis, the *functional load hypothesis* (Hockett 1955; 1967; Martinet 1955), according to which phonological contrasts that do little work in a phonological system tend to merge when they are phonetically similar. Their results indeed showed that functional load, operationalized as minimal pair counts, was significantly correlated with a pair of phoneme's tendency to merge.

There are currently very few freely available phonological databases for Romance languages. The CLEARPOND database (Marian et al. 2012), which was originally designed for the analysis of neighborhood density, contains two sub-corpora for French and Spanish. The French corpus is a subset of *Lexique* (New et al. 2001; cf. <http://www.lexique.org>), a richly annotated database containing more than 140,000 entries. The Spanish corpus is based on SUBTLEX-ESP (Cuetos et al. 2012), a dataset containing only word entries and their frequencies, estimated from a corpus of movie subtitles. CLEARPOND does provide phonetic transcriptions for Spanish; these were derived using *eSpeak* (cf. <http://espeak.sourceforge.net>), a text-to-speech system.

Since phonological databases are still less widely used than speech corpora in phonological research, there are understandably far fewer tools available. *Phonological CorpusTools* (Currie Hall/Mackie/Yu-Hsiang Lo 2019) is perhaps the most helpful as it is relatively easy to use and contains a range of features to automatically obtain information about *n*-gram frequency, functional load, neighborhood density, and several other metrics.

4 Quantitative methods in corpus phonology

Quantitative methods are becoming an increasingly important tool for corpus phonologists since they allow us to better understand and test hypotheses about linguistic variables in what are often messy and noisy data. However, it is crucial to realize that *outcome variables* (or *response variables*, or *dependent variables*) in phonological corpora, i.e. variables we want to draw inferences about, are usually *discrete*, and not *continuous*. As a result, the most well-known statistical techniques

(t-test, Analysis of Variance, classical linear regression), which are encountered in most introductory statistics textbooks, are ill-suited for the analysis of such data. This section aims at clarifying the different types of data that corpus phonologists typically deal with, as well as introducing some important techniques that can be used to analyze them. I will first discuss the two sub-types of discrete data, known as *categorical data* and *count data* (Friendly/Meyer 2016), after which I will provide an overview of generalized linear (mixed-effects) models, a family of statistical models that offers a unified conceptual framework for data analysis. Most researchers working in quantitative linguistics nowadays use the R environment (cf. <https://www.r-project.org>), an open-source, cross-platform computer program for statistics. Good introductions for linguists include Baayen (2008), Gries (2016), and Johnson (2008).

4.1 Categorical data

Categorical data are data that can take on a finite number of values (also called *levels*). Although there is no theoretical upper limit on the number of levels, in practice categorical outcome variables are very often binary, which means that they can take on only two values. The presence/absence of schwa in French (↗4 From vowel weakening in Romance to French schwa) and the syntactic gemination of consonants (*raddoppiamento sintattico*) in Italian (↗18 Italian; cf. Krämer 2009, 219–234) are both examples of phenomena that can be analyzed as binary outcome variables. Some variables can take on a larger number of values. For example, the liquids /l/ and /r/ in Dominican Spanish have at least four variants, since they can be realized as a full liquid (e.g. *mujer* [mu'her] 'wife'), as a glide (e.g. *comer* [ko'mej] 'eat_{INF}'), be assimilated to the following consonant (e.g. *cuerpo* ['kwep:ɔ] 'body'), or be deleted altogether (e.g. *papel* [pa'pe] 'paper'; cf. Acosta-Martinez 2014).

Categorical data can be analyzed in a number of ways. When one is interested in examining how a single categorical *explanatory variable* (or *predictor*, or *independent variable*) relates to a single categorical outcome variable, a simple yet effective approach is to build a *contingency table*. As an example, we will test a simple hypothesis about French liaison (↗21 French), using (simplified) data from the PFC project discussed in Eychenne et al. (2014). Our substantive hypothesis is that liaison in the verb form *est* 'be_{3SG}' is more likely to be realized in reading than in conversation. We will therefore test the statistical *null hypothesis* according to which there is no difference between conversation and reading task. We will set aside the presentative form *c'est* 'it is', since it only occurs in conversation and there is evidence that it behaves differently from other forms (Durand/Lyche 2008). Table 10.1 is a two-way contingency table of the results, using the PFC database.

Table 10.1: Frequency of liaison realization in *est* based on 14 survey points in the PFC database.

	liaison	no liaison	total
conversation	158	183	341
reading task	300	90	390
total	458	273	731

As a first step, it is useful to calculate the expected frequencies assuming that liaison realization and task are independent. For any cell in row i and in column j , the expected frequency is calculated as follows:

$$(1) \quad E_{ij} = (O_i \times O_j) / N$$

where E is the expected frequency, O is the total observed frequency for a given row or column, and N is the total number of observations (here, 731). These figures are reported in Table 10.2. The observed/expected ratio (cf. Table 10.3) can now give us an intuitive sense of how much our data deviate from what we would expect under independence. If task and liaison were perfectly independent, the ratio would be 1 in all cells. It appears that liaison is under-represented in conversation and over-represented in the reading task, whereas non-liaison is over-represented in conversation and under-represented in the reading task. This seems to agree with our substantive hypothesis, but is this statistically meaningful or is it simply due to chance, perhaps because our sampling method was imperfect? A common way to test that is to perform a chi-square test of independence (χ^2) on the contingency table (Table 10.1). This test will give us an estimated probability (the infamous p value) of obtaining data at least as extreme as ours if the experiment were repeated a large number of times, assuming that the null hypothesis is true. A formal test gives us the chi-square statistic $\chi^2 = 72.75$ with one degree of freedom,² which corresponds to a probability $p < 0.00001$. Since the usual significance threshold in the Humanities is 5% (i.e. $p < 0.05$), we can reject the null hypothesis and accept the alternative hypothesis that there is a significant difference in the realization of liaison between the two tasks.

² Degrees of freedom in a contingency table correspond to the number of rows minus 1 multiplied by the number of columns minus 1. In our case, $(2 - 1) \times (2 - 1) = 1$.

Table 10.2: Expected frequencies for liaison realization in *est*.

	liaison	no liaison	total
conversation	213.6	127.4	341
reading task	244.4	145.6	390
total	458	273	731

Table 10.3: Observed/Expected ratios for liaison realization in *est*.

	liaison	no liaison
conversation	0.74	1.44
reading task	1.23	0.62

4.2 Count data

The second sub-type of discrete data is *count data*, which represent frequency counts for a given variable. These are probably less common in linguistics than in other fields, such as ecology and biology, but they do arise from time to time. As a matter of example, consider the notion of neighborhood density, which is usually operationalized as the number of words that differ from a target word by exactly one edit operation (insertion, deletion or substitution of one segment). Using the CLEARPOND database mentioned above, I have extracted data for French and Spanish, limiting myself to the 5,000 most frequent words in both languages for expository purposes. The neighbor counts (or *frequency spectrum*) for both languages are illustrated in Figure 10.2 (plotted on a squared root scale). As we can see, in both languages the largest neighbor count is 0, and there is a general downward trend as the number of neighbors increases. We see, however, that French has a small lobe between roughly 30 and 55 neighbors, and another smaller one between 60 and 80. In addition, it is clear that Spanish words have far fewer neighbors: while Spanish words have on average 2.3 neighbors, with a maximum of 29, French words have on average 8.5 neighbors, with a maximum of 89. (For example, the French word *temps* ‘time’ has among its neighbors *ton* [tɔ̃] ‘your_M’, *ta* [ta] ‘your_F’, *tante* [tāt] ‘aunt’, *tende* [tād] ‘stretch_{1SG.SBJV}’ etc.). This discrepancy might have important implications for theories of the lexicon and language processing, since it has been argued that neighborhood density plays a role in speech production and perception (Luce/Pisoni 1998; Scarborough 2013), but differences such as these would be virtually impossible to detect without corpus data.

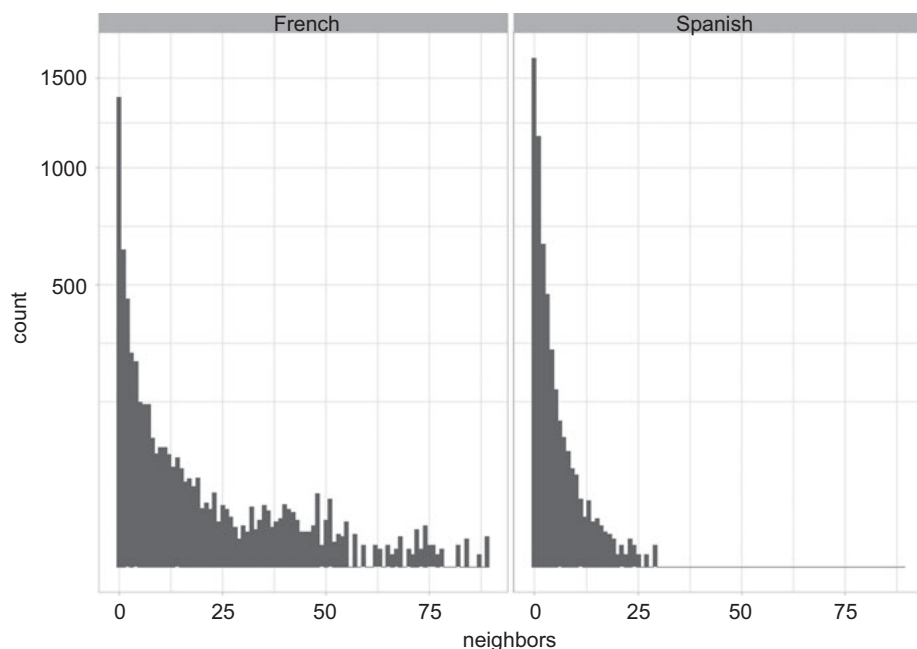


Figure 10.2: Neighborhood density in French and Spanish based on 5,000 words.

Count data such as these are often modeled using a *Poisson distribution*. An important feature of this distribution is that its mean and variance³ are equal: in other words, a data set with a low mean tends to have all its data points close to the mean, whereas a dataset with a high mean tends to display a greater amount of variation around the average. Let us see how well the Spanish data could be modeled with this distribution. This is displayed in Figure 10.3, where bars represent the observed neighbor counts and dots represent the expected count under a Poisson distribution. As we can see, the fit is quite poor. The reason why is because these data violate the assumption that the mean and variance are equal. Indeed, the mean is equal to 2.3 whereas the variance is equal to 10.5! Our data thus exhibits *overdispersion*, whereby the variance exceeds the mean (by a factor of 4.5). This is a common situation with count data, and a common remedy is to use a *negative binomial distribution*, which allows the variance to be proportional, instead of being equal, to the mean (Agresti 2002, 130–131; Friendly/Meyer 2016, 82–85). Figure 10.4 shows the result of fitting a negative binomial distribution to the Spanish data. It is clearly a much better model than the Poisson distribution.

³ The variance is the square of the standard deviation, which is the expected spread around the mean.

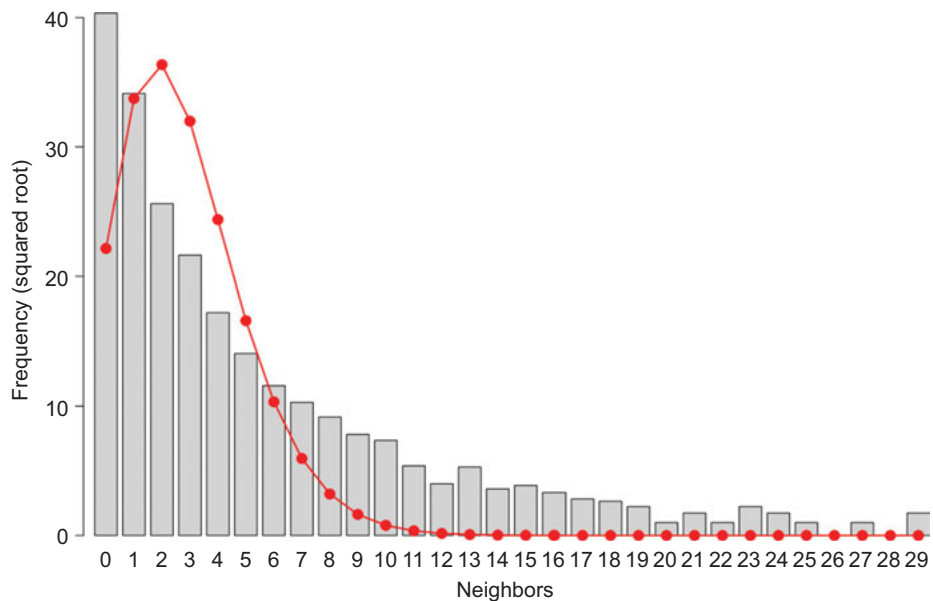


Figure 10.3: Poisson distribution fitted to the Spanish count data.

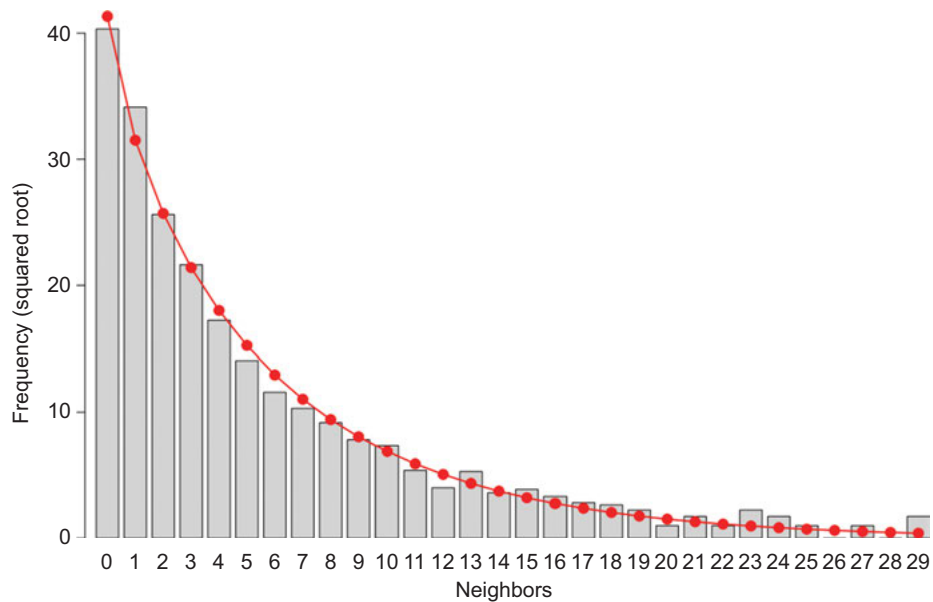


Figure 10.4: Negative binomial distribution fitted to the Spanish count data.

4.3 Generalized linear (mixed-effects) models

Linguists often need to build complex hypotheses that may relate several explanatory variables to an outcome variable. Moreover, these explanatory variables may not always be discrete. *Generalized linear models* (GLMs) are a family of statistical models that extend a well-known technique, *linear regression*, to relate many kinds of outcome and explanatory variables. Let us start with a simple example illustrating classical linear regression for one continuous outcome variable and one continuous explanatory variable. We will look at the relation between intensity (measured in decibels) and pitch (measured in semi-tones) in stressed vowels followed by schwa in word-final position in Southern French, e.g. *patte* ['patə] 'leg', *écologique* [ekolo'zikə] 'ecological'. The data are taken from Eychenne (2015) and contain 337 observations.

Figure 10.5 offers a scatter plot of these data, with intensity on the *x* axis and pitch on the *y* axis. The solid line corresponds to the *line of best fit*, which is the line that is closest to all the points in the data, based on minimizing the sum of the square of the distance between a point (the observed pitch for a given intensity measurement) and its vertical projection on the line (the predicted pitch for a given intensity value). The line of best fit suggests that we can model a linear relation between the two variables. This means that we can predict, to a certain extent, the expected pitch for any

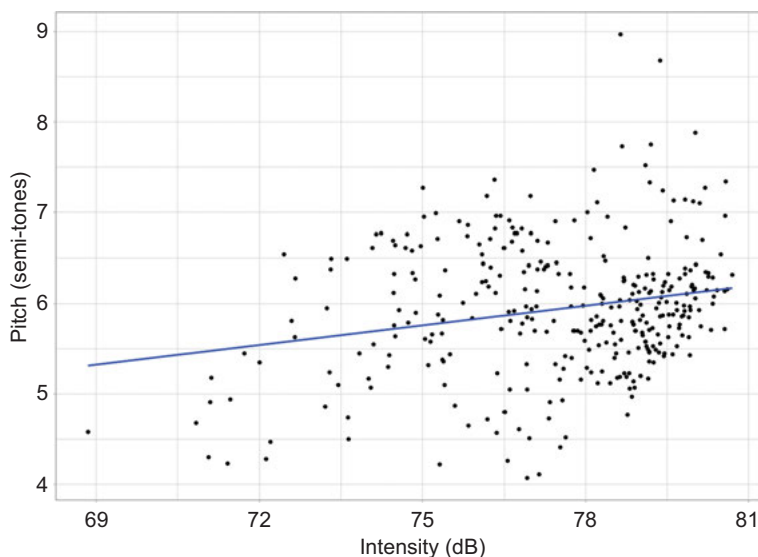


Figure 10.5: Linear relation between intensity and pitch for a 65-year-old male speaker of Southern French.

given intensity value. In the general case, any linear relation such as this one can be expressed by the following equation:

$$(2) \quad y = ax + b$$

where x and y are the values on the x and y axes, respectively, a is the slope of the line, and b is the intercept, which is the point where the line crosses the y axis. In the context of linear regression, the slope is called *regression coefficient*, and we consider that there is a linear relation between x and y if a is different from 0. (If $a = 0$, then no matter how x changes, y will always be equal to b .) In our example, the model in (2) can be written as:

$$(3) \quad \text{predicted pitch} = 0.072 \times \text{intensity} + 0.326$$

The value of the regression coefficient ($a = 0.072$), even though it is quite small, is significantly different from 0 in this case ($p < 0.0001$). Indeed, the 95% *confidence interval* for this coefficient, i.e. the interval within which the true value of this parameter is expected to lie (with 95% chance), is $[-0.038 - 0.107]$, an interval which is fairly narrow and, crucially, does not contain the value 0. (Remember that if $a = 0$, there is no relation between x and y .) The positive sign also indicates that the correlation between intensity and pitch is positive: as intensity increases, so does pitch. Note however that this regression model tells us nothing about the causal relation between the two variables: this is a linguistic problem, not a statistical one. Although we usually interpret the variable on the x axis as a predictor and the variable on the y axis as an outcome, all the model tries to do is find a linear relation between them.

This type of linear model can be straightforwardly generalized to include more than one predictor, by assigning each explanatory variable its own regression coefficient. There are also a number of ‘tricks’ that can be used to transform categorical predictors into numeric ones, but these technical details are usually taken care of automatically by modern statistical software.

Generalized linear models, as their name implies, are a generalization of the approach I have just sketched out. Instead of relating x and y directly, as we have done, they use a *link function* (usually called $g(\cdot)$), which relates the explanatory variables to the expected value of the outcome variable y :

$$(4) \quad g(y) = a_1x_1 + \dots + a_nx_n + b$$

This approach allows us to build, among other things, *logistic regression* models for binary outcomes as well as *Poisson regression* models and *negative binomial regression* models for count data. I will illustrate how GLMs work with the neighborhood density data that we have discussed above. Marian et al. (2012) reported a significant effect of (log) frequency and word length on neighborhood density in the CLEARPOND

database. Let us try to replicate their finding in Spanish, using a negative binomial model fit on a random sample of 500 words (cf. Eychenne/Shon 2019). The resulting model is reported in Table 10.4.

Table 10.4: Negative binomial regression model for neighborhood density in Spanish.

	estimate	standard error	z value	p value
(intercept)	2.88	0.23	12.52	< 0.0001
length	-0.43	0.02	-16.57	< 0.0001
log frequency	0.09	0.03	2.73	0.006

The model provides us with an estimate of each model parameter along with several other pieces of information. The standard error gives an indication of the precision in the estimate (lower is better). The *z* value is a standardized score which corresponds to the estimate divided by the standard error: the higher the standard error (i.e. the more imprecise our measurement), the closer the *z* value will be to 0. The *p* value corresponds to the probability that the normalized estimate (i.e. the *z* value) is equal to zero given our data: as a rule of thumb, a *z* value is statistically significant at the usual 5% threshold if its absolute value is larger than 2. In our example, the absolute value of the *z* values for length and log frequency are rather large (16.57 and 2.73, respectively), and as a result their *p* values are both lower than 0.05 (5%). This indicates that there is a linear relation between these explanatory variables and the outcome. Because the link function used by the negative binomial model is the logarithmic function, we need to exponentiate the regression coefficients in order to interpret them on their original scale. The coefficient for length is $e^{-0.43} \approx 0.65$: this means that there is on average a 35% decrease in the number of neighbors for every additional segment in a word, keeping everything else constant. The coefficient for log frequency is $e^{0.09} \approx 1.09$, which means that there is on average a 9% increase in the number of neighbors every time log frequency increases by one unit (i.e. every time raw frequency is multiplied by $e \approx 2.7182$).

Explanatory variables such as the ones we have explored are also known as *fixed effects* because we usually have (or at least, we should have) a substantive hypothesis about how they affect the outcome variable. Sometimes, however, we need to include (categorical) variables about which we do not have any specific hypothesis, because we expect them to vary at random. Such variables can be included in a GLM as *random effects*, and the resulting model is called a *generalized linear mixed-effects model* (GLMM). A common example in corpus phonology is the treatment of participants: we usually want to include a variable for participants because we expect variation across individuals. A GLMM that includes a random effect for participants allows each participant to have their own intercept and/or to have their own regression coefficient(s) for one or several explanatory variable(s). For example, Bayles/

Kaplan/Kaplan (2016) analyzed the realization of schwa in French (using a subset of the PFC database) with logistic mixed-effects regression models. This approach allowed them to show that the presence/absence of schwa in clitics, in word-initial position and within complex clusters (in external sandhi) was subject to both intra- and inter-individual variation. GLMMs are establishing a new standard in the field, as they are more powerful and more robust than alternative approaches. They have the additional benefit of being able to handle unbalanced data, which are commonly found in corpus linguistics, quite well. Interested readers are encouraged to consult Gries (2015), who provides an accessible overview of GLMMs for corpus linguistics, focusing on logistic mixed-effects models. Baayen (2008, chapter 7) is another fine introduction, although he focuses more on continuous outcome variables. Gelman/Hill (2007) offer a comprehensive treatment of the topic for social sciences.

5 Conclusion

Corpus phonology, as I have tried to show, is not a brand-new branch of linguistics. It is grounded in an old research tradition which considers that linguistic analysis must be based on observation, not of cherry-picked examples, but of samples large enough that they can be treated as a reasonable approximation of the linguistic system that the linguist tries to understand. The computational power and the statistical methods that are now available make it possible to investigate questions that early structuralists could probably not have dreamed of. For instance, Hockett (1955, 216), who offered the first formal definition of functional load using the then-new mathematical framework of information theory, lamented that he had not been able to put his own equation to use because “the amount of counting and computation necessary [was] formidable”. Some sixty years later, his equation is routinely used by corpus phonologists to probe the properties of phonological contrasts (Eychenne/Jang 2018; Oh et al. 2015; Surendran/Levow 2004; Surendran/Niyogi 2003; Wedel/Kaplan/Jackson 2013).

Despite the undeniable progress that they allow, phonological corpora do have limitations, as pointed out by Durand (2017). Their representativeness is obviously dependent on their size and the sampling method that was used to build them. In addition, because they are a finite sample of a language, they often fail to reveal rare events that may be linguistically interesting but difficult to observe in spontaneous speech. Therefore, they should be seen as one source of evidence among others, and insights gathered from corpus studies should be confronted with other sources of evidence such as phonetic and psycholinguistic experiments or computational modeling.

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11 Sociophonetics

Abstract: In this paper we review current findings in the interdisciplinary field of sociophonetics, focusing on fieldwork- and corpus-based analyses of speaker- and group-specific phonetic and phonological variation in selected Romance languages. We show how multiple sources of allophonic variation represent a rich potential for the expression of social-indexical meaning in both wider and lesser-known varieties of Romance.

Keywords: non-referential meaning, social variation, identity

1 Introduction

Sociophonetics is the study of social-indexical meaning conveyed by the sounds of speech. Its inception as *Lautstilistik* (Ger.) or *phonostylistique* (Fr.) can be traced back to the Prague School (Trubeckoj 1939/1958) and the French functionalist tradition (Léon 1971; 1993; 2009; Fónagy 1983) as a thematic label for expressivity in speech. In North America, in close connection with the emerging field of variationist sociolinguistics (Labov 1962; 1972), “socio-phonetics” (Deshaies-Lafontaine 1974) came to refer to an innovative methodology combining phonetic analysis with field methods from dialectology to study patterns of synchronic variation as underlying mechanisms of sound change in the community. The bulk of studies that followed focused on longitudinal and synchronic variation and change, using increasingly more diverse auditory and acoustic phonetic techniques. Over the course of the next four decades, methods and research questions have expanded and diversified. Traditional fieldwork and interview techniques have been enriched by ethnographic observations linking phonetic variation to social practice (Eckert 2000; Mendoza-Denton 2008), new acoustic and articulatory phonetic techniques have been deployed to synchronic phonetic variation relevant to sound change (Lawson/Stuart-Smith/Scobbie 2018; Mielke/Carignan/Thomas 2017), innovative empirical methods have been proposed to study the cognitive representations of variability and cultural diversity (Campbell-Kibler 2012; Chevrot/Drager/Foulkes 2018), and computational techniques have been tested in simulations of diffusion and transmission of innovations and change across large communities (Fagyal et al. 2010; Stanford/Kenny 2013; Harrington et al. 2018).¹ While there is still no consensus on whether sociophonetics is merely a methodological

¹ For additional reviews of past and present scholarship, cf. Hay/Drager (2007), Di Paolo/Yaeger-Dror (2011), Thomas (2011), and Baranowski (2013), among others.

“interface” between two subfields (Thomas 2011, 2) or a full-blown “methodological approach within variationist sociolinguistics” (Baranowski 2013, 403), researching the social significance of phonetic variation continues to be the unifying theme in the “loose confederation of industries” (Foulkes/Scobbie/Watt 2010, 704) recognized as the independent subfield of sociophonetics today. If visibility is a measure of success, it is probably fair to say that sociophonetics has “made it” to a full-fledged subfield of scientific inquiry.²

The “social life of phonetics and phonology” (Foulkes/Docherty 2006, 409) is rooted in multiple sources of indexical information stemming from speakers’ geographical origins, ethnicity, social class, interactional stance, footing, speech styles, and register, to name a few. In the variationist sociolinguistic tradition, it is customary to present methodologies tackling such complex sources of indexical meaning as epistemologies that build on each other.

The first methodological tradition, so-called *first wave* studies of variation (Eckert 2012, 93), proposes to model social meaning as a result of interactions among social factors. It seeks to establish meaningful correlations between certain speech phenomena (e.g. allophonic variation in plosives, lingual articulations in nasals etc.) and pre-established sociological categories (e.g. age, gender, ethnicity, socioeconomic class, social networks, regional origin etc.). *First wave* studies consider sociophonetic variation a reflex of social factors that influence individuals’ actions within a given socio-economic hierarchy and their speech patterns as representative of practices in a larger speech community. Following in the footsteps of Weinreich/Labov/Herzog (1968), these studies seek to identify patterns of synchronic variation as diagnostics of ongoing language change.³ Thus *first wave* studies bridge the gap between today’s methodological traditions focused on instrumental phonetics and auditory analyses of vernacular speech in early 20th-century dialectology and accordingly represent the building blocks of sociophonetic knowledge in most Romance languages.

In so-called *second wave* studies, sociophonetic variation is conceptualized as locally relevant stylistic practice. Studies following this methodological tradition are typically ethnographic and fieldwork-oriented and continue to model social-indexical meaning as conditioned by sociological factors, but additionally underscore how observed patterns of variation are the results of meaningful actions by central figures of communities of practice (e.g. adolescent peer groups, neighborhood, workplace etc.). Studies of sociolinguistic variation in the Romance languages, both in monolin-

2 The yearly variationist sociolinguistics conference, NWAV, has been featuring workshops in sociophonetic methods for nearly two decades and ICPHS in Melbourne (2019) has had different sessions focusing on the production, perception, and acquisition of social-indexical variation in speech.

3 Of course, linguistic variation and language change are not synonymous. The former is a prerequisite for the latter but is not predictive: “Not all variability and heterogeneity in language structure involves change; but all change involves variability and heterogeneity” (Weinreich/Labov/Herzog 1968, 188).

gual and multilingual settings, have been informed by many influential *second wave* studies, some of which will be reviewed here.

In the last two decades, following similar developments in the social sciences (Carter 2013), many sociophonetic studies have embraced constructivist views of social life and, thus, social-indexical variation in language. These studies are collectively referred to as *third wave* approaches to variation (Eckert 2012, 93–97). In their conceptions, social-indexical meaning in speech and language is the dynamic result of self-expression and self-differentiation of individuals who actively shape, rather than just reflect, their own social worlds by the styles that they adopt. More interpretative than experimental and primarily focused on select individuals and small communities of practice, *third wave* studies currently represent a minority in Romance sociophonetics.

In this chapter, we report on *first* and *second wave* studies using fieldwork and survey-type methodologies.⁴ Rather than foregrounding social categories, some of which could be disputed on methodological or epistemological grounds, our review is organized in terms of phonetic categories and historically attested phonological processes associated with these categories. Following Eckert/Labov (2017, 469), we consider that social-indexical meaning in speech is expressed through language-specific allophonic variation that provides a rich “indexical potential” for “register[ing] distinctions in the collective co-existence that is the social world”. We first turn to social-indexical variation in the consonant systems of Romance, as cued by voicing/devoicing, gemination/degemination, palatalization, velarization, assibilation, and rhoticization (Section 2). We then review selected studies of socially meaningful allophonic variation in oral and nasal vowel systems (Section 3) and end on social-indexical meaning cued by prosodic variation (Section 4). To conclude (Section 5), we briefly summarize the contribution of sociophonetics to the study of Romance languages.

2 Sociophonetics of consonantal variation

2.1 Variation and change in the consonant systems of Romance

Numerous, historically well-attested, phonological processes in the consonant systems of the Romance languages have been shown to convey social-indexical meaning synchronically. While these processes are sometimes classified in terms of “fortition” and “leni-

⁴ Approaches to social meaning as a continuum of decreasing reference and increasing performativity (Eckert 2019) or a signaling game within game-theoretic pragmatics (Burnett 2019) represent emerging new avenues that cannot be reviewed here.

tion”, we prefer the terms “strengthening” and “weakening” to center our discussion on the segments rather than possible articulatory correlates that can be difficult to identify.

All non-geminate obstruents inherited from Latin underwent some degree of weakening or loss in all subgroups of Romance (Carvalho 2008). However, the outcome of these changes was variable and depended on many factors, including the type of consonant, phonetic environment, prosodic position, and external factors such as language contact. In short, while historical changes affecting the consonant system were rule-governed, they generally lacked uniformity across types of consonants and groups of languages. As Scheer/Ségéral (2008, 140) put it with respect to weakening (‘lenition’): “the only generalization we can see is relative for a given input in a given language and regarding a given phenomenon”. We adopt this motto in our presentation of consonantal variation and changes most typically featured by *first* and *second wave* studies.

2.1.1 Intervocalic voicing and devoicing

Word-medially, especially in intervocalic positions, weakening was particularly strong in northern Gallo-Romance that included the ancestor varieties of today’s standard French. In these varieties, bilabial plosives /p/ and /b/ weakened to /v/ (e.g. PIPERE(M) > Fr. *poivre* ‘pepper’ and DEBERE > Fr. *devoir* ‘have to_{INF}’) while other intervocalic consonants disappeared, leaving no trace and, therefore, no sources for allophonic variation in place or manner of articulation. A different process resulted in a similar outcome in nearly all varieties of Italo-Romance where non-geminate plosives remained stable in intervocalic positions yielding relatively limited allophonic variability for instance in Tuscan Italian, the ancestor of today’s Standard Italian (e.g. FOCU(M) > It. *fuoco* ‘hearth’).

Voiced vs. voiceless consonants in intervocalic positions show a relatively clear split between northern (Cismontano) and southern (Oltramontano) varieties of Corsican that together form the basis of a flexible, so-called “polynomic”, spelling standard (cf. Blackwood 2011). The social-indexical meaning of these variations has been analyzed in terms of educational attainment, participation in rural vs. urban social networks, and more or less adherence to normative language ideologies. In Jaffe’s (2003) fieldwork in bilingual Corsican village and town schools in the central dialect areas of the island, for instance, both voiced and voiceless plosives appeared in elementary school children’s spellings of target words such as ‘friend’ and ‘brother’ that are conventionally spelled *amica* and *fratellu* but variably pronounced [a'miga] or [a'mika] and [fra'dellu], [fra'tellu] or [fra'teddu]. In Jaffe’s study, children from towns tended to be more categorical in their choices of variants than children from rural areas who seemed to be more aware of variation. Flexible “polynomic” norms were not apparent in central and northern Corsican-speaking teachers’ responses who, despite target words evoking well-known pronunciation

differences, did not accept any spelling alternatives reflecting southern pronunciation (Jaffe 2003, 529).

The production of intervocalic sibilants has been, both historically and synchronically, quite variable in Ibero-Romance varieties. A prime example is the alveolar fricative series, which, in the evolution of Spanish, has exhibited both voicing (e.g. /s/ > /z/ as in CASA(M) > OSp. *ca[z]a* ‘house’) and devoicing (e.g. /z/ > /s/ as in OSp. *ca[z]a* > Sp. *ca[s]a*) (Hualde/Prieto 2014, 111). Though Modern Spanish voiceless /s/ has been claimed to exhibit sporadic voicing as a generalized casual/fast speech phenomenon in all speech communities (Clegg/Strong 1992, 32), social indexation and systematic, heightened frequency of voicing have been attested in Costa Rican Spanish (Chappell 2016; Chappell/García 2017), Catalanian Spanish (Davidson 2019a; 2020a; 2021) and Ecuadorian Spanish (Davidson 2019b; García 2019) using both production and attitudinal data obtained through a combination of fieldwork interviews and matched guise techniques. Costa Rican /s/ voicing is favored by younger male speakers in accordance with an asymmetrical access to positive social evaluations: though /s/ voicing across genders indexes lower social class and less education, additional positive attributions of local identity, friendliness, and confidence are exclusively available for male speakers (Chappell 2016, 371; Chappell/García 2017, 31). Somewhat analogously for Ecuadorian Spanish, /s/ intervocalic voicing is favored by younger male speakers from less urban areas and exhibits a gender asymmetry with respect to its social perception: negative associations of lower status and unpleasantness are afforded exclusively to female speakers (García 2019, 144), consistent with traditional accounts of female speech being more subject to social scrutiny and penalized than that of males (Trudgill 1972). In stark contrast, however, is the case of Catalanian Spanish. In Barcelona, Spanish /s/ voicing is favored by younger female speakers from less urban areas and is covertly positively associated with Catalan-Spanish bilingual identity and pleasantness. This is ultimately consistent with a change in progress from below, as an increasingly vital feature of an emerging regional variety of Spanish in contact with Catalan (Davidson 2019a, 72; 2020a; 2021). Taken together, these studies plainly illustrate that the social life of Spanish intervocalic /s/ (indeed, any speech feature) is wholly context- or community-dependent, rather than inherently imbued with any one particular social meaning.

An additional case of socially stratified intervocalic sibilant production is that of the devoiced alveolar and postalveolar fricatives in Central/Eastern Catalan. Prescriptively voiced /z/ and /ʒ/ are variably devoiced as [s] and [ʃ] in a Barcelonan sociolect known as *xava*, which, while traditionally associated with lower class urban male youth, is now popularly considered to be a Spanish way of speaking Catalan.⁵ Social correlates of gender, social class, and first language were found for the devoicing

⁵ For further information on the origins of and linguistic ideologies associated with *xava* Catalan, cf. Ballart Macabich (2002).

of each of /z/ and /ʒ/ (though the latter was additionally often realized as a palatal approximant /j/) in a group of 60 middle- and high-school age Barcelonan youth, with devoicing being favored by Spanish-L1 working class males (Ballart Macabich 2013, 149). Ballart Macabich highlights first language as the strongest source of sibilant devoicing in *xava* Catalan, followed by social class, which corroborates the aforementioned trajectory of *xava* Catalan as stereotypical of the urban lower class, and now members of the Spanish-L1 population. The results of a larger (120 informants) study examining the devoicing of /z/, as well as the postalveolar affricate /dʒ/, across speakers ages 3–40 from specific Barcelona neighborhoods (Nou Barris, Gràcia, Eixample), corroborates the stratification of /z/ devoicing according to first language (via neighborhood as a proxy, favoring devoicing in Nou Barris) (Benet/Cortés/Lleó 2012, 397). Beyond additional devoicing favored by younger speakers, the authors highlight the lack of first language (via neighborhood proxy) effects on /dʒ/ devoicing, accounted for by the greater import of language-internal factors, such as markedness and frequency (Benet/Cortés/Lleó 2012, 402). Together, these studies illustrate the complex interplay between both social and linguistic factors, uniquely foregrounded in language contact settings.

2.1.2 Word-final obstruent devoicing

In the Romance languages, non-assimilatory obstruent devoicing is rather rare. In Gallo-Romance varieties, it is typically linked to sound change and substrate influence. In early Old French, the weakening and deletion of word-final consonants included the intermediate step of obstruent devoicing (/d v z/ > /t f s/), which was preserved in some morpho-phonological alternations, such as liaison and gender marking in modern French (e.g. GRANDE(M) > *grand* [gʁɑ̃]~[gʁɑ̃t] / *grande* [gʁɑ̃d] ‘large_{M/F}’; NOUV(M) > *neuf* [nœf] / *neuve* [nœv] ‘new_{M/F}’). Examples of substrate influence come from Eastern Regional French spoken in Alsace and Lorraine where devoicing is attested in the local Germanic dialects with categorically voiceless word-final obstruents. Devoicing, on the other hand, is more variable in regional varieties of French where it can interact with vowel lengthening and schwa epenthesis in non-word-final positions, as well. For instance, in some varieties of Lorrain French, the monosyllabic *table* /tabl/ ‘table’ and *faible* /fɛbl/ ‘weak’ are realized as bisyllabic words, in which the vowels preceding the consonant clusters are lengthened, the voiced obstruents are devoiced, and epenthetic schwas between the obstruents and the liquids are inserted: for instance [ta:pəl] (Montreuil 2010, 159) and [fɛ:pəl] (Boughton/Pipe 2020, 332).

Pipe’s (2014) sociolinguistic fieldwork in the city of Strasbourg and a village in northern Alsace also revealed classical signs of dialect leveling, i.e. a decrease in apparent time of emblematic local pronunciations, including word-final devoicing, in favor of supra-local features. For instance, as expected in situations of dialect

leveling, rural working-class speakers between 18–30 years of age devoiced less than their elders, but those who reported to speak the local dialect and had a strong attachment to the region tended to show some degree of resistance to the standard and preserved this local pronunciation feature in their speech (Pipe 2014, 219). Not only age was relevant but also other factors such as gender and socio-economic status. In words such as *garage*, middle-class urban female speakers showed higher rates of devoicing than working class rural women. Beyond individual variation that might have obscured group-based differences, one can hypothesize that this signals an “iconization of devoiced /ʒ/” (Armstrong/Mackenzie 2018, 184): while rural speakers tend to shift to supra-local pronunciation standards, some members of the urban community display, and thus sporadically preserve, iconic indexes of local speech “as distinct from the surrounding rural one” to reassert their distinct position in the socioeconomic hierarchy.

One Romance language in which non-assimilatory word-final obstruent devoicing does exist and can convey social-indexical meaning is Catalan. In Catalan, voicing contrasts in fricatives, plosives, and affricates are systematically neutralized in favor of voicelessness in coda position (Wheeler 2005, 145; cf. also Hualde/Eager 2016, 333, for a more comprehensive review). Accordingly, contact with Catalan has likely motivated the presence and rise of word-final /d/⁶ devoicing in neighboring Spanish varieties (Hualde/Eager 2016, 331), coined Catalan Contact Spanish (CCS) by Davidson (2015; 2019a). Though the production frequencies and social correlates of CCS word-final /d/ devoicing have yet to receive exhaustive empirical attention, a dissertation by Pieras (1999) on 31 Majorcan Catalan-Spanish bilinguals revealed that devoicing was sensitive to habitual language use and predominant language of exposure via primary social networks, favoring increased CCS /d/ devoicing with greater use of and exposure to Catalan (Pieras 1999, 247–248). Subsequent attitudinal studies suggest that this feature may likely cue positive affiliations with bilingual Catalan-Spanish identity. Perception interviews conducted by Sinner (2002) and Davidson (2019a) revealed that overt awareness of word-final /d/ devoicing as a feature of CCS was restricted to bilinguals. Figure 11.1 shows that explicit awareness of word-final /d/ devoicing as a feature of CCS fell precisely in the middle of four other phonetic features readily identified by participants prompted to name all features of CCS that they knew to be typical of this contact variety. Overt commentary toward CCS speech was generally positive amongst bilinguals, with frequent themes of solidarity toward a shared bilingual identity alongside the notion that, save for an exaggeratedly strong Catalanized accent, CCS speech positively indexes knowledge of Catalan, which is highly esteemed in Catalonia (Davidson 2019a, 71).

6 Dental /d/ is the only voiced obstruent in Spanish with a robust distribution word-finally (Hualde 2014, 140).

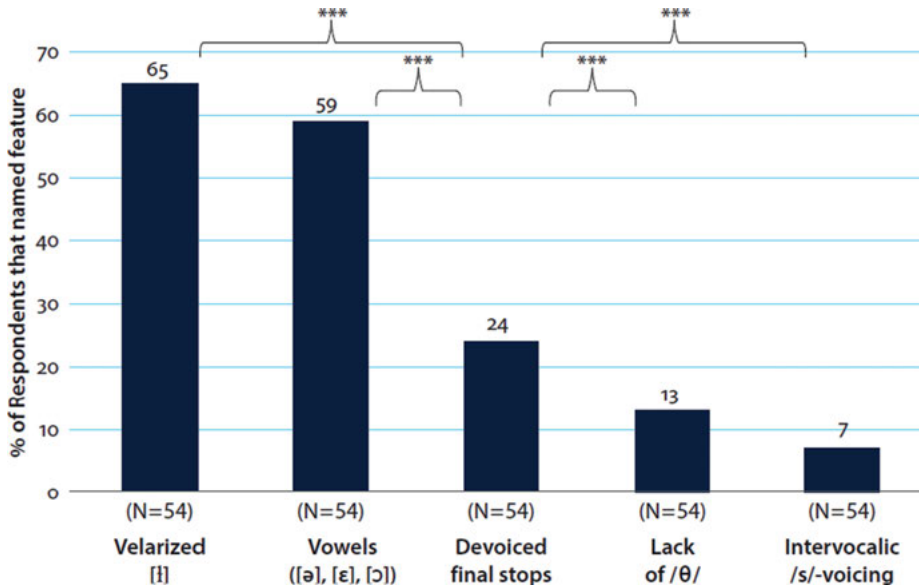


Figure 11.1: Degree of overt awareness of phonetic features of Catalan Contact Spanish (Davidson 2019a, 69) reported to be typical of this contact variety.

2.1.3 Spirantization

The unique evolution of the Latin intervocalic voiceless plosive series is a hallmark feature of Western Romance, illustrating a diachronic continuum of weakening in the form of voicing (e.g. *SAPERE* > BPor., Northern EPor. *sa[b]er* ‘know_{INF}’; *VITA*(M) > BPor., Northern EPor. *vi[d]a* ‘life’; *AMICA*(M) > BPor., Northern EPor. *ami[g]a* ‘friend_F’) to spirantization (e.g. Southern EPor., Sp.,⁷ Cat., Gal. *sa[β]er*, Fr. *sa[v]oir*; Southern EPor., Sp., Cat., Gal. *vi[ð]a*; Southern EPor., Sp., Cat., Gal. *ami[ɣ]a*), to elision (e.g. Fr. *vie*, *amie*) (Boyd-Bowman 1980, 30, 107, 129). Though variation in this series’ production appears most frequently researched through the lens of dialectology and laboratory phonetics, without attention to extralinguistic factors or possible social indexation, there exists a relatively recent interest in sociophonetic and attitudinal studies with regard to /b/ production in US Spanish, where the voiced labiodental fricative [v] is often attested in conjunction with the bilabial approximant [β] and bilabial plosive [b]. While there is ongoing debate as to whether or not US Spanish [v] in words like *vaca* ‘cow’ is the product of language contact with English or an endogenous relic feature from Medieval Spanish (Torres Cacoullos/Ferreira 2000), evidence from both production and attitudinal studies have confirmed that the social indexation of [v]

⁷ But consider ⤵25 Judeo-Spanish for the exceptionality of this variety.

for select US Spanish varieties involves bilingualism with English. In a production study on 17 Spanish-English bilinguals from El Paso, Texas, Trovato (2017, 271–272) finds that the spirantization of /b/ to [v], explored both acoustically via relative intensity measurements as well as auditorily via rater judgments of [v] vs. [β], is favored by female speakers for whom English was the predominant language in their formal education, and in contexts of orthographic <v> over .

As for attitudes toward US Spanish [v], Chappell (2019) conducted a matched guise test with 75 US Spanish-English bilinguals (predominantly from Texas), revealing that the social evaluation of [v] was sharply divided based on speaker gender: in female speech, [v] indexed positive attributes of being hard-working and intelligent, competent in Spanish, and of older age, whereas male [v] voices were penalized across these same attributes (i.e. less hard-working and intelligent, less competent in Spanish, of younger age) (Chappell 2019, 256). Taken together, the production and attitudinal results suggest that US Spanish [v] exists as a prestige variant indexing higher bilingual literacy and educational/professional status, and not unexpectedly, access to the sociolinguistic benefits of a hyper-articulated variant asymmetrically favors female speakers. Regardless of the historical, endogenous motivations for /b/ spirantization to [v] in US Spanish, its contemporary social status in the North American context is deeply rooted in Spanish-English contact. This perhaps is reason enough to approach continued examinations of this feature not as categorically either contact-induced or endogenous, but instead as a product of intertwined linguistic and social effects.

2.2 Gemination and degemination

Geminate consonants, original to Latin, degeminated in all but Italo-Romance varieties. In the latter, they convey phonemic distinctions and appear in both word-medial and word-initial positions.

The stable phonemic status of geminates in Italian and Sardinian, however, does not mean that there is no potential for socially meaningful allophonic variation. In fact, the variable length of geminates in Italian has been linked to new indexical meaning in North-South migration and dialect contact situations. Cerruti (2011) reports that syntactic doubling (*raddoppiamento sintattico*), the gemination of word-initial consonants after proclitics and oxytons in contexts such as *vado a Roma* ‘I go to Rome’ [ˈvaːdoaˈrɔːma], has been “imported” from central and southern regional varieties of Italian into northern Turin Italian. In these communities, gemination functions not only as a marker of age and adolescent group membership, but also as a highly salient index of shared local identity with “native speakers of Italian, whose parents come as much from Southern Italy as from Turin and from non-native speakers, whose parents have recently immigrated to Italy” (Cerruti 2011, 23). Dialect contact between multiple dialects of Italian in immigrant

contexts has also led to variable realizations of geminates in English loans of American Italian, i.e. a variety “spoken by Italian immigrants to North America whose native language is/was an Italian dialect” (Repetti 2009, 226). Although variable gemination in American Italian does not seem to be tied to any particular social practice, it is considered one of the defining indexical features of this contact variety.

In modern French that is thought to be devoid of lexical quantity distinctions, secondary geminates can occur due to the so-called “spelling pronunciation” of learned borrowings from Latin. The lengthening of certain word-medial consonants ([m], [l], [ʁ]) in words such as *grammaire* ‘grammar’, *illégal* ‘illegal’ and *irréel* ‘unreal’ can index style distinctions between a type of “bookish” (geminate) pronunciation considered “an elegant, extra-phonological variant of the singleton” (Meisenburg 2006, 2). When tested in a series of production and perception experiments, however, geminate realizations were neither systematically produced nor perceived as distinct from singletons (Meisenburg 2006).

The degemination of intervocalic alveolar trills, such as in *birra* ‘beer’ [ˈbi:ra] in Roman Italian and [ˈbi:ra] in Standard Italian has been largely attributed to dialect leveling. However, findings since the early 1990s have also shown that degeminated trills, an emblematic trait of Roman Italian, did appear in the speech of teenagers who moved to Rome from other regions of Italy in their early childhood. This is despite the fact that regionally marked phonetic features continually receded and became rare in the speech of their peers born in Rome (cf. Conti/Courtens 1992, 259, 267).

2.3 Palatalization and affrication

Allophonic variation due to the coarticulation of plosives with following vowels represents a rich potential for indexical meaning. Palatalization is one such co-articulatory process triggered by a front vowel or palatal glide following the plosive and causing dental or alveolar consonant to be retracted towards the velum and velar consonants to be moved forward towards the hard palate (Ladefoged/Maddieson 1996).

Historically, front vowels [i], [e], and [ɛ] had only palatalized velar plosives (Pope 1952, 125–129), but this no longer applies to many varieties of contemporary French where palatalization, given the right conditioning environment, can affect all plosives. Traditionally considered a working-class feature (Léon 1993, 203–204), the palatalization of velars in contemporary varieties of European French can take place both word-medially (e.g. *paquet* ‘package’ [pake] > [pakʲe] > [patʲe]) and word-finally (e.g. *sac* ‘bag’ [sak] > [sakʲ] > [satʲ]). In Hansen’s (2012) corpus, collected in Paris, palatalization was prevalent in high-frequency words, including discourse particles (*donc* ‘so’) and relative pronouns (*que* ‘that’), and used by young female and male speakers of diverse socioeconomic backgrounds alike.

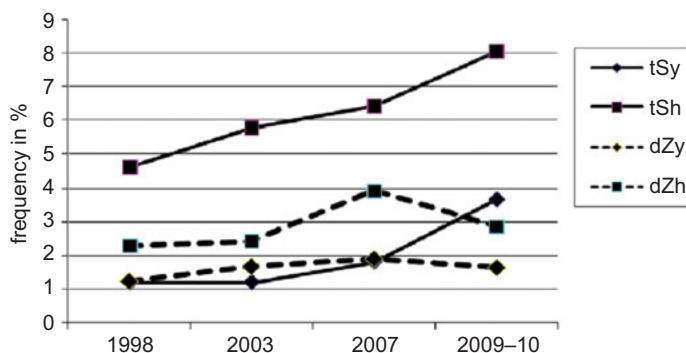


Figure 11.2: Longitudinal evidence of the increasing use of palatalized affricates before /y/ in French national broadcast media. The same pattern applies to /i/ (from Candea/Adda-Decker/Lamel 2013, 414).

Palatalization and affrication are also salient phonetic features of several regional dialects. Woehrling/Boula de Mareüil (2006) tested the recognition of regional accents by listeners in France and found that palatalized affricates in high-frequency constructions such as *tu as* ‘you have’ ([tya] → [tʰa] → [tʰa]) significantly improved the rate of identification of the local vernacular in Marseilles. They also pointed out, however, that the association appeared to be stereotypical: “the rather strong accent of the Languedoc speakers, which is the best identified as Southern [was] more often associated with Marseilles than Marseilles itself” (Woehrling/Boula de Mareüil 2006, 1513). In North American varieties of French, affrication is a widespread dialectal feature. Based on an extensive corpus recorded from Radio Canada between 1970 and 2008, for instance, Chaliér (2019) shows that in the last four decades the affrication of /t/ and /d/ before word-initial high vowels has become an integral feature of standard Quebec French pronunciation.

Since the late 1990s, in European varieties of French the joint effects of palatalization and affrication (PalAff) of plosives in word-initial position before high vowels has emerged as a complex marker of identity at the intersection of age, gender, ethnicity, and social class (Jamin/Trimaille/Gasquet-Cyrus 2006; Vernet/Trimaille 2007; Spini/Trimaille 2017). It carries negative connotation of masculinity and affect (e.g. toughness) and is stereotypically attributed to adolescent vernaculars spoken in working-class urban areas associated with ethnic conflicts:⁸

- (1) « Votre cousin conduit une “voiture” et adore le “melon” ? [C’est] un Marseillais » (Spini/Trimaille 2017, 59 citing Gasquet-Cyrus).
 ‘Your cousin is driving a “car” (*voiture* [vwatʃyʁ]) and he loves “cantaloupe” (*melon* [məlon])? He is from Marseille.’

⁸ For one of the many stereotypical references found in the national news cf.: *Marseille : Déchaînement de violence dans deux cités des quartiers du Nord* ‘Marseille: Outburst of violence in two projects of the northern districts’, *Sud Ouest* (<https://www.sudouest.fr>), September 15th, 2019).

PalAff is widely attested in multiethnic speech styles (Fagyal/Stewart 2011; Fagyal/Torgersen 2018) emerging from multiple input varieties used by speakers of diverse ethno-linguistic background in working-class suburbs, referred to as the *banlieues* ‘suburbs’.⁹ Perceptual experiments, however, cast some doubt on the salience of PalAff as a stigmatized marker of identity. Based on the results of a large perceptual experiment conducted on speech samples obtained from broadcast news Trimaille/Candea/Lehka-Lemarchand (2012) concluded that the mere presence of a high degree of PalAff is not sufficient to trigger negative reactions from listeners, as listeners’ evaluations were largely dependent on context and a complex correlation with other phonetic features. Some studies also point out that in European varieties of French, palatalization and affrication are phonetically conditioned “noisy releases” and, as such, largely dependent on individual speaker characteristics (Berns 2013, 274). To what extent they possess precise social-indexical meanings remains to be determined.

Another interesting case of sociophonetic variability concerning palatalization is that of Argentinean Spanish in Buenos Aires. Beyond the rather renowned case of fronting and fricativization of the Spanish palatal obstruent /j/ to postalveolar /ʒ/ in Argentinean and Uruguayan Spanish, which in Buenos Aires Spanish has since undergone devoicing to /j̥/,¹⁰ an additional sound change concerning the palatal inventory is the merger of the nasal palatal /ɲ/ and the sequence of an alveolar nasal+glide (/nj/). The variable loss of contrast between minimal pairs such as *uranio* ‘uranium’ and *huraño* ‘unsociable’ was the focus of a recent empirical study by Bongiovanni (2019), who collected production data across 33 Buenos Aires Spanish speakers stratified for gender and age. While varying degrees of acoustic distance (via a combination of duration measurements, formant trajectory analysis, and static formant analysis) between each production of /n/, /nj/, and /ɲ/ were observed across all speakers, the encroachment of the nasal+glide sequence onto the palatal /ɲ/ was found to be sensitive to effects of age and gender, such that younger female speakers were leading the merger in apparent time relative to older males (Bongiovanni 2019, 16–18). Bongiovanni posits that the production of /ɲ/ as [nj] is most likely a change in progress from below, operating below speakers’ conscious awareness, as there were no task effects (as a proxy for attention to speech and “formality”) indicating acoustic differentiations between the two variants. Curiously, however, she notes that a popular Argentinean TV comedy show aired a sketch in which local, non-standard pronunciations are explicitly corrected, which poked fun at a stereotypically Argentinean production of *mañana* ‘morning’ being produced as with /nj/ instead of /ɲ/ (Bongiovanni 2019, 18). Accordingly, it is possible that this feature may already index

⁹ The term *banlieue* ‘suburb’ in this context represents a cultural construct used in reference to multi-ethnic, urban, working-class neighborhoods.

¹⁰ This change is well tracked using variationist sociolinguistic methodologies (Fontanella de Weinberg 1978; Rohena-Madrado 2013; 2015).

Argentinean identity and may soon show greater explicit awareness in the speech community, warranting further investigation.

As regards sociophonetic variability for Romance affricates, the (de)affrication of Catalan postalveolar voiced /dʒ/ (e.g. *diumenge* ‘Sunday’) and voiceless /tʃ/ (e.g. *anxova* ‘anchovy’) is characterized by Veny (1982) and Recasens (1991) as a primary isoglossic feature distinguishing Eastern dialects of Catalan, which have undergone deaffrication to /ʒ/ and /ʃ/ respectively, from Western dialects that conserve affrication. Carrera-Sabaté (2009) explored affricate production in the less careful speech of 30 Catalan speakers of Lleida (Lleidatà), a Western variety, alongside a 22-hour Lleidatà corpus of more careful newscaster and debate speech. Additionally, a perception task was administered to elicit explicit reactions to the variable productions of both affricates. While affrication was observed as the majority variant in less careful speech and even in more careful debate speech (notably where a presentation of local identity is perhaps more valuable for recruiting voters than using more socially exogenous features), deaffrication was the majority variant in newscaster readings. Carrera-Sabaté (2009, 103) suggests that this finding illustrates influence from the prestige afforded to Eastern Catalan. Perception results showed considerably lower discrimination of deaffrication vs. affrication for the voiced series relative to the voiceless one. These differences were stratified by education level and degree of written proficiency in Catalan, favoring evaluations of deaffricated [ʃ] as more ‘correct’ with higher proficiency and education levels (Carrera-Sabaté 2009, 100). Ultimately, Carrera-Sabaté (2009, 103–104) argues that younger, more formally educated speakers are leading a change toward the deaffrication of voiceless /tʃ/ as motivated by the explicit prestige afforded to Eastern Catalan, yet they maintain affrication for /dʒ/ since (de)affrication for the voiced series is not as acoustically, and perhaps socially, salient. In this way, Lleidatà speakers can, on the one hand, adopt more salient Eastern Catalan features that afford them upward social mobility as more educated and competent speakers of Catalan, whilst simultaneously maintaining local features that index in-group solidarity without noticeably distancing them from the more prestigious Eastern norm. The effects of standard language ideologies via the media on linguistic variation, alongside the interplay between acoustic salience and accommodation strategies, constitute a promising avenue for future investigations of Romance variation and change.

2.4 Liquids and approximants

Through their multiple allophonic realizations, liquids and approximants, especially so-called rhotics (“r-like” sounds), participate in a number of socially meaningful distinctions in the Romance languages. Sounds distinguished by lateral airflow due to tongue blockage of central airflow out of the mouth, i.e. the modern

alveolar /l/ and its numerous allophones vary considerably across the Romance languages, evidencing a wide array of sound changes in a variety of phonetic positions, including geminate reduction to [l] (e.g. CABALLU(M) > Por. *cavalo*, Gal. *cabalo* ‘horse’), palatalization to [ʎ] (e.g. LACU(M) > Cat. *llac* ‘lake’; FILIA(M) > It. *figlia*, Por. *filha* ‘daughter’), spirantization to [x] (e.g. MULIERE(M) > Sp. *mujer* ‘woman’), vocalization to [w] and then to a vowel (e.g. CAL(I)DA(M) > Fr. *chaude* ‘hot_F’; TALPA(M) > Por. *toupeira* ‘mole’), and elision (VOLARE > Por. *voar* ‘fly_{INF}’) (Boyd-Bowman 1980, 45, 78, 81, 84).

As the presence of an alveolar lateral phoneme /l/ is common to all Romance varieties, a particular point of sociolinguistic interest is the phonetic quality of /l/, which has been described as velarized or “dark” in select varieties of Catalan, Portuguese, and Romance varieties in contact with them (Davidson 2020b; Recasens 2012; Recasens/Espinosa 2005). The presence of a velarized lateral category ([ɫ]) in these varieties and a non-velarized lateral ([l]) in the rest of Romance has been argued to result from divergent evolutions from Latin, which exhibited both categories in complementary distribution: [ɫ] in coda contexts and [l] in onset contexts (Recasens 2014, 20–21; Rasico 1981, 200; Allen 1989, 33; Badia i Margarit 1984, 199). Accordingly, the by-language distributions of [l] and [ɫ] evidence, for [ɫ] varieties, a historical velarization of once non-velarized onset laterals (e.g. LIQUIDU(M) > Cat. *liquid*, Por. *liquido* ‘liquid’), and for [l] varieties, both the loss of [ɫ] through vocalization and/or elision (e.g. FALSU(M) > Oc. *faus* ‘false’; SALTU(M) > Sic., Lig. *sautu* ‘jump’; INSULSU(M) > Sp. *soso* ‘tasteless’; ALTERU(M) > Fr. *autre* ‘another’) (Pope 1952, 81–83; Recasens 1996, 66, 84, 86; 2014, 20–21).

There is also empirical evidence of the social and linguistic conditioning of the lateral velar [ɫ], as well as overt and covert attitudes towards its realizations in Catalan Contact Spanish (CCS) in Barcelona (Davidson 2019a; 2020b). Linguistic constraints favoring velarization included coda contexts and adjacent to non-front vowels and/or velar consonants, as well as Spanish-Catalan cognates. Social constraints favoring velarization included male and less urban speech, greater dominance in Catalan, as well as more casual speech. The combination of style and gender correlates, suggestive of the status of CCS [ɫ] as a sociolinguistic marker, was ultimately contextualized within a community-level discourse of Spanish-Catalan bilingualism. Specifically, despite positive covert and overt solidarity associations with in-group bilingual identity, covert and overt social stigmas of CCS [ɫ] as “improper Spanish”, “ugly-sounding”, and “rural” also exist. They jointly indicate that while the aggregate clustering of all CCS speech features can index upper class social status in Catalonia, this social evaluation is a generalization made across a composite of social indices that can trigger perceptions of ridicule and even disdain:

- (2) a. Bueno, la ele catalana, sí ... yo intento no usarla cuando hablo castellano porque quiero hablarlo bien, pero bueno, me sale como me sale.
(Davidson 2019a, 68, Speaker 12)
‘Well, the Catalan /l/, yes ... I try not to use it when I speak Spanish, because I want to speak it well, but well, it comes out how it comes out.’
- b. No uso la ele catalana cuando hablo castellano. Hablo correctamente y cuando hablo en castellano, uso la ele castellana, y en catalán, pues sólo allí la catalana.
(Davidson 2019a, 69, Speaker 42)
‘I don’t use the Catalan /l/ when I speak Spanish. I speak correctly and when I speak in Spanish, I use the Spanish /l/, and in Catalan, well only then the Catalan /l/.’

Lateral velarization as a linguistic stereotype has been explored simultaneously in Majorcan Spanish and Majorcan Catalan (Pieras 1999; Simonet 2010). In both varieties, decreased velarization led by younger female speakers was attested as an ongoing change from above. The unique distribution of velarized and non-velarized laterals in different varieties of Catalan (and indeed Spanish), coupled with the acoustic and social salience of this feature (Hickey 2012, 405), offers ample opportunity for continued cross-Romance comparisons highlighting the confluence of linguistic and social effects.

In contrast to laterals, rhotics are not easily identified based on phonetic or phonological criteria. In fact, it has been argued that the grouping of “*r*-like” sounds has more to do with language-specific diachronic and literacy traditions than acoustics or physiology (Chabot 2019). In French, rhotics show particularly rich allophonic variation and their precise phonetic representation was subject to some debate (cf. Whitley 2003, 83).

The general conclusion from *first wave* sociophonetics studies focusing on rhotics as markers of geographic origin is that in most varieties of French alveolar trills [r] and taps [ɾ] have become vestigial variants that are gradually replaced by uvular allophones, such as the voiceless uvular fricative [χ] (*frais* [fχɛ] ‘costs’ and *après* [apχɛ] ‘then’) and its voiced counterpart [ʁ] (*bras* [bʁa] ‘arm’, *adresse* [adʁɛs] ‘address’), depending on the preceding phonetic context. As the uvular place of articulation becomes prevalent, alveolar rhotics have been receding in usage even in the speech of older speakers’ regional French in contact with Occitan in the South of France (Lonnemann/Meisenburg 2009; Eychenne 2009) and in North America (Canac-Marquis/Walker 2016). The velar approximant [u] is also attested in intervocalic positions in French spoken in Belgium (Demolin 2001), but its use can be more widespread, as indicated by its rendition by a thirty-year-old middle-class male speaker born in Paris shown in Figure 11.3. Such heavily vocalized variants of the rhotic have also been associated with *parigot*, working-class French spoken in the early 20th century, although their current use and status remain uncertain (cf. Abecassis 2005, 116–117, for a French cinema corpus).

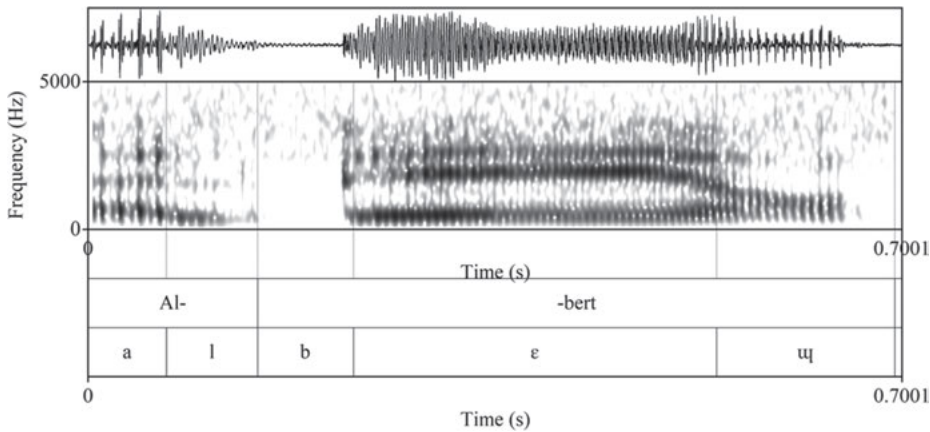


Figure 11.3: Velar approximant as allophone of the rhotic in the first name *Albert*, pronounced by a thirty-year-old male middle-class speaker of Parisian French (Fagyal et al. to appear).

In Montreal, the replacement of alveolar allophones by their uvular counterparts has been tied to changes in local identity, following rapid political, economic, and societal changes affecting Quebec society since the late 1950s. As the first French colonists arriving in the Gulf of Saint-Lawrence were likely users of alveolar allophones (Morin 2002, 51) that remained the local norm in Montreal and Western Quebec until the early 20th century,¹¹ between 1950 and 1970 the local variant was set into rapid regression. Longitudinal studies in the 21st century show that nearly four decades later, Montreal as a community has undergone a rapid shift away from the local forms which have been, in many cases, categorically replaced by the incoming uvular and velar variants (Sankoff/Blondeau 2007). The joint cognitive and social significance of the rapid replacement of the rhotic in Montreal remains a test case for possible changes affecting aging adults' language use across the life span (Sankoff 2019).

An additional intriguing case of rhotic sociolinguistic variation is that of word-final alveolar rhotic production in the Spanish of migrant workers from Moroleón, Mexico. In several Spanish varieties (Peninsular, Mexican, Guatemalan, Costa Rican, Colombian, Ecuadorian, Bolivian, Chilean, Paraguayan, Argentinean), the alveolar trill /r/ and/or tap /r/ are variably realized as an assibilated alveolar rhotic (denoted by [r̥] within the Hispanic Linguistics tradition), with devoicing and syllable position as additional metrics of variation (Hualde 2014, 187; Mazzaro/González de Alba 2019, 289). With respect to Mexico City Spanish, Perissinotto (1972) offered perhaps the earliest empirical attestation of a change in progress from above, led by upper-class female speakers and favoring the production of assibilated [r̥] word-finally, from sociolinguistic interview data from the 1960s. The assibilated rhotic has consequently

¹¹ Uvular and velar allophones were already the categorically preferred allophones in the eastern parts of Quebec, including Trois Rivières and Quebec City.

diffused outward to other urban centers in Mexico, eventually reaching Moroleón, a large industrial center in Guanajuato. Moroleón attracts internal migration from smaller, rural neighboring towns in Mexico and is also home to a sizable community of migrant workers that move to the United States for the majority of each year in order to work on mushroom farms in a rural Pennsylvania town (Matus-Mendoza 2004, 19–20). Consequently, this urban center offers unique insights into the role of local social networks and societal structures on linguistic variation via the comparison of assibilation rates between migrants to Moroleón and Pennsylvania.

The quantification of word-final rhotic assibilation production in the previous two studies underscores the importance of social mobility as a locally constrained aspect of individual speech communities. Findings revealed that whereas assibilation was favored by younger female speakers with higher levels of education in Moroleón, in parallel with the change in progress from above originally observed in Mexico City, gender stratification by migrants in Pennsylvania was comparatively diminished. This asymmetry seems to reflect the unique social circumstances of each group of migrants (Matus-Mendoza 2004, 23–26). The social ecology of Moroleón consists of a wide range of social classes and socially salient differences therein, which facilitates social (and consequently linguistic) mobility, hence the faster adoption of incoming prestige norms like the production of [ʃ]. For migrant workers in Pennsylvania, the social ecology is completely different: socially salient distinctions of class are nearly absent, as social mobility for migrant field-laborers in the United States is extremely limited. Though female speakers produced more assibilated allophones than males, they did so rather modestly, which can be taken as a reflection of their inability, in that setting, to aim at significant social mobility through linguistic and other types of differentiation.

3 Variation and style in the vowel systems

3.1 *First wave* studies of vowels in Romance

Most sociophonetic studies of vowels in Romance languages have investigated dialectal variation and historical change in both oral and nasal vowels. In keeping with the interdisciplinary nature of the enterprise, methodologies of data collection tend to borrow both from experimental and fieldwork-driven investigations, and methods of analysis typically use the standard toolkit of acoustic and perceptual studies in the speech sciences.

Similar to other languages, the bulk of sociophonetic work in Romance consists of *first wave* studies of phonetic detail, phonological description, and dialectal variation (cf. Baranowski 2013, 404 for a review). Acoustic and perceptual studies tend to focus on variation and change in vowel quality (e.g. vowel shifts and mergers) and across different contemporary social groups and communities of practice. Vowel duration and

voice quality in vowels have been studied to a lesser extent. In the following sections, we highlight three topics that hold particular interest for a variety of social-indexical meaning: devoicing and allophonic variations of mid-vowels in European French, vowel shifting in São Miguel (Azorean) Portuguese, and nasal vowels in two dialects of French.

3.2 Phrase-final vowel devoicing

In European French, front-mid and close vowels /e/, /ɛ/, /ø/, /œ/, /i/, /y/, and /u/ can undergo devoicing at the right edge of major prosodic phrase boundaries (↗21 French). In such cases, the last portion of the vowel becomes devoiced and is followed by a sustained fricative-like noise that can form a full-length, excrescent coda consonant (Fónagy 1989; Fagyal/Moisset 1999). This phenomenon, called phrase-final vowel devoicing (PFVD), has been linked to the production of finality in discourse (Smith 2002; Dalola 2014; 2015; Dalola/Bridwell 2019) and to social factors influencing speakers’ speech styles and socioeconomic status. It has been argued that it represents a classic Labovian case of a new, vigorous, and overtly prestigious sound change led primarily by young, upwardly mobile, educated female speakers (Fagyal/Moisset 1999). PFVD has also been attested among working class adolescents orienting towards the majority society and the predominant use of standard French (Fagyal 2010, 146). Figure 11.4 shows the spectrogram of the word *Aubervilliers* in which the utterance-final /e/ is devoiced and followed by a fricative-like noise in the speech of a male adolescent recorded near Paris.

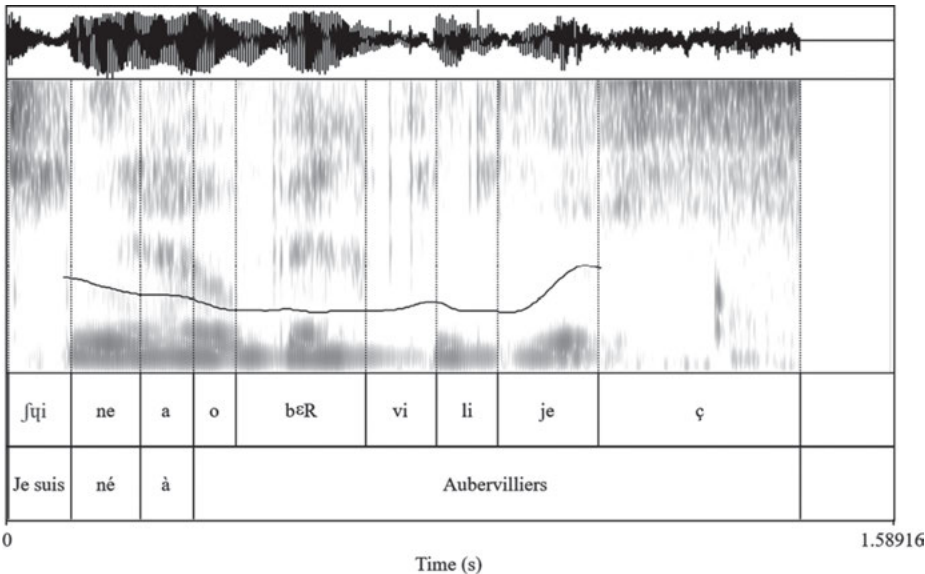


Figure 11.4: Devoicing of /e/ at the end of the utterance ‘I was born in Aubervilliers’ by a male adolescent in a working-class suburb of Paris (Fagyal 2010, 146).

PFVD can be found in formal and informal registers, many situational styles, including readings of texts (Smith 2003; Berns 2013), and can affect an even wider range of vowels than previously thought (e.g. the back nasal /ɔ̃/). Although it has not yet been extensively studied as a source of individual styles in fieldwork investigations, role-play experiments using prompts that simulated changes in audience design demonstrated that native speakers of European French showed higher rates and enhanced degrees of devoicing in pragmatic contexts favoring “either slower or more formal speech or both” (Dalola/Bullock 2017, 796).

While PFVD is no doubt a “salient phonetic characteristic of contemporary French spoken in France” (Berns 2013, 263) where its scope now extends to multiple socio-indexical meanings, it has also been attested in many other varieties of French spoken in Belgium, Switzerland, and Canada, as a by-product of noisy releases of word-initial plosives on the following vowels (Martin 2004). Thus, instances of plosive releases isolated in the speech of 84 speakers in the PFC (*phonologie du français contemporain*) corpus, tracking contemporary phonological variation in French (Durand/Laks/Lyche 2002; 2009), seem to indicate that PFVD is not a phonetic feature typical to particular social classes or communities of practice in European varieties of French. Rather it appears to be part of a hyper-articulated style that speakers can take on in certain contexts “to add emphasis, or to highlight a particular message” in speech (Berns 2013, 256).

The following excerpt recorded with a Parisian upper-class female speaker is particularly revealing of how the strengthening of the fricative-like noise [ç] following the devoiced close vowel /i/ can convey sentence-finality and affect (i.e. indignation over the lack of preparedness of the speaker’s son for the French *baccalauréat* exam):

- (3) Là, j’ai vu mon fils c’est bien simple, il a les cours se sont terminés. Un, c’était quand, un **mardi** [mɑ̃diç]. Il passait la philosophie le **jeudi** [ʒœdiç]. Il n’avait rien commencé à réviser le **mardi** [mɑ̃diç]. Et il a alors il a des facilités.

(PFC, speaker 75clb1)

‘I have seen my son, it’s easy, he has, classes were finished. On a, when was it, on a Tuesday? His philosophy exam was on Thursday. He hadn’t started studying at all on Tuesday. And well he learns with ease.’

3.3 Social-indexical meaning of mid vowels in French

In stressed syllables, two series of allophones are typically distinguished for each of the three mid vowels: “tense” or “close-mid” [e], [ø], and [o] and “lax” or “open-mid” [ɛ], [œ], and [ɔ]. The latter are more open and retracted towards the back of the oral cavity, which is manifest acoustically in higher F1 and lower F2 frequencies. With phonemic distinctions between the two series receding since the early 20th century, phonetic conditioning has become more prevalent and the corresponding allophones

are now regarded as positional variants of each other: “tense” allophones tend to appear in open syllables and their “lax” counterparts are usually found in closed syllables. The many exceptions to this “open/closed syllable adjustment rule” (*loi de position*) represent emblematic dialectal differences (cf. below), but *first wave* sociophonetic studies in recent years have also uncovered some intriguing cases of social convergence. The studies singled out in this subsection represent only some of the recent investigations of the social-indexical meaning of this feature.

Hansen/Østby (2016), for instance, report that the use of the tense allophone [e] in closed syllables (e.g. *élève* [elev] ‘pupil’) has been observed among upper-class speakers of the Parisian *bourgeoisie*, even though just about a decade ago this phenomenon was still “typically a phenomenon observed among the young MC/UWC¹² speakers” (Hansen/Østby 2016, 413). Speakers of all three social classes featured in their study also showed a general loss of allophonic distinctions in unstressed syllables, with working-class speakers leading the change. Among the most surprising contemporary tendencies, is the halting of a once vigorous change: the fronting of the back mid vowels [o] and [ɔ] to [ø] and [œ]. Once famously recorded in the emblematic sentence “C’est *jeu* le *Mareuc*!”¹³ (Martinet 1958), this widely attested change in the late 1950s and early 1960s seems to have become marginal in the French capital, while at the same time it continues to be documented elsewhere in the territory (Woehrling/Boula de Mareüil 2006; Armstrong/Pooley 2010). The general conclusion is that while all groups seem to be engaging in the above ongoing changes, upper-class speakers appear to be lagging behind; together with the generalization of some pronunciation features across all social classes, their peculiarly conservative linguistic behavior deserves further investigation.

3.4 Vowel shift in São Miguel Portuguese

Another socially meaningful vocalic phenomenon of interest is that of an ongoing vowel shift in São Miguel Portuguese, a unique variety of European Portuguese spoken by the approximately 5,000 residents of the island of São Miguel, Azores. The vowel shift, first attested in the 1930s and depicted below in Figure 11.5, distances this insular variety considerably from the European Portuguese Standard used in popular media (Silva 2005, 2). Examples include shifts from European Portuguese [u]va ‘grape’, av[o] ‘grandfather’, av[ɔ] ‘grandmother’, and v[a]ca ‘cow’ to São Miguel Portuguese [y]va, av[u], av[o], and v[ɔ/a]ca, respectively (Silva 2005, 3).

¹² Middle class / upper working-class.

¹³ The sentence plays on the fronting of [o] to [ø] in the words *joli* ‘pretty’ and *Maroc* ‘Morocco’ in the French equivalent of ‘How pretty is Morocco!’.

The production of these shifted vowels is far from categorical, however, leading Silva (2005) to empirically explore their social conditioning. The results of variable rule analysis on more casual (picture-naming) and more careful (word-list reading) speech samples from 11 speakers from the village of Nordeste reveal that vowel shifting is favored by lower-class speakers in more casual speech, suggesting that style-shifting toward the European Standard is an active linguistic tool in the community (Silva 2005, 12). Style-shifting is argued to be a reflex of islanders' linguistic insecurity, as revealed by a near-absolute incidence of speakers' initial reluctance to participate on the basis of their self-proclaimed "terrible Portuguese" (Silva 2005, 16). Silva concludes that speakers' accommodation toward the European Standard, precisely for only half of their vocalic inventory rather than all vowels, evidences the unique duality between local identity and exogenous prestige: on the one hand, speakers cling to some shifted variants so as not to risk dissociation from the local vernacular and the islander indexation it holds, while on the other hand, they also closely adhere to the European Standard for some vowels as a means of perceived sociolinguistic mobility and "educated manner of speaking".

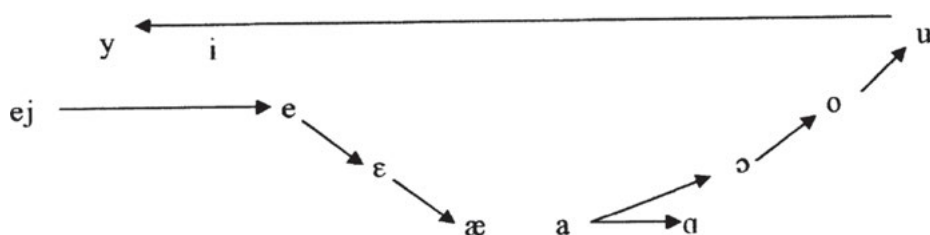


Figure 11.5: São Miguel Portuguese vowel shift (Silva 2005, 4).

3.5 Mergers and shifts in the nasal vowel systems of French

Over the last five decades, the phonetic realizations of nasal vowels in French, our final vocalic case study, have given rise to a number of corpus-based and laboratory-style investigations (721 French). While nasality remains contrastive in every dialect of French, different nasal sub-systems have different vowel inventories whose realizations vary considerably depending on a number of social and linguistic factors.

Varieties of French spoken in Paris and its surrounding areas (Northern Metropolitan French) represent a nasal subsystem that has lost the phonemic distinction between the rounded and unrounded front nasal vowels / $\tilde{e}$ / and / $\tilde{\alpha}$ / and operates with only three phonemes: / $\tilde{e}$ / as in *pain* 'bread', / $\tilde{\alpha}$ / as in *paon* 'peacock', and / $\tilde{o}$ / as in *pont* 'bridge'. The historical process that led to this outcome is known as a counterclockwise chain shift set in motion to preserve the phonological contrasts between

the three vowels. Thus, as a result of the merger of the front nasal vowels / $\tilde{e}$ / and / $\tilde{\alpha}$ /, the phonetic realizations of the front nasal / $\tilde{e}$ / became progressively more open which, in turn, has triggered the retraction and raising of / $\tilde{\alpha}$ / and / $\tilde{o}$ /. Empirical evidence for this shift has been attested since at least the late 1970s (Malécot/Lindsay 1976; Fónagy 1989; Hansen 2001; Carignan 2013). These differences are perceptually salient and can create challenges in same- and cross-dialectal identifications of nasal vowels (Nicholas 2018; Nicholas/Fagyal/Carignan 2019).

Varieties of French spoken in the South of France retain all four historically attested nasal vowel phonemes. Nasal vowels in the southern varieties are often articulated with an audible consonantal element, called a nasal appendix (Léon/Carbon 1983), immediately following the vowel. The degree of nasality of the preceding vowel and the realization of the nasal appendix, however, vary considerably depending on the speaker (Carignan 2017), regional origins (Delvaux et al. 2012), situational style, age, and the orientation of the speaker towards local linguistic and cultural norms (Violin-Wigent 2006; Courdès-Murphy/Eychenne 2020).

The phonemic inventory of nasal vowels in French spoken in Quebec is also composed of four nasal phonemes, but their phonetic realizations set apart the Quebec French nasal system from European varieties of French in a characteristic manner. The three peripheral vowels / $\tilde{e}$ /, / $\tilde{\alpha}$ /, and / $\tilde{o}$ / have long been attested as fronted and close, with a greater propensity of the front nasal to diphthongize (Walker 1984; Brasseur/Ménard 2013; Carignan 2013). It has also been proposed that these vowels might be involved in a clockwise shift, i.e. rotating in the opposite direction than their nasal counterparts in Northern Metropolitan French (cf. Figure 11.6). The identification of the vowels involved in this shift can be challenging to identify in both same- and cross-dialectal comparisons (Nicholas 2018; Nicholas/Fagyal/Carignan 2019).

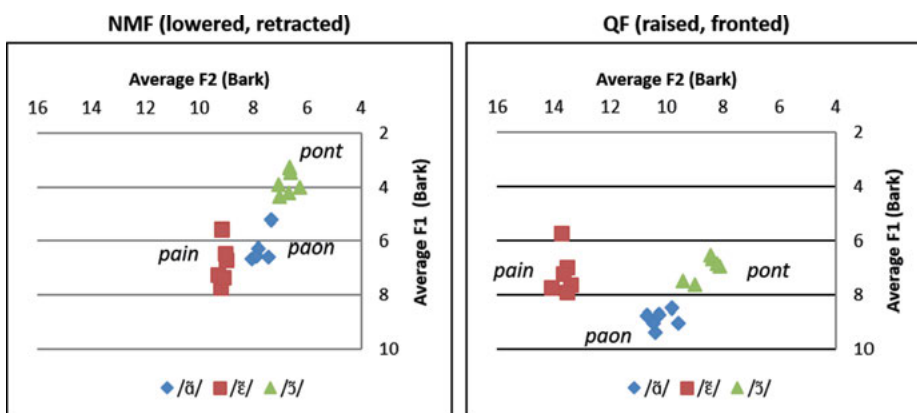


Figure 11.6: Realizations of three nasal vowels in Northern Metropolitan French (left) and Quebec French (right) from a production experiment (Nicholas/Fagyal/Carignan 2019, 2; Carignan 2014).

Social-indexical meanings associated with these distinctions remain to be identified. In a production and perception study of /ã/ in Montreal, Remysen (2014) shows that young female speakers living in the outskirts of Montreal perceive the more retracted, Northern Metropolitan French-like realizations of this open nasal vowel (/ã/) as typical to Montreal and tend to place its fronted allophones in rural areas, such as Saguenay-Lac-Saint-Jean and Gaspésie, of Quebec. What is more, the same listeners also tend to associate the fronted allophones of the open nasal vowels with lesser educational attainment. Based on the rate of correct identifications of the fronted allophone as /ã/ in Remysen's (2014) study, it seems that the less fronted phonetic realizations of this nasal vowel phoneme might be on its way to become a marker of local identity in Montreal.

4 Prosody and social information

The study of suprasegmental features, primarily rhythm and intonation, has a vast literature in most major Romance languages. Until about the last decade, however, prosodic cues were the neglected stepchildren of *second wave* sociophonetic studies attempting to link prosodic variation to local social practice and identity construction (Thomas 2011; Di Paolo/Yaeger-Dror 2011). In this sub-chapter, we present a couple of well-known exceptions to this tendency.

A widely renowned binary of stereotypical group identities in Mexican Spanish is that of *naco* y *fresa* 'hick and snob/posh'. Respectively associated with laziness, peasantry, and a lack of cultural refinedness on the one hand, and superficial vanity and elitism on the other, the linguistic performance of either *naco* or *fresa* identity has been linked to a complex union of features, including discourse and pragmatic markers, the use of English borrowings and code-switching, taboo slang words, popular Spanish words and unique intonation patterns (Holguín 2011, 219–220; Martínez Gómez 2014, 88; 2018). Holguín (2011) conducted a meticulous ethnographic study of, among others, *naco* and *fresa* identity construction in the social networks of three young Mexican women along the El Paso (United States) and Ciudad Juárez (Mexico) border, which evidenced speakers' fluid control of intonational cues to index *naco* or *fresa* identities in conversations with friends and family, a sampling of which appears below in Figure 11.7.

Intonational contours were additionally included as stimuli for a matched guise technique in order to elicit listeners' covert awareness of prosodic cues as indices for *naco* and *fresa* identities, which bore out quite transparently (Holguín 2011, 61–63). Furthermore, a subsequent virtual ethnography (via a corpus of online blog posts and video submissions) of *fresa* and *naco* identity construction was conducted by Martínez Gómez (2014), revealing that these intonational cues are in fact salient enough to warrant significant overt social commentary as linguistic stereotypes.

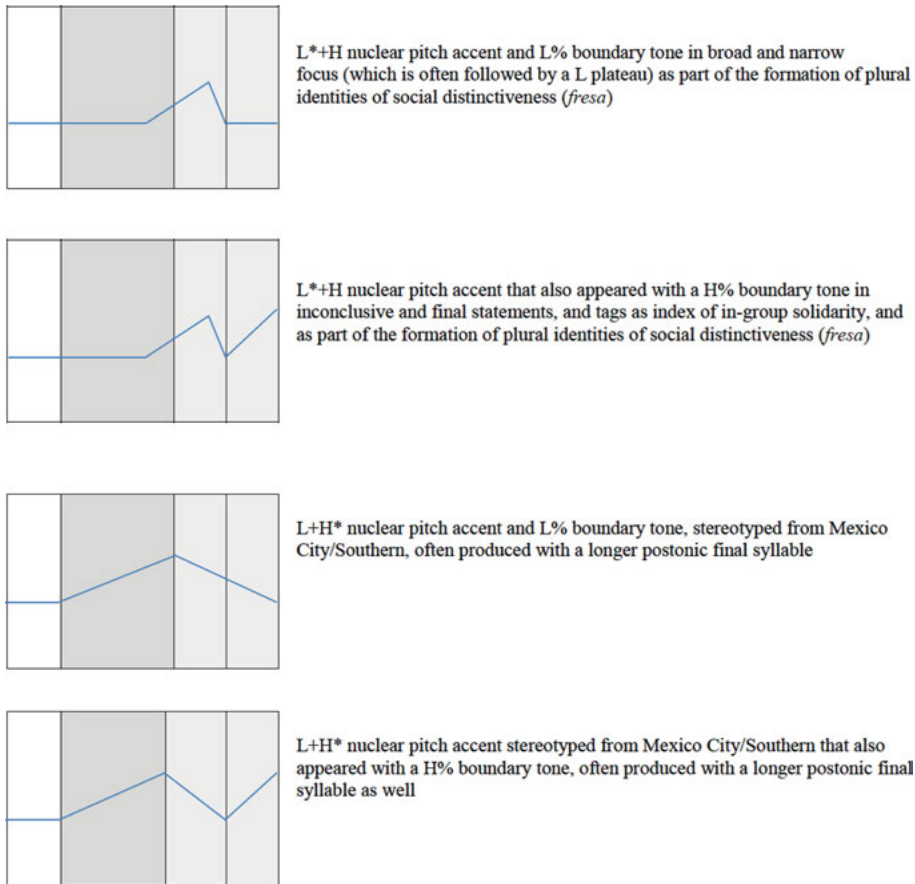


Figure 11.7: Prototypical intonational contours for each of *fresa* and *naco* (Mexico City/Southern) identity construction (Holguín 2011, 222).

In French, sociophonetic studies of rhythm and intonation have almost exclusively focused on dialectal variation. In a few cases, however, speaker-specific prosodic variation has been linked to age, ethnicity, segregation, and degree of embeddedness in youth social networks. The prosodic rhythms of twenty-four female and male adolescents recorded in the Multiethnic Paris French corpus (Gardner-Chloros/Cheshire/Secova 2014), for instance, were examined for characteristics of stress-timed rhythm, as previously attested for many multiethnic urban vernaculars in Europe (Fagyal/Torgersen 2018). Canonical rhythm metrics, among them the normalized Pairwise Variability Index (nPVI), showed that there was no clear effect of gender and only a small effect of cultural background on the variability of adjacent vocalic and consonantal duration intervals, both previously correlated with more or less syllable-timed rhythm in French. However, male and female teens with multicultural backgrounds who clearly dominated in conversations with their peers – for instance in longer

overall talk time – and also used multiple segmental phonetic features attributed to adolescent urban-vernaculars in French also tended to show more variability in interval durations. Thus, in addition to pointing to more stress-timed rhythm, these results also underline the crucial role that interactional factors might play in socio-prosodic variation.

Sociophonetic studies of French have also focused on intonation in multiethnic speech styles, and a few have been carried out in experimental settings (Stewart 2012). In a web-based experiment where listeners placed recordings with stress patterns ranging from clearly penultimate (“non-standard”) to clearly phrase-final (“standard”) in more or less socially desirable urban areas of Paris, Stewart (2012) found that the most numerous and strongest cues to penultimate prominence were associated with neighborhoods that also scored low in perceived linguistic correctness and urban poverty. Following up on prosodic cues to ethnic identity, Paternostro/Goldman (2014) showed that some of the intonation contours associated with multiethnic working-class youth have context-bound pragmatic interpretations, and additional phonetic, linguistic, and semiotic information is required for a “banlieue accent” to be perceived. The interactional aspects of these prosodic cues have been further examined in micro-sociolinguistic studies of peer-group interactions that showed that intonation phrase-final contours are routinely modified according to the participants present in the interaction. Members of adolescent peer groups facing an outsider, such as a fieldworker, rather than their peers, negotiate their stance and index their affiliation with members of their audience through the variable use of standard and stylistically marked intonation contours (Fagyal/Stewart 2011, 95; Lehka-Lemarchand 2017).

5 Conclusion and discussion

In this chapter, we have focused on *first* and *second wave* studies of social-indexical meaning in a number of speech phenomena from across the Romance languages. Rather than foregrounding social categories, we organized our review in terms of phonetic categories and historically attested phonological processes associated with these categories. We showed that social-indexical meaning in speech is expressed through different kinds of language-specific allophonic variation that allow cross-linguistic comparisons and detailed language-specific discussions. While this chapter could not do justice to the wide array of studies constantly emerging in our field across multiple Romance varieties, it is our hope that it encourages more work on sociophonetic variation, especially in lesser-studied varieties. Given the meticulous documentation of the historical evolution of modern Romance from Latin, a notable area of continued contribution could be more research on linguistic variation linked to the unique linguistic and political statuses of Romance varieties in their respective modern territo-

ries. In these settings, complex and often hegemonic negotiations of linguistic capital (Bourdieu 1991) are ever-increasingly at the forefront of daily life and could have a major impact on language use. Such research could also continue to serve as a bridge between the wealth of previous dialectological approaches to variation in Romance and the vanguard of variationist waves of sociolinguistic study.

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12 First language acquisition of Romance phonology

Abstract: This chapter provides an overview of monolingual first language phonological acquisition studied in typically developing children in several Romance languages, including Catalan, French, Italian, Portuguese, and Spanish. Findings on babbling as well as on segments, syllables, stress, rhythm, and intonation are presented. In a cross-linguistic comparison, it is shown that the acquisition of segments follows universal paths whereas the acquisition of syllable structure, stress, rhythm, and intonation is largely language-specific. Another important aspect is that prosodic phenomena are (universally) acquired before segments. These results indicate from an acquisition perspective that segmental and suprasegmental phenomena are independent from each other. Research gaps and areas for further research are identified.

Keywords: first language acquisition, babbling, segments, prosody, universal vs. language-specific

1 Introduction

This chapter is concerned with the first language acquisition of phonology in monolingual child acquirers of a Romance language. Monolingual acquisition of a first language refers to children who acquire only one native language (L1) in a natural acquisition context as opposed to simultaneous or successive/sequential bilingualism (2L1; ↗13 Bilingual phonological acquisition) and as opposed to (child or adult) second (and third etc.) language acquisition (L2, L3, Ln; ↗14 Second and third language acquisition of Romance phonology). Monolingualism is not as clear-cut as it may seem at first sight because individual and/or societal bilingualism represents the norm in many regions, e.g. in Catalonia where Catalan is typically spoken along with Spanish.

It is commonly assumed that (weak) continuity exists between child and adult phonologies, i.e. that children gradually but systematically build up their phonologies according to the target system. However, it is debated whether only perception data or also production data reflect children's phonological competence (Fikkert 2007). Universal tendencies in terms of contrast and markedness have been established in the literature on first language phonological acquisition (Jakobson 1941/1969; Macken/Ferguson 1981; Bernhardt/Stemberger 1998). Another issue is whether prosody is acquired before segmental phonology (Snow/Balog 2002). This chapter presents acqui-

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sition studies conducted with Romance-speaking children from an empirical perspective focusing on the issues of converging (and diverging) cross-linguistic findings. For theoretically oriented accounts on the acquisition of phonology cf. e.g. Kiparsky/Menn (1977) and Fikkert (1994; 2007).

A relevant question in the context of first language phonological acquisition is when a phonological category can be said to be “acquired”. In many studies, a numerical (and arbitrary) percentage correct¹ of 90% is used (e.g. Jimenez 1987; Hermandorena/Lamprecht 1997; Zmarich/Bonifacio 2004; MacLeod et al. 2011), while in other works accuracy is set at 75%, or mastery of a property is defined at 100%. At any rate, direct comparability between studies is not always possible (Bernhardt/Stemberger 1998; Lleó 2008). A further complication is that not all studies systematically distinguish between first appearance of phonological categories and their acquisition.

Many studies on the first language acquisition of Romance phonology contrast monolingual and bilingual language acquisition, or they contrast two (or more) different native languages. The review of the available literature on Catalan, French, Italian, Portuguese, and Spanish (and very sporadically also on Romanian) aims at establishing general (possibly universal) tendencies as well as language-specific phenomena in the acquisition of phonology. This survey is notoriously selective since Romance languages have not all been described to the same extent and since they display considerable dialectal variation in themselves as well. Furthermore, the focus is on typically developing children without phonological disorders or other types of language impairment.²

The chapter is structured as follows. Section 2 provides an overview of first child vocalizations and babbling during (or beyond) the first year of life until babbling converges to words of the target system. The acquisition of segments according to major sound classes is reviewed in Section 3. Sections 4 and 5 present findings on acquisition related to the syllable and to stress and rhythm as suprasegmental phenomena. Section 6 summarizes results on the acquisition of intonation in Romance languages. Section 7, finally, discusses the findings with respect to universal and language-specific patterns and concludes with an outlook on research gaps and further open questions.

¹ Correctness of consonants (PCC “percentage of consonants correct”) is measured “by dividing the number of correctly produced consonants by the total number of consonants in the target word” (MacLeod et al. 2011, 94).

² For literature on children with phonological disorders cf. Aguilar-Mediavilla/Sanz-Torrent/Serra-Raventós (2002); Barlow (2005) on Spanish/Catalan; Kehoe et al. (2015) on French; Bortolini/Leonard (2000); Fasolo/Majorano/D’Odorico (2008); D’Odorico et al. (2010); Galluzzi et al. (2015) on Italian; and Yavas/Lamprecht (1988); Henrich/Ribas (2015); Mezzomo et al. (2015) on Portuguese.

2 First child vocalizations and babbling

Research has uncovered that newborns as old as a few days are sensitive to and prefer to listen to their native language (Moon/Cooper/Fifer 1993). They are also able to discriminate phonological categories at this age at the segmental (Bertoncini et al. 1987) and prosodic (Nazzi/Floccia/Bertoncini 1998) levels. Regarding production before the babbling stage, differences between French and German infants with a mean age of 3.1 days have been established by Mampe et al. (2009), who show that French babies' cries have a rising contour (and Germans a falling one). These forms correspond to language-specific patterns perceived in prenatal stages and invite the conclusion that newborns' cries are influenced by the surrounding speech prosody (especially intonation). Within a language, (non-)cry vocalizations differ prosodically as a function of context, as D'Odorico (1984) and D'Odorico/Franco/Vidotto (1985) show on the basis of 4 Italian infants (0;4,2–0;5,28³). These vocalizations exhibit idiosyncratic prosodic properties until ca. 0;9 (D'Odorico/Franco 1991).

Babbling starts at around 0;6 “with the production of articulated sounds and syllables” (de Boysson-Bardies/Sagart/Bacri 1980, 511). Canonical babbling is defined as “rhythmic alternations between consonant and vowel-like properties, giving a percept of rhythmic speech that simulates adult output without conveying meaning” (Kern/Davis 2009, 353). Initial reduplicative babbling corresponds to the use of identical CV syllables (e.g. [baba]), while variegated babbling entails different vowels and/or consonants in two successive syllables (e.g. [babi], [bada]; Kern/Davis 2009). Late babbling refers to longer sequences of articulated syllables grouped under an intonational contour, which is formally comparable to adult speech (de Boysson-Bardies/Sagart/Bacri 1980; de Boysson-Bardies et al. 1980). Jakobson's (1941/1969) view is that there is discontinuity between babbling and language acquisition.

Cross-linguistic studies on babbling largely confirm Jakobson's universals: most generally, anterior positions are acquired before posterior positions, and contrast in terms of a sonority/obstruction alternation is favored. Montes Giraldo (1971) reports on babbling in 4 Colombian children until 0;11 and finds that labial consonants are predominant whereas velar consonants are lacking. /i/ and back vowels are absent. Oller/Eilers (1982) show in a sample of 8 Spanish and 8 English children between 0;11 and 1;2 (mean age: 1;0) that both groups mainly produce CV syllables, in which the consonant corresponds to voiceless and unaspirated labial and alveolar plosives. Most vocalic segments are front vowels.

Zmarich/Lanni (1998), Zmarich/Ferrero (1999), and Zmarich/Miotti (2003) investigate the production of consonants and vowels in Italian children from 0;9 to 1;6. As in Spanish, alveolar plosives and nasals are most frequent among consonants. Despite

³ Children's age is provided by the convention years;months,(days).

some inter-individual variation, convergence to adult vowel targets as measured by F1 and F2 values is observed during this stage. Majorano/D'Odorico (2011) study 11 Italian children (0;10–2;0) and find a high number of labials in early babbling. Front vowels and /a/ are generally preferred while rounded back vowels are avoided. From around 0;11 on, babbling approaches the target system.

Kern/Davis (2009) compare acquisitional patterns in canonical babbling across French, Romanian, Dutch, Turkish, and Tunisian Arabic (n=4 children per language, age: 0;8–2;1). Cross-linguistically, the most frequently produced consonants are plosives (French: 51.5%, Romanian: 51%), followed by nasals and glides. In French, nasals (ca. 25%) are used twice as much as the average percentage across languages. In Romanian, on the other hand, glides slightly outnumber nasals (both around 15%). Labials are most frequent in French (47%), while coronals are most frequent in Romanian (around 60%). In all languages, children mostly produce vowels of the mid and low front and the central vowel space (66% in lower left quadrant category overall). This trend is particularly pronounced in French with a preference for front vowels, whereas Romanian favors central vowels. Back vowels are hardly found in any language during the observed period.

De Boysson-Bardies/Sagart/Bacri (1980) and de Boysson-Bardies et al. (1980) investigate (late) babbling and first word productions of a French child aged 1;6–1;8. By this age, obstruents include plosives but also fricatives, with voicing contrasts being mostly established. Sonorants correspond to nasal sounds, while liquids are still rare. Vowels are preferably spread front vowels and, to a lesser degree, rounded back vowels. Vihman/Nakai/DePaolis (2006) confirm that plosives constitute the greater part of the consonantal proportion in babbling in French, American English, and Welsh. In French, fricatives are second most frequent at the 4-word stage (corresponding to age 0;11–1;2), and nasals are second most frequent at the 25-word stage (corresponding to age 1;2–1;8). The three classes of consonants show differences in duration across languages (plosives > fricatives > nasals), which is unexpected and explained by the possibility that plosives are less common than fricatives at this stage. Language-specific vowel length approximates the respective target at 25 words.

To sum up, results on early and late babbling in Spanish, Italian, French, and Romanian point to early cross-linguistic universal tendencies where general properties and segmental and syllable structure preferences are concerned. However, numerous studies on babbling in French compared to other languages have found that language-specific prosodic characteristics exist during the babbling stage (de Boysson-Bardies/Sagart/Durand 1984; de Boysson-Bardies et al. 1986; 1989). In particular, French babbles display target-like F0 rising, final lengthening, as well as equal length of non-final syllables by as early as 0;8 (Hallé/de Boysson-Bardies/Vihman 1991; Levitt/Wang 1991; Levitt/Aydelott Utman 1992; Whalen/

Levitt/Wang 1991; Konopczynski 1993; Levitt 1993; DePaolis/Vihman/Kunnari 2008). These findings lend support to the conclusion that prosodic properties, particularly F0 and timing, are acquired before segmental properties and, consequently, that these properties are language-specific from early on. Furthermore, they provide counterevidence to the discontinuity hypothesis as formulated by Jakobson (1941/1969).

Findings relevant to the role of the segmental nature of CV sequences in babbling are inconclusive. According to the Frame-Content Theory (MacNeilage/Davis 1990), these two successive segments display co-occurring features, e.g. apical consonants are followed by front vowels. For French and Romanian, children overall produce the expected CV co-occurrence in babbling (Kern/Davis 2009). The predictions are partly corroborated in Italian children at 1;2 (Zmarich/Lanni 1998; Zmarich/Ferrero 1999). The Italian children in Majorano/D'Odorico's (2011) study, however, do not consistently follow the predictions. Finally, reduplicative babbling in Portuguese children does not confirm the Frame-Content Theory as most reduplications are made up of labial consonants and dorsal vowels (Baia/Correia 2018).

3 Segments

This section summarizes the outcomes of studies on the acquisition of different consonant classes and vowels. In these studies, children are mostly observed over a period of time, in which spontaneous production data are collected or experimental data are elicited. While consonants have been described in detail for many languages, the development of vowels is less precisely captured. It is generally assumed that plosives precede fricatives, voiceless sounds precede voiced sounds, front vowels precede back vowels, and unrounded vowels precede rounded vowels (Bernhardt/Stemberger 1998). These tendencies are borne out in the acquisition of Romance languages: as in babbling, (voiceless) labial and alveolar plosives and nasals are the first sounds acquired by Romance-speaking children in meaningful units. Fricatives are acquired next but subject to variation and instability. Most problematic are rhotics (especially trills when compared to taps).

Segmental acquisition is typically described in relation to phonological processes. Until age 5 to 6, general cross-linguistic processes include final consonant deletion or weakening, consonant cluster reduction, and fricative and liquid substitution (on Spanish cf. Anderson/Smith 1987; Goldstein/Iglesias 1996; Goldstein/Cintrón 2001; on Brazilian Portuguese Yavas 1988; Lamprecht 1993; Ferrante/Van Borsel/de Britto Pereira 2008; 2009; da Silva et al. 2012; on Italian Zanobini/Viterbori/Saraceno 2012; Viterbori/Zanobini/Cozzani 2018; on Romanian Buja 2015).

3.1 Plosives and nasals

Montes Giraldo (1970; 1971) observes in the spontaneous productions of 4 Spanish-speaking children (up to ages 3–5) born in Colombia a preponderance of voiceless plosives in early speech, which are also used to substitute other target segments:

- (1) Sp. a. [pan'tana]⁴ for [ben'tana] *ventana* 'window'
 b. [tol] for [sol] *sol* 'sun'

(Montes Giraldo 1971, 329, 331)

In Macken's (1978; 1979) case study of a Mexican-Spanish child up to age 2;6, the child starts off with voiceless plosives and the nasals /m/ and /n/. The findings are confirmed in experimental studies with Mexican children (aged 3;0–5;7), whose first phonemes are (voiceless) plosives (Jimenez 1987). Macken/Barton (1980) state that the phonemic contrast between plosives is acquired with labials first, followed by the velar and the dental plosives. In 3 Puerto Rican children between 1;10 and 2;5, Goldstein/Cintrón (2001) find that plosives and the nasals /m/ and /n/ occur across the board. Anderson/Smith (1987) investigate phonological development in 6 slightly older Puerto Rican Spanish-speaking children (mean age: 2;8). Plosives are produced in 41% of all consonantal contexts, and the most frequent places of articulation are alveolar (42%) and bilabial (21%). Plosives, nasals, and glides are produced with an overall accuracy of more than 75%.

According to Macken/Barton (1980), the allophony of voiced plosives with spirants in Spanish is not yet acquired by the age of 4, and the order of the spirantized variants is the same as for the voicing contrast, i.e. labial > velar > dental. In contrast, Lleó/Rakow (2005) find that target-like spirantization is high from early on and stably ranges above 80% between 2;7 and 2;9 in 3 Spanish-speaking children:⁵

- (2) Sp. a. [ga'βesa] for [ka'βeθa] *cabeza* 'head' (Miguel⁶, 2;3)
 b. ['naða] *nada* 'nothing' (José, 1;10)
 c. [do'tuya] for [tor'tuya] *tortuga* 'turtle' (Miguel, 2;6)

(Lleó/Rakow 2005, 1359)

Voiceless plosives are generally produced more accurately than their voiced counterparts (Goldstein/Cintrón 2001). The contrast between voiceless and voiced plosives

⁴ IPA reconstructed from the transcription used by the author.

⁵ Examples (2a) and (2c) further display deviant voicing of the initial plosive. In (2a), the interdental fricative of the final syllable is substituted by an alveolar fricative, and in (2c), the final tap of the first syllable is omitted.

⁶ Where indicated in the literature, (abbreviations of) children's names and ages are provided in the examples in order to follow phonological development within or across corpora.

can be captured by Voice Onset Time (VOT), i.e. the interval between the release of the plosive and the onset of voicing (Lisker/Abramson 1964). In Romance languages, voiceless plosives fall within the short lag range (VOTs of up to 30 ms), while voiced plosives are produced by lead voicing/prevoicing, i.e. with negative VOTs because voicing sets in before the release.⁷

Spanish children of 0;4–0;6.5 discriminate (bilabial) plosives in stimuli with a negative VOT of -60 and -20 ms as well as plosives in stimuli with a VOT of +20 and +60 ms (irrespective of the voiceless/voiced categories), whereas discrimination in the category in between (-20 and +20 ms) is not found (Lasky/Syrdal-Lasky/Klein 1975). Turning to production, Macken/Barton (1980) find in 7 Mexican-Spanish children that VOT is not systematically acquired by 3;10 (only 2 children have established a contrast between /b/ and /p/). Konefal/Fokes (1981) show that a 4-year-old child acquiring Venezuelan Spanish principally produces plosives in the short lag period (voiceless and voiced). A 7-year-old child, by contrast, displays the relevant distinction also with respect to prevoicing. On the other hand, Eilers/Oller/Benito-Garcia (1984) report on the acquisition of VOT in 7 Cuban Spanish-speaking children and find that by 2;3.5, the relevant contrasts (lead voicing vs. short lag) are acquired by some children, whereas by the mean age of 0;11, the short lag predominates cross-linguistically (0–30 ms).

The production of prevoicing in initial voiced plosives is also more difficult to acquire in French (Allen 1985). Strategies to circumvent this acquisition problem include the production of a preceding homorganic nasal (3a), of a mid-front or low vowel (3b) or of a nasalized vowel.

- (3) Fr. a. [ʔmba'lo] for [ba'lɔ] *ballon* 'balloon'
 b. [oba'lo] for [ba'lɔ] *ballon* 'balloon'

(Allen 1985, 41, 42)

As in Spanish, voiceless and bilabial plosives are preferred in French at age 1;9–2;8 (Allen 1985). MacLeod et al. (2011) report on the acquisition of consonants in Québécois French by 156 children aged 1;8–4;5 in a picture-naming task. In young children, most consonants emerge in word-initial, followed by word-medial and word-final positions. The first fully mastered consonant in all positions is /n/ at 1;8–1;11, followed by /m/, /t/ and /z/ at 2;6–2;11. Greatest accuracy is achieved after 3;0.

Studies on Italian indicate that /p/, /b/, /t/, /k/, and /m/ are among the first consonants (mostly in onset position) in Italian children aged 1;6–2;3 (Zmarich/Bonifacio 2004). /n/ is subsequently documented between 2;4 and 2;11 (Viterbori/Zanobini/Cozzani 2018).

⁷ In other (e.g. Germanic) languages, the contrast between voiceless and voiced plosives is established by short lag VOTs vs. long lag VOTs (> 30 ms). However, not all Germanic languages follow this generalization: Dutch patterns with the Romance family in exhibiting truly voiced /b d g/ and unaspirated /p t k/ (van Alphen/Smits 2004).

Teixeira/Davis (2002) longitudinally study 2 Brazilian Portuguese children (1;0–3;0) and find that alveolar (52%) and labial consonants (27%) are favored. In Toreti/Ribas' (2010) case study of a Brazilian Portuguese child aged 1;6–2;6, plosives (especially /p/ and /k/) are frequent in onsets during the observed period, as are /m/ and /n/, whereas Yavas (1988) finds dental plosives to be acquired first by children aged 2;4–4;4. Based on data from 240 Brazilian Portuguese children aged 3–8, Ferrante/Van Borsel/de Britto Pereira (2008; 2009) note that /p/, /b/, /t/, /d/, /k/, /g/, /m/, and /n/ are acquired by 3 years.

Among nasals, /m/ and /n/ are acquired before the palatal and the velar variants (Stoel 1973; Yavas 1988):

(4) Sp. [ˈnina] or [ˈnina] *niña* 'girl' (Montes Giraldo 1971, 332)

(5) It. [siˈnole] for [siˈnore] *signore* 'man' (Viterbori/Zanobini/Cozzani 2018, 546)

Assimilation of nasal consonants takes place from early on in Spanish (Lleó/Rakow 2006).

3.2 Fricatives and affricates

In contrast to plosives and nasals, fricatives are less frequently and less accurately produced and more often substituted (Anderson/Smith 1987; Goldstein/Cintrón 2001). Eblen (1982) investigates the acquisition of the unvoiced fricatives /x/ (produced as [h] in the Oaxaca region in Mexico), /f/ and /s/ in 3 Mexican children aged 3 using spontaneous picture naming and imitated-sentence responses. The overall error rate in producing these phonemes mounts up to 41%. In the /x/ ([h]) context, most errors correspond to substitution by plosives (6a). Errors pertaining to singleton /s/ are mostly deletion (6b) or substitution by plosives, affricates, or other fricatives. Highest accuracy is achieved in word-final position. Consonant clusters with /s/ in preconsonantal position tend to be reduced. Importantly, there is a high degree of individual variation among and within children (cf. also Jimenez 1987 on /x/ in Mexican Spanish).

(6) Sp. a. [ˈpakalu] for [ˈpaxaro] *pájaro* 'bird' (Claudia, 3;10,7)
 b. [fiˈhole] for [friˈxoles] *frijoles* 'beans' (Fabiola, 3;6,15)
 (Eblen 1982, 205)

In Brazilian Portuguese, fricatives and affricates are subject to considerable variation at age 3 (Ferrante/Van Borsel/de Britto Pereira 2008; 2009). Oliveira (2003) analyzes the acquisition of /f/ vs. /v/ and /ʃ/ vs. /z/ in Brazilian Portuguese children between 1;0 and 3;8 and finds the following acquisition order: /v/ at 1;8, /f/ at 1;9, /z/ at 2;6, /ʃ/ at 2;10. She concludes that, firstly, anterior fricatives are acquired before posterior

fricatives and, secondly, voiced fricatives are acquired before voiceless fricatives in Brazilian Portuguese. Savio's (2001) data on /s/ vs. /z/ fit these tendencies as they are acquired after /f/ vs. /v/ but before /ʃ/ vs. /ʒ/, i.e. they follow the anterior to posterior scale. Moreover, /z/ (2;0) precedes /s/ (2;6) favoring the earlier acquisition of voiced fricatives. By contrast, in Amorim/Barreto Matzenauer's (2014) study of /s/ vs. /z/ and /ʃ/ vs. /ʒ/ in 40 European Portuguese children aged 3;0–3;11, another picture emerges: In general, voiceless fricatives are acquired before voiced ones, and the only fricative not acquired by at least 80% of the children is /z/. Voiced /z/ and /ʒ/ are substituted by voiceless fricatives in 70% and 77% of all contexts, respectively:

- (7) EPor. a. ['seβə] for ['zeβrə] *zebra* 'zebra' (João, 3;0,12)
 b. [ʃu'eβu] for [ʒu'eʒu] *joelho* 'knee' (Leonor, 3;3,9)
 (Amorim/Barreto Matzenauer 2014, 242)

In Québécois French, /s/, /ʃ/, and /ʒ/ are not acquired until 4;5 in all positions (MacLeod et al. 2011). Rose (2000; 2003) shows in 2 Québécois-French children that the acquisition of the uvular fricative [ʁ] is also subject to inter-speaker variability. One child substitutes the sound in singleton onsets (8a) and deletes it in final position until 2;1,5 (8b), where [ʁ] emerges later than other consonants. The other child does not show systematic substitution but dorsal assimilation of coronals preceding [ʁ] in branching onsets (8c). The author concludes that the children have different underlying representations of [ʁ].

- (8) Fr. a. [ka'gɛ]⁸ for [ka'ʁɔt] *carotte* 'carrot' (Clara, 1;7,27)
 b. [bœ:] for [bœʁ] *beurre* 'butter' (Clara, 1;10,4)
 c. [gʁol] for [dʁol] *drôle* 'funny' (Théo, 3;4,19)
 (Rose 2000, 230, 232, 237)

In Italian, fricatives and affricates appear around age 1;9–2;0 (Zmarich/Bonifacio 2004). In Zanobini/Viterbori/Saraceno's (2012) study, 80% of the children accurately produce /f/, /v/, /s/, /z/, and /tʃ/ at 3;0–3;6, whereas only a minority produces /dʒ/ and /ʃ/, and none of the children produces /ts/ or /dz/. While /f/, /v/, and /s/ are produced most accurately in word- (and syllable-)initial position, /z/ is produced more accurately in word-medial syllable-initial position (word-initial [z] appears only through assimilation in Italian). Among typical processes, fricatives are stopped (9a), and affricates become fricated (9b).

- (9) It. a. ['pumo] for ['fumo] *fumo* 'smoke'
 b. [sok:o'lata] for [tʃok:o'lata] *cioccolata* 'chocolate'
 (Viterbori/Zanobini/Cozzani 2018, 546)

⁸ Other substituting segments include e.g. [d], [z], [l], [j], and [w] (Rose 2000, 203).

3.3 Liquids

Cross-linguistic studies agree on the fact that liquids are acquired latest (Stoel 1973). /l/ only appears by 3;0–3;6 in French (MacLeod et al. 2011) and in Italian (Zanobini/Viterbori/Saraceno 2012). Rhotics are not fully acquired by 3;9 in Brazilian Portuguese (Miranda 1996; 2003; Oliveira 2006). More specifically, Hernandorena/Lamprecht (1997) assess the acquisition of the liquids /l/, /ʎ/, /r/ and /ʀ/ in 310 Brazilian Portuguese-speaking children from 2;0 to 7;1. They find that /l/ is first acquired in word-initial position by 2;8–2;9, followed by the onset position within words (3;0–3;1). /r/⁹ appears by 3;4–3;5 in both positions. Both /l/ and /r/ are favored in tonic syllables. /ʎ/ and /ʀ/, which are found word-internally (and /ʀ/ word-finally) only and are favored in post-tonic syllables, appear by 4;0–4;1 and 4;2–4;3, respectively. Similarly, in Ferrante/Van Borsel/de Britto Pereira's (2008; 2009) study, /l/ appears in simple onsets at age 3 and in complex onsets at age 4. The same pertains to /r/ with one year of delay (ages 4 and 5, respectively). /ʀ/ is first produced in onsets (age 3) and later on in codas (age 4; cf. also Bonilha/Mezzomo/Lamprecht 2006). In complex onsets, /l/ tends to be preserved more regularly than /r/ (Bonilha/Mezzomo/Lamprecht 2006). According to Amorim (2014), who tested 40 European Portuguese children between 4;0 and 4;11, only the palatal lateral is not acquired in simple onsets by 4;0. Generally, in complex onsets and codas, acquisition of liquids is only found after 4;0. Across Romance, liquids are often deleted (10), glided, fronted, or substituted by obstruents or by other liquids (11).

- (10) BPor. [bĩn'ka]¹⁰ for [brĩŋ'kar] *brincar* 'play' (3;2,15)
(Bonilha/Mezzomo/Lamprecht 2006, 35)

- (11) EPor. [ʒi'lafɐ] for [ʒi'rafe] *girafa* 'giraffe' (Marco, 4;4,3)
(Amorim 2014, 70)

Montes Giraldo (1970; 1971) states that the Spanish consonant inventory is established by age 3, except for rhotics, which are only acquired between ages 4 and 6. Among Spanish rhotics, Jimenez (1987) finds that the tap reaches accuracy by 4;7 (90%) while the trilled variant only achieves 50% by that age. Kehoe (2018) observes in three monolingual children analyzed from 2;0 to 3;0 that the alveolar tap /r/ in complex onset clusters is not used in more than 20% of all cases. In medial position, children achieve greater accuracy for /r/ (up to 80%). The same overall tendencies pertain to the trill /r/. Error types include deletions (12a) or substitutions by [ð] (12b), [j], [d], or [l]. Taps are replaced by trills and vice versa.

⁹ /r/ is usually realized as a fricative in Brazilian Portuguese.

¹⁰ In addition to liquid deletion, an alveolar nasal consonant is produced by the child and the final coda is omitted.

- (12) Sp. a. ['kan:ə] for ['grande] *grande* 'big' (Maria, 2;1,9)
 b. [ka'tɛða] for [kar'tera] *cartera* 'wallet' (Maria, 2;4,22)
 (Kehoe 2018, 718)

Goldstein/Iglesias (1996) experimentally assess the phonological development of 54 Puerto Rican children (3;2–4;11). They confirm that cluster reduction (most commonly liquid deletion) is as frequent as 15% in the group of the 3-year-old children but occurs in less than 10% of all contexts in the 4-year-olds. Goldstein/Cintrón (2001) report on 84.1% errors in consonant clusters (vs. only 6% of deletion of singleton consonants) in Puerto Rican Spanish. Of these errors, 93% concern liquid deletion, of which /r/ in syllable-initial position within the word is mostly involved (85%).

The acquisition of the French rhotic, which displays characteristics of a liquid but usually surfaces as a fricative [ʁ], has been discussed in section 3.2.

3.4 Glides and vowels

Even though the glides [w] and [j] are attested in early productions, they often figure as phonetic substitutions for other consonants, e.g. [ɲ] (gliding):

- (13) It. ['bajo] for ['bapo] *bagno* 'bath'
 (Viterbori/Zanobini/Cozzani 2018, 546)

Vowels tend to be produced accurately from early on. Kehoe (2002) observes 80% of target-like vowel production in 2 monolingual Spanish children at the onset of word production, which increases to over 90% as early as by 1;10–2;0. Occasional errors correspond to vowel harmony and to a preference for /a/ or /ɑ/:

- (14) Sp. [tan] for ['tren] *tren* 'train' (Goldstein/Cintrón 2001, 353)
 (15) BPor. ['pata] for ['bɔtɐ] *bota* 'boot' (Toreti/Ribas 2010, 44)

For European Portuguese, Fikkert (2005) suggests that the vowels least affected by deletion are acquired first, i.e. the dorsal vowel /a/ before coronal (/e/, /ɛ/, and /i/) and labial vowels (/o/ and /u/). The vowel system of Portuguese is more complex than that of Spanish and displays rich allophony due to vowel reduction in unstressed position (cf. e.g. Fikkert 2005). Fikkert/Freitas (2006) show in longitudinal cross-sectional data of seven European Portuguese children from 0;11 to 3;7 that, in general, variation decreases with age and that vowel allophony is acquired early as is shown on the basis of underlying /a/ and /e/ (which are neutralized to /e/ in certain phonological contexts). Results are particularly positive for /a/, realized as [ɐ] before nasals (16a) but as [a] before non-nasals in stressed position (16b).

- (16) EPor. a. ['kɐmɐ] *cama* 'bed' (Inês, 1;9,19)
 b. ['patu] for [sɐ'patu] *sapato* 'shoe' (Marta, 1;3,8)
 (Fikkert/Freitas 2006, 94, 95)

The vowel [i] (as a reduced variant of /e/ and /ɛ/ in unstressed position) plays a particular role in the acquisition of Portuguese. It is used before and after words and for cluster simplification. [i] appears as a protomorpheme (17a), which in front of nouns is considered a placeholder for the article, before initial /s/+C clusters (17b), in branching onsets (17c) and word-finally (17d):

- (17) EPor. a. [i'pɛ] for [pɛ] *pé* 'foot' (Inês, 1;5,11)
 b. [i'ta] for [ʃta] *estar* 'be_{INF}' (Laura, 2;4,30)
 c. ['pɛdɪrɐ] for ['pɛdrɐ] *pedra* 'rock' (Luís, 2;5,7)
 d. [ɐ'zuʃi] for [ɐ'zuʃ] *azul* 'blue' (Pedro, 2;7)
 (Freitas 2004, 166, 167, 168; Vigário/Frota/Freitas 2003, 819)

4 Syllables

This section presents findings on the acquisition of syllables and syllable constituents. Perception studies show that the syllable is the basic prosodic unit as it, rather than vowel quality, phonemic changes or sub-units of syllables like morae, serves as an early cue in phonological perception in children as old as 2 days (Bertoncini/Mehler 1981; Bijeljac-Babic/Bertoncini/Mehler 1993; Bertoncini et al. 1995; van Ooijen et al. 1997; Nazzi et al. 2006).

It is undisputed that CV is the initial syllable in language acquisition (Levelt/Schiller/Levelt 2000). For example, in early Spanish (1;10–2;5), CV represents 67% of all syllable types and is followed by V (22%) (Goldstein/Cintrón 2001). In French and Italian, CV is also followed by V (Rose 2000; Zmarich/Ferrero 1999; Zmarich/Miotti 2003; Zmarich/Bonifacio 2004). In Brazilian Portuguese, Santos (1998) observes in 3 children (0;11–3;0) that CV and V are followed by CVC, CVV (one vowel being a glide) and, at around the age of 2, CVVC and VC.

In early stages of acquisition, syllable constituents are non-branching. Lleó/Prinz (1996) show in 4 Spanish (and contrastively in 5 German) children aged between 0;9 and 2;1 that syllable structure assignment is language-specific since Spanish children produce the second and German children the first consonant of clusters during the non-branching stage:¹¹

- (18) Sp. ['loβo] for ['gloβos] *globos* 'balloons' (Miguel, 1;10) (Lleó/Prinz 1996, 38)

¹¹ E.g. German [po:t] for [bʁo:t] *Brot* 'bread'.

In a comparison of Spanish and French, Kehoe et al. (2008) propose that simple onsets and nuclei are followed by a stage of undifferentiated consonant-liquid (CL) and consonant-glide (CG) sequences analyzed as branching onsets. In cross-sectional data of 14 French-speaking children (mean age: 2;4) and longitudinal data of 5 Spanish-speaking children (1;3–3;0), these children generally acquire C+/l/ before C+/ʁ/ or C+/r/ sequences. Rising diphthongs are acquired along with C+/l/ (or shortly afterwards). In both languages, no consistent errors distinguishing rising diphthongs from branching onsets are found but mutual substitutions (CL for CG and vice versa; cf. 19, 20) do occur. The authors conclude that CL and CG are not distinctly represented in early children's grammars and that CG is initially analyzed as a branching onset in French and Spanish.

- (19) Fr. a. [bja] for [bʁa] *bras* 'arm'
b. [pla] for [pwa] *pois* 'pea'

- (20) Sp. a. [dja'ʔɔn] for [dra'ʝon] *dragón* 'dragon'
b. [kʊ'lumplo] for [ko'lumpjo] *columpio* 'swing'

(Kehoe et al. 2008, 21, 23)

Freitas (2003), Freitas/Rodrigues (2003) and Fikkert/Freitas (2004) analyze the acquisition of branching onsets and /s/+C clusters in 7 European Portuguese children from 0;10 to 3;7 in contrast to dialectal data and in contrast to Dutch. Within obstruent+liquid clusters, plosive+liquid sequences precede fricative+liquid sequences. In branching onsets, the left-edge member is mostly deleted in European Portuguese, like in Spanish (21a). Processes specific to European Portuguese and unattested for Dutch include the deletion of both consonants (21b) and vowel epenthesis, particularly [i] (cf. 3.4 and 21c). /s/+C cluster acquisition coincides with fricative coda acquisition by 2;0 (21d) while obstruent+liquid clusters are not yet acquired at this age (21e). The authors interpret their data as indicating a coda status for the initial fricative in /s/+C clusters as part of an empty-headed syllable (as opposed to Dutch).

- (21) EPor. a. [bisi'lete] for [bisi'klete] *bicicleta* 'bicycle' (Luís, 2;2,27)
b. [pisi'ete] for [bisi'klete] *bicicleta* 'bicycle' (Luís, 1;11,20)
c. [fi'lot] for [flor] *flor* 'flower' (Laura, 2;7,16)
d. [ˈgɔʃtu] *gosto* 'like_{1SG}' (Marta, 1;11,10)
e. [ˈʃtele] for [(i)ˈʃtrele] *estrela* 'star' (Marta, 1;11,10)

(Freitas 2003, 34; Fikkert/Freitas 2004, 63, 64)

First codas in Spanish are filled by glides (Lleó 2003) and appear around age 1;10. Lleó (2003) observes in two children from 1;3 to 2;3 that word-medial codas are acquired before word-final ones (22) and that codas of stressed syllables are acquired before those in unstressed position (cf. Núñez-Cedeño 2007; Polo 2018). These results are attributed to the prosodic structure of Spanish, which favors trochaic feet

(cf. Section 5). Stressed syllables as heads of trochaic feet therefore license codas and demonstrate an intricate relationship between the acquisition of the prosodic hierarchy and the licensing of codas. Another reason for the preponderance of medial codas is that they typically contain unspecified coronal features. By contrast, inflectional morphology as expressed by final codas seems to play a minor role in early acquisition. As the comparative study of Lleó et al. (2003) shows, these tendencies are not universal since German codas are acquired earlier.

- (22) Sp. a. [do] for [dos] *dos* 'two' (José, 1;9,2)
 b. [mam'βeto] for [al'βerto] *Alberto* (proper name) (José, 1;9,2)
 (Lleó 2003, 269)

By 2;7, codas are produced accurately in 95% and 82% in 2 children speaking Northern European Spanish (Polo 2018). First coda segments in this study correspond to nasals, followed by laterals, fricatives and lastly, rhotics. Substitutions generally occur in codas in word-final position and in unstressed syllables and particularly pertain to laterals (mostly with [j], 23a), fricatives (mostly with [h]) and rhotics (various substitutes, e.g. [h], [ʁ], [ɾ], 23b). Polo (2018) takes these results as indicative of the fact that children first acquire the syllabic skeleton before focusing on segments in Spanish.

- (23) Sp. a. [kajçe'tin] for [kalθe'tin] *calcetín* 'sock' (M, 1;10)
 b. [pin'tah] for [pin'tar] *pintar* 'draw_{INF}' (A, 2;7)
 (Polo 2018, 17, 18)

Prieto/Bosch-Baliarda (2006) investigate the acquisition of codas in 4 Catalan-speaking children from 1;1,28 to 3;0,2. They find that codas are produced from early on in Catalan and that stressed syllables and word-final position privilege their emergence (24a, b), which the authors attribute to frequency effects. Morphological import, as in Spanish, is less important. Based on picture identification and elicited imitation tasks in 16 Spanish(-dominant) (mean age 2;4,09) and Catalan(-dominant) children (mean age: 2;2,08) from the Barcelona area, Borràs-Comes/Prieto (2014) confirm that language-specific distribution is crucial because the Catalan children produce significantly more target-like codas in final and stressed position. Complex codas are observed by 1;11; /r/+C codas are frequently reduced to the least sonorous segment (24c).

- (24) Cat. a. [pa'tit]¹² for [pə'tit] *petit* 'small' (Pep, 1;1,24)
 b. [ti'bal] for [tim'bal] *timbal* 'drum' (Pep, 1;6,23)
 c. [bet] for [bert] *verd* 'green' (Laura, 1;11,12)
 (Prieto/Bosch-Baliarda 2006, 245, 248, 269)

¹² The unstressed full vowel [a] in this example indicates that the child has not yet acquired unstressed vowel raising of (adult) Catalan.

In Brazilian and European Portuguese, first codas occur between 1;2 and 1;7 and are acquired by between 3;2 and 3;8. These codas correspond to /n/ before fricative and liquid codas emerge (Mezzomo et al. 2010; Toreti/Ribas 2010). Final codas emerge before medial ones (as in Catalan but unlike Spanish). Target-deviant coda realizations include vowels and glides:

- (25) EPor. [ka'iw]¹³ for [kɐ'ir] *cair* 'fall' (Jordão 2008, 68)

Demuth/Kehoe (2006) investigate the acquisition of word-final obstruent+liquid clusters in 14 French children (mean age: 2;4) in a cross-sectional study. These clusters are acquired later than both singleton word-final consonants and word-initial obstruent+liquid clusters. Within the cluster, the obstruent is preserved and acquired before the liquid (26), which is compatible with the general acquisition order and the principle to reduce syllables to the least sonorous segment.¹⁴

- (26) Fr. [tig] for [tigʁ] *tigre* 'tiger' (Demuth/Kehoe 2006, 72)

Final vowel epenthesis produced by 3 children provides further evidence for the analysis of word-final consonants as onsets of empty-headed syllables (27); cf. vowel epenthesis in European Portuguese in (17a, b).

- (27) Fr. a. ['nynə] for [lyn] *lune* 'moon' (Ar, 2;6,8)
 b. ['tablø] for [tabl] *table* 'table' (Ar, 2;6,11)
 (Demuth/Kehoe 2006, 75)

5 Stress and rhythm

As basic prosodic units, syllables serve as anchoring points for stress expressed by changes in fundamental frequency (F0), along with increases in intensity and/or duration. The (language-specific) alternation of strong and weak syllables gives rise to rhythmic patterns, as exhibited in larger units like metrical feet, prosodic words and phonological phrases. The Romance languages differ with respect to stress and rhythm. While most languages display variable lexical stress with a preference for trochaic rhythm, French has an obligatory phrase-final accent. A point of discussion in the literature is whether there is a trochaic bias in L1 acquisition in general (Hochberg 1988; Vihman/DePaolis/Davis 1998; Bijeljac-Babic/Höhle/Nazzi 2016).

¹³ IPA reconstructed from the transcription used by the author.

¹⁴ This is an extremely marked coda cluster, which is very often reduced in adult speech too.

Romance languages have been traditionally classified as syllable-timed, as opposed to stress-timed languages like English, German, or Dutch (↗8 Comparing and deconstructing speech rhythm across Romance languages).¹⁵ However, since these categories have not been confirmed empirically (Roach 1982; Dauer 1987), languages are instead characterized by the proportion of overall vocalic material (%V) and by the variability in the duration of vocalic (and consonantal) intervals (VarcoV/C) (e.g. Ramus/Nespor/Mehler 1999; Dellwo/Wagner 2003).

Numerous studies have addressed newborns' ability to perceive rhythmic differences. Italian children of 2–3 days perceive rhythmic differences in various conditions including between two disyllabic words unvaried in segmental structure, between two trisyllabic words varied in segmental structure, and between sets of several disyllabic words varied in segmental structure (Sansavini/Bertoncini/Giovanelli 1997). In a series of experiments, Mehler et al. (1988) demonstrate that 4-day-old French newborns distinguish their native language from others, even when devoid of segmental cues. However, they are unable to distinguish two foreign languages from each other, which is explained by the fact that children start to acquire the prosodic properties of their native language prenatally. Specifically, children can discriminate groups of languages on the basis of rhythmic properties only, which are assessed in newborns by using the high-amplitude sucking paradigm. In Nazzi/Bertoncini/Mehler's (1998) study, English stimuli (stress-timed) are discriminated from Japanese stimuli (mora-timed), but no distinction is found between English and Dutch sentences (both stress-timed). In an experiment including English, Dutch, Spanish, and Italian stimuli, discrimination is only found for a contrast of English or Dutch sentences (stress-timed) with Spanish or Italian sentences (syllable-timed). Contrasting 24 French and 24 Spanish children of age 0;9, Skoruppa et al. (2009) find that the Spanish group successfully distinguishes stress-initial from stress-final pseudo-words (e.g. /'lapi/ vs. /pi'ma/). This distinction is borne out in French only when the same pseudo-word is used (/pima/ vs. /pi'ma/).

For the acquisition of prosodic words (PWs), it has been claimed that children adhere to binary metrical feet in early acquisition. Lleó (2002; 2006) analyzes the acquisition of PWs in 3 monolingual Spanish children from 1;3 to 2;2 (compared to monolingual German and to bilingual Spanish-German children) and finds cross-linguistic variation. First (trochaic) PWs with binary feet occur from 1;2 on (e.g. [ˈmano] *mano* 'hand'), which is before iambs (28a) and trisyllables emerge (28b). Monosyllabic PWs only occur around 1;7 (mostly without a coda; 28c). Spanish children expand their PW productions by an unfooted syllable.¹⁶ PWs composed of two

¹⁵ Mora-timing as exhibited by languages such as Japanese will not be taken into consideration since it does not apply to Romance languages.

¹⁶ By contrast, German children first truncate these syllables and later produce another additional foot ([ˈnana] for [baˈnana] *Banane* 'banana'; Lleó 2002, 293).

feet are observed at age 1;10 in Spanish. Quadrisyllables are truncated until 2;2 (28d). Phonological phrases appear at 1;5 in 1 child and at 1;10 in the 2 other children (28e, f).

- (28) Sp. a. [be'jɔ] for [le'on] *león* 'lion' (José, 1;7)
 b. [no'nino] for [ko'nexo] *conejo* 'rabbit' (José, 1;7)
 c. [bɛ:] for [peθ] *pez* 'fish' (José, 1;7)
 d. [pa'bɔtah] for [mari'posa] *mariposa* 'butterfly' (José, 1;9)
 e. [ʔɪ'tɛ:nθə] for [el'djente] [el [diente]_{PW}]_{PPH} 'the tooth' (José, 1;10)
 f. [ʔɔdʊ'nɛnɛ] for [ʔotro'nene] [[otro]_{PW} [nene]_{PW}]_{PPH}
 'another child' (Miguel, 1;10)

(Lleó 2006, 212, 215)

Spanish children hardly truncate iambs (< 20%) in contrast to German children but convert iambs to trochees by stress misplacement from 1;9 to 2;6 (Arias/Lleó 2009). In a similar way, Montes Giraldo (1971) reports on target-deviant word stress placement in words with antepenultimate stress in favor of penultimate stress distribution in Colombian Spanish:

- (29) Sp. a. [pam'pala] for [ʔlampara] *lámpara* 'lamp'
 b. [ta'tano] for [ʔplatano] *plátano* 'banana'

(Montes Giraldo 1971, 340)

In fact, the trochaic pattern is the most frequent foot in various languages, such as Spanish, Catalan, and English (Astruc et al. 2010). However, studies on perception, babbling, and production in a range of languages reject a general trochaic bias in child phonology. Instead, they converge on the finding that language-specific frequencies corresponding to metrical feet are crucial (Vihman/DePaolis/Davis 1998 and Demuth/Johnson 2003 on French; Vigário/Freitas/Frota 2006 on European Portuguese; Hochberg 1988; Prieto 2006; Pons/Bosch 2007 on Spanish and Catalan).

Based on spontaneous and imitated data from 4 Mexican children aged 1;7–2;2, Hochberg (1988) shows that target-deviant stress shift with iambic outputs is attributed to segmental difficulties within the relevant syllable, e.g. with /r/ onsets (30a). Another explanation is semantic, as an important commonality of all words but one of the corpus containing stress shift is their pragmatic import (pointing function, imperatives):

- (30) Sp. a. [mi'ra] for [ʔmira] *mira*_{IMP} 'look'
 b. [da'mɛ] for [ʔdame] *dáme*_{IMP-1SG.DAT} 'give me'

(Hochberg 1988, 284, 285)

Astruc et al. (2010) explore the word prosody and the omissions of weak syllables in 12 Spanish, Catalan, and English children aged 2, 4 and 6 in a name elicitation task.

The omission of weak syllables decreases in all languages, and by 6 years, truncations are no longer observed. Comparing individual languages, the development of the complexity of PWs and the omission rates are language-specific. Spanish children produce multisyllabic PWs at 2;0 already, and, consequently, weak syllable omissions at 2;0 are least frequent in Spanish (10%; 31), closely followed by Catalan (13%; 32), and are most frequent in English (26%).

(31) Sp. [ipu'potamo] for [ipo'potamo] *hipopótamo* 'hippopotamus'

(32) Cat. [pu'pontam] for [ipu'põtəm] *hipopòtam* 'hippopotamus'

(Astruc et al. 2010, 3)

In French, first PWs maximally correspond to a trochaic foot. Once again, child phonology shows language-specific characteristics as subminimal words and early iambs also occur according to the frequencies of the input (33). In fact, 62% of monosyllabic French words are subminimal (Demuth/Johnson 2003).

(33) Fr. a. [pɛ] for [pɛp] *peigne* 'comb' (Suzanne, 1;5)

b. [da] for [ma'dam] *madame* 'lady' (Suzanne, 1;5)

c. [pi] for [paʁa'pluʃi] *parapluie* 'umbrella' (Suzanne, 1;5)

(Demuth/Johnson 2003, 223, 224)

In Goad/Buckley's (2006) case study, disyllabic PWs are attempted (34a) before monosyllabic PWs (34b), as is the case in Spanish. The production of PWs is extended by left-edge functional material (34c). Trisyllabic words are acquired later than in Spanish (34d), which can be explained by the fact that Spanish tends to have longer PWs than French (Roark/Demuth 2000; Demuth/Johnson 2003; Lleó 2006).

(34) Fr. a. [mə'mæ] for [ma'mã] *maman* 'mum'

b. [pa] *pas* 'not'

c. [a'ji] for [œ'livʁ] *un livre* 'a book'

d. [pupæ'ko:] for [abʁi'ko] *abricot* 'apricot'

(Goad/Buckley 2006, 126–127, 129, 134)

In elicited speech material, Payne et al. (2011) compare the speech rhythm in terms of %V and VarcoV/C of 9 children of 2, 4 and 6 years and adults in Spanish, Catalan and English. A cross-linguistic tendency of child phonology is "syllable-timed" speech rhythm, i.e. higher %V values and lower variability in vocalic interval duration when compared to adults. On the other hand, consonantal variability is higher in children (a typically "stress-timed" characteristic). Despite these universal tendencies, language-specific rhythmic properties can be observed at age 2 already. With the exception of higher VarcoC scores, children of 6 years achieve the rhythmic target in

all languages. Using vowel length and the variability of successive vowel durations as rhythm metrics, Grabe/Post/Watson (1999) show in three 4;3–4;6-year-old French and three English children that by this age, the French children's rhythm is identical to that of the input (but not so for the English children). Starting off with characteristics of syllable-timing, it may therefore take longer to acquire the rhythm of a stress-timed language.

In European Portuguese, phonetic cues are ambiguous as vowel reduction or deletion (corresponding to increased variability of vocalic intervals) indicates stress-timed rhythm whereas in terms of %V, the language behaves more like a syllable-timed one. Vigário/Frota/Freitas (2003) consider %V as the relevant measure for European Portuguese children to relate to syllable structure and, thus, to rhythm: unlike Dutch children, European Portuguese children faithfully produce target V syllables. Furthermore, they produce empty onsets before syllables starting with /s/+C clusters (17b) and have vowel epenthesis in complex onsets as well as massive word-final [i] insertion (cf. Sections 3 and 4).

6 Intonation

In the past years, research on phonological acquisition has also focused on intonation, mostly according to the Autosegmental-Metrical framework using the Tones and Break Indices (ToBI) transcription system (Frota/Prieto 2015). The repertoire of intonational targets in terms of pitch accents, boundary tones as well as their scaling and alignment properties has been investigated in Spanish, Catalan, and European Portuguese children. In general, children's productions resemble child-directed speech in form and meaning as early as before the 2-word period and before the age of 2 (Thorson et al. 2015 on Spanish and Catalan; Vigário/Frota 1992 and Frota/Vigário 1993; 1995 on European Portuguese).

Lleó/Rakow/Kehoe (2004) compare the acquisition of the prenuclear pitch accent in broad-focus declarative statements, which differ in Spanish (rising L*+H) and German (falling H*+L). Contrastive data of the monolingual children (2;10–3;1) clearly demonstrate target-like and language-specific distribution of the pitch accents before 3;0, but the prenuclear and nuclear pitch accents in Spanish are not systematically distinguished. Similarly, in an investigation of the intonation of yes/no-questions by monolingual and bilingual Spanish and German children at 2;0 and 3;0, Lleó/Rakow (2011) show that the intonational targets are already mastered around 2;0. Evidence of language-specific peak scaling and alignment is also found but scaling of the steep final rise in Spanish yes/no-questions is only observed by 3;0.

As in Spanish, Prieto/Vanrell (2007) find evidence of early mastery of intonational grammar in 4 Catalan-speaking children (1;1,24–2;2,13). Around 1;9, they display language-specific pitch accents and (complex) boundary tones, e.g. in state-

ments and requests. While tonal alignment is target-like, scaling properties are not yet fully acquired by this age. Importantly, intonational development is independent from lexical growth.

From a comparative perspective, Prieto et al. (2012) show on the basis of longitudinal data collected from 2 Spanish- and 4 Catalan-speaking children aged 0;11–2;4 that at the onset of 1-word utterances, a number of intonational contours are used, the statement pattern L+H* L% being the most frequent one. The increase of nuclear pitch configurations is marked by a sudden burst from one or two configurations to six or seven, which occurs between 1;5 and 1;6 in Spanish and between 1;8 and 1;11 in Catalan after the children have surpassed the 25-word-limit. Alignment of intonational targets is mostly mastered, and erroneous scaling of L% disappears by or after 2;0 (cf. also Vanrell et al. 2010).

Astruc et al. (2009; 2012) compare data by 12 Spanish, Catalan, and English children aged 2, 4 and 6 and find a high incidence of level tones in the youngest age group across languages (39%). Scaling of tonal targets shows language-specific differences and gradually improves with age. While L tones are aligned target-like from early on, H* targets are produced less accurately. Interestingly, the realization of H* targets is more accurate in Spanish than in Catalan (and English) which is explained by language-specific differences in syllable composition and the distribution of pitch accents.

7 Summary and conclusions

Studies on babbling point to major cross-linguistic similarities across the Romance languages which are compatible with Jakobson's universals: plosives and nasals are the first sounds to be observed among consonants, and front vowels are preferred over back vowels in early stages of babbling. These commonalities notwithstanding, studies on (late) babbling indicate that convergence to the target language occurs towards the end of the first year of life and strongly supports continuity between babbling and language-specific prosody. Possibly, certain prosodic characteristics like F0 and timing are language-specific earlier than segmental properties (around 0;8).

The findings on segment acquisition are largely compatible with what has been established for babbling. In meaningful words, plosives and nasals are acquired first and most stably across Romance (1;6–2;11). Studies do not agree on when the allophony between voiced plosives and spirants in Spanish is mastered. Another acquisitional challenge is imposed by the voicing contrast between plosives, especially prevoiced ones, which are first preferably realized in the short lag range (i.e. with short positive VOTs). There is no consensus as to when this contrast is fully mastered in acquisition. Fricatives appear after plosives and nasals; they are only acquired between 3 and 4 years, roughly speaking. Liquids are latest to be acquired. Rhotics, especially taps and

trills, present the most difficult phonological categories and are only acquired after the age of 4. Vowels can be said to be acquired with ease even in languages displaying rich vowel allophony. The correspondences to babbling substantiate claims of continuity between babbling and phonological acquisition in meaningful units.

The acquisition of syllables and syllabic constituents in Romance confirms the well-established preference for the CV syllable type. Another general acquisition path in Romance is that onsets are acquired before codas and simple syllable constituents are acquired before complex ones. The emergence and the acquisition of codas seems to depend heavily on language-specific frequencies. These acquisition paths mirror the frequencies of the language-specific inputs to which children are exposed (e.g. that Portuguese and Catalan have more codas than Spanish).

The available studies on stress and rhythm indicate that children are able to perceive rhythmic differences from early on across the board. Specifically, they distinguish groups of languages in terms of mora-, stress-, and syllable-timed categories and rely on the prosody of the native language they are exposed to in prenatal stages. In French, a language without lexical stress, newborns are possibly less sensitive to stress differences. The acquisition of stress and PWs seems to be guided by a preference for a binary trochaic foot but language-specific differences in syllable structure and metrical feet are decisive for subsequent development. The existence of a trochaic bias is rejected in Romance language acquisition. The rhythmic properties as measured by %V and the variability of the duration of vocalic and consonantal intervals indicate language-specific distributions around 2;0.

Finally, children generally show quite some variability of intonational pitch configurations and master pitch accents and boundary tones according to their native language around or even before 2;0. While alignment is target-like at around 2;0, language-specific scaling is only acquired at a later stage. The H* accent is most problematic with respect to achieving target-like alignment, whereas the L% boundary tone imposes the most difficulty in scaling. Importantly, intonational development precedes grammatical development and is boosted by lexical growth.

To sum up, universal acquisition paths can be established for segments and for the preferred CV syllable type in Romance; these tendencies pertain to both babbling and first words. A natural explanation for the universal paths in segment acquisition (in both babbling and the production of meaningful units) is that (anterior) plosives and nasals are easier to acquire than fricatives and liquids from a purely anatomic view, irrespective of the target language (Jakobson 1941/1969). The processes related to the acquisition of segments sustain this view. Importantly, the acquisition paths of segments seem to be universal even though language-specific inputs differ cross-linguistically.

On the other hand, suprasegmental categories are acquired language-specifically. Onset and coda emergence as well as their complexity and position within the word not only diverge between Romance and other language families but also within Romance languages. Since syllable (and foot) structure bears on stress and rhythmic properties

of a given language, the acquisition of these prosodic categories also displays diverging paths. Finally, intonation, at least in the Romance languages in which it has been researched from an acquisition perspective, clearly shows language-specific variation with respect to the acquisition of pitch accents and boundary tones, as well as their alignment and scaling.

Taken together, token frequency in the child's linguistic input is more important for syllabic and prosodic categories than it is for segments (for which articulatory properties are most relevant) in language acquisition. In fact, the acquisition of segments by no means represents a prerequisite for the acquisition of tonal structures. This is exactly what results on (late) babbling show. Although segment production displays universal tendencies, properties related to F0 and to the timing of syllables are heavily influenced by children's target language. Other prosodic categories like syllables, stress, rhythm, and intonation also show language-specific characteristics from early on. Under the assumption that phonological acquisition is language-specific if "economical", we may conclude that the acquisition of prosody is less "costly" than the acquisition of segments.

Importantly, though, there are obvious universal tendencies in the acquisition of suprasegmental phenomena to start off with: the acquisition of complex syllable types and constituents follows the same paths in Romance languages (but at different ages depending on language-specific input). Young children generally exhibit a syllable-timed speech rhythm, and differences in stress and rhythm are perceived by newborns in all languages (but the native language influences perceptive competence). Level tones are a cross-linguistic characteristic in early intonation (but the production of language-specific tones occurs shortly afterwards).

An important factor which intervenes with universal segmental and language-specific suprasegmental phonological acquisition is timing: as has been laid out, language-specific phonology occurs by the end of the first year of life during the babbling stage (as early as by 0;8), whereas segments only become fully mastered at older ages. These cross-linguistic findings can be characterized by another kind of universality with respect to timing: even though the production of prosody does differ according to the target language, target-like production of prosody is universally acquired before target-like production of segments (cf. Prieto/Estève-Gibert 2018 for a more general overview of prosodic development in first language acquisition). Furthermore, the findings justify the distinction between segmental and suprasegmental properties not only from a theoretical perspective but also from the perspective of language acquisition.

The review of the literature has provided information on the acquisition of phonology for major Romance languages, including Catalan, French, Italian, (European and Brazilian) Portuguese, and Spanish. Unfortunately, Romanian as well as many other Romance varieties have not yet been described with respect to phonological acquisition to date. Neither have the major languages been researched to an equivalent extent, especially Italian, for which many studies focus on phonologically impaired children, but phonological acquisition in typically developing children is

underrepresented. Overall, Spanish figures as best documented for phonological acquisition. Studies on various varieties have addressed babbling, the acquisition of segments, syllables, stress, rhythm, and intonation in detail (for an overview cf. Lleó 2008) but a number of varieties in Latin America have not been assessed yet.

French has been most thoroughly described in terms of babbling, especially in contrast to other (non-Romance) languages. As a consequence of these studies, it is possible to deduce important information on universal and language-specific tendencies in the earliest stages of language production. Few studies have also assessed babbling in Italian and Spanish infants; however, respective studies on Catalan and Portuguese are virtually absent. For completion of the picture and a more fine-grained conclusion on Romance languages in general, it would be interesting to verify in future research if in these languages segmental and prosodic properties of babbling are consistent with the findings on French, Italian, and Spanish.

Studies on segments as produced in meaningful units are abundant in Spanish and Portuguese (and, to a lesser extent, in Italian). It is striking that vowels have been mostly addressed in (European) Portuguese but not in the other languages. As a matter of fact, the Spanish and Italian systems are rather simple as compared to Portuguese. An evident research gap pertains to the acquisition of the (relatively more complex) French vowel system. Segmental acquisition in Catalan is also a desideratum for future research in order to substantiate continuity between babbling and first words across Romance languages. It would be interesting to compare Catalan to Portuguese because both languages share some characteristics which do not prevail to the same extent in other Romance languages, e.g. vowel reduction.

The acquisition of syllables, stress, and rhythm is generally well-documented in Romance, with the exception of Italian, for which studies following up on the results obtained for other Romance languages are needed. In future research, it would also be worthwhile to find more universal or language-specific tendencies from a theoretical perspective, e.g. in terms of which consonants are deleted in clusters. Different proposals include the directionality of syllable structure assignment and sonority considerations, but their generalization potential is not yet worked out across Romance.

Finally, the acquisition of intonation does not have a long-standing tradition as compared to segment and syllable acquisition. However, interesting results are available for Spanish and Catalan (and Portuguese). The lack of studies on the acquisition of French and Italian intonation (and other Romance varieties) could be fruitfully filled methodologically since a common framework exists using Autosegmental-Metrical conventions for a wide range of Romance languages (Frota/Prieto 2015). This could also be extended onto further varieties allowing for comparability and, thus, for conclusions in terms of universal and language-specific tendencies in phonological acquisition.

Methodologically speaking, studies on the acquisition of phonology are either longitudinally oriented, using spontaneous child data in naturalistic settings, or based on cross-sectional experiments to elicit speech data. The advantages and disadvantages

of both methodologies are straightforward: while in longitudinal studies, children can be observed over a long period of time in their linguistic development, the number of observed children is typically very low (often case studies), which makes it difficult to draw reliable generalizations on acquisition. By contrast, in experiments, many children can be tested but normally only at a specific and single point in time, which complicates conclusions on development. In the presented literature, results are mostly not controlled for different methodologies. Ideally, methods should be triangulated and designed according to the intended research goal (e.g. development vs. outcome in language acquisition). From a theoretical perspective, studies focusing on these methodological issues may contribute to our current understanding of the impact of perception vs. production regarding children's phonological competence.

A final direction for future research is to be mentioned for the acquisition of phonology at its interfaces. The role of phonology in the acquisition of morphosyntactic criteria has been established, for example, in the domain of determiner acquisition (which are frequently omitted in early acquisition stages). Studies on Romance languages show that determiner realization depends, among other factors, on the prosodic characteristics of the noun. Children first prosodify (monosyllabic) determiners with monosyllabic and then with disyllabic (and trisyllabic etc.) nouns as the acquisition of the prosodic hierarchy proceeds (Demuth/Tremblay 2008; Demuth et al. 2012). For disyllabic determiners (in Spanish), this ordering is not found. As PWs on their own, disyllabic determiners are prosodified at higher levels of prosodic structure, e.g. at the level of the phonological phrase. The higher rate of polysyllabic words in Spanish therefore entails an advantage with respect to the acquisition of higher levels of the prosodic hierarchy (as opposed to French). These and other interfaces should be further studied under the perspective of first language acquisition of Romance phonology.

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Conxita Lleó

13 Bilingual phonological acquisition

Abstract: This chapter reviews much of the work done on the bilingual phonological acquisition of one or more Romance languages. In a first step, it focuses on segments, by separating those that are shared by all Romance languages from those that appear in only one or a few Romance languages, and examines the child acquisition of vowels, consonants, and several phonological processes in bilingual settings. In a second step, it discusses how bilingual children acquire syllabic constituents, (re) syllabification, and the higher levels of prosodic structure, i.e. intonation and speech rhythm.

Keywords: segments, prosody, prosodic positions, simultaneous bilinguals, heritage language

1 Introduction

Given the large number of languages that make up the Romance group, we cannot attempt to deal with an exhaustive discussion of their characteristics and their acquisition. Therefore, I focus on three “major” languages, Portuguese, Spanish, and French, plus one considered “minor”, namely Catalan. Note that they all belong to the Western Romance group. Furthermore, the input that young children receive does not necessarily match the standard varieties (i.e. Standard European Spanish, Standard French etc.), but the varieties spoken in their environment.

Before going into the topics of this chapter, I would like to mention a couple of preliminary points. In the present world, many situations lead to a child acquiring more than one language simultaneously. The most typical one results from the parents’ emigrating from a country where a certain language is spoken, e.g. Spanish, to another country with a different language, e.g. French. This type of situation is common among workers and refugees, the former often moving within Europe, the latter into Europe. In such situations, children are exposed to the language of their family, or heritage language (Spanish in our example), and to the new language, which is the societal or majority language (French if the family has immigrated into France).

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Although the field of language acquisition has been focusing on bilingualism – and even trilingualism and multilingualism – for several decades (Ferguson/Menn/Stoel-Gammon 1992; Vihman 1996), we still do not know how to define some basic issues involved in our research, namely how children acquire two or more languages more or less simultaneously.

Norris/Ortega (2012) make a case in favor of the so-called “bilingual turn”, which requires that the various properties of bilinguals be defined in their own terms, in a fashion that is independent from that of monolinguals. However, there are many types of bilinguals: from children who have access to a rich, monolingual-like input in both languages, being able to produce well-formed outputs, to other children exposed to a defective input in at least one of their languages. According to some analyses (e.g. Montrul 2008; 2009), the latter case may lead to an “incomplete” grammar, as compared to another grammar based on a richer input. For instance, a child growing up in an English-speaking environment might hear a limited number of subjunctive forms in the Spanish input he or she receives in the familial domain and thus might not include this mode in his or her target grammar (Montrul 2009). If maintained in that incomplete state, such a grammar may give rise to a modified variety of the language in question. Pires/Rothman (2007; 2009) correctly differentiate the inclusion of inflected or personal infinitives in the grammar of European Portuguese vs. its exclusion in Brazilian Portuguese: European speakers have been exposed to inflected infinitives at school, whereas Brazilian speakers have not. However, the outcomes are very similar: neither European nor Brazilian speakers use such infinitives, because the former, in spite of having been exposed to them, are not sure about their usage and thus avoid them. Now, if we want to be able to differentiate all possible outcomes, we need some benchmark with reference to which varieties are judged (not pre-judged). If we want to know how far off the variety is, we must be able to compare the parents’ and the children’s varieties. And we must be able to characterize the various types of input and output, and the kind of outcome that emerges from a certain specific situation. While several scholars put forward the notion of incomplete acquisition, others consider it inappropriate, given that the linguistic knowledge acquired represents a fully-fledged functional system, which to some extent differs from the varieties of the respective language spoken by monolingually raised speakers (cf. Rothman 2009; Kupisch/Rothman 2016). Concluding this brief initial discussion, it is necessary to insist on the crucial importance of the variety of language that we choose as the comparative one, especially given the continuous changes that occur on the basis of language contact. Notions like “incomplete knowledge” are licit and pertinent, but only if resulting as an incomplete reproduction of something like “complete input”, i.e. if it is reproduced in that way by the child.

2 Segments

The smallest chunks or formal sound units into which lexical items can be reduced are segments, i.e. vowels and consonants. A brief presentation of such units and their acquisition by children as characteristic for a Romance language, acquired as L1, will introduce the topic.¹ The minimal sound units that result from so-called minimal pairs are considered “phonemes”, as, e.g., in Sp. *p[al]so* ‘step’ vs. *p[e]so* ‘weight’. These Spanish words are different from one another as far as the two vowels /a/ and /e/ are concerned. We say then that these two vowels are two phonemes of the Spanish vowel system. Something similar can be said about consonants: e.g. /p/ and /b/ are two different phonemes of Spanish, as the two words *[p]eso* ‘weight’ and *[b]eso* ‘kiss’, with different meanings, have a sole phonetic difference, and to use one or the other depends on the intention of the speaker, whether he or she wants to refer to a weight or a kiss. There is another difference though between non continuant or [-cont] [b] and [+cont] [β], which are considered two allophones of the phoneme /b/. Such allophones are predictable, because producing [b] or [β] depends on the phonetic context: in initial position and after nasals (e.g. *un beso* ‘a kiss’), /b/ is produced as a ([-cont]) plosive, i.e. [b], whereas when following any other consonant or a vowel, it surfaces as a ([+cont]) fricative-approximant as in *ese[β]eso* ‘that kiss’ (so-called spirantization; cf. 2.4.2, ↗24 Spanish). This means that in a certain context a continuous [β] is required and in another context a non-continuous [b] is called for, i.e. the speaker does not randomly choose to pronounce [b] or [β]. Phonological processes such as the one exemplified here need to be acquired during L1 acquisition to develop complete phonological knowledge. When a child acquires more than one language simultaneously (2L1) and the languages involved differ from one another regarding their phonological rules, cross-linguistic influence may affect the way a specific feature is acquired. This can lead to a perceivable foreign accent in one of the languages. Likewise, delayed development may occur. In the remainder of this section, various examples of the bilingual acquisition of segmental phonology will be discussed.

2.1 Vowel systems

Latin had a relatively simple vowel system, with front unrounded and back rounded vowels, but without front rounded or back unrounded ones, which are generally consid-

¹ The notion “segment” is used to designate an indivisible unit, ultimately a mental unit of organization. Our first task is to see that these minimal units cannot be thought of as strung together in a simple linear pattern. As our model of phonological representation becomes more articulate and more complex, the term “segment” becomes less and less appropriate, since there is no physical reality that is being segmented. For the purposes of the present chapter, we take the segment to be no more than the minimal unit of a phonological representation, which, according to structuralist and generative assumptions, is divisible in its features.

ered marked (Jakobson 1941/1968). A complex property of the Latin vowel system, though, consists in the phonological contrast between short and long vowels. This unitary classical system gave way to the various systems of Romance languages, where the quantity contrast was substituted by differences in quality. There is a core vowel system, consisting of five cardinal vowels, which are shared by all the Romance languages discussed here and represented by the Spanish system (/i e a o u/), which is one of the simplest in Romance (cf. Figure 13.1). In the other Romance languages, the number of vowels is generally larger. In Catalan, French, and Portuguese, for instance, there are four mid vowels instead of two, i.e. the middle space on the aperture dimension, which in Spanish is filled by /e/ and /o/, comprises four vowels (/e ε ɔ o/). The mid-open vowels /ε ɔ/ are arguably more marked than their mid-close counterparts /e o/, which may influence children to not produce them or to produce them later. This is what happens in the Catalan spoken in Catalonia, which is in permanent contact with Spanish. The presence of Spanish stimulates the child acquiring both languages simultaneously to omit the mid-open vowels /ε/ and /ɔ/. French, in addition, has two rounded mid vowels (/ø œ/) and schwa (for a discussion of its phonemic status ↗4 From vowel weakening in Romance to French schwa). Catalan has a seven-vowel system (/i e ε a ɔ o u/) and one additional vowel, /ə/, which in Standard Catalan appears only as substitute for /a ε e/ in unstressed position and is thus set in round brackets in Figure 13.1.

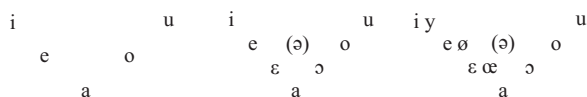


Figure 13.1: Spanish, Catalan, and French oral vowel systems (from left to right).

Figure 13.1 shows the three types of vowel systems present in Romance, from the simplest one (Spanish) to the most complex one (French) through the one occupying an intermediate position with regard to complexity (Catalan). Portuguese also occupies an intermediate position in presenting seven oral vowels (↗26 Portuguese). In addition, French and Portuguese each comprise a series of nasal vowels, which have emerged diachronically from their oral counterparts plus a subsequent nasal consonant (↗6 Nasals and nasalization).

Some Romance languages show a close relationship between stress and vowel quality, as in the case of Portuguese and Catalan, which have rules of unstressed vowel reduction. For instance, Central and Eastern Catalan have two rules: in unstressed position /a ε e/ become [ə], and /ɔ o/ are raised to [u]. The vowels /i/ and /u/ do not change; alternatively, unstressed /u/ can be considered to converge with the back vowels /ɔ/ and /o/. In European Portuguese, the rule of unstressed vowel reduction has four output vowels: [i i u e]. In other languages, like Spanish, stress does not have much of an effect on vowel quality. This also holds true for Italian, which, however, presents a strong lengthening effect on stressed vowels (if the following consonant is

short). It is only in the Catalan variety spoken in the Balearic Islands that the vowel /ə/ has the status of a phoneme, occurring in both stressed and unstressed syllables. In French, certain unstressed vowels are deleted, as is the case with the so-called *e muet*. This term refers to the schwa vowel [ə], which is orthographically represented as <e>, and is usually dropped at the end of lexical items, as in e.g. *collège* [kɔ'lɛʒ] 'school'. However, it is generally retained if preceded by two consonants in the syllable onset, e.g. *mer*[kʁə]di 'Wednesday' (→4 From vowel weakening in Romance to French schwa). In Portuguese, especially in its European varieties, unstressed vowels undergo a notable reduction regarding quantity as well as quality, to the point that certain unstressed vowels totally disappear, giving rise to complex consonant clusters (→26 Portuguese).

Given unstressed vowel reduction in Catalan, but not in Spanish, and given that both languages are in permanent contact, we might expect mutual influence. Spanish receives a moderate influence from Catalan, with a greater degree of reduction than would occur if there were no language contact. Influence of Spanish onto Catalan is stronger, to the point that in the Catalan spoken in Barcelona schwa has been modified, being produced closer to [ɐ] than to [ə].

2.2 Consonant systems

There is a core system of 13 Romance consonants, shared by Portuguese, Spanish, Catalan, and French. According to sonority, consonants are classified as obstruents on the one hand (six plosives, two fricatives) and sonorants on the other (three nasals, one lateral, one rhotic). The places of articulation for obstruents can be reduced to the three basic ones: labial, coronal, and dorsal. A great number of sonorants are coronal. In this section, we consider only those segments that are present in the majority of the Romance languages discussed. Language by language, consonants can be defined as follows:

- Shared by the four Romance languages: six plosives /p t k b d g/; two fricatives /f s/; three nasals /m n ɲ/; one lateral /l/; and one rhotic /r/ = 13 consonants.
- Besides these, Spanish has two more fricatives (/θ x/, the former only in European varieties) and one affricate (/tʃ/); one palatal lateral /ʎ/ (which under so-called *yeísmo* is progressively being substituted by /j/); and another rhotic /r/ = five more consonants.
- French has four additional fricatives /v z ʒ ʒ/; and yet another one, /ʁ/ that is phonologically the language's rhotic = five more consonants.
- Portuguese has four more fricatives (/v z ʒ ʒ/); one more lateral /ʎ/; and one more rhotic /r/ = six more consonants.
- Catalan has four fricatives /v z ʒ ʒ/; four affricates /tʃ dʒ ɟ ɟ/; another lateral /ʎ/; and another rhotic /r/ = ten more consonants.

Beside the 13 consonants shared by all four languages, there are a few more that appear in several languages: palatal /ʎ/, the multiple vibrant rhotic /r/, and the single vibrant rhotic /r/ appear in Spanish, Catalan, and Portuguese. French has a uvular fricative /ʁ/. In Spanish, the voicing contrast is only relevant for plosives, which are voiceless (/p t k/) or voiced (/b d g/), whereas all four fricatives and the affricate are voiceless (/f θ s x ʎ/). French presents six fricatives: labials (/f v/), coronals (/s z/), and palatals (/ʃ ʒ/). The fricatives /f s ʃ/ are voiceless, whereas /v z ʒ/ are voiced. Catalan has five fricatives instead of six, because nowadays there is generally no /v/ in the standard language, but only in some varieties spoken in València, Tarragona, and the Balearic Islands (cf. Alomar et al. 1999; Veny 2006). French has the largest vowel system (with eleven oral vowels) and, with Spanish, the smallest consonant system (besides the 13 shared consonants, French and Spanish have only four more). Interestingly, in Spanish, the smallest consonant system combines with the smallest vowel system (five vowels).

2.3 Acquisition of vowel segments

Most Romance vowels are unmarked and thus easy to produce, except for e.g. the front rounded vowels of French, which are considered marked. Especially Spanish vowels tend to be maintained in a target-like way without major changes when acquired in a bilingual setting. In fact, Kehoe (2002) showed that they are acquired very early and with target-like quality by both monolingual and bilingual children. Nonetheless, not all vowels are equally simple, as e.g. /u/ is more difficult to produce than the other cardinal vowels (and it occurs less frequently than /o/ both in adult and child language). Jakobson (1941/1968) considered /i a u/ to build the simplest vowel triangle, being very common in the languages of the world, and occurring in such different languages as, e.g., Arabic and Quechua (Kichwa). However, there occur substitutions of [o] for /u/ and [e] for /i/ with some frequency, as e.g. in the acquisition of Catalan by a child growing up as a German-Catalan-Spanish trilingual.

Table 13.1: Substitution of vowels in a trilingual German-Catalan-Spanish child at age 2;5 (years;months).

Target form			Child production
Sp.	<i>Miguel</i>	[mi'ɣel] (proper name)	[me'ɣel]
Cat.	<i>petit</i>	[pə'tit] 'little'	[pi'tit]
	<i>mussol</i>	[mu'sɔl] 'awl'	[mo'sɔl]
	<i>culín</i>	[ku'lin] 'little butt'	[ko'lin]
	<i>cotxet</i>	[ku'tʃet] 'little car'	[to'tet]
	<i>molí</i>	[mu'li] 'mill'	[mo'li]
	<i>conill</i>	[ku'niʎ] 'rabbit'	[ŋo'liɫ]/[ŋo'ɲil]

The items given in Table 13.1 all show an iambic (weak–strong) pattern. The child productions of the Spanish proper name *Miguel* and the Catalan words *petit* and *mussol* pattern alike in that the unstressed vowel of the pretonic syllable assimilates to the second, stressed one. However, since the closed back vowel /u/ is not yet acquired by the child, as becomes clear from the production of *culín* as [ko'lin], target-like closing of unstressed /o/ to [u] is also absent from her pronunciation of *cotxet*, *molí*, and *conill*. The presence of vocalic alternations in the child's production of Spanish *Miguel*, pronounced as [me'ɣel] (i.e. with harmony of openness), seems to reflect cross-linguistic influence from Catalan to Spanish, which completely lacks processes affecting the spectral properties of unstressed vowels.

In Optimality Theory (OT), the interplay of vowel harmony and avoidance of [u] has a straightforward analysis by means of two constraints, one leading to assimilation of height and another one banning the closed back vowel /u/, which in most Romance languages is the last to be acquired. Thus, the data in Table 13.1 are the result of the interaction of the constraints given in (1) and (2).

- (1) VOWEL HARMONY (VH): requires AGREE[aperture] of the unstressed vowel towards the stressed one, leading to assimilation of height.
- (2) No vowel /u/.

Note that VH here applies only to the [aperture] feature, not to the place of articulation feature [back], since the child produces [to'tet], with [+back] followed by [-back], i.e. without modifying the input vowels, even though they do not agree in their place of articulation.

The Catalan rule of unstressed vowel reduction has entered the child's grammar, but its outcome is not always visible, due to constraint (2), banning /u/ from the child's inventory. Other vowel-related operations present in Catalan also differ in child language. Thus, the mid vowel /o/ and the diphthong /au/ turned into [o] only in Western Catalan. Interestingly, a process of vowel harmony takes place in a word like *cosir* [ko'zi] 'sew_{INF}' that changed into [ku'zi] in Eastern Catalan. This is clearly comparable to the observed production of Sp. [me'ɣel] or Cat. [pi'tit], where VH is controlled by the stressed vowel of the word. Catalan experienced such VH in its diachronic development, as e.g. in relation to the first unstressed vowel of GENUC(U)LU(M) > Cat. *genoll* [ʒə'noɫ] 'knee': attracted by the stressed [+back] vowel, pretonic /e/ became [o] or [u] ([ʒo'noɫ] or [ʒu'noɫ]), depending on the dialectal area. The same thing happened to FENUCULU(M) > *fenoll*, *fonoll* 'fennel' or RESTICULU(M) > *restoll* > *rostoll* 'stubble field' (cf. Lleó 2003). There is an ongoing debate among scholars on whether L1 acquisition and diachronic development have some similarities. In spite of having limited the data considerably (cf. Table 13.1), we can observe a certain parallelism between language-acquiring children and diachronically emerging languages in that children apply vowel-harmonic processes that also operate in diachronic development.

In the remainder of this section, we present selected results of a study on the acquisition of Catalan vowels carried out in two neighborhoods of Barcelona, namely Gràcia, a traditional residential area located close to the city center and mainly inhabited by middle-class Catalan-dominant families, and Nou Barris, a district created in the north-eastern outskirts of the city with the aim of housing the immigration waves of the 1950s, 1960s and 1970s. While the percentage of speakers fluent in Catalan amounts to 83% in Gràcia, only about 61% of the population of Nou Barris are fluent in that language (cf. Lleó/Cortés/Benet 2008, 194). Three groups of Catalan speakers were considered in total: (i) ten children aged 3–5 (G1), (ii) ten young adults aged 19–23 (G2), and (iii) ten adults aged 32–40, who were the parents of the children from G1. Catalan words that contain segments not belonging to the Spanish vowel system, i.e. /ɛ/, /ɔ/, and schwa, were elicited from the participants, using a picture naming task. The underlying assumption was that the percentages of non-target-like productions of Catalan vowels would point to the degree of influence that Spanish exerts on Catalan at the phonological level (cf. Cortés/Lleó/Benet 2009; Lleó/Cortés/Benet 2008). Figures 13.2–4 present the results for groups G1 and G3, i.e. the children acquiring Catalan in two different settings and their parents. The results were obtained through auditory and acoustic analyses of the elicited words.

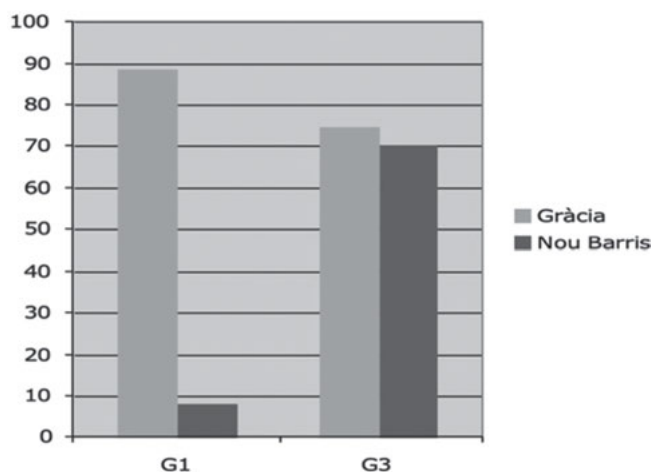


Figure 13.2: Mean percentages of target-like production of /ɛ/ (adapted from Cortés/Lleó/Benet 2009, 191).

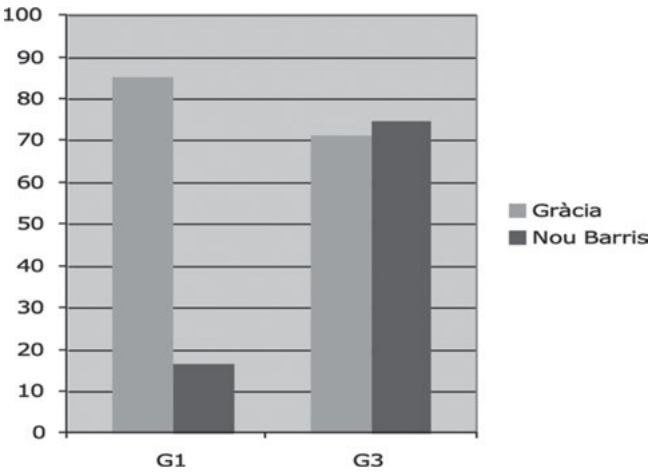


Figure 13.3: Mean percentages of target-like production of /ɔ/ (adapted from Cortés/Lleó/Benet 2009, 191).

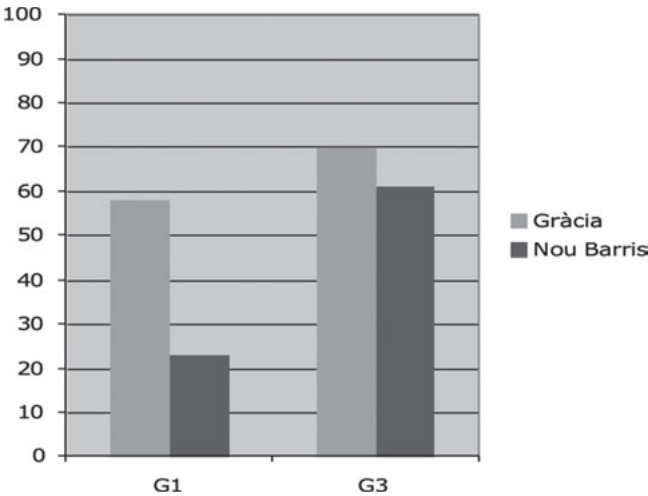


Figure 13.4: Mean percentages of target-like schwa production (adapted from Cortés/Lleó/Benet 2009, 191).

As shown in Figures 13.2–13.4, the percentages for G1 are very similar for /ɛ/, /ɔ/, and schwa, with high percentages of target-like production in Gràcia and low percentages in Nou Barris. By contrast, G3, i.e. the generation of the children’s parents, shows no significant differences between the two neighborhoods. This indicates that the Spanish-dominant adults benefit from the formal instruction in Catalan provided by the educational system. At the same time, the findings point to the direction into which present-day Catalan might develop in the future, namely towards a loss of the open–close distinction of mid vowels.

2.4 Acquisition of consonants

As opposed to Romance vowel systems, which mainly comprise unmarked segments, Romance consonants involve several difficulties for language-acquiring children. One example is the rhotic /r/, which occurs in many Romance vernaculars and which children generally do not produce in a target-like manner before the age of three (Rose/Dos Santos 2006).

Consonant modifications in child language have various causes. One is the limitation to a single place of articulation across the syllables of a child word. This is often the case in Spanish and Italian, because in these languages multisyllabic words are frequent, and the child has limited resources to store and produce more than one or two syllables for a single lexical item, not yet having acquired a certain place (e.g. dorsal) or manner of articulation (e.g. fricative). The same holds true for certain prosodic complexities: at the point in time when the prosodic structure of words is limited to CV.CV, It./Sp./Cat. *campana* ‘bell’ is pronounced [ˈpana], Sp. *pelota* ‘ball’ [ˈpɔda] or Sp. *mariposa* ‘butterfly’ [ˈpɔza], all with reduced syllable structure (Lleó 1990; 2002). The Catalan data presented in Table 13.2 illustrate various processes that are considered typical strategies of child language by some scholars, such as, e.g., labial assimilation resulting in [ˈβiβa] for Cat. *llibre* [ˈliβrə] ‘book’, [moˈmia] for Cat. *bon dia* [bɔnˈdiə] ‘good morning’ or [ˈpapas] for *sabates* [səˈβatəs] ‘shoes’, which beside labial harmony also shows unstressed syllable deletion.

Table 13.2: Consonant and word simplifications produced in a trilingual German-Catalan-Spanish child (cf. Lleó 1990). ‘~’ refers to two alternative forms, produced by the child.

Target form			Child production	Age
Cat. <i>llibre</i>	[ˈliβrə]	‘book’	[ˈβiβa]	2;4
<i>bon dia</i>	[bɔnˈdiə]	‘good morning’	[moˈmia]	2;4
<i>sabates</i>	[səˈβatəs]	‘shoes’	[ˈpapas]	2;4
<i>girafa</i>	[ʒiˈrafə]	‘giraffe’	[iˈfafa] ~ [iˈβafa]	2;4
<i>elefant</i>	[ələˈfan]	‘elephant’	[foˈfan]	2;4
<i>joguēt</i>	[ʒuˈɣet]	‘toy’	[ʒoˈʒet]	2;4
<i>galleda</i>	[gəˈʎeðə]	‘bucket’	[ˈzeza]	2;4
<i>quarto mama</i>	[ˈkwartuˈmamə]	‘mom’s room’	[ˈmamaˈtato]	2;4
<i>gallina</i>	[gəˈʎinə]	‘chicken’	[aˈnina]	2;4
<i>taronja</i>	[t(ə)ˈɾɔɲ.ʒə]	‘orange’	[ʒoˈʒɔn.ta]	2;5
<i>bicicleta</i>	[bi.si.ˈkle.tə]	‘bicycle’	[bɛ.ˈblɛ.ka]	2;5
<i>ànec</i>	[ˈanək]	‘duck’	[ˈanək]	2;5
<i>flors</i>	[flɔs]	‘flowers’	[ˈɔ]	2;5

Labial harmony also occurs in [fo'fan], whereas ['zɛ.za] and [ʒo'ʒɛt] show coronal and palatal consonants, respectively. Simplification strategies such as these can be analyzed in both linear and non-linear models: Cat. *sabates* and *galleda*, produced as ['pa.pas] and ['zɛ.za], respectively, are analyzed in linear phonology as having undergone deletion of the initial unstressed syllables. By contrast, non-linear phonology does not use the notion of deletion, but assumes empty time slots or positions, which are filled by associating with the elements stored on the segment tier. Seen from this angle, the initial syllables of [sə'βa.təs] and [gə'ʎɛ.ðə] do not have a prosodic position to associate with, since in early stages of phonological acquisition, prosodic words only consist of one trochaic foot (↗12 First language acquisition of Romance phonology).

2.4.1 Reanalyzing reduplication

Studies on the L1 acquisition of phonology discuss both vowel and consonant harmony. In relation to vowels, harmony refers to place of articulation and aperture (cf. the data in Table 13.1). Young children have been found to go through a stage in which words have one single point of articulation, shared by vowels and consonants, and often repeated in the onset and coda of monosyllables, e.g. [ʃɔ] for *flors* (cf. Table 13.2). This simplifies production, but it is unexpected because, while languages show vowel harmony relatively often, consonant harmony is generally absent from the languages of the world. This has led to the conclusion that consonant harmony is an emergent property of child language. The simplification involved in consonant harmony indirectly manifests another characteristic of child language, namely the fact that lexical representations are still rather unspecified and lacking the stability they have in the adult speech (cf. Fikkert/Levelt 2008).

Moreover, Ota/Skarabela (2018) have shown that reduplication, which is an extreme type of harmony, serves a further goal, namely that of facilitating word recognition. Accordingly, the authors showed that nine-month-old children were able to segment familiarized reduplicated words better than familiarized non-reduplicated ones. And still a further purpose of reduplication can be found in trisyllabic words in Italian, Spanish, or Catalan: their unstressed initial vowel assimilates to the one of the second syllable, and they surface in simplified syllable structures. The repetition of one syllable reduces the memory load and thus the resources that the child has to apply to the storage and production of long (trisyllabic) words (cf. Lleó 1990).

The treatment of alleged consonant harmony by Fikkert/Levelt (2008) has brought an interesting new perspective to this phenomenon, as the authors interpret it as an epiphenomenon resulting from stages that in one form or another all children go through (cf. Vihman 1985). After a short period of faithfulness to the input, the child consonants and vowels share their features, in the sense that, e.g., labial vowels are associated to labial consonants of the same syllable. As development proceeds, segments gain a higher degree of autonomy, until they become relatively independent from one another. An interesting aspect of this hypothesis is the assumption that, although

certain markedness constraints are already active at the very beginning of acquisition, other constraints emerge during the acquisition process.

As already mentioned in 2.4, it has been suggested in the literature that the prosodic word is limited to one foot at the initial acquisitional stages. This entails that some markedness constraints are defined prior to basic faithfulness constraints (which, among other things, militate against the deletion of elements present in the input). Early acquisition of the prosodic word is thus characterized by its limitation of one foot and a markedness constraint requiring identity of place of articulation across segments. However, these markedness constraints are demoted in the child's constraint hierarchy, allowing for a greater variability regarding the composition of segments to syllables and of syllables to words.

The examples in Table 13.2 show many substitutions of consonants, especially with regard to place of articulation. Most of the words are disyllabic and only a few comprise more than two syllables. The child appears to be beyond Fikkert/Levelt's (2008) first stage of faithfulness to the input and associates each word with a specific place of articulation, independently of the number of syllables or feet. Other phenomena typical of child language development like syllable truncation are discussed in Lleó (2002) for Spanish and in Prieto (2006) for Catalan; for French, the reader is referred to Rose/Dos Santos (2006) and Yamaguchi (2012).

2.4.2 Spirantization and nasal assimilation

Languages undergo different types of lenition and assimilation processes. Spirantization of voiced plosives and the place assimilation of nasals will serve as examples. These processes lead to allophony, which in the case of spirantization can be described as follows. As in other Ibero-Romance languages, the Spanish phonemes /b d g/ are produced as fully voiced plosives when they occur in onset position and surface as fricative-approximants depending on the position of the relevant onset in the word or phrase (cf. Hualde 2005). If the onset appears in absolute initial position or after a nasal, and in case of /d/ after /l/, voiced plosives are maintained as such, but in other contexts (following a vowel and/or another continuant segment), they undergo spirantization (↗24 Spanish; cf. Lleó 2017). This is generally considered a weakening or lenition process.² Following the feature-geometrical analysis proposed by Harris (1984), spirantization can be conceived as a process of assimilation, with the feature [cont] spreading from left to right, i.e. from a [cont] segment to the next sound, which then gets associated with it and becomes continuous as well (cf. Figure 13.5). Spirantization is thus to be interpreted as a complicating factor for children acquiring Spanish, as it increases the variation of surface forms.

² Note that some phonologists analyze spirantization in the opposite direction, i.e. as a fortition process (Barlow 2003; Lozano 1979).

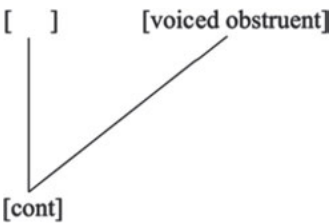


Figure 13.5: Feature-geometrical description of spirantization in Spanish.

However, children acquiring Spanish do not manifest any difficulties in producing the fricative-approximant allophones at a very early age. Lleó/Rakow (2005) observed 4 groups of children (aged 1–4): 3 Spanish monolinguals, 5 German monolinguals, 3 German-Spanish bilinguals, and 4 Spanish-German bilinguals.³ The aim was to determine how spirantization develops under monolingual and bilingual conditions. Results showed that Spanish monolingual children produce spirants before age 2;0, although with a very flat U curve shortly after this point, which indicates that they need some time to figure out what the contexts for spirantization are. German-Spanish bilingual children begin with a relatively high rate of spirantization in Spanish; between 1;7 and 2;4 it is only slightly lower as compared to one attained by the monolinguals. After 2;4–2;6, they show a drastic reduction in the production of spirants, which are virtually not produced again until around 5;0 (Figure 13.6).

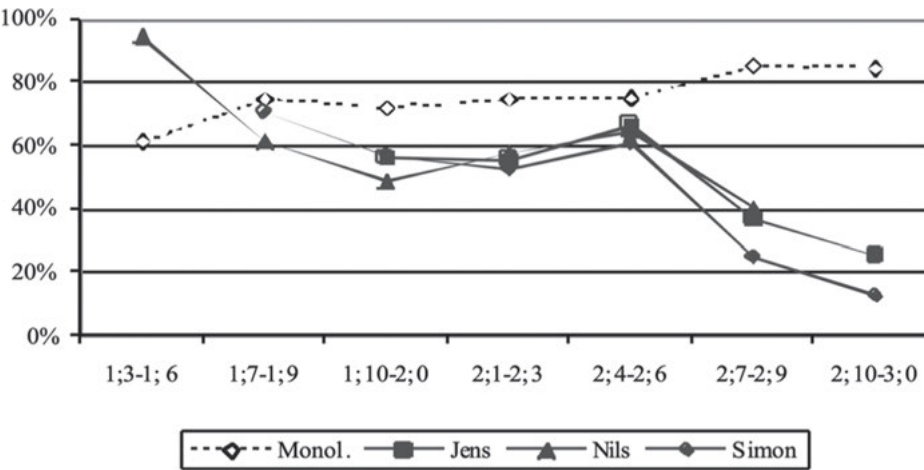


Figure 13.6: Production of spirants in Spanish in three bilingual children living in Hamburg (Northern Germany) and in monolingually raised Spanish children.

³ The first language mentioned indicates the environmental language, i.e. “German-Spanish” refers to bilinguals living in Germany, whereas the languages of bilinguals living in Spain are referred to as “Spanish-German”.

Clearly, applying spirantization leads to alternation of forms, as in the case of Sp. *vaca* ['baka] 'cow' vs. *la vaca* [la'βaka] 'the cow'. This duality of form can be avoided by not applying spirantization and thus abiding by a presumed UNIFORM EXPONENCE constraint (3).

- (3) UNIFORM EXPONENCE (UE): A lexical item (morpheme, word etc.) is invariable for property P.

This constraint, taken from Kenstowicz (1996), can result in a single surface form if we consider it undominated. Then spirantization would be inactive, as is the case for Standard German, which shows no respective alternation of plosive and spirant surface forms. In turn, if spirantization outranks UE, there will be form duality. Based on several studies and going back as far as babbling, it has been proposed that children acquiring Romance languages have a preference for fricatives and approximants, whereas those acquiring Germanic languages prefer plosives to fricatives and approximants (cf. Boysson-Bardies/Sagart/Durand 1984; Boysson-Bardies 1991). Children growing up with a language which presents spirantization such as Spanish on the one hand and a language which lacks this process such as (Standard) German on the other are confronted with the problem of acquiring two different constraint hierarchies simultaneously. This might involve a certain delay in the development of the target-like forms in both languages.

Another type of assimilation rather widespread among the Romance languages involves nasals (▷6 Nasals and nasalization). Two types of assimilation can be distinguished in this area: a nasal consonant in coda position tends to spread its nasal feature to the originally oral vowel of the nucleus, e.g. [a] + [n] yielding [ã]. From the languages considered here, this is limited to French and Portuguese, where nasal vowels became phonologized over time and the adjacent nasal consonants do not surface any more (e.g. Fr. *saut* [so] /o/ 'jump' vs. *son* [sɔ̃] /ɔ/ 'sound'). The other type of assimilation involves the place of articulation: the nasal consonant adopts the place of articulation of a following obstruent as in, e.g., Sp. *in+capaz* [in̥ka'pas] 'unable'. Figure 13.7 shows the operation of assimilation from an onset obstruent to the previous nasal consonant, which adopts the place of articulation features of the following consonant. Note that this phenomenon is comparable to the one described in Figure 13.5, with the difference that in spirantization feature spreading operates in the opposite direction.

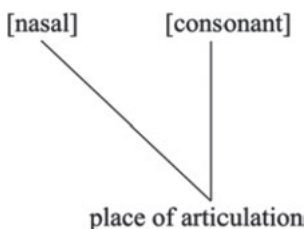


Figure 13.7: Feature-geometrical description of nasal assimilation in Spanish.

Based on data collected from German-Spanish and Spanish-German bilingual children as well as from monolingually raised Spanish and German controls, Lleó/Rakow (2006) showed that both monolinguals and bilinguals growing up in Spain exhibited high percentages of target-like assimilation in their Spanish. This was less so the case for the bilinguals living in Germany, which speaks in favor of the strong effect the environmental language on the weaker language.

2.4.3 Voice Onset Time (VOT)

Since Lisker/Abramson (1964) established Voice Onset Time (VOT) as an important area for phonetic analysis, this concept has been successfully applied to a great number of languages. VOT measures the distance in milliseconds (ms) between the release of a plosive and the onset of voicing (starting of the vibration of the vocal folds). Three types of VOT are commonly considered: (i) short lag, (ii) long lag, and (iii) pre-voicing (or: voicing lead, i.e. voicing starts prior to the burst of the plosive). In Spanish, short lag refers to a distance of about 0 to 30 ms for voiceless plosives; their voiced counterparts, in turn, are pre-voiced, which means that the vibration of the vocal folds starts before the release of the plosive (i.e. negative VOT values of up to -120 ms are attested). In German, voiceless plosives show VOT values of about 70 ms, which is perceived as aspiration, and their voiced counterparts reach between 0 to 30 ms, i.e. they are phonetically devoiced and show no aspiration. Note that the VOT values of the German voiced plosives are similar to those of the Spanish voiceless plosives.

There is variability in the VOT values produced by speakers of any language. However, all Romance languages present the binary contrast [±voiced] as discussed for Spanish, while in (Northern Standard) German (and also in English) the phonological contrast /p t k/ vs. /b d g/ is phonetically expressed through the feature [±aspirated]. Table 13.3 shows the most frequent groupings of plosives and the respective VOT patterns.

Table 13.3: Plosive phonemes and phonetic realization in Spanish (left) and German (right).

Spanish			German		
Phonemes	Phonetic realization		Phonetic realization		Phonemes
/b d g/	-120	pre-voicing			
/p t k/	+30	short lag	short lag	+30	/b d g/
			long lag	+70	/p t k/

Only few studies have addressed VOT production in bilingual children. Deuchar/Clark (1996) found no difference between the VOT production of Spanish monolinguals and

those of English-Spanish bilinguals. Kehoe/Lleó/Rakow (2004), by contrast, showed that the German-Spanish bilingual children displayed different patterns of VOT development: while the development of the target-like phonetic realizations of the two-way phonological contrast was delayed for both languages in some children, others showed cross-linguistic influence (e.g. non-target-like pre-voicing of German /b d g/). Still others exhibited strict separation of their two languages and produced target-like VOT patterns in both Spanish and German from the very beginning. Another study to consider in this context is Banov (2014), who analyzed VOT production in simultaneous English-Spanish bilinguals who were raised in the US and had been continuously exposed to both languages from birth. The participants were students at an American university and thus beyond childhood. Results show that in spite of having been exposed to both languages all their lives, VOT values were lower in English and higher in Spanish as compared to the VOT values of both languages as spoken by monolinguals. Compromise values of both languages were also found by Kupisch et al. (2014) or Kupisch/Lleó (2017), who deal with adult simultaneously bilingual French-German and Italian-German speakers (aged 20–40). Such studies involving heritage speakers are especially interesting, as they can inform us about the questions of whether their VOT values are comparable to those of monolinguals or L2 bilinguals.

3 Syllable structure

In the 1970s, when empirical research on child phonology experienced a considerable upswing, most studies concentrated on segmental aspects of speech. The research ground was established not least by Chomsky/Halle's (1968) *The sound pattern of English* (SPE): phonology was understood as the study of segments, their contexts and in particular the rules controlling them. However, towards the beginning of the 1980s, a strong movement against the SPE-based linear understanding of phonology changed perspectives and led researchers to seeing prosody as crucial (cf. Goldsmith 1990; Kehoe 2013). Segments ceased to be conceived of as the essential units, and it was the relation between prosodic positions and the segments filling them that increasingly became the focus of attention. The advent of Autosegmental, Metrical and Prosodic Phonology, namely of non-linear phonology, led to a new understanding of the sound shape of languages, in particular to a hierarchical understanding of prosody (cf. Clements 1990; Kaye 1989).

3.1 Coda consonants

In the Romance languages, the syllabic nucleus is generally occupied by a vocalic segment, whereas the margins of the syllable (onset and coda) are filled with con-

sonants or glides (≥2 Syllable structure and (re)syllabification). Other languages, as e.g. from the Germanic and Slavonic families, also permit sonorant consonants in the nucleus, as e.g. Eng. *bo[t]* or Cz. *p[r]st* ‘finger’. Consonants occurring in the onset tend to be less sonorous than those occurring in the coda (Clements 1990). The onset is generally considered a strong position and the coda a weak one. This has as a consequence that in onset position consonants tend to adopt a strong variant, whereas in coda position they tend to be weakened or even deleted (although final devoicing, which represents a kind of fortition, is a common process in many languages, among them, e.g. Catalan). However, it has been proposed that this treatment of the margins takes place in adult language, but not in child language, as children tend to neutralize contrasts in prosodically strong positions, i.e. word-initially and in the onsets of stressed syllables (cf. Inkelas/Rose 2008; Kehoe 2015; Marshall/Chiat 2003; McAllister Byun 2012).

An intriguing aspect of coda acquisition is related to bilingualism in the following sense: children produce few codas at first, and codas are acquired at different speeds depending on several variables, among them the degree of complexity of the syllable structures of the target language, the density of codas in the input, the age of the child, and the (mono- or multilingual) scenario of acquisition. Only few studies have addressed the acquisition of codas in young bilinguals. Lleó et al. (2003) analyzed data produced by Spanish and German monolingual children (aged 1;1–2;4) as well as by bilingual children of the same age, living in Hamburg (Germany) and Madrid, respectively (cf. also Kehoe/Lleó 2003). As concerns the occurrences of syllable types in both languages, German presents a greater percentage of closed syllables (63%) than Spanish (28%; Delattre 1965, 42). The aim of Lleó et al.’s (2003) study was to determine whether Spanish influence on German reduced the number of codas produced in German or, in turn, German influence on Spanish resulted in a greater proportion of codas in the Spanish produced by the bilinguals as compared to monolinguals. The latter hypothesis prevailed, as the bilingual children living in Germany produced more codas in Spanish than monolinguals did, without reducing the number of codas they produced in German. The reason for such an effect was attributed to the fact that German was the dominant language of these participants. Interestingly, the Spanish-German bilingual children living in Spain, hence in a Spanish-dominant environment, also produced higher percentages of codas than the Spanish monolingual controls, again without reducing the percentages of codas produced in German. A possible explanation for this – at first sight astonishing – fact in terms of OT is provided farther below in this section.

A different picture of coda production in bilingual children is discussed by Almeida/Rose/Freitas (2012), who analyzed data produced by a child raised in Portugal by a French-speaking father and a Portuguese-speaking mother and showed that closed syllables were infrequently produced in both languages. Note that French admits several consonants in coda position but, according to Delattre (1965, 42), presents a ratio of closed syllables of only 24%. This would seem insufficient to

license children's production of different coda consonants if the overall production of the coda category is low in both French and Portuguese, assuming a certain threshold that production of the category must reach. Being the majority language (which is Portuguese in Almeida/Rose/Freitas 2012) could be a sufficient condition, if (and only if) the number of codas produced surpasses that threshold. Interestingly, the dominant language, i.e. Portuguese, influences the weaker language with a delaying effect, as the child produces fewer codas in French than French monolinguals are reported to produce. This is in contrast to the German-Spanish bilingual children analyzed by Lleó et al. (2003), who produce codas sooner and more often than Spanish monolingual children do, suggesting simultaneously acquisition of two languages with very different rates of codas in the input. While the consonant systems of French and Portuguese are rather similar, as pointed out in 2.2, this holds true for the onset position but not for the coda. In word-final as well as word-medial codas, European Portuguese is far more constrained than French, which in bilingual situations seems to have a delaying effect from Portuguese on French.

To understand the differences in the results of Almeida/Rose/Freitas (2012) and Almeida's (2011) studies on the one hand and Lleó et al.'s (2003) study, on the other, it should be taken into consideration that French licenses a large array of different consonants in coda position but presents only a low percentage of closed syllables. As Almeida/Rose/Freitas (2012) point out, an explanation based on language dominance fails to explain bidirectional influence from the majority language (Portuguese) onto the heritage language (French) and vice-versa. Regarding both the Spanish-German and the Portuguese-French data discussed in this section, OT seems to possess a greater explanatory power: given the assumption that markedness constraints such as *ONSET* and *NoCODA*, which militate against onsetless and closed syllables, occupy a high position in the children's constraint hierarchy at the initial stage of acquisition (Gnanadesikan 2004; cf. also Lleó 2020, 27), the large quantity of coda consonants in the German input received by both the German-Spanish children (living in Germany) and the Spanish-German children (living in Spain) causes demotion of these constraints. This might explain the fact that both bilingual child groups benefit from the presence of German in their input regardless of whether German is the dominant or the weaker language (Lleó 2017). French-Portuguese bilingualism, by contrast, seems not to be facilitative regarding the acquisition of coda consonants.

3.2 Branching onsets

Concerning the acquisition of branching onsets, the majority of children acquiring a Romance language develop as expected: in the initial stage, consonant clusters are reduced to a single segment, mostly the first, which presents the least sonority. In Spanish and French, some children go through another stage in which the position of the second consonant is substituted by a glide. Comparison should be between the

timing of the various solutions: (i) reduction to a single segment, (ii) substitution of the second element with a glide, (iii) insertion of an epenthetic vowel between the two C segments, and, finally, (iv) production of two consonant segments in the onset.

Kehoe et al. (2008) did not find great differences in the area of L1 onset cluster acquisition in French and Spanish. By contrast, the monolingual acquisition of branching onsets in Portuguese seems to go through a systematic stage in which the two consonants are separated by an epenthetic vowel. This does not hold true for the Portuguese-French bilingual child analyzed by Almeida/Rose/Freitas (2012) (cf. 3.1), who does not go through such a stage in Portuguese. This might be explained by the exposure to the more complex syllable structures of French, which might exert an accelerating effect, probably causing the child to escape the epenthetic-vowel stage and thus developing faster than monolingually raised Portuguese children do.

4 Prosodic structure

To understand bilingual outcomes, we must differentiate prosodic positions and segments, because all candidates for bilingual outcomes are related to both. If we initially have six segments, three consonants and three vowels, they can be grouped in various ways. If the syllabic constituents are simple, i.e. neither onset nor coda are branching, the distribution of three C and three V elements yields CV.CV.CV. However, if a language allows for branching, this entails more structure, e.g. CCV. CVC, involving a branching onset and a branching rhyme. All in all, a simple syllable structure needs many vocalic slots and many syllables, whereas a complex syllable structure correlates with fewer syllables and a greater number of C slots. Children who simultaneously acquire two languages that favor different patterns of syllable structure may be confronted with conflicting prosodic information in the input. In what follows we summarize recent research on the L1 acquisition of (re)syllabification in French, Spanish, and Catalan (4.1), before turning to the bilingual acquisition of prosodic features that refer to the whole speech signal, such as intonation and speech rhythm (4.2).

4.1 (Re)syllabification

French *liaison* “is a phenomenon of external sandhi that occurs at the left edge of major lexical categories in spoken French” (Wauquier/Shoemaker 2013, 163). It comprises a latent word-final consonant (*liaison* consonant), which surfaces when it encounters a word beginning with a vowel. The *liaison* consonant then becomes the onset of an otherwise onsetless following syllable, e.g. *un copain*

[ɛ.ʃkɔ.pɛ] ‘a buddy’, but *un ami* [ɛ.n#a.mi] ‘a friend’, *des femmes* [de.ʃfam] ‘women’, but *des hommes* [de.z#ɔm] ‘men’. The latent final consonant in the first word is subsequently resyllabified as the onset of the following word, thereby creating misalignment between word boundaries (represented as #) and syllable boundaries (indicated with a dot) in *liaison* environments. However, resyllabification across word boundaries also takes place when a word with a fixed final consonant precedes a vowel-initial word, e.g. *avec lui* [a.vɛk.#lɥi] ‘with him’, but *avec elle* [a.vɛ.#kɛl] ‘with her’ (so-called *enchaînement (consonantique)*, 21 French). According to Vinter (2001), French children produce 70% of consonants of their target language correctly at the age of two years. However, “at the age of two to three years, less than 50% of the liaisons between determiner and noun are produced correctly in a denomination task” (Chevrot/Dugua/Fayol 2009, 589). Research on the development of French *liaison* in bilingual children, however, still needs to be intensified (cf. Nicoladis/Paradis 2011).

Turning to Spanish and Catalan, these two languages have an automatic rule of resyllabification, which operates in a manner similar to French *enchaînement* (cf. above). However, there are no latent consonants of the French *liaison* type, i.e. word-final consonants that appear only in prevocalic position. This is why the number of misproductions related to erroneous segmentations in child speech (e.g. Sp. **el noso* resulting from the erroneous segmentation of *un oso* ‘a bear’) is much lower than in French. Lleó (2016) conducted a study on resyllabification, as acquired by Spanish and German monolinguals as well as by German-Spanish bilinguals. Her findings showed early mastery of resyllabification in the Spanish monolingual children (between the 60% and 90% of target-like resyllabification at 2;4). As opposed to Spanish, German prefers to clearly delimit prosodic words, e.g. by glottal stop insertion. Bilingual Spanish-German children raised in Spain have values similar to monolinguals. Bilinguals who grow up in Germany, by contrast, have lower resyllabification values and show many instances of glottal stop insertion. Thus, speakers of a heritage language or weak L1 bilinguals do not resyllabify, which means that they preserve the unity of the word rather than that of the syllable. Could the tendency to preserve the unity of words be considered unmarked? Interestingly, the very same tendency is exhibited in L1 German learners of L2 Spanish. Lack of resyllabification also leads to word uniformity but allows for syllables without onsets. By contrast, children acquiring a Romance language in multilingual settings tend to follow the variability that the input imposes on them, which sacrifices the integrity of prosodic words in favor of a greater number of unmarked (CV) syllables, as is the case in, e.g. *los osos* ‘the bears’, which is morphologically analyzed as *l+o+s* (CVC) *os+o+s* (VCVC), but syllabified as [lo.s#o.sos] (CV.CV.CVC).

4.2 Intonation and speech rhythm

Prosody has increasingly become the focus of attention in research on phonological acquisition during the last decades. One topic to begin the exploration of basic questions is whether Romance languages share intonation features. Regarding segmental features, we have seen that many of them are shared. Actually, the mere fact of having intonation is already a shared distinctive or typological feature of Romance languages (French is viewed as an exception as it is judged to not have lexical stress; cf. Martin 2015; Selkirk 1972/2015; ↗9 Intonation). If it is true that French only has stress at the phrasal rather than at the word level, lack of stress implies lack of prosodic feet as well, which means that the alleged occurrence of iambic feet takes place at the level of phrases, ending in a stressed syllable. Other languages, like Catalan, Spanish, or Portuguese do have the whole set of prosodic constituents, which provide prosody with more varied patterns.

It is widely accepted that in most varieties of Spanish broad-focus declaratives have two different pitch accents, nuclear L^* (or $L+H^*$) and prenuclear $L^*+<H$ with delayed peak (cf. Prieto/Roseano 2010; Hualde/Prieto 2015).⁴ By contrast, in German, both nuclear and prenuclear accents can be produced as falling pitch accents (Féry 1993). Lleó/Rakow/Kehoe (2004) analyzed the pitch accents produced by two German monolingual children, one Spanish monolingual child and two German-Spanish bilingual children living in Germany and concluded that the monolinguals produced the respective pitch accents in a target-like manner before the age of 3;0. However, at the same age the bilinguals showed many substitutions in their productions of the Spanish pitch accents. Their preference for rising contours can be due to markedness, as rising tones are considered less marked than falling tones (Lleó/Rakow/Kehoe 2004, 23). However, this does not seem to be the case in the intonation of certain interrogatives, as German *wh*-questions are often produced with rising F_0 by both monolingual and (German-Spanish) bilingual children, although the intonational grammar of German allows for overall falling contours in this case (Lleó/Rakow 2011).

Turning to the durational properties of speech, the most widespread types of speech rhythm are syllable-timing, which is typical of most Romance languages, except for European Portuguese, and stress-timing, which characterizes, e.g., German and English (cf. Abercrombie 1967; Pike 1945; ↗8 Comparing and deconstructing speech rhythm across Romance languages). Since it was shown in the late 1980s that neither stress-based nor syllable-based isochrony is systematic in either of the two language groups (Dauer 1987), research concentrated on the ratio of vocalic and consonantal material in the speech signal and captured the contrast between stress-

⁴ An exception is Buenos Aires Spanish which, as a consequence of migration-induced contact with several Italo-Romance varieties, exhibits rising pre-nuclear accents with the F_0 peak reached within the temporal limits of the stressed syllable (i.e. $L+H^*$), cf. Gabriel et al. (2010).

and syllable-timing through so-called rhythm metrics (cf. Ramus/Nespor/Mehler 1999), the two most applied metrics being the overall percentage of vocalic material in the speech signal (%V) and several metrics that capture the variability of consonantal and vocalic intervals. The latter comprise, first, the so-called pairwise variability index (PVI) which is mostly applied to consonants in its non-normalized version and to vowels in its normalized version, i.e. PVI-C and nPVI-V, respectively (cf. Grabe/Low 2002; Low/Grabe/Nolan 2001). The second metric referring to the variability of (vocalic or consonantal) intervals is the so-called variation coefficient (VarcoV/C), which corresponds to the standard deviation of the individual vocalic or consonantal durations and patterns with the nPVI in being normalized for speech rate (cf. Dellwo/Wagner 2003; White/Mattys 2007).

As pointed out by Post/Payne (2018), recent findings on speech rhythm in bilingual children showed remarkable commonalities between monolinguals and bilinguals in that the speech production of both groups is characterized by even-timing of vocalic intervals at early developmental stages. However, bilinguals may differ from monolinguals in relation to the time at which the rhythmic patterns of their language(s) are produced in a target-like manner. As shown by Kehoe/Lleó/Rakow (2011) with the example of six (German-Spanish and Spanish-German) bilingual children, rhythmic separation between the two languages acquired occurs only at the age of 3–4 years. The “intermediate” bilingual patterning, which precedes the separation of the bilinguals’ two languages, is accounted for by the authors in terms of phonetic compromise. Separation of languages on the one hand and cross-linguistic influence on the other were also found by Bunta/Ingram (2007), who investigated the speech of four-year-old Spanish-English bilingual children: the authors found a significant difference between English and Spanish in terms of vocalic and consonantal variability (expressed through PVIs, which were higher for English as compared to Spanish). Interestingly, the bilinguals’ English was influenced by Spanish in showing lower PVIs as compared to the English produced by monolingual children of the same age. Their Spanish, in turn, showed no rhythmic influence from English, in that no significant difference was found between the vocalic variability in bilingual and in monolingual speech. All in all, the findings suggest that although the rhythm produced by bilingual children tends towards syllable-timing, they are still capable of differentiating their languages at the durational level.

Another aspect closely related to rhythm is stress and its acoustic correlates, which may differ between languages. While the prominence which occurs at the right edge of the accentual phrase in French is mainly expressed through temporal cues, intensity and F0 seem to play a minor role in signaling prominence (cf. Dodane/Bijeljac-Babic 2017, 40, citing Rossi 1980 and Vaissière 1991). Note, however, that recent accounts of French intonation attribute a significant role also to F0 regarding the expression of demarcative phrase-final stress (cf. Delais-Roussarie et al. 2015; 21 French). In English, where stress is lexically contrastive, accented syllables exhibit greater F0 and intensity values as well as longer durations. With these differences in mind, Dodane/

Bijeljac-Babic (2017) analyzed data produced by bilingual French-English children (aged 3;3–6;0) as well as by same-aged French and English monolingual controls. Since the bilingual children lived in France, more influence of French onto English was expected than vice-versa. The participating children were asked to produce disyllabic words, which were analyzed comparing the cues used in the first syllable to those used in the second syllable in both languages. The authors found that the bilinguals produced over-long final syllables in French, even longer than those of the French monolinguals, possibly to better mark the contrast between their English and French productions. Furthermore, the bilingual children produced high pitch accents on the initial syllable of their disyllabic productions in French, more so than they did in English, which the authors interpret as transfer of the English trochaic pattern to French (cf. also the discussion in Lleó 2020).

5 Conclusion

At least since phoneticians and phonologists began to analyze bilingual speech data, it has been recognized that bilingualism could have various outcomes. Several explanations have been proposed, trying to fill the theoretical gaps encountered in research. For instance, regarding spirantization (cf. 2.4.2) the question arises as to whether the observed facts are due to markedness or language transfer. If markedness were the relevant factor, this would imply incomplete acquisition, because unmarked elements are supposed to be acquired first and, depending on the situation, the child might stop acquiring the weak language, especially if the acquisition of the majority language is intensified.

Based on syntactic data collected from children acquiring German in monolingual and bilingual settings, Clahsen/Eisenbeiss/Penke (1996) argued that bilinguals follow the same qualitative acquisition process as monolinguals do, but this process is accelerated in bilinguals (cf. also Patuto/Repetto/Müller 2011). As outlined in the previous sections, other scholars, by contrast, found much cross-linguistic interaction, especially in the area of phonology. If a phenomenon had been acquired and later on it was no longer present, this could be due to attrition, which implies language loss. More research is necessary to better understand the variety of notions that research has brought up.

Some aspects still to take into consideration involve various factors guiding L1 phonological acquisition. To determine what factors are the relevant ones is crucial in the context of bi- and multilingualism, to predict or explain various outcomes of bilingual acquisition. In this sense, research has pointed to notions of markedness, complexity, uniformity, and frequency (cf. Lleó/Cortés 2013 for a summary). Here, the combination of different types of languages has been limited to Romance languages, generally being acquired simultaneously together with a Germanic language. There

are various reasons for exploring this constellation in more detail, namely these two language families are often placed towards the opposite ends of linguistic measurements: this is the case for lenition and fortition in relation to processes of assimilation, short lag vs. long lag in relation to VOT, syllable- vs. stress-timing in rhythm, limited vs. high number of codas, simple vs. complex syllable constituents, low vs. high numbers of monosyllables and multisyllabic words (not including compounds) etc. The attribution of these properties to the Romance vs. Germanic languages still needs more research. However, some preliminary descriptions have been contributed to the discussion.

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Nicholas Henriksen

14 Second and third language acquisition of Romance phonology

Abstract: This chapter synthesizes research on the second (L2) and third (L3) language acquisition of phonological structures across the Romance languages. First, the chapter offers an overview of models of L2 and L3 acquisition that account for the myriad cross-language influences observed in phonological acquisition. Next, these models are applied to numerous studies on Romance-language phonological acquisition. These studies provide a diverse corpus in terms of investigational techniques, theoretical approaches, areas of linguistic study, language pairings, and the language levels of individual learners. Specifically, the chapter offers information on the L2/L3 acquisition of Catalan, French, Galician, Italian, Portuguese, and Spanish. The majority of research derives from L2 segmental acquisition; when possible, information is offered on L3 acquisition, and on suprasegmental acquisition. Altogether, the collective body of work covered here can be viewed as a resource in the study of L2/L3 Romance-language acquisition and cross-language phonological influence.

Keywords: Phonological acquisition, L2 acquisition, L3 acquisition, phonetics, Catalan, French, Galician, Italian, Portuguese, Spanish

1 General principles of phonological acquisition

Prior to synthesizing the research focused on L2 and L3 phonological acquisition in Romance, it is necessary to offer an overview of principles that are relevant for understanding how non-native sounds are perceived and stored relative to a first language (L1). Section 1.1 thus focuses on the notion of language-specific learning. Next, 1.2 introduces the dominant frameworks of L2 and L3 phonological learning.

1.1 Language-specific listening

Most empirical work in L2 phonology adheres to the premise that the acquisition of L2 speech sounds is largely influenced by “language-specific listening” (Pallier/Christophe/Mehler 1997). In essence, L2 sounds that do not already occur or are phonetically different from those of a learner’s L1 are filtered through preexisting L1 phonological knowledge. The persistent assimilation of L2 segments onto existing L1-phonological categories, even after years of L2 experience, is assumed to inhibit target-like L2 segmental production. This inhibition results in foreign-accented

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speech. Therefore, one aspect of L2 learning that presents a great challenge is the ability to perceptually discriminate L2 segments from one another and from similar L1 segments. Functional monolinguals are, in many cases, incapable of categorizing and discriminating cross-language phonetic contrasts that do not distinguish meaning in their L1. Research shows this to be the case for segments (Goto 1971), syllabification and segmentation (Cutler et al. 1989), lexical stress (Dupoux et al. 1997), and even intonation (Grabe et al. 2003).

The notion of language-specific listening feeds from findings on infant L1-phonological acquisition (12 First language acquisition of Romance phonology). It has been shown that, as far as perception is concerned, nearly all phonological dimensions pertaining to the L1 are robustly acquired during the first year of life (e.g. Jusczyk et al. 1993). Infants are able to categorically discriminate many cross-linguistic segmental contrasts during the initial weeks and months after birth. However, infants' sensitivity to ambient-language contrasts is perceptually reorganized between 6 and 12 months of life. During this period, language-specific learning is optimized as infants lose the ability to discriminate non-native contrasts. It is believed that this early consolidation of L1 phonological dimensions affects the ability to form new categories later in life, leaving L1 dimensions as "filters" for the acquisition of later (i.e. L2) dimensions. Additionally, when adult L2 learners are insensitive to certain acoustic differences that signal a phonemic contrast in an L2, they often rely on phonetic information that is redundant or secondary for native speakers in order to mark the distinction between the two L2 phonemes (cf. Trubeckoj 1939/1958, 47). For instance, the tense-lax distinction in L1 English vowels (e.g. /i/ vs. /ɪ/) may be reanalyzed as a long-short distinction by L2 learners who are L1 speakers of Spanish (Flege/Bohn/Jang 1997).

1.2 Models/accounts of second-language phonology

Three models of speech perception are currently available that account for cross-language variability in the perceptual organization of non-native contrasts. First, the Speech Learning Model (SLM), elaborated in Flege (1995), relies on the existing perceptual relations between L1 and L2 phonetic categories. Specifically, an L2 segment that is phonetically similar, but not identical, to an L1 segment will be perceptually assimilated to the L1 category by the "equivalence classification" process (Flege 1987). Through equivalence classification, the more experienced a listener is with his or her L1 (i.e. the more advanced they are in adulthood), the more likely they are to seek constancy within sensory input, thus placing foreign phones onto well-established L1 categories. This results in a complex array of category assimilation and dissimilation between the L1 and L2 subsystems. Further, there is a core assumption that the mechanisms and processes used in learning L1/L2 sound systems remain intact over the course of a lifetime. Preexisting L1 categories are thus subject to evolution and

expected to reflect the properties of all L1 and L2 phones identified as realizations of the respective categories. The outcome is an intermediate, or merged, representation of both the L1 sound and its L2 approximation, resulting in foreign-accented speech. Although Flege acknowledges that his findings do not necessarily disprove notions such as the Critical Period Hypothesis (e.g. Lenneberg 1967), his research consistently shows that factors such as the speakers' age of arrival in the country where the L2 is spoken are melded with other factors likely to influence L2 pronunciation. This suggests that it may be impossible to discern any precise effect of maturational constraints on L2 phonological learning.

The second framework is the Perceptual Assimilation Model (PAM), put forth in Best (1995). PAM is grounded in a "direct realist approach" to explaining perception-oriented contrasts of speech sounds. Most generally, PAM is concerned with the initial state of adult L2 learning. It seeks to predict perceptual difficulties in the differentiation of non-native contrasts based on their assimilation to L1 categories. The model proposes that naïve listeners are likely to perceptually assimilate an unfamiliar, non-native phone to the most articulatorily-similar phone in their native phonology. Best/Tyler (2007) extended PAM to the PAM-L2 model, which allows for new ways of understanding experiential and developmental change in L2 perception and production. A number of PAM-L2's predictions are reminiscent of Flege's SLM. However, there are some noteworthy differences. For example, PAM-L2 proposes that a large L2 vocabulary curtails change in L2 perception and production because it forces the learner to settle on an L2-accented version of the L2 phonology. As such, PAM-L2 implies that a learner's perceptual assimilations of L2 sounds must be taken into account before formal instruction begins. A third framework, the Second Language Linguistic Perception model (L2LP; Escudero 2005; 2009), similarly predicts difficulties for L2 learners in the face of new or similar L2 sounds, according to named "scenarios" (new, similar, multiple-category assimilation).

To fill the gap needed for theoretical models specific to the L2 acquisition of intonation, Mennen (2015) proposed the L2 Intonation Learning Theory (LILt). This model aims to account for the development of L2 intonational grammars, drawing some of its assumptions from prior experimental studies as well as from models such as the SLM, PAM and PAM-L2. In order to establish predictions for L2 intonational learning, Mennen suggests that four key differences between the L1 and the L2 must be assessed. Specifically, Mennen posits that challenges in L2 intonational acquisition derive from the following dimensions: the systemic dimension (inventory and distribution of tonal categories, such as low and high tones); the realizational dimension (the phonetic implementation of tonal categories, such as F0 height and tonal alignment); the semantic dimension (the form-meaning association of categories); and the frequency dimension (the relative frequency of use of tonal categories in the L1 and the L2). When possible, in subsequent sections of this chapter, the findings of research on L2/L3 intonational acquisition will be framed according to Mennen's LILt.

1.3 Models/accounts of third-language phonology

While the patterns of L1-to-L2 influence introduced by the SLM form the bedrock of linguists' understanding of L2 phonological acquisition, Flege does not make explicit predictions for L3 phonological acquisition. However, since the defining feature of the SLM is that L2 sounds are filtered through preexisting L1 knowledge, it would stand to reason that, applying SLM principles onto L3 acquisition, the L1 would be the dominant source of transfer onto the L3. At the same time, it is essential to scrutinize data from a learner's L2, in addition to their L1, in order to determine the extent to which an L3-target phonological construct occurs in both the L1 and the L2. Building on this point, models of L3 phonological acquisition debate the notion of full versus property-by-property access when acquiring an L3, reminiscent of models from morphosyntactic acquisition (e.g. Schwartz/Sprouse 1996).

Proponents of full-transfer models look to evidence from the L1 and the L2 to build their hypotheses. For example, Rothman's Typological Primacy Model (TPM; Rothman 2015) asserts that transfer onto the L3 will come from the most structurally similar language (i.e. it can be the L1 or the L2). Much like Schwartz/Sprouse's (1996) Full Transfer/Full Access (FTFA) model of L2 acquisition, the TPM assumes that either the L1 or L2's grammar will be fully transposed onto the L3 early in L3 development, and that this full-scale transfer can, in certain cases, render non-facilitative outcomes. A speaker proficient in an L1 or L2 will undergo potential patterns of influence into the L3: primary L1 influence (Hermas 2014), or primary L2 influence known as the "L2-status effect" (Bardel/Falk 2007; 2012; Llama/Cardoso/Collins 2010). Besides the L2-status effect, other factors have been found to lead to primary L2 influence, including perceived similarity (Cenoz 2003) and relative proficiency levels among the L1, L2, and L3 (Gut 2010).

Accounts of property-by-property transfer are likewise common in the L3 phonological literature. A robustly attested pattern in L3 acquisition is that of combined cross-linguistic influence (CLI; De Angelis 2007). Combined CLI refers to the phenomenon in which two or more previously acquired languages affect L3 production patterns in tandem. This combined influence can occur at any level, be it at level of the full phonetic system, with different aspects of a learner's L3 affected by their L1 and their L2, or at the level of a single sound. The Cumulative Enhancement Model (CEM; Flynn/Foley/Vinnitskaya 2004) and the Linguistic Proximity Model (LPM; Westergaard et al. 2016) expound on the possibilities regarding this partial transfer between languages. In the case of the CEM, transfer only occurs if target-like linguistic representation facilitates L3 acquisition (i.e. facilitative transfer), and this transfer is applicable only to individual linguistic properties. The LPM similarly predicts by-property transfer, but also allows for non-facilitative transfer from the L1 or the L2 into L3. Slabakova (2017) further proposed a Scalpel Model of property-by-property transfer (for additional discussion cf. Puig-Mayenco/González Alonso/Rothman 2020; González Alonso/Rothman 2017).

Research on L3-phonological acquisition is confounded by the diversity of contexts in which L3-learning takes place. We should bear in mind that much work highlighting L3 phonological acquisition focuses on either early bilinguals learning an L3 or early monolinguals who are sequentially acquiring an L3 after late-adult L2 acquisition. L3 acquisition against the backdrop of migration-induced bilingualism has only recently been addressed (e.g. Gabriel/Krause/Dittmers 2018 on German-Turkish and German-Russian bilinguals who learn French as an additional foreign language after English in the German educational system; cf. also Rothman/González Alonso/Puig-Mayenco 2019, 17–22). Murkier still is the classification of bilingual speakers (de Bruin 2019), whose unique linguistic backgrounds and acquisitional settings may deeply influence their L3 acquisition. Thus, there are many necessary future lines of inquiry to continue this investigation and bolster the understanding of these processes.

In the upcoming sections we will return to more recent, language-specific findings for L3 phonology research as it relates to Romance languages.

2 L2/L3 acquisition of Catalan

This section focuses on the L2/L3 acquisition of Catalan phonology. Most research centers on vowel production (especially in Spanish-Catalan bilingual communities in Spain), with more recent work focusing on the L3 learning of consonantal allophony.

The idea of transfer between languages is clearly seen in the situation of early-acquisition bilinguals, who offer researchers the opportunity to examine the impact of cross-language influence across a lifetime. Bosch/Ramon-Casas (2011) considered the impact of differing Catalan-Spanish bilingual childhood environments on adult vowel production. Two groups of Catalan-Spanish bilingual mothers were tested: those who had grown up in Catalan-speaking homes (C-group) and those who had been raised in Catalan-Spanish bilingual homes or in Spanish homes with early Catalan exposure (BSC-group). After analysis of target words containing the mid-front Catalan vowels, it was found that the BSC group often produced [e] instead of [ɛ]. The authors concluded that input factors, such as the incorporation of contrastive categories during childhood, can result in instability in child (and subsequently, adult) bilingual production.

Adding to the evidence of cross-linguistic phonetic interference is the work of Simonet (2011) on the Catalan-specific mid-vowel contrast between /o/ and /ɔ/. To study the potential influence of Spanish /o/ vowels on Catalan /o/ vs. /ɔ/, 30 female Catalan-Spanish bilingual students from the island of Majorca (Spain) participated in the study. Over the course of two sessions, the participants completed activities based

on a categorical AXB discrimination task.¹ The participants were asked to speak only in Catalan for the first session before using a random mixture of Spanish and Catalan in the second. Simonet found that when the participants spoke Spanish alongside Catalan, the similarity in production between the Spanish /o/ and the Catalan /o/ and /ɔ/ increased. Thus, even though a bilingual speaker may originally show little interference between their two languages, they are prone to phonetic interference when the two are in close contact (cf. Grosjean 1982; 2008). For further elaboration of this topic cf. Simonet (2014) and Ramírez/Simonet (2018).

These variations can also be seen when adult bilinguals use less of their L1 in daily life. Mora/Nadeu (2012) studied this phenomenon by testing the production of the Catalan vowels /e/ and /ɛ/ for two groups of L1-Catalan/L2-Spanish bilinguals in Catalonia (Spain). Both groups were highly proficient in Catalan and Spanish, but while one group reported 40–70% Catalan usage (low use), the other group reported 80–100% Catalan usage (high use). The results of two speeded categorization and AXB discrimination tasks showed that the low-use group had a slower and less accurate recognition of /e/ and /ɛ/, as well as more Spanish-influenced productions of Catalan /ɛ/. This provides evidence of L2 influence on L1 sound categories after extensive L2 experience.

Further research on phonological acquisition in Catalan explores the connection between phonetic categorization and lexical representation, as demonstrated by Amengual (2016b) in his study of the Catalan back mid-vowel contrast (/o/ vs. /ɔ/) produced by Spanish-Catalan bilinguals living in Majorca (Spain). Through a picture-naming task, perception tasks (i.e. identification and discrimination), and a forced lexical-decision task, Amengual showed that though the bilinguals consistently displayed target-like pronunciation of Catalan /o/ vs. /ɔ/ in the production task and performed at ceiling in the perception tasks, they had a high error rate in identifying Catalan words based only on the inclusion of the /o/ or /ɔ/ vowel in the lexical decision task (cf. also Amengual 2016c). Amengual's study additionally showed the effect of cognate status between the two languages.

From an L3 perspective, Henriksen/Harper (2017) provide evidence in support of the L2-status effect (Bardel/Falk 2007; 2012) in L3-Catalan learning by L1-English speakers who had acquired L2-Spanish after adolescence. The study focused on two linguistic phenomena produced by a group of L1-English/L2-Spanish/L3-Catalan speakers: the lenition of the intervocalic plosive /b/, and the velarization of /l/. The lenition of intervocalic plosives is a phenomenon that is realized in Spanish and Catalan, but not in English. Conversely, the velarization of /l/ occurs in English and Catalan, but not in Spanish. When looking for evidence of L1-English influence on

1 In this task, participants hear three stimuli sequentially. The first "A" and third "B" stimuli are different, and the second "X" stimulus is identical to either "A" or "B". The goal of the task is that respondents must decide whether the second "X" stimulus is identical to the "A" or "B" heard immediately before or after it.

L3-Catalan, one would expect L3 production of intervocalic phonemic plosives to be more English-like, that is to say, less lenited. When looking for evidence of L2-Spanish influence onto L3-Catalan, one would expect L3 production of /l/ to be more Spanish-like, or less velar. Henriksen/Harper found that, for the L3 learners, both the production of Catalan /b/ and of Catalan /l/ were L2-like (i.e., Spanish-like), and that there was no evidence for direct L1 influence. This finding of L2-to-L3 influence, but not of L1-to-L3 influence, supports the L2-status effect for typologically similar languages.

3 L2/L3 acquisition of French

As for the work on the L2/L3 acquisition of French, research has focused on its vowel system, including nasal and rounded vowels. Other work centers on segments, French liaison, and intonation.

Although most research on L1-L2 phonological interactions focuses on how speakers' L1 influences their L2, there is also a body of research that documents bidirectional influences. These findings demonstrate that the phonology of an L1 can also receive influence from an L2, with evidence stemming from the classic study by Flege (1987; cf. also Chang 2012; Flege/Eefting 1987; Sancier/Fowler 1997). Specifically, Flege showed that L1-English speakers who are highly proficient in French produce the English /t/ with VOT values that differ from those of monolingual English speakers in the direction of the French monolinguals. Similarly, Flege found that L1-French speakers who are highly proficient in English produce the French /t/ with VOT values that are in the direction of English monolinguals. Therefore, the L1 productions of both groups of highly proficient L2 speakers showed evidence of influence from their L2.

It is further reasonable to expect differing levels of bidirectional influence between an L1 and L2 based on the amount of L2 exposure and proficiency of speakers. The differing levels are additionally based on the usage dominance relation between a bilingual's L1 and L2. Flege (1987), for instance, found that the VOT values of L1-English /t/ as produced by English learners of French were more French-like with both greater proficiency and after more L2 exposure. Based on results such as these, it can be expected that the inverse is also true: L1-to-L2 influence will decrease with more exposure to, higher proficiency in, and more usage of the L2. This expectation is also supported by results from Flege (1987) with regard to the L2 production of French /u/. Specifically, Flege found that L2 learners of French who had higher proficiency in French and more exposure to this language produced French /u/ with formant values that were more in the direction of L1-French speakers.

It is also important to distinguish between phonological and lexical categorization in the learning of L2 sounds. Darcy et al. (2012) examined the acquisition of French

vowel contrasts by L1-English speakers at two levels of linguistic analysis: phonetic categorization and lexical representation. An ABX categorization task revealed that intermediate and advanced learners categorized /œ/ vs. /ɔ/ and /y/ vs. /u/ differently from native speakers of French. Additionally, both learner groups demonstrated greater accuracy on the /y/ vs. /u/ contrast, compared to the /œ/ vs. /ɔ/ contrast. Crucially, in the lexical-decision task, the intermediate-learners' responses for words containing /y/ were facilitated (in terms of response time) when hearing an otherwise identical word containing /u/ (and vice versa). This suggests that, for intermediate learners at least, /u/ and /y/ are not distinguished in lexical representations. This outcome allowed the authors to consider that the acquisition of phonetic categories (inferred through the ABX categorization task) is not analogous to the establishment of lexical contrasts containing those vowels (inferred through the lexical-decision task). Altogether, the data patterns motivated the authors to propose a model of L2 pronunciation termed "direct mapping from acoustics to phonology" (DMAP).

Along the lines of vocalic analysis, Baker/Smith (2010) examine how dialect-specific learning affects L2 production and perception. To study this topic, the authors explored the differences between the production and perception of the French high vowels /i y u/ by L2 learners of either Quebec French or European French. These high vowels differ across the two varieties, because of general cross-dialect acoustic differences, in addition to the assibilation of /t d/ before /i y/. L1-English learners of Quebec or European French were asked to identify and discriminate between both Quebec and European French vowels and to produce the vowels in several phonetic contexts. The Quebec French learners were more accurate at discrimination and identification of vowels produced by Quebec and European French speakers; this suggests that there is an important effect of L2 dialect exposure on learners' psycholinguistic and production abilities.

Nasal vowels in French present common and persistent difficulties for learners of this language. While French has a phonemic contrast between oral and nasal vowels, English does not. Peterson (2015) explored how L2 learners of French acquire the difference between nasalization and nasal vowels based on phonological context. The author provides spectrographic analyses of speech data produced by L1 English speakers learning French as an L2. Learners at all stages of acquisition produced full nasal vowels in the Vn# context. In contexts where an oral vowel was contrastive with a nasal vowel (i.e. *paix* [pɛ] 'peace' vs. *pain* [pɛ̃] 'bread'), advanced learners were able to suppress nasal coarticulation (i.e. they suppressed influence from L1 English), whereas beginner learners coarticulated in these contexts in an English-like fashion. In contexts where phonemically contrastive nasal counterparts do not exist in French, all speakers produced vowels with high degrees of nasal coarticulation.

In a larger-scale study, Márquez Martínez (2016) examined the L2 acquisition of French nasal vowels by L1-English university-level students. Naïve participants, intermediate and advanced learners of French, and French native speakers participated in phonological-processing tasks involving perceptual mapping, discrimination,

and lexical decision. Márquez Martínez outlined two possible acquisition strategies: nasal-unpacking (e.g. learners will “repair” /kã/ *quand* ‘when’ as /kan/), and nasal-stripping (“replacing” /kã/ with /ka/). The application of either strategy was probed via a categorization task contrasting predicted difficult pairs (e.g., /kã/ vs. /kan/; /kã/ vs. /ka/). The results indicated that naïve listeners mostly heard French nasal vowels as sequences of oral vowel + nasal consonant, presumably through nasal-unpacking. However, intermediate learners initially heard French nasal vowels as oral, presumably through nasal-stripping. Advanced learners overcame this miscategorization and were also shown to lexically encode French nasal vowels in target-like fashion. Altogether, the author concluded that advanced learners are able to establish firm lexical contrasts between oral and nasal vowels.

At the prosodic level, Tremblay (2011) investigated the processing of L2-French resyllabification by L1-English speakers of various proficiency levels in French, and by L1-French speakers. Tremblay explored the listeners’ development of a parsing procedure for recognizing vowel-initial words in the context of liaison. In French, this prosodic process results in a misalignment of syllable and word boundaries. Through an eye-tracking experiment, respondents identified liaison- and consonant-initial real and nonce words in auditory stimuli. The author developed stimuli beginning with a singular adjective and a target noun in direct-object position (e.g. *Kim regarde le ...* ‘Kim is looking at the ...’), and manipulated the subsequent target noun in three ways: the onset of the target in the stimuli, which was vowel- (i.e. liaison-)initial or /z/-initial; the lexical status of the word (real vs. nonce); and the possibility of a lexical competitor for the target noun. The results suggested that L2 and native participants use different parsing procedures for recognizing liaison-initial words.

In a further study, Tremblay et al. (2012) implemented a word-monitoring task to explore how L1-English speakers parse accented syllables in French. The results show that, first, lower-level L2 learners parse accented syllables as word-initial in French, whereas more advanced learners parse accented syllables as word-final. Second, when parsing word-final syllables in French, learners use an increase in duration as the primary cue for identifying word boundaries, whereas French controls largely rely on a rise in fundamental frequency to do so. The authors account for these findings through a discussion of the co-occurrence of the phonetic cues available for marking stress and accent.

Regarding intonation, Gabriel/Meisenburg/Wocker (2018) studied L1-German/L2-French learners’ pitch range and variability. The learners, categorized as beginning, intermediate, or advanced, performed a short Discourse Completion Task. For German, intonational structure is word-based, whereas for French it is phrase-based. The authors show that, first, the learners do not differ significantly from French native controls in their pitch realization (the authors calculated pitch range and variability through a Pitch Dynamism Quotient). Second, the results revealed significant differences between the two speaker groups on speech rate, with learners displaying lower fluency scores; cf. also Santiago/Delais-Roussarie (2015) for a study

on intonational acquisition of L1-Mexican-Spanish speakers who are L2 learners of French.

Albar/Yoo (2019) studied continuation rises for L1-Japanese speakers who were L2 learners of French, classified into three proficiency levels (beginning, intermediate, advanced). The authors designed their study around a critical prosodic difference between the two languages: whereas Japanese prosodic boundaries use a default low tone (L%), the use of rising contours in French depends on an array of syntactic, metrical, interactional, and phrasing constraints. Results show that although learners are able to reproduce utterances through a sentence-reproduction task, they are not aware of the linguistic motivations underlying the usage of different rise types.

Regarding work on L3 French, a contribution by Llama/López-Morelos (2016) aimed at extending the work on French acquisition to trilingual teens, and more specifically to Spanish heritage speakers who were schooled in English and took part in a French immersion program. The learners participated in a picture-naming task in each of their three languages, with the target words containing a voiceless plosive in stressed onset position. It was found that VOT values largely matched those of the control groups for Spanish and English, indicating the creation of two separate categories for voiceless plosives in each of these two languages. However, in their least-experienced language, French, the learners relied on English when producing /t/ and /k/, suggesting that the L3-French voiceless plosives had been equivalence classified with the respective L2-English categories.

Additionally, Gabriel/Krause/Dittmers (2018) analyzed the production of [±voiced] plosives in French as a foreign language by multilingual learners who speak Russian or Turkish as a heritage language along with their dominant language, German. These data were compared to monolingually raised German learners of French as a foreign language. The two multilingually raised groups performed more target-like than the monolingually raised Germans for /p t k/. The authors interpret this outcome as an example of a partial multilingual advantage in foreign-language learning.

4 L2 acquisition of Galician

Amengual/Chamorro (2015) explored the L2 acquisition of Galician by L1 speakers of Spanish. The authors investigated the perception and production of the Galician mid-vowel contrasts /e/ vs. /ɛ/ and /o/ vs. /ɔ/ by Spanish-Galician bilinguals residing in two urban areas in Galicia, Spain. The authors collected perception and production data for each contrast through two perception tasks (i.e. binary forced-choice identification tasks and AX discrimination), as well as through a short reading task. The bilinguals also completed the Bilingual Language Profile (BLP; Birdsong/Gertken/Amengual 2012) and were subsequently classified as Spanish-dominant or Galician-dominant. The result of the perception tasks indicated that the Galician-dominant bilinguals

had greater sensitivity in discriminating between each of the mid-vowel pairs than the Spanish-dominant bilinguals. Acoustic analysis of the production data, through F1 and F2, further revealed that the Galician-dominant bilinguals implemented a Galician-specific contrast for /e/ vs. /ɛ/, whereas the Spanish-dominant bilinguals produced a single (i.e. neutralized) mid-front vowel. However, for the /o/ vs. /ɔ/ pair, both bilingual groups maintained this contrast in equal measure. Overall, the data reveal an interaction between language dominance, and phonological asymmetry (i.e. front vs. back vowels), in this understudied language pairing.

5 L2/L3 acquisition of Italian

As discussed in this section, empirical research on L2 and L3 acquisition of Italian largely focuses on vowels, geminate consonants, and prosody.

Pace (2016) examined whether vowel pronunciation of /a/ in L2 Italian is impacted by L1-English speakers' patterns of vowel reduction. To do so, the author asked five native English speakers who had been learning Italian for less than 18 months to complete a picture-naming task. The acoustic analysis revealed that the learners' pronunciations of L2-Italian /a/ were intermediate between target-like English and Italian, as predicted by Flege's SLM (1995).

Regarding consonants, Cabrelli/Pichan (2019) analyzed data on the production of intervocalic voiced plosives for English-Spanish bilinguals who were studying L3 Italian at the beginning stage. Learners participated in a delayed repetition task in L1 English, L2 Spanish, and L3 Italian. Although intervocalic voiced plosives are [-continuant] in Italian and English and [+continuant] in Spanish, 54% of the learners produced [+continuant] realizations in their L3. This suggested an initial reliance on L2-Spanish patterns, possibly due to the typological proximity between Spanish and Italian (cf. Rothman 2015). As for the remaining 46% of realizations, the authors suggested that language dominance, proficiency, and experience may impact structure transference.

Besides Sardinian (⋈19 Sardinian), Italian is the only Romance language to use geminate consonants contrastively. De Clercq/Simon/Crocco (2014) examined whether L1-Dutch learners of L2 Italian have acquired the perception and production of the Italian contrast between singleton and geminate consonants. The results of an AXB discrimination task and a word-reading task revealed that learners were able to perceive the distinction between singletons and geminates and produce longer closure/frication durations for geminate than for singleton consonants. In addition, like the L1-Italian speakers, the learners produced longer vowels preceding singletons than preceding geminates. However, further inspection of individual learner productions revealed a substantial amount of overlap between the two phonemic categories, leading to a less robust data dispersion than was documented for the control group.

At the prosodic level, Baele (2012) contrasted the prosody of yes/no-questions for L1-Belgian-Dutch (BD) speakers who were L2 learners of Italian. Participants completed a “Spot the Difference” task in pairs in either their L1 (BD) or in L2 Italian. Spontaneous discussion arose, from which Baele extracted yes/no-queries (i.e. the speaker is looking for more information) and checks (i.e. the speaker is looking for affirmation). Comparing the F0 contours, Baele found that the learners had largely transferred their L1 patterns onto their L2. However, when the same analysis was completed with a more advanced group of L2-Italian learners, the participants demonstrated more target-like L2 prosody (cf. De Marco/Sorianello 2012).

Boula de Mareüil/Vieru-Dimulescu (2006) explored the perception of Spanish-accented Italian and Italian-accented Spanish when the segmental features of an utterance are combined with the suprasegmental features of a different language. Four bilinguals of Italian and Spanish read a list of segmentally identical utterances in their non-native language (Spanish or Italian). The researchers then performed two speech-synthesis manipulations: prosody transplantation, in which Spanish prosody was transferred onto the Italian segmental productions (and vice versa), and speech stylization manipulation, in which the natural prosody of each non-native utterance was manipulated to contain native-like intonation. Forty native listeners of each language judged the stimuli set. For each pairwise condition containing conflicting segment-prosody combinations, participants’ responses were dependent on the prosody that had been transplanted onto the stimulus. Specifically, the Italian stimuli with Spanish prosody received more “Spanish” responses than “Italian” responses, and vice versa. Altogether, the authors suggest that prosody may play a larger role in foreign-language identification than is often assumed.

6 L2/L3 acquisition of Portuguese

Most work on L2/L3 Portuguese focuses on its vowel system, as well as on patterns of L3 learning by L1-English/L2-Spanish speakers.

Díaz Granado (2011) explored the potential differences in the acquisition of an L2 vs. L3 sound system by testing the hypothesis that new category acquisition is available across the lifespan. The author explored the acquisition of seven stressed oral vowels in Brazilian Portuguese with data from five groups: (1) native speakers of American English; (2) native speakers of Mexican Spanish; (3) native speakers of Brazilian Portuguese; (4) L1 speakers of English who speak L2 Portuguese; and (5) L1 speakers of English who speak L2 Spanish and are learning L3 Brazilian Portuguese. The main conclusion was that the more experience with an L1, L2, or L3 (assessed through the quality and quantity of language input), the more likely native-like pronunciation will be reached. The L3-Portuguese group had been exposed to the Spanish and Portuguese /u a/ (which were found to share the same acoustic properties) five years

longer than the L2-Portuguese group, who had no previous experience with Spanish. According to the author, the extra input received by the L3 group was facilitative for L3 learning (cf. Flynn/Foley/Vinnitskaya 2004). In an earlier work, Kendall (2004) had examined the common difficulty of L1-American-English learners of Portuguese in perceiving and producing the Portuguese mid vowels /e ε o ɔ/.

Regarding the acquisition of Portuguese nasal vowels, Bailey (2013), compared vowels produced by six native speakers of Brazilian Portuguese and four Spanish-English bilinguals who acquired Brazilian Portuguese as an L3. Bailey compared vowel and nasal murmur duration and formant frequencies, revealing few between-group production differences. This suggested the possibility of positive transfer for language learners of typologically similar languages (cf. Rothman 2015).

Elvin/Escudero/Vasiliev (2014) tested the relative influence of vowel inventory size versus acoustic properties as predictors of discrimination accuracy through comparing listeners of Australian English and Iberian Spanish when presented with six Brazilian Portuguese vowel contrasts: /a/ vs. /ɔ/, /a/ vs. /ε/, /e/ vs. /i/, /o/ vs. /u/, /e/ vs. /ε/ and /o/ vs. /ɔ/. Australian English already uses many of the Brazilian Portuguese vowels tested in the study, thus it might be expected that these listeners would display better discrimination performance than the Iberian-Spanish listeners. However, the Iberian-Spanish group was more accurate at discriminating the Brazilian Portuguese contrasts. This outcome led the authors to suggest that cross-language acoustic differences, rather than vowel-inventory sizes, are more reliable for predicting non-native discrimination abilities (cf. also Elvin/Williams/Escudero 2016).

Regarding L3-Portuguese consonants, Cabrelli Amaro (2017a) investigated the extent to which L1 and adult L2 phonological systems resist influence from an L3. The author tested the Phonological Permeability Hypothesis (PPH; Cabrelli Amaro/Rothman 2010), which states that adult L2 phonological systems are different from L1 systems with regard to their ability to be influenced by a new language (i.e. an L1 is less affected by L3 learning than a late-acquired L2). Cabrelli Amaro examined the acquisition of L3 Brazilian Portuguese by L1-English/L2-Spanish and L1-Spanish/L2-English sequential bilinguals, comparing these to Spanish and Brazilian Portuguese controls. The author assessed the acquisition of word-final vowel reduction in Brazilian Portuguese, testing perception via a forced-choice goodness task and production via a delayed-repetition task (testing /e o/). The results from the forced-choice goodness task did not reveal perceptual instabilities for either the L1-English/L2-Spanish or the L1-Spanish/L2-English groups. However, regarding production, the L1-English/L2-Spanish group produced Spanish /o/ that was analogous to Brazilian Portuguese, whereas the L1-Spanish/L2-English group showed values for Spanish /o/ that were within the range of Spanish-control data. Cabrelli Amaro interpreted this as preliminary support for the PPH.

In an additional study designed to test the phonological acquisition of L3 Portuguese, Harper (2014) explored the production of intervocalic /b d g/ by two speaker groups: an L1-English/L2-Portuguese and an L1-English/L2-Spanish/L3-Portuguese

group. Intervocalic plosives are significantly lenited in Spanish but are not lenited in English or Brazilian Portuguese. Harper demonstrated that the L2-Portuguese learners' production of /b d g/ was similar to their L1, as expected. However, the Portuguese production of the L2-Spanish/L3-Portuguese group was substantially L2-influenced (i.e. these learners produced Portuguese /b d g/ in a Spanish-like way even though their L1 and L3 strongly resemble one another). While this might present evidence in favor of the L2-status effect, a confounding explanation is that there may be transfer from the typologically closer language (i.e. Spanish rather than English) at the initial state of acquisition, presumably when typology is assessed based on structural similarity (cf. Rothman's 2015 TPM).

7 L2/L3 acquisition of Spanish

The majority of work on L2/L3 acquisition of Romance phonology has focused on the acquisition of Spanish, typically by L1 speakers of English. This section thus reviews work on segmental acquisition (7.1) followed by work on suprasegmental (or prosodic) acquisition (7.2).

7.1 Consonants and vowels

Though many studies thus far have focused on the impedance of L2 and L3 development due to L1 influence, it would be remiss to not discuss situations in which rapid development can occur. In Alvord/Christiansen's (2012) analysis of the acquisition of spirantization of /b d g/ in adult learners of Spanish, it was found that an extensive, intense experience abroad can make up for a lack of formal instruction, especially when factors such as language use and attitude are considered. In this study, 34 adult male Spanish-L2 learners, having just returned from a two-year mission trip in various Spanish-speaking countries, were asked to read through a short story containing target words. Despite not having received formal pronunciation instruction, the learners produced target-like approximants at a rate of 81%, based on categorical coding of acoustic data (cf. also Alvord/Rogers 2014; Bongiovanni et al. 2015).

Cabrelli Amaro (2017b) studied beginner, intermediate, and advanced learners of L2 Spanish who began acquiring L2 Spanish at the mean age of 13. Through a sentence-recitation task, the beginner groups produced plosive-like postvocalic /b d g/, whereas intermediate and advanced learners showed higher degrees of lenition. The author also uncovered an interaction between proficiency and prosodic boundary. Developmentally, learners first produce postvocalic underlying plosives as approximants in word-medial position and later also at the beginning of prosodic words. Advanced learners produce approximants in both contexts. The effect of pro-

sodic boundary on the acquisition of Spanish voiced plosives was previously explored by Shea/Curtin (2011). In this study, high-intermediate and native speakers showed subtle interactions between lenition and prosodic context (i.e. word and stress position) that were not seen in low-intermediate speakers.

The enduring effect of early language exposure was exemplified in Amengual (2019), who examined data from early bilinguals of Spanish and English divided into two groups (simultaneous and sequential bilinguals), as well as data from late-sequential L2-Spanish learners (L1-English/L2-Spanish). Amengual's acoustic analysis focused on the intensity difference between the minimum of the target consonant and the maximum of the following vowel. Through a read-aloud task, it was found that the simultaneous bilinguals and the L2-Spanish learners displayed less lenition of intervocalic /b d g/ (i.e. less Spanish-like) than the early-sequential bilinguals (i.e. L1-Spanish/L2-English) who received exclusive Spanish input during the first years of life. Amengual concluded that early exposure to English (as evidenced through the data patterns of the simultaneous bilinguals in contrast to the early-sequential bilinguals) has long and persisting effects on target-like spirantization in Spanish (for a more extensive review of bilingual speech ↗15 The phonology of Romance contact varieties). For an exploration into the acquisition of /b d g/ in L2 Spanish using a code-switching methodology cf. Henriksen et al. (2021).

Regarding the acquisition of L2-Spanish rhotics, Face (2006) and Rose (2010) explored the effect of learner proficiency on the target-like distinction of the Spanish phonemic tap and trill through cross-sectional designs. Rose analyzed data from 21 L1-English/L2-Spanish speakers and showed that four of them articulate the tap-trill phonemic distinction in native-like fashion. Rose subsequently proposed five stages of development in order to acquire target-like pronunciation. In a different study, Olsen (2012) showed that learners who employ retroflex articulations (i.e. tongue tip is raised) in English produce Spanish trills with greater target-like performance than learners who use bunched articulations (i.e. tongue tip is down).

It should be noted that tap and trill productions are inherently variable. This variability, largely due to the articulatory complexity of these sounds, leads to considerable inter- and intra-speaker variation even within monolingual communities (Henriksen 2014; Willis 2006). Given this background, Henriksen (2015) examined the acoustic correlates of the phonemic tap-trill contrast (/ɾ/ vs. /r/) in the productions of eight first-generation immigrant speakers who arrived in the USA after adolescence, and eight second-generation (i.e. heritage) speakers of Mexican Spanish born and raised in the greater Chicago area. In spite of much individual variation, the results showed that many bilinguals produce phonemic trills with a single apical occlusion, and that almost all speakers realize the tap-trill phonological contrast by means of segmental duration, rather than by number of occlusions.

Following this, Amengual (2016a) investigated Spanish tap-trill contrasts for 40 Spanish heritage speakers and 20 L2-Spanish learners in Northern California. The acoustic methods followed those of Henriksen (2015). Results showed that: (1) most

speakers produce non-canonical phonemic trills with one or zero occlusions; (2) most speakers maintain the rhotic contrast through segmental duration primarily, and not through number of occlusions; and (3) the latter circumstance is especially common for L2 learners and English-dominant heritage speakers.

In L3 research, Kopečková (2016) studied L3 phonological development in 19 German learners of Spanish with prior knowledge of English, with five of them also being speakers of Croatian, Israeli Hebrew, Italian and Polish, Russian, and Spanish as a heritage language, respectively. The participants were recorded in their L1 German, L2 English and L3 Spanish. Testing their production of the Spanish /r/ and /r̄/ segments over the course of three years of formal target-language instruction, the study identified a positive effect of specific, rather than broad-based, bilingual experience on L3 speech learning. The author argued further for a degree of “connected growth” of L2 and L3 phonology. For a study on the development of the tap-trill contrast by L1-Mandarin speakers who were L2-English and L3-Spanish learners cf. Patience (2018).

Solon (2017) explored the effect of level of experience in her study of /l/ production by L1-English/L2-Spanish learners in the Midwestern United States. The phoneme /l/ was chosen by virtue of being an alveolar lateral that exists in both English and Spanish but differs between languages in both phonetic realization and allophonic patterning. The author tested first- through fourth-year learners of Spanish, as well as graduate students and university Spanish instructors. After exploring by-group patterns, the author found that although all learners showed evidence of English-like “darker” laterals (displaying lower F2 values), higher-level proficiency groups produced laterals that were lighter (i.e. more fronted, lower F2 values) and that more closely approximated the target Spanish. For further reading on these acoustic metrics, the reader is directed to Simonet (2010).

Moving onto L2-Spanish vowels, Ronquest (2013) elicited semi-spontaneous speech from Spanish heritage speakers through a picture-identification task. Acoustic analysis revealed that the heritage vowels were both longer and had greater levels of unstressed vowel reduction than monolingual Spanish speakers, per previous research. Critically, the author concluded that, given the quantity of vowel reduction, and keeping in mind the myriad influences on a speaker’s language use and experiences, English exposure alone could not explain the reported findings. Another example of language interference comes from MacLeod (2012), who examined durational differences between English and Spanish in the production of diphthongs and hiatuses by L1-English/L2-Spanish speakers in Canada. The author found that, although L2-Spanish learners initially produce longer hiatuses and glides than native speakers, with experience their values shorten and approximate target-like patterns.

Díaz/Simonet (2015) presented acoustic data on the Spanish /e/ vs. /ei/ contrast (as in *pena* ‘pity’ vs. *peina* ‘comb_{3SG}’) by intermediate and advanced L1-English/L2-Spanish speakers. Differently from Spanish, English uses a mid-front vowel /e/ (*bet*) and a mid-to-high front diphthong /ei/ (*bait*). Three speaker groups participated

in a production task: a group of intermediate-level late L2 learners of Spanish; a group of highly proficient late L2 learners of Spanish; and a group of Spanish native speakers. The authors calculated formant movement through an acoustic metric termed “vector length”. The results for vector length showed that /e/ was similarly monophthongal in all groups; however, /ei/ was diphthongal for the Spanish native speakers and advanced learners, but less so for the intermediate-level learners. In a different study, Cobb/Simonet (2015) explored the vowel productions of three groups of speakers in Spanish (intermediate-level learners, high-level learners, and native speakers of Spanish). The acoustic analysis showed that the intermediate learners produced /u/ in a more fronted (i.e. more English-like) fashion, whereas the advanced learners produced /u/ with greater backness, along the lines of Spanish native speakers.

In addition to experience, it has been hypothesized that increasing the difficulty of a speaker’s task can lead to a more native-like pronunciation (cf. Robinson 2001). This idea was investigated in Solon/Long/Gurzynski-Weiss (2017). Participants worked in pairs and were entrusted to guide each other through a fictional information-gap tour. The street names were minimal pairs which differed in their stressed vowels only (e.g. *Calle Copa* ‘Copa Street’ vs. *Calle Capa* ‘Capa Street’), and production was tested on both simple and complex versions of the map task. The complex map included 11 more stops on its route, as well as extraneous roads and landmarks along the way. The results showed only minimal effects of task complexity on L2 pronunciation differences of the Spanish vowels /i e a o u/. For further research on task-based effects on L2-Spanish learning cf. McKinnon (2017).

7.2 Prosody

Regarding the L2 acquisition of Spanish stress, researchers have explored the role of analogy and lexical knowledge in learners’ production of Spanish stress patterns, inspired by the findings of Aske (1990), Eddington (2000), and Face (2004). Bullock/Lord (2003) examined three groups of Spanish learners who participated in a task designed to elicit production of real and nonce Spanish words. The results indicated that learners overgeneralized the penultimate stress pattern, especially in contexts of heavy penultimate syllables. Bullock/Lord (2003) analyzed further non-target responses to determine if such responses were made based on an analogical connection. Considerably more analogies were made on nonce tokens than on real-word tokens, with lower-level learners more likely to make analogies than advanced learners. These outcomes confirmed the hypothesis that L2 learners of Spanish rely on similar exemplars and overall frequency for stress placement (cf. also Carlson 2006).

One illuminating area of research concerns the acquisition of L2-Spanish stress by L1-speakers of French. Specifically, Dupoux and colleagues examined the acquisition of contrastive stress in Spanish. The authors focused primarily on French-speaking learners, since French does not mark stress contrastively. Dupoux et al. (1997)

and Dupoux/Peperkamp/Sebastián-Gallés (2001) found that monolingual French listeners perform at lower levels compared to Spanish listeners when discriminating stimuli that vary in the position of stress only, using nonce words such as *BOpelo* vs. *boPElo*. However, this stress “deafness” was found in tasks that used high phonetic variability and memory load. Since less cognitively demanding protocols were not tested, the researchers questioned whether monolingual French speakers truly lack metalinguistic representation of contrastive stress. To follow up on this point, Dupoux et al. (2008) tested 39 native speakers of French, who were late learners of Spanish, in a sequence-recall and an on-line lexical-decision experiment. In the first experiment, the late learners were indistinguishable from French monolingual controls when recalling a sequence of alternating stress patterns. In the lexical-decision experiment, the late learners showed high error rates distinguishing word-nonword minimal pairs that differed in stress (e.g. *BOpelo* vs. *boPElo*), but low error rates in word-nonword minimal pairs involving a phonemic distinction (e.g. *luz* ‘light’ vs. **suz*). Given the incongruent results in lexical decision, the authors confirmed that the deficit in stress perception is a persistent processing limitation in the acquisition of L2-Spanish stress for French-L1 speakers.

Of note, few studies examine the acoustic correlates of Spanish stress, such as duration, amplitude, and pitch. For Spanish stress, pitch and duration appear to be the most robust correlates (e.g. Ortega-Llebaria/Prieto 2011), yet little is known about how this is affected by cues that conflict with L1 properties (for French, cf. Tremblay et al. 2012).

As for L2-Spanish intonation, Henriksen/Geeslin/Willis (2010) reported on a developmental study based on data from five English-speaking learners of Spanish enrolled in an immersion program for seven weeks in León, Spain. The acoustic analyses revealed two mutually exclusive developmental patterns: increased use of a given set of intonational melodies over time; or the increased use of intonational features (i.e. pitch accents and boundary tones) regardless of the melodies to which they were applied. In terms of LILt (Mennen 2015), the second pattern can be understood as development in the frequency component.

One recurrent finding in acoustic analyses of L2-Spanish intonation, pointed out in Bullock (2009), is that the phonetic alignment of prenuclear peaks with respect to the stressed syllable appears to occur earlier in bilingual speech than in monolingual speech in a range of language pairings: Quechua-Spanish (O’Rourke 2003), German-Spanish bilingual children (Lleó/Rakow/Kehoe 2004), and Italian-Spanish in Argentina (Colantoni/Gurlekian 2004; Gabriel/Kireva 2014; Kireva/Gabriel 2015). From a theoretical perspective, in terms of the realizational dimension, the LILt does not predict that bilinguals would necessarily produce early-aligned peaks in uniform fashion; these findings are likely due to the language pairs in question (for example, for Andean and Argentinean Spanish, this is clearly transfer from the contact languages Quechua and Italian, respectively). Other authors have examined the production of other intonational properties by early and late L2 learners, for example

native Mandarin-speaking late L2 learners (Chen 2007; Cortés Moreno 2006), early Basque-Spanish bilinguals (Elordieta/Calleja 2005), and Spanish-English bilinguals in Miami (Alvord 2006).

Additional work on intonation has been accomplished in Zárate-Sánchez's investigations into L1-English/L2-Spanish intonation, exploring issues in the perception (2016; 2018b) and production (2018a) of intonational features. In Zárate-Sánchez (2018a), the author contrasted the production of final boundary tones in declarative utterances by monolingual speakers of English and Spanish as well as by heritage speakers of Spanish. The data showed a high boundary tone for English monolinguals, a low boundary tone for Spanish monolinguals, with advanced L2 learners of Spanish obtaining intermediate, merged values. The latter observation provides support for notions put forth in Flege's SLM, showing that phonological categories comprise features from both languages, yielding intermediate outcomes.

Sánchez-Alvarado (2019) examined the use of syntactic and intonational strategies for focus-marking in L1 Peninsular Spanish, L1 American English and L1-English/L2-Spanish speakers. The author showed that in a contrastive-subject focus condition, L2 learners displayed patterns similar to L1-Spanish speakers, using the pitch accent L+H* even though this category is not used in L1 English. The author explained that such adjustments toward the native speaker norm in the frequency of use of a given category (per L1Lt, Mennen 2015) should also be considered as an instance of learning.

As for prosodic timing (i.e. temporal organization of speech), Robles-Puente (2014) shows that adult Spanish-English bilinguals who moved to the United States in early childhood display less variation in vowel duration in their English than do English monolingual speakers. The author interprets this as evidence of L1-Spanish influencing L2-English. Similar results have been reported for L2 English as spoken by L1 speakers of other languages, with typically less vowel duration variation than monolingual English (e.g. Henriksen/Fafulas 2017; Thomas/Carter 2006). For data on the temporal organization of speech, as it relates to patterns of oral fluency in L2 Spanish, cf. García-Amaya (2009; 2015).

It is well-known that Buenos-Aires Spanish (known as *Porteño* Spanish) was influenced substantially by Italian due to Italian immigration to Buenos Aires during the first half of the 20th century. *Porteño* Spanish therefore may show more stress-related vowel lengthening and final lengthening than other varieties of Spanish (Gabriel/Kireva 2014; Kireva/Gabriel 2015). Gabriel/Kireva (2014) explored how strongly Italian as an L1 influences the production of L2 Spanish, by comparing both the timing patterns and the realization of yes-no questions of the L2 Spanish produced by L1-Italian speakers who had learned Castilian Spanish as their L2 with a *Porteño* Spanish control corpus. Confirming expectations, both *Porteño* and L1-Italian/L2-Castilian Spanish showed high, Italian-like, values for vowel-related metrics of timing. Additionally, the data for the nuclear contours and the prenuclear pitch obtained via yes-no questions appeared consistent with Eckman's Markedness Differential Hypothesis (cf. Eckman 2008). For further exploration into the durational properties

of Afrikaans-Spanish bilinguals who live in Patagonia, Argentina, cf. Henriksen et al. (2019). In this research, the authors examined data from L1-Afrikaans speakers who learned L2 Spanish between the ages of 5 and 18. Although the Afrikaans-Spanish speakers reside in a currently Spanish-majority area, the community had remained functionally monolingual in Afrikaans until the 1950s, when the Patagonian region shifted nearly completely to Spanish due to immigration by speakers from northern Argentina (for further elaboration, cf. Szpiech et al. 2020).

8 Conclusion

When studying L2 and L3 phonological acquisition, one can begin to appreciate the multiple and layering effects that go into language perception and production. For all, the journey begins with the learning of an L1 in infancy, during which foreign phones are discarded over time as “language-specific listening” emerges. Afterwards, all new language information is filtered through an L1 lens, which, to the chagrin of many L2 and L3 learners, often results in foreign-accented speech. Several models debate the exact way by which new sounds are categorized, whether through the evolution of existing categories after merging with new phones, or through the placing of new phones within existing categories (Best/Tyler 2007; Flege 1995). More recent work on L2-Romance acquisition scrutinizes the question of phonological versus lexical categorization in language learning and considers models from which to frame their innovative findings (Amengual 2016b; Darcy et al. 2012). Regarding L3-specific models, current research debates whether L3 learners are afforded full or property-by-property access when acquiring an L3. All frameworks underscore the existence of cross-language influence, as has been demonstrated by the studies cited in this chapter.

Additionally, we have highlighted some of the factors that warrant earnest consideration when conducting empirical research on L2/L3 phonological acquisition. Specific linguistic considerations demonstrated in this chapter include: phonological context (Peterson 2015); prosodic context (Cabrelli Amaro 2017b); syntactic constraints (Albar/Yoo 2019); markedness (Gabriel/Kireva 2014); typological similarity (Rothman 2015); cognate status (Amengual 2016b); and the inherent variability of articulatory complex phones (Henriksen 2015). Some acquisitional considerations include: proficiency (Flege 1987); language input prior to adolescence (Bosch/Ramon-Casas 2011); simultaneous/sequential bilingualism (Amengual 2019); language dominance (Amengual/Chamorro 2015); language use (Mora/Nadeu 2012); language mode (Simonet 2011); L2-dialect exposure (Baker/Smith 2010); and task variability (Solon/Long/Gurzynski-Weiss 2017). Together, these studies should be viewed as a resource on L2 and L3 Romance acquisition, and evidence of the fascinating ways by which language categorization and learning contexts interact during phonological learning.

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Christoph Gabriel and Uli Reich

15 The phonology of Romance contact varieties

Abstract: The present chapter provides an overview of segmental and prosodic properties of Romance contact varieties. By using this term, we refer to linguistic systems that are acquired as either a first or an early second language and used by their speakers on a regular basis in their social environment and whose phonological systems are crucially influenced by the phonology of another language. After briefly reviewing selected theoretical approaches to language contact, we select examples to discuss mechanisms and effects of linguistic contact at different phonological levels: starting with segments, we progress to the higher levels of word prosody, stress patterns, and durational cues and end with a discussion of cross-linguistic influence at the intonational level.

Keywords: contact-induced change, convergence, transfer, second language acquisition, segments, prosody

1 Introducing the field

Phonological systems are always subject to variation and change, which is triggered, among other things, by contact with other languages. More than 2000 years of documentation put Romance languages into a privileged position to study the various mechanisms and effects of contact phonology. From a historico-geographical and cultural perspective, we can distinguish between territorial, migration-induced, and cultural contact. It goes without saying that a clear-cut distinction between these categories is not always possible.

Territorial contact occurs along and across boundaries of language communities and may concern both national languages, such as Spanish and Brazilian Portuguese, which merge into the mixed variety *Sp. fronterizo* / *Por. fronteiraço* spoken

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in the Uruguayan-Brazilian border region, and minority languages such as Basque in contact with Spanish and French in the Basque Country. An overlap between the categories of territorial and migration-induced contact can occur when, for instance, Basque-dominant speakers whose Spanish is crucially influenced by their first language move from their home region to Madrid, with the Basque-Spanish contact being shifted, so to speak, by migration from the Basque Country to the capital.

Migration-induced contact comprises at least three different scenarios. The first one is transnational migration which can lead to linguistic constellations where Romance languages are spoken as so-called heritage languages (HL) by second or third generation immigrants in the respective target countries (cf. Valdés 2000; Montrul 2016; 2018; Polinsky 2018). Spanish can be considered the best-studied Romance language in this respect, not least because of numerous recent studies on the phonology of Spanish as a HL in the English-speaking context (for an overview cf. Rao/Ronquest 2015; Ronquest/Rao 2018; Rao 2019). Recently, Spanish as a HL has also come more into focus in the German-speaking context (Ruiz Moreno 2019). A specific case of heritage bilingualism, though with a much longer history, is the one of Judeo-Spanish, which came into contact with many typologically different languages after the expulsion of the Jewish communities from the Iberian Peninsula in the late 15th century; ↗25 Judeo-Spanish). The respective varieties are usually not included under the term HL but rather are referred to as diaspora varieties. In both HLs and diaspora varieties, however, the migrants' language continues to be used by its speakers in the private and familial domain in the destination country, where it undergoes considerable changes at all linguistic levels under the influence of the environmental language. An example of the reverse case, with the migration language being abandoned by large parts of the immigrants and the language of the target country adopted by them, hence with massive influences from the immigrants' languages, is the linguistic situation in contemporary Argentina: the majority of the population are monolingually raised speakers of so-called *Porteño* Spanish, the original nonstandard variety of the capital which is crucially influenced at the prosodic level by contact with the Italo-Romance varieties spoken by labor-seeking immigrants (cf. 4.3 and 5.1). Secondly, it goes without saying that mobility not only occurs across borders but also within them. This phenomenon becomes apparent with the example of the rural exodus to the capitals in several Latin American countries. In this very context, speakers of rural origin who are typically bilingual and speak a variety of Spanish or Portuguese which is crucially influenced by their dominant language at the phonological level tend to suppress the respective (mostly socially stigmatized) features of pronunciation when talking to the urban population (cf. Delforge 2012 for the example of unstressed vowel devoicing in Peruvian Spanish in contact with Quechua; cf. also 3.1). The third scenario to be addressed in the context of migration-induced contact is territorial expansion and colonization, which plays a crucial role due to extensive overseas colonization activities of Romance-speaking Europeans from the Early Modern period on. These territorial expansions resulted in various contact situations involving Romance languages, e.g. Spanish and Yucatec Maya in Mexico,

French and Arabic in the Maghreb, or African languages as substrate for the varieties of Spanish spoken in Latin America, and of Portuguese in Brazil. An extreme case of linguistic contact, leading to the emergence of a new type of language, can be seen in creolization, which will not be dealt with in the present chapter (§28 Romance-lexifier creoles).

Cultural contact, finally, refers to the use of different languages as a cultural technique. Potential linguistic scenarios that can be subsumed under this term include, e.g., the interaction of a given language with a widely used *lingua franca* (cf. Matras 2009, 275–277) such as English, which is used in large parts of the Romance-speaking world as an additional language in predominantly professional contexts, as well as the contact between prestigious standard varieties such as Parisian French and (often stigmatized) regional varieties or French-based creoles in the overseas departments (cf. e.g. Pustka 2007; 2012 on the realization of rhotics by Guadeloupean speakers in contact with Guadeloupean *kwéyòl*). Cultural contact also becomes apparent with the example of pluricentricity, which refers to the coexistence of different pronunciation norms applying in different regions (cf. Willemyns/Bister 1989; Clyne 1992; Oesterreicher 2000): in this context, an educated speaker of, e.g., Paraguayan Spanish might adopt the pronunciation norms of, e.g., Madrid or Buenos Aires, given their high prestige in the Spanish-speaking world.

It comes as no surprise that in all of the aforementioned constellations speakers of a particular language come into contact with at least one other language or variety which is not their first one. This leads to an increase in language learning demands after the completion of the L1 critical period (§12 First language acquisition of Romance phonology; §13 Bilingual phonological acquisition), be it in the form of unguided acquisition of a second or additional language or as instructed foreign language learning. All variants of language learning yield transfer (Odlin 2003) from the learners' L1 to the L2 at all linguistic levels, including phonology (§14 Second and third language acquisition of Romance phonology). The opposite direction of cross-linguistic influence (CLI) from L2 to L1, by contrast, only occurs under specific conditions, i.e. when the L2 becomes the learners' dominant language, which is often connected with L1 attrition (for an overview on phonetic and phonological attrition cf. Polinsky 2018, 114–163; de Leeuw 2019; Celata 2019). However, the present chapter concentrates on varieties of Romance languages that are acquired either as an L1 or as an early L2, are used on a regular basis by their speakers, and whose phonological systems are crucially characterized by the results of CLI. To refer to this type of variety we use the term “contact variety”. Local phenomena, which are restricted to certain lexical items, such as the phonological integration of loanwords, are not dealt with in the following (§16 Loanword phonology in Romance).¹ It should be pointed out

¹ For a different perspective cf. Smith (2007, 79–83), who dedicates this section of his chapter to loanword phonology.

in this context that nowadays quite a few Romance languages do not exist as non-contact varieties, since they are spoken almost exclusively by multilingual speakers or in regions characterized by more or less stable bilingualism. These include Sardinian and all varieties of Rhaeto-Romance, as well as Occitan, Catalan, Galician, and all dialects of Judeo-Spanish still spoken today. This entails a methodological caveat in that data from these languages cannot be compared to control data from the respective non-contact varieties – simply because there are no monolingually raised adult speakers of these languages at hand.

It is obvious that we cannot come close to achieving descriptive exhaustivity, given the vast number of multilingual scenarios in which Romance languages have been involved in the past and continue to be at present. After briefly reviewing selected theoretical approaches to language contact (Section 2), the chapter provides examples illustrating mechanisms and effects of linguistic contact at different phonological levels: starting with segments (Section 3), we progress to the higher levels of word prosody, stress patterns, and durational cues (Section 4), and end with a discussion of CLI at the intonational level (Section 5). Given the close intertwinement of the different levels of phonological representation, we will also refer to interdependencies between them. Section 6, finally, provides some concluding remarks and opens directions for future research.

2 Theoretical approaches

Regarding the linguistic impact of the historico-geographical and cultural constellations mentioned in Section 1, a wide range of factors have been claimed to be crucial. Thomason/Kaufman (1988) suggest that the shift of an entire speech community to another language is the decisive social condition for structural “interference”, as opposed to “borrowing”, a process that targets predominantly the lexicon in speech communities that maintain their language. Van Coetsem (1988) sees psycholinguistic conditions at work that complement the sociolinguistic approach put forward by Thomason/Kaufman (1988). He claims that phonological transfer – “imposition” in his terminology – is restricted to a “source language activity” that corresponds to the dominant language in the competence of the speaker, where “dominant” means “knowing to a better degree”. Thus, if a community shifts to another language, many speakers with the same dominant language impose rules and features onto the target language, which thereby would change due to the recurrence of the same processes. Muysken (2000) assumes three main possibilities for a speaker to deal with bilingual competence: “insertion” corresponds largely to van Coetsem’s (1988) “imposition”; “alternation” refers to sentential code switching; and “congruent lexicalization” involves the use of elements from either language in a structure that is wholly or partly shared by the two languages involved.

As in all situations of innovative language use, sociolinguistic factors may play a decisive role in the diffusion of contact-induced structures. From Schuchardt (1885) to Labov (1966/2006) and beyond, many scholars have employed the concept of prestige or similar social concepts to refer to these factors. We believe that the most elaborate model for treating social variation is Eckert's (2008) "indexical field", since it allows for multiple association of social values grounded in particular ideologies and transcends the high-low dichotomies of former models. The study of multilingualism necessarily refers to sociohistorical realities, but sociolinguistics is not the focus of this chapter (§11 Sociophonetics). The same applies to historical perspectives that are studied primarily in the context of contact intensity in order to determine predictive power with respect to domain and depth of language contact processes. Regarding these issues, the reader is referred to Matras (2009) and Muysken (2010).

Whereas traditional Romance linguistics (cf. Krefeld 2003 for a critical overview) combines some or all of these factors in the concepts of *substratum* (e.g. interferences from the L1 to the more prestigious L2, followed by language shift) and *superstratum* (e.g. borrowings into L1 from more prestigious L2, but L1 is still maintained), a more complex ecology of language is assumed in contemporary contact linguistics, treating multilingualism as a feature pool and questioning the importance of historical languages as useful explanatory factors (cf. Mufwene 2001; García/Wei 2014; Otheguy/García/Reid 2015; Wei 2018).

Starting with the turn of the millennium, the concept of grammatical interfaces as outlined by Sorace (2011) and refined by Chamorro/Sorace (2019) has been increasingly discussed among scholars seeking to model and explain the outcomes of linguistic contact (cf. Fischer/Gabriel 2016 for an overview). In the framework of Sorace's "Interface Theory", it is assumed that linguistic phenomena that are located at so-called "external" interfaces between core-grammatical domains such as phonology or syntax on the one hand and peripheral ones such as information structure or pragmatics on the other, are more likely to undergo change in situations of language contact than are those pertaining to core-grammatical domains only. A respective example is the interplay of prosodic phonology (in the sense of intonational phrasing and nuclear stress placement) and word order. In many Romance languages, this interplay involves additional interaction with information structure (cf. Dufter/Gabriel 2016 for an overview). Sorace (2011, 14) attributes the susceptibility to change at the syntax-pragmatics interface to the optionality that is attested there. In contrast to the stability of the core-grammatical domain, which is characterized by unambiguous grammatical rules such as the unmarked ordering of verb and object (in Romance: VO), changes seem to occur precisely in areas where bilinguals and L2 speakers are confronted with a high degree of variability, namely in terms of the question of which functions belong to which surface forms. However, as pointed out by Fischer/Vega Vilanova (2018) with the example of morphosyntactic change in

the variety of Judeo-Spanish spoken in Bulgaria, the mere fact that a given linguistic phenomenon is located at an external interface is not a sufficient condition for CLI to occur. Rather, there must be a perceived equivalence relation between the two linguistic systems in the sense of Heine/Kuteva (2003) for the respective feature to be transferred, i.e., whether a feature is borrowed from a contact language depends not only on whether it is located at an external interface but also on whether there are structural equivalence relations between the systems involved. Such equivalences may consist, e.g., in morphosyntactically similar constructions, but also in features that refer to the whole speech signal such as similar vowel systems. An example of the former case is the stress pattern of comparative constructions such as Sp. *más fuerte* ‘stronger’, which are realized by some speakers of Bulgarian Judeo-Spanish with a main stress on the pre-posed comparative particle, i.e. [mas,fwerte] (rather than [mas'fwerte] as in other varieties of Spanish), following the model of Bg. по-силен (*po-silen*) [ˈpɔ,silen] (Andreeva et al. 2017, 175). It should be pointed out that such cases speak in favor of the assumption that perceived linguistic similarities between languages (Westergaard et al. 2017) are more relevant to the occurrence of CLI than is mere typological relationship (cf. Rothman 2011; 714 Second and third language acquisition of Romance phonology). However, equivalence relations can be perceived not only between specific grammatical constructions but may also refer to the whole speech signal: if two languages in contact both have rather simple vowel systems with only front unrounded and back rounded vowel phonemes, phenomena affecting the surface realization of vocalic segments such as unstressed vowel reduction are likely to be transferred in bilingual speakers. Respective examples will be discussed in Section 3. In the same vein, languages having similar intonation systems such as, for instance, Spanish and Italian, are likely to further converge in contact situations (cf. 5.1). In other words: the fact that a given phenomenon is located at an external interface is a facilitative condition for CLI to occur, on a par with perceivable equivalence relations between the languages involved.

As we review, extend, and complement these approaches, we are guided by the following basic assumptions: arguably, most scholars would agree that the historical locus of contact-induced change is second (and third, fourth etc.) language acquisition, an inevitable feature of multilingual societies. The languages that contribute to the formally structured and socially constrained feature pool of a given community may be more or less different with respect to their phonological configurations. The mechanisms involved in the acquisition of phonological rules and patterns can be attributed both to the perception and to the production of linguistic utterances. Speakers may project phonetic events to phonological representations constructed in the acquisition of another language and thus perceive the phonetic reality differently. We might call this mechanism phonological reanalysis. In addition, speakers may overgeneralize phonological rules and patterns across languages, a mechanism we call phonological analogy, following established concepts from the study of lan-

guage change in general (Kiparsky 1995; Campbell 1998).² The relevant mechanisms may apply at all levels of phonology: sounds may be perceived based on phonological representations of sounds available in the phonology of a language acquired earlier, just as a pitch movement may be reanalyzed as a cue for stress even if it is a distinctive tone in the phonology of another language spoken in the same community. Rhythmic patterns may be overgeneralized across languages just as a sound may be if it is close to another sound that is harder to pronounce in a second language, even without reanalysis. From the perspective of languages as external linguistic conventions associated with particular social groups such as, for instance, “Parisian taxi drivers” or “rappers from Dakar”, the resulting phonological forms appear as impositions (van Coetsem 1988), transference (Thomason/Kaufman 1988; Thomason 2001), or transfer (Odlin 2003). A form that has not been described as belonging to a given language appears in this language because a speaker carries it over from another language.

Just as in all other aspects of linguistic change, besides the language-particular mechanisms, we must also consider the universal markedness of features and rules (cf. Andersson/Sayeed/Vaux 2017, 17–21) if we want to give a theoretically plausible account of what happens to phonologies in multilingual societies. All levels of phonological organization show forms that are more basic and forms that are more complex with respect to the features and rules employed for their construction (Jakobson 1941/1969; Dressler 1984; Vennemann 1988). To the extent that less marked forms are easier to acquire and more frequently represented in phonological inventories, the preference for less marked forms increases with the degree of multilingualism, since their presence in a speaker’s first language is more probable and they are easy to learn (Reich 2004). Moreover, tradition – a force that works against the reduction of markedness – is weaker in societies characterized by heavy migratory demography than in societies that live in rather closed ecologies. Of course, as in all linguistic change, markedness is a concept that is difficult to handle since different formal parameters may order preferences in opposite ways: for instance, what is good for syllable structure may be bad for rhythmic consistency. However, such difficulty does not lessen the importance of markedness for theoretical explanations of contact-induced change, since it is markedness that accounts for forms that are not represented in either of the languages of a given society.

And, again in the very same sense as in general language change, whether a linguistic form that rises as a consequence of language contact survives in a linguistic community depends on the sociolinguistic value a given community assigns to it. We

² Ultimately, what happens in multilingual communities is only quantitatively different to what happens in societies with less variation in their linguistic traditions. All studies on language change and variation must work with variables in the representation of linguistic competence, and complex multilingualism only widens the structural gap between available variants within these variables.

will not focus on sociolinguistic restrictions in this article (→11 Sociophonetics) but will concentrate instead on the structural impact of multilingual environments on the phonologies of Romance languages.

3 Features and segments

Starting with the structuralist tradition (→ Romance phonetics and phonology: an introduction), the phonemic units of a given language are commonly interpreted as bundles of distinctive features. Seen from a cross-linguistic perspective, some of these features or combinations thereof occur more frequently in sound systems, like [+front; -rounded], while others are rather rare, as is the case for [+front; +rounded]. In situations of multilingualism, CLI is often guided by universal principles as outlined in Section 2. For instance, universally marked segments such as front rounded vowels are less frequent in the varieties of French spoken in many African communities (Boutin/Cissé 2016, 65) as compared to metropolitan French, and nasal vowels are frequently replaced with the respective /V+nasal/ sequences in Midi French (e.g. *pain* pronounced as [pɛ̃] rather than [pɛ̃] ‘bread’; Coquillon/Turcsan 2012, 112–114), which reflects the long-lasting contact with Occitan, a language lacking nasal vowels (→22 Occitan). In the remainder of this section, we first exemplify selected mechanisms of contact-induced sound change, in particular the maintenance, reduction, and expansion of segmental characteristics, and phonological processes affecting segments (3.1), before discussing in more detail two specific examples: the production of unstressed vowels (3.2) and plosives (3.3).

3.1 Maintenance, reduction, and expansion

CLI can result in universally marked structures being preserved. This is the case for the lateral contrast /l/ : /ʎ/, which has been abandoned in most varieties of Mainstream Spanish³ in favor of a simplified system with only one lateral /l/ as a consequence of so-called *yeísmo*, i.e. merger of /ʎ/ and /j/ (cf. Gómez/Molina Martos 2013 for a cross-varietal perspective), but which has been maintained in varieties of Spanish spoken in communities of bilingualism with Quechua – a language presenting the phonemic contrast /l/ : /ʎ/ (cf. Cusihamán 1976 for Cusco Quechua and Parker 1976 for Ancash Quechua). In this case, the presence of the phonemic opposition /l/ : /ʎ/ in the contact language presumably has supported the maintenance of the palatal lateral

³ Following Lipski (1994), among others, we use “Mainstream Spanish” as a generic term to refer to Peninsular and American non-contact varieties of Spanish.

in Andean Spanish.⁴ Another variety of Spanish which has preserved the lateral /ʎ/ is the one spoken in Majorca, most probably because of the close contact with Catalan (or rather *mallorquí*), whose consonantal system also includes the palatal lateral as a phoneme (Rost Bagudanch 2020). A different explanation of the maintenance of the traditional pronunciation of graphical <ll> as [ʎ] needs to be given for Paraguayan Spanish: although the contact language, Guaraní, lacks /ʎ/, this segment appears to be preserved in the Spanish produced by older bilinguals and mainly occurs in read speech, as shown by Gabriel/Pešková/Ewald (2020, 48–50). The authors explain their findings by referring to a cultural factor, i.e. to the fact that many Paraguayans learn Spanish only at school, where the traditional Castilian distinction /ʎ/ : /j/ is taught as a norm and deviant productions in read speech are often corrected by teachers. Another striking characteristic of Paraguayan Spanish is the insertion of glottal stop [ʔ] in intervocalic position as in *mi [ʔ]hijo* ‘my son’ (Krivoshein de Canese/Corvalán 1987, 23; Gabriel/Pešková/Ewald 2020, 42). The glottal stop is part of the Guaraní sound system (Walker 1999, 68) and also occurs in the Guaraní name of the language *avañe’ẽ* (graphically represented as <’>).

Cross-linguistic influence can also favor the reduction of segment inventories. This is true, for instance, of the vowel system of Peruvian Spanish, which is reduced to /a i u/ for at least many Quechua-dominant bilingual speakers due to influence from Quechua (Guion 2003, 119; Pérez Silva 2017). The merger of the mid and close vowels /e i/ and /o u/, respectively, to one close front and one close back phoneme (/i/, /u/) is commonly referred to as *motoseo* or *motosidad*⁵ and yields stigmatized productions such as *pelota* [pɾiˈlota] ‘ball’ (cf. Cerrón-Palomino 2003; Zavala/Córdova 2010). Further examples of CLI yielding reduced complexity of tonic vocalism include two varieties of Catalan. As shown by Ballone (2015) based on formant analysis, the quality of stressed mid vowels in the Catalan variety spoken in Alghero (Sardinia) patterns with the three-level vowel aperture system of Logudorese Sardinian (↗19 Sardinian) rather than with the four-level (mainland) Catalan system (↗23 Catalan). The same process is found in the Catalan spoken by the inhabitants of Spanish-dominant neighborhoods of Barcelona (Cortés/Lleó/Benet 2009; Lleó/Cortés/Benet 2020).

In addition, CLI can also lead to the application of phonological processes that operate in a particular language to broader contexts, thereby expanding the domain of the process at issue. An example of this is scope of vowel harmony (VH), which is restricted in European French to the front mid vowels /e/ and /ɛ/ (e.g. *aime* [ɛm] ‘love_{3SG}’ but *aimer* [eme] ‘love_{INF}’) but which in Central African French also applies to /i/ and can be triggered by both word-final and word-initial vowels (e.g. *indésiré* [ɛdezeʁe] ‘undesired’, *intelligent* [ɛtiliʒã] ‘intelligent’), a phenomenon which can

⁴ “Andean Spanish” is a common, but misleading term, since it suggests a dialectal homogeneity of Spanish spoken in the whole range of the Andes from Colombia to Chile. Such homogeneity is not even true of the Quechua-speaking societies, let alone all others.

⁵ These terms are derived from *mote*, which designates a typical Andean dish.

be attributed to influence from contact languages such as Sango (Bordal 2012, 30). Furthermore, CLI can modify neutralization processes that are already active in a given language, without extending or reducing their domain of application. This is true of Yucatecan Spanish, which is characterized by the fact that the neutralization of coda nasals yields [m] as in *Yucatá*[m] and *pan* 'bread' [pam], both produced with a final bilabial nasal instead of an alveolar [n] as in Mainstream Spanish (labialization, cf. Michnowicz 2008; Uth 2021).

Apart from cases where a specific contact language can be identified, complex multilingual situations can also reinforce the reduction of markedness of feature inventories (cf. Dressler et al. 1987 for a general introduction to this view). In these cases, the observable linguistic behavior cannot be traced back to one single language but has to be related to many different languages that all share the lack of specification of a given feature in their phonologies. This view is linked to a dichotomy between speaker-oriented economy of expression vs. hearer-oriented ease of perception (Donegan/Stampe 1979; Levinson 2000), the balance between them tilting towards ease of perception in situations of multilingualism. The harder a feature is to process perceptually, the later it will be learnt and thus, the more likely it is that it will be replaced by another feature that serves the same function but is easier to process (Reich 2004). For example, the central open vowel /e/ that in European Portuguese is opposed to its anterior counterpart /a/ does not have phonemic status in Brazilian Portuguese, with [e] occurring only as a phenomenon of posttonic reduction of /a/; the system shows corresponding morphological consequences by replacing the dative marker *a* with *para*. Consider the European Portuguese examples given in (1a) vs. (1b) and their Brazilian counterparts in (2).

- (1) EPor. a. Aquela [e'keɫe] menina gosta de cerveja.
'This girl likes beer.'
b. Dei uma cerveja à aquela [a'keɫe] menina.
'I gave a beer to this girl.'
- (2) BPor. a. Aquela [a'keɫe] menina gosta de cerveja.
b. Dei uma cerveja **para** aquela [para'keɫe] menina.

Further examples of processes of variation and change that fit into this pattern of preference for phonetically more salient forms expressing grammatical functions include the use of either the strong disyllabic pronoun *ele/ela* 'he/she' or the zero anaphora for syntactic objects instead of the mono- or subsegmental clitics *o/a* (Cyrino/Reich 2002) and correspond to the general preference for unreduced vowels in the nuclei of pretonic syllables and the resolution of consonantal clusters by epenthesis. The latter aspects have been argued to contribute to the rhythmic differences between Brazilian and European Portuguese (Abaurre/Galves 1998). In this view, the multilingual history of Brazilian Portuguese (cf. Reich 2004 for a short overview) has enhanced the

perceptive transparency of its phonological oppositions, as opposed to the preference of economy that can be observed in the phonological system of European Portuguese. Further examples of complex multilingualism involving many interacting languages whose effects are difficult to tease apart are found in the young urban *banlieue* varieties of French (cf. Fagyal 2010a; 2010b; Paternostro 2017), which share some of their segmental characteristics such as, e.g., the fronting of back vowels, with other non-Romance urban varieties used by young speakers such as Multicultural London English (Cheshire et al. 2011).

3.2 Unstressed vowels

Languages differ as to whether their vowels exhibit similar spectral properties in both stressed and unstressed syllables, or they present processes affecting unstressed vowels, such as centralization, raising, devoicing, or even complete deletion. Processes such as these are prone to be transferred in all situations of linguistic contact and consequently occur in a large array of Romance contact varieties. Andean varieties of Peruvian Spanish, for instance, are characterized by (partial or full) devoicing and deletion of unstressed vowels as in *los escuchaba* ‘listened to them’ produced as [losɛskɯ'tʃaβa], with devoicing in the pretonic domain, or *pacientes* ‘patients’ as [pa'sjents], with total elision of the posttonic vowel (Delforge 2008, 111; cf. also our example (11) in Section 4). These cases of unstressed vowel weakening, which are presumably transferred from (Cusco) Quechua (Delforge 2011), are perceived as a stigmatized feature of pronunciation on a par with the *motoseo*-like alternations of stressed vowels discussed in 3.1 (Delforge 2012).

Unstressed vowel reduction also occurs in the Spanish spoken by Catalan-dominant speakers in Catalonia, at least in casual, non-monitored speech. However, this is not a case of devoicing but rather of centralization (Poch Olivé/Harmegnies 1994; Poch/Harmegnies 2010; cf. Poch Olivé 2016 for an overview).⁶ Yet another type of unstressed vowel reduction is raising of, e.g., unstressed /o/ to [u] as is typical of Portuguese and also occurs in the Spanish spoken in Olivenza (Extremadura), a small town located in the Spanish-Portuguese border area, which had been under Portuguese control until the early 19th century. As shown by Gabriel/Grünke/Kireva (2020) based on formant analysis, unstressed /o/ is raised to [u] in a quarter of the cases, even in monitored (read) speech. According to the authors, this finding speaks in favor of interpreting this feature of the Spanish spoken in Olivenza as the result of L1 transfer during the process of L2 acquisition by its inhabitants following incorpo-

⁶ Other contact-induced features of Catalanian Spanish include the voicing of intervocalic /s/ as in *lo[z] amigos* ‘the friends’ and the velarization of /l/ (cf. Davidson 2015a; 2015b). Regarding listeners’ attitudes towards these features cf. Sinner (2004, 589–593) and Davidson (2019).

ration into Spain. The feature has since become fossilized and occurs systematically in the speech of both young and elderly speakers (ages ranging from 18 to 74). This suggests that the raising of unstressed /o/ constitutes a marker of local identity across age groups. However, some speakers do not show any instances of unstressed vowel raising, most of these being females (Gabriel/Grünke/Kireva 2020, 430–431). According to the authors, the fact that raising of unstressed /o/ occurs less frequently in female speech might be explained by women's stronger adaption to linguistic norms, at least in more traditional societies (Labov 2001, 293). In the case of Olivenza Spanish, stronger adherence to supra-regional norms might indicate a decrease in local pronunciation features, which, in turn, reflects an ongoing phonological change.

The question of pronunciation norms is also of particular relevance when it comes to comparing different varieties of Judeo-Spanish from the perspective of unstressed vowel reduction. As shown by Gabriel/Kireva (2014a), mature bilingual speakers of Judeo-Spanish and Sofian Bulgarian consistently raise unstressed /o/ and /a/ to [u] and schwa, respectively, in both read and spontaneous speech and in both of their languages. However, they avoid raising of unstressed /e/ to [i], which is absent from the received pronunciation of the variety of Sofian Bulgarian and considered a stigmatized feature typical of Eastern Bulgarian dialects. According to Gabriel/Grünke (2018), this speaks in favor of an emerging pronunciation standard of Sofian Judeo-Spanish, which is based on the norms of the standard pronunciation of the variety of Bulgarian spoken in the capital.⁷ Istanbul Judeo-Spanish, in turn, exhibits some unstressed vowel alternations that can be explained by partial transfer of Turkish VH, as is the case for the underlying back mid /o/ of *anyos* 'years', which may surface as the unrounded high back vowel [u] (in accordance with the rules of Turkish VH; cf. Göksel/Kerslake 2005, 21–25). As argued by Gabriel/Grünke/Quintana (2021) based on spectral and auditory analyses, the transfer of Turkish vowel harmony seems to be inhibited by the high functional load that unstressed word-final vowels bear in (Judeo-)Spanish: consistent transfer of VH rules from Turkish would blur morphological oppositions such as gender, since, e.g., *estos* 'those_M' and *estas* 'those_F' would both surface as *[*estis*] (according to Turkish major VH) or *[*estes*] (minor harmony). Instead, posttonic /o/ following a stressed close front vowel is rather changed to [u] as in *esto(s)* [*estu(s)*], which might be seen as a compromise solution, as it represents an assimilation with regard to vowel height but does not prevent the masculine from being recognized as such (due to lack of assimilation regarding the front-back dimension and roundness).

Further cases of contact-induced spectral reduction of unstressed vowels include heritage Spanish in the Anglophone context (Ronquest 2013; Alvord/Rogers 2014; for an overview cf. Rao/Ronquest 2015, 405; Ronquest/Rao 2018, 168–170) and the partial

⁷ Sporadic vocalic alternations which can be attributed only partly to specific contact languages also occur in other varieties of Judeo-Spanish spoken on the Balkans (Quintana 2006, 57–61).

convergence toward English of unstressed vowels in Frenchville French, as outlined by Bullock/Gerfen (2004) (→4 From vowel weakening in Romance to French schwa).

3.3 Plosives

A perceptually relevant acoustic feature of plosives is so-called Voice Onset Time (VOT), which refers to the time that elapses between the burst of the plosive and the onset of voicing (Lisker/Abramson 1964; Cho/Ladefoged 1999). VOT is considered one of the most relevant features characterizing the language-specific realizations of plosives (Nagy/Kochetov 2013). Commonly, three VOT types are distinguished: (i) pre-voicing, i.e. voicing onset (VO) before the release of the plosive (measurable in terms of negative VOT values), (ii) short lag, i.e. VO with or shortly after the release (yielding short positive VOT values), and (iii) long lag, i.e. VO considerably after the release (yielding long positive VOT values). All Romance languages present a two-way phonological contrast for plosives, which is phonetically realized through pre-voicing for the voiced (or: lenis) plosives /b d g/ and through short-lag VOTs for their unvoiced (or: fortis) counterparts /p t k/, respectively. Deviating from this, in most Germanic languages, among them English and many varieties of (both High and Low) German, the lenis-fortis contrast is expressed by the feature [±aspirated], which corresponds to a contrast between short-lag lenis and long-lag fortis plosives, i.e. /b d g/ are rendered as devoiced, non-aspirated plosives ([b̥ d̥ ɡ̊]), whereas /p t k/ are produced with a clearly perceivable aspiration of up to 100 milliseconds (/p^h t^h k^h/). VOT patterns are likely to be transferred by foreign language learners and contribute considerably to the perception of a foreign accent (Lein/Kupisch/van de Weijer 2016; Gabriel/Kupisch/Seoudy 2016). They also contribute to the specific sound shape of Romance-Germanic contact varieties. An example of this is the Portuguese produced by bilingual speakers of Brazilian Portuguese and Pomerano, a diaspora variety of Low German, which is spoken in a number of communities in the province of Santa Catarina. As shown by Ruiz Moreno/Gabriel (2020) on the basis of controlled production data gathered using a picture-naming task, monolingual speakers of Brazilian Portuguese living in the small town of Pomerode present the typical Romance contrast, while the younger bilinguals display a mixed system in that they clearly prevoice /b d g/ (presenting the typical Romance-type negative VOT values) but aspirate the voiceless plosives. The older bilinguals differ from the younger ones in using the same “Germanic” contrast in both of their languages, i.e. they show a clear transfer from Pomerano to their Portuguese. Referring to Labov’s (1966/2006) concept of overt vs. covert prestige, the authors argue that the latter, conveyed by the prevalence of a “Germanic” feature of pronunciation, operates within both generations, although its effect can be felt with less intensity among the younger bilinguals. For a similar result concerning bilingual speakers of another Low German variety spoken in southern Brazil, Hunsrückisch, cf. Lara (2017).

Transfer of VOT patterns also occurs in situations of heritage bilingualism. Regarding Spanish as a heritage language in Northern Germany, the VOT measurements performed by Ruiz Moreno (2019) showed, among other things, that the proportion of non-canonical realizations in Spanish (i.e. devoicing of /b d g/) is higher among early bilinguals raised in Germany than among bilinguals who grew up in a Spanish-speaking environment. Conversely, the proportion of non-canonical productions of /b d g/ in German is highest in late bilinguals who immigrated to Germany in adulthood (Ruiz Moreno 2019, 129). Both results demonstrate a high degree of CLI in bilingual speakers. Similar outcomes are reported by several studies on Spanish as a HL spoken in the Anglophone context (for an overview cf. Rao/Ronquest 2015, 404–405; Ronquest/Rao 2018, 165–166). For example, so-called spirantization, i.e. the production of voiced plosives as fricative-approximants [β ð ɣ] in all contexts other than after a pause or homorganic nasal or lateral, which is a typical feature of many Ibero-Romance languages, undergoes attrition in contexts of heritage bilingualism. This is true of Spanish-English heritage bilinguals living in the USA who were shown to spirantize the respective segments only to a limited extent and produced them rather as (non-canonical) plosives (Rao 2014; 2015). Interestingly enough, in Judeo-Spanish, spirantization occurs only word-internally (Hualde 2013), whereas it operates across word boundaries in Mainstream Spanish. In the literature, this fact is a matter of controversy: the possible interpretation of limited spirantization as an archaism is opposed by Penny's (1992, 256) view that this lenition process was already generalized in the Iberian language area by the end of the 15th century and that the Judeo-Spanish pattern of plosive realization should rather be regarded as a result of CLI from the surrounding languages.

4 Prosodic words, stress, and beats

Prosodic words, stress, and beats are mutually dependent in their definitions. Prosodic words are application domains for rules of stress assignment and prosodic processes of all kinds. Stress is a culminative property of prosodic words in many languages: each word has one and only one syllable that is stronger than all other syllables of that word, where “strong” refers to intensity, duration, tonal excursion, and sonority. Beats, in language, are normally understood as nuclei of syllables, and are primitives for rules that construct metrical prominence grids, the hierarchically highest of which is assumed to project stress (Hayes 1995; Kager 2007). But this is only a rough sketch of prototypical correlations of the corresponding prosodic features and rules. Languages vary with regard to all of them, and plurilingual competence may rearrange these constellations across the languages involved. Thus, stress may be associated not only with words, but also with phonological phrases. In many languages, stress seems to be part of the phonological form of the word, as are

segmental features, rather than being projected by metrical algorithms (van der Hulst 1999). Moreover, phonetic implementation does not necessarily involve all of the four prosodic dimensions (Hyman 2009; 2014). We will give some examples regarding the phonological construction of stress and prominence (4.1), its phonetic realization (4.2), and the rhythmic performance of metrical prominence (4.3) in Romance contact varieties. Again, our presentations can only serve as illustrations of some of these theoretical possibilities, with no claim of exhaustivity.

4.1 Phonological construction of stress and prominence

To begin with, stress may be fixed or free. If it is free, it may serve distinctive functions and thus contribute directly to the construction of meaning, be it at the lexical or at the pragmatic level. This crucial difference between phonological systems may serve as an important predictor for restrictions in language contact. Moreover, the parameters constraining the metrical construction of prominence may render completely different prosodic surfaces of segmental strings. Following the classical approach by Hayes (1995),⁸ the construction of metrical prominence varies in the first place with respect to the selection of the relevant phonological unit that constitutes the base line: in quantity-sensitive languages, such as Latin (Roca 1999; Oniga 2014, 26–31) or Wolof (Ka 1987; 1994), it is the mora, while in other languages, such as German or Piro (Arawakan, Eastern Peru), it is the syllable (Hayes 1995, 200–201). Furthermore, strength may be attributed to the first or the second mora or syllable of a foot, a rule that renders the latter as iambic or trochaic. The construction of feet may start at the leftmost or the rightmost syllable of a given domain and, finally, the initial or the final foot may bear lexical stress. While these parameters already give us quite a wealth of combinatorial possibilities that lead to deep differences between the prosodic systems of languages showing culminative stress, they form only the tip of the iceberg.

Some languages seem to lack the domain “prosodic word” completely or at least do not optimize it in speech. In Reference French (↗21 French), for example, the most salient prosodic domain is the Phonological Phrase, which we take to be more or less coreferential to Jun/Fougeron’s (2000) Accentual Phrase (cf. also Delais-Roussarie et al. 2015). Processes such as *liaison* apply mostly within but not across the boundaries of this domain, while there is no word-related boundary that would block *liaison* within the phrase. Furthermore, in the absence of final schwa, the most prominent syllable corresponds to the rightmost syllable of the phrase, not the word. Thus, pro-

⁸ Hayes’ (1995) seminal work on metrical phonology is certainly not the only theory of stress, but is arguably one of the most prominent, so it can serve as a notional anchor for scholars from many strands of phonological theory.

sodic words do not seem to play an important role in the phonology of this language. This is probably why speakers with French as L1 show considerable problems in learning stress patterns of languages that do have a prominent lexical accent, a phenomenon often labeled as “stress deafness”. Dupoux et al. (2008) report that French advanced learners of Spanish, a language with contrastive lexical accents, do not perform better than true beginners at perceiving them and claim that the native phonological features of French explain this stress processing impairment: since prosodic words are absent in the prosodic configuration of their dominant phonological competence, rules applying to it are hard to process and learn.

The inverted situation can be observed in utterances produced by speakers who acquire a language in which no stress assignment rules apply to the prosodic word on the basis of a dominant phonology that does project stress to prosodic words.⁹ Sichel-Bazin/Buthke/Meisenburg (2012a) conducted an experiment with bilingual speakers of (Midi) French and Occitan, a language that retained the primary stress of Latin that Reference French gave up. When performing in French, the speakers realize AP-internal prominences at the positions projected by a metrical alternation of strength (cf. also Sichel-Bazin/Buthke/Meisenburg 2012b; Sichel-Bazin 2015).

The effects of a dominant phonological system when performing utterances in a language with a different phonology can be even more complex, though. Consider a prominent pair of languages in West Africa: Wolof is the dominant language in Dakar, the capital of Senegal. French is used widely in education, media, and public life in general, in some regions it serves as a vehicular language and it is important for urban youth culture, such as Hip Hop and other types of popular music (cf. Dreyfus/Juillard 2004 for a report on the sociolinguistic situation and Boula de Mareuil/Boutin 2011 for a perception-oriented account of differences in African varieties of French). The two languages display very different phonological systems, which leads arguably to the particular prosodic performance of French by Senegalese speakers, called the Senegalese ‘groove’ by Reich (2020); for an overview of segmental and some prosodic consequences in Senegalese French cf. Boutin/Gess/Guèye (2012).

Wolof is not tonal, as are many other languages in West Africa, but distinctive functions are assigned to another important dimension of prosody, namely timing: the language shows patterns of duration that are distinctive at both the lexical and the pragmatic level:¹⁰

⁹ In the context of foreign language learning, this is the case for German learners of French as a foreign language, who tend to misinterpret the French AP-final accent as word-final stress – probably due to negative transfer from German – and consequently produce too many accentual prominences in their L2 production (Gabriel/Grünke/Karsten 2022).

¹⁰ The literature on Wolof (Robert 2000; Rialland/Robert 2001; Voisin-Nouguier 2002; Sall 2005) describes the lengthening in (3c, d) in the chapters on morphology without giving importance to its prosodic realization.

(3) Distinctive duration in Wolof

Wol.	a.	fat	:	faat
		'clean up _v ' ¹¹		'kill _v '
	b.	gën	:	gënn
		'better'		'milk'
	c.	ma dem	:	maa dem
		'I go'		'I _{FOC} go'
	d.	mu dem	:	moo dem
		'he goes'		'he _{FOC} goes'

(Ka 1987, 11; Bell 2003, 5; Rialland/Robert 2001, 895)

Additionally, long vowels and consonants may appear more than once and in any position in the word:

(4) Duration in the lexical phonology of Wolof

Wol.	a.	wolof 'Wolof'
	b.	boole 'mix _v '
	c.	teraanga 'hospitality'
	d.	dajaloo 'come together _v '
	e.	woowandoo 'call together _v '
	f.	feesalukaay 'funnel'
	g.	jigeenubiir 'pregnant woman'

(Ka 1987, 222–227; Bell 2003, 7–9)

As indicated by the orthographic representation, in (4b) the first syllable is long, in (4c) the second and in (4d) the third or final; (4e–g) show length in different positions of the word. Ka (1994) and Bell (2003) explain that in cases without long syllables (4a), speakers perceive the initial syllable as the most prominent in the word, but not in words with a long syllable (4b–d), which is always perceived as more prominent, and that in cases with more than one long syllable (4e–g), it is the first of these syllables which is perceived as the most prominent one. Summing up, we have a phonology with free, distinctive duration and default initial stress in prosodic words. This configuration contrasts heavily with the most important second language spoken in Dakar: French has fixed durationally marked prominence on the final syllable of the phonological phrase and no stress at the word level. Thus, both the position of stress and the phonological exploitation of timing patterns are different.

In the variety of French spoken by persons who acquired Wolof as their first language, we readily observe patterns of pronunciation that correspond directly to the

¹¹ These verb forms are invariant in Wolof. The grammatical categories of person, number, tense/aspect, mood, and focus (cf. 3c, d) are realized in an inflectional marker preceding the verb.

phonological configuration of Wolof. In many utterances, the final syllable of the phonological phrase, the pivotal domain in Reference French but the opposite end of the initially stressed word of Wolof, is left without final lengthening on the items *remarques* ‘notice_{2SG.PRS}’, *homme* ‘man’, and *instrument* ‘instrument’ in the example given in Figure 15.1 or even heavily apocopated as shown with the examples of *demander* [d^amā] ‘ask_{INF}’ and *comment* [kɔm] ‘how’ in the utterance represented in Figure 15.2.

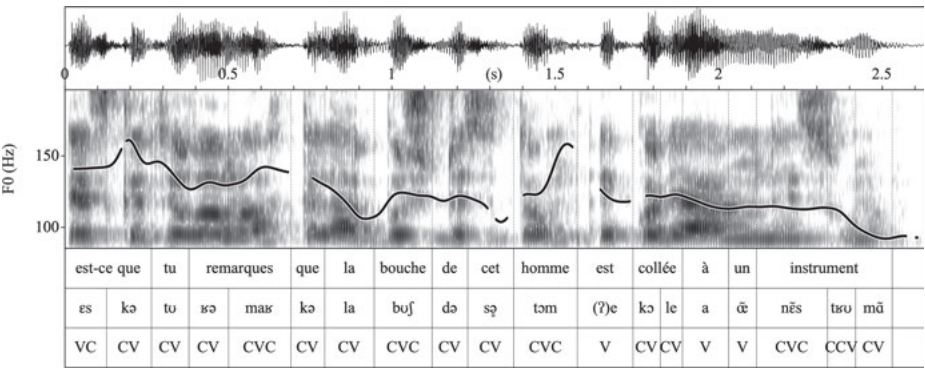


Figure 15.1: F0 contour and waveform of the utterance *Est-ce que tu remarques que la bouche de cet homme est collée à un instrument ?* ‘Do you notice that the mouth of this man is glued/stuck to an instrument?’ (semi-spontaneous speech) produced by a 27-year-old bilingual male speaker from Dakar, Senegal (L1 Wolof, L2 French).

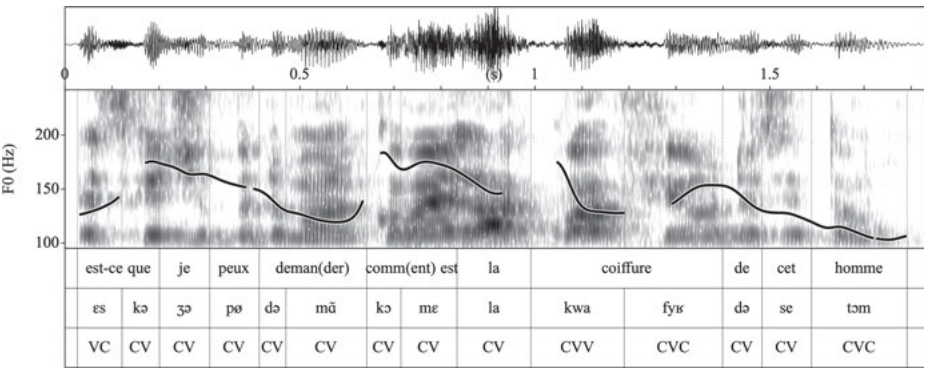


Figure 15.2: F0 contour and waveform of the utterance *Est-ce que je peux deman(der) comm(ent) est la coiffure de cet homme ?* ‘Can I ask what the haircut of this man is like?’ (semi-spontaneous speech) produced by a 26-year-old bilingual male speaker from Dakar, Senegal (L1 Wolof, L2 French).

Within the theoretical framework sketched in Section 2, we can explain these facts as reanalysis resulting in imposition: the structural domain of free distinctive lengthening

in Wolof is the phonological word, while accentual lengthening is fixed at the right boundary of a phonological phrase in French. Thus, the phrase-final lengthening of French is left unparsed in this phonological configuration. Left-headed metrical grids assigned from left to right give rise to reduction and apocopation at their opposite sides, the right peripheries of words and phrases, just as in Figure 15.2. The imposition of an accentual pattern from Wolof thus leads to reduction and elision in French.

These facts suggest also that, at a theoretical level, we need to observe all phonetic parameters of prosody (pitch excursions, duration of syllables, consonants and vowels, formant quality of vowels, loudness) separately, since their exploitation for phonological functions varies substantially and culminative stress is but one of many ways phonological configurations may restrict the distribution of duration, tone, and prominence.

4.2 Phonetic realization of stress and prominence

While in many European languages stressed syllables are supposedly longer, associated to pitch excursion, louder, and blocked for vowel reduction, this accumulation of phonetic cues is far from universal in a wider perspective. In tone languages (Yip 2002), e.g., pitch excursions may be independent of stress, and distinctive tones are associated with more than one position in the word. Duration is independent from stress in languages such as Wolof (Ka 1987; 1994) or Conchucos Quechua (Buchholz/Reich 2018). In these languages, intensity also appears to be unrestricted by any of the metrical parameters sketched above. Reduction, finally, is a property linked to rhythm and cannot serve as an exclusive indicator for stress. Thus, these languages blur the cognitive salience of stress, and their description has led phonologists to put forward typological concepts of prosodic variation (cf. Beckman 1986; van der Hulst 1999). We think that while these concepts may capture possible clusters of feature configurations, prosodic variation is not restricted to these types and we therefore follow Hyman (2009; 2014) in assuming a rather phenomenological approach that looks for functional exploitation of tone, duration, intensity, and vowel quality (Buchholz/Reich 2018).

Phonological competence acquired in situations of plurilingualism involving languages that differ in this respect may yield distributions of these features unknown in the standard varieties. An interesting case is the interaction of tone languages with languages that lack lexical tone, i.e. so-called “intonation-only languages” (Gussenhoven 2004, 12). In Papiamentu, a Caribbean creole language that blends Portuguese, Spanish, Dutch, and African languages coming arguably from the Bantu sphere, Rivera-Castillo/Pickering (2004) observe a system that realizes stress by duration only, distributes lexical tones in interaction with phrase-level pitch patterning, and shows tonal spreading. In the following examples, an acute means high tone, while the stress marks follow normal usage:

- (5) Pap. a. esakí ta é pis'ká 'This is the fish.'
 b. mi tá 'gustá 'píska 'I like fishing.'
 c. mi tá 'gustá 'piská 'I like to fish.'
- (Rivera-Castillo/Pickering 2004, 268–269)

The terms “imposition”, “transfer” or “insertion”, as sketched in the introduction, cannot easily describe the processes that led to this complex system of stress by duration, lexical tone, and intonation. Reanalysis in the processing of multilingual data in acquisition and the innovative reorganization of features from different linguistic traditions are more likely the relevant mechanisms to explain these phonological systems.

4.3 Rhythmic performance of metrical prominence

Languages also differ with respect to the rhythmic performance of phonological forms (↗8 Comparing and deconstructing speech rhythm across Romance languages). A widespread view on this phenomenon stems back to Abercrombie (1967) and was elaborated as a typology that sorts languages into a syllable-timed and a stress-timed type (Dauer 1987; Auer 2001; Turk/Shattuck-Hufnagel 2013). Dufter (2003) foregrounds the systemic functions of timing and prominence, the combination of which renders four types of linguistic rhythm. In his view, only languages that do not exploit prosodic resources for the expression of meaning can show truly rhythmic alternation of strength. Reich/Rohrmeier (2014) see rhythmic differences such as those between European Portuguese and Spanish as options in the production of phonological forms with regard to abstract metrical grids, much like different rhythmic performances of the same piece of music.

Such rhythmic preferences have direct impact on syllable structure and segmental inventories, since central vowels and complex syllable structures correlate with rhythms that prefer higher levels of the metrical grid. Syllables follow preference patterns for the rhythmic distribution of sonority and branching of structural positions that are respected in the languages of the world to different degrees (↗2 Syllable structure and (re)syllabification). Thus, complex syllable structures seem to get reduced in scenarios of multilingualism and subsequent contact-induced change, as restrictions on branching lead very often to vowel epenthesis or elision of material. Furthermore, rhythmic properties affect not only stress-delimited feet, metrical grids etc., but also determine the characteristics of the whole speech signal, at least in the sense of speech rhythm as the ratio of consonantal and vocalic intervals.

Consider Conchucos Quechua and Spanish in Peru. With 10 million speakers in the Andes, Quechua is the biggest surviving language in the Americas. In important parts of the colonial and post-colonial societies of Colombia, Ecuador, Peru, Bolivia, and Argentina, generations of speakers who had acquired a dialect of Quechua as their L1 have learned Spanish as an L2. Quechua has always been identified as exerting

major influence on Andean Spanish, but systematic work on its prosody is only beginning (O'Rourke 2005; 2008; 2012; Muntendam 2013; van Rijswijk/Muntendam 2014; Muntendam/Torreira 2016; Buchholz/Reich 2018; Froemming/Rao 2021).

In the dialect spoken in the Conchucos valley, located in the province of Ancash in Peru, the prosodic configuration of Quechua also shows free distinctive lengthening, just like Wolof. Here, duration may appear at every position of the word:

- (6) Qu. a. u[:]shuku 'hide_{INF}'
 b. chilli[:]wa 'rope'
 c. ishmuna[:] (name of an herb)

Also, duration may appear more than once in a word:

- (7) Qu. gaga[:]ma[:]n 'he comes to me' vs. qaqaman 'to the boulder'

In some cases, duration also expresses morphological contrast:

- (8) Qu. a. wiya 'hear_{INF}' vs. wiya[:] 'hear_{1SG}'
 b. chakra 'hut' vs. chakra[:] 'my hut'

The importance of duration in the phonology of Quechua is observable also in the systematic reanalysis of Spanish stress as duration in loanwords, a feature that is reflected in orthographic forms:

- (9) Qu. a. kalabaasu < Sp. cala'bazo 'calabash'
 b. kawaallu < Sp. ca'ballo 'horse'
 c. maakina < Sp. 'máquina 'engin'

These facts suggest that stress on prosodic words is implemented differently at least, if not entirely absent in this language, in spite of the claim in most literature on other dialects of Quechua that seem to assign stress on the penultimate syllable (for Cusco Quechua cf. O'Rourke 2005 and Muntendam 2013) or on the initial syllable of the word (for Conchucos Quechua cf. Hintz 2006). In a quantitative study on a selected set of data from a corpus of Conchucos Quechua, Buchholz/Reich (2018) show that no syllable in morphological words is a preferred locus for pitch excursion, length, or intensity. Only the peripheries of phrases show systematic pitch excursions.

Prominence is mostly realized by duration in Conchucos Quechua, and the two languages spoken in the bilingual community show a particular pattern, the source of which is hard to determine, since temporal organization is an option of rhythmic performance that varies across and within languages. In both languages spoken in Conchucos, processes of reduction and elision cluster the segmental information of the phonological form of the word into sequences of heavy syllables. Delforge (2008)

and de Crignis (2016) show similar patterns for different bilingual Spanish-Quechua communities in Peru. The resulting pattern fits quite well into the description of stress-timing in the literature on rhythm typology in that it shows both complex syllable structures and reduced vowels. The Quechua example (10) *Tsaypa laadun-paa hanapaa aywa-nki defrente* ‘At the side of this top you walk on’ and the Spanish example (11) *Pasas por debajo del perro* ‘You pass beneath the dog’, adapted from Bendežú Araujo/Buchholz/Reich (2019), illustrate this nicely. The bottom lines in (10) give a morphological gloss and a translation for the Quechua example, above which we sketch a syllabified version of the underlying form (UF), the beats resulting from it as a base line for the construction of a metrical grid by the application of alternating prominences. In the surface form (SF), only strong vowels are realized, and consonantal material is clustered around these prominent peaks of sonority (cf. Reich/Rohrmeier 2014 for a theoretical account of this view).

(10)	Qu.	SF	[tse:p	la:	dump		xa	nap
		<i>prominence</i>	x	x		x		x
		<i>beats</i>	x	x	x	x	x	x
		UF	/tse:	pa	la:	dun	pa:	ha na pa:
			⌈a⌋	waŋ		de	frent]	
			x		x		x	
			x	x	x	x	x	
			aj	wan	ki	de	fren	te/
		tsay-pa	laadu-n-paa	hana-paa	aywa-nki		defrente	
		DEM.DIST-GEN	side-3SG-DIR	top-DIR	go-2SG		of.front	
			‘At the side of this top you walk on.’					

(11)	Sp.	SF	[ˈpa:z	pɔ	rə	ˈβa:	xəð		ˈpe	rə]
		<i>prominence</i>	x			x			x	
		<i>beats</i>	x	x	x	x	x	x	x	
		UF	/ˈpa	sas	por	de	ˈba	xo	del	ˈpe ro/

Again, it is hard to see how we should explain these patterns as instances of imposition in language contact in the traditional sense, since it is easy to observe similar patterns in spoken Spanish in communities far away from the Quechuan sphere and also in other languages (cf. Kabatek 1994 for Mexican Spanish).¹² Nevertheless, it is a characteristic feature of both Quechua and Spanish in some, but not all bilingual communities (cf. also O’Rourke 2005; Muntendam/Torreira 2016). We might coin such

¹² The problem of uniqueness of explanation is notorious in contact linguistics and not hard to understand: the set of universally available structures is limited, often binary, so that change and variation may reach the same results with and without the influence of bilingualism (Reich 2004).

instances of innovative creation of particular patterns for both (or more) languages in a given community a “multilingual conspiracy”.

If we understand rhythm as the particular alternation of vocalic and consonantal material in time, another approach is possible too. Seen from this angle, the rhythmic properties of a given language can be captured by so-called rhythm metrics, which largely describe the ratio of vocalic and consonantal material in the speech signal (↗8 Comparing and deconstructing speech rhythm across Romance languages). Such metrics can also be used to capture the rhythmic characteristics of contact varieties as compared to non-contact varieties.

Taking an example from the Romance-speaking world, the variety spoken in the Argentinean capital of Buenos Aires, so-called *Porteño Spanish*,¹³ is characterized by prosodic phenomena that evidence the influence of Italian, due to the immense immigration waves between the second half of the 19th and the first half of the 20th century (Fontanella de Weinberg 1987; Pešková et al. 2012). It is worth noting that, after the Italians, the second largest immigrant group were Spaniards who came mostly from Galicia (Vázquez Presedo 1971, 44; Fontanella de Weinberg 1987, 133; Gugenberger 2004; 2018). European immigration not only caused an enormous growth of the Argentinean capital, but also undeniably influenced the language, which is, apart from numerous loans such as *manyar* ‘eat_{INF}’ (< It. *mangiare*), particularly evident in its prosody (cf. 5.1 on the melodic patterns). Interestingly enough, both *Porteño Spanish* and the L2 (European) Spanish produced by Italian learners of different dialectal origin show rhythmic values more similar to those of Italian than to those of Castilian Spanish (Gabriel/Kireva 2014b; Kireva/Gabriel 2015a). In detail, this involves a greater variability of vocalic intervals and an overall greater percentage of vocalic material in the speech signal. It is noteworthy that the rhythmic differences between the varieties in question are minimized by excluding from the calculation the tonic and pre-boundary syllables, which suggests that the rhythmic properties of *Porteño Spanish* can be explained as a transfer effect of the lengthening of metrically strong and pre-boundary syllables from Italian (↗18 Italian; Krämer 2009) to Spanish, which presumably took place during the process of acquisition of Spanish as an L2 by Italian immigrants (cf. also Colantoni/Gurlekian 2004; McMahon 2004).

The strong influence that Italian as a migration language exerted on *Porteño* speech rhythm constitutes a rather unique case, due to both quantitative (the sheer number of Italian-speaking immigrants) and social factors (the self-concept of Argentina as a country of immigration). It should be noted that no comparable effect was observed in situations where Argentinean Spanish came into contact with languages spoken by less numerous immigrant groups. As a first example we mention the South African immigrant community in Patagonia (Afrikaans/Spanish bilinguals), whose Spanish at the

¹³ Due to the massive influence of audio-visual mass media, *Porteño Spanish* has spread far beyond the limits of the capital and nowadays is perceived as *argentino neutro* ‘neutral Argentinean (Spanish)’ in large parts of the country (cf. Pešková et al. 2012).

rhythmic level does not differ from monolingual Patagonian Spanish, while their Afrikaans is shown to be massively influenced by Argentine Spanish by presenting less high vowel interval variability compared to the Afrikaans produced by monolingual speakers from South Africa (Coetzee et al. 2015; Henriksen et al. 2019; Szpiech et al. 2020). A second example is so-called Argenchino Spanish, spoken by the Chinese who migrated to Argentina after 1980 (Vetter 2012). This variety shows some traces of contact with Chinese both at the tonal level (cf. 5.2) and in rhythm, the variability of vocalic intervals being lower than in Buenos Aires Spanish (Gabriel 2018). However, given the low sociolinguistic status of this immigrant variety, it is unlikely that these features would be widespread in common Argentinean Spanish as was the case for “Italian” rhythm (at least after the sociolinguistic “upgrading” of Porteño Spanish; cf. Pešková et al. 2012).

Further work on bilingual speech rhythm carried out in the first two decades of this millennium includes Roseano et al. (2020) on differently balanced Italian-Friulian bilinguals, Gabriel/Kireva (2014a) on speakers of Judeo-Spanish living in Bulgaria, Kireva/Gabriel (2015b) on the Portuguese-influenced variety of Spanish spoken in Olivenza (Extremadura), Meisenburg (2013) on Occitan-influenced Midi French, and Robles Puente (2014) on US-spoken heritage Spanish under the pressure of English. All these studies reveal clear signs of convergence of rhythmic patterns in bilinguals, though to different extents and depending on both individual factors (e.g. language dominance, attitudes) and the sociolinguistic status of the languages involved.

5 Intonation

All Romance languages are considered intonation-only languages. For Romance intonation systems in situations of linguistic contact, this entails two main settings: first, contact of a Romance language with another (Romance or non-Romance) intonation-only language; second, contact of a Romance language with a tone language. Regarding the first setting, at least two possible contexts need to be considered, in particular (i) contact between two languages that both have lexical stress (assigned to word domains), and (ii) contact between a language with lexical stress and another one without it. Since the latter context has already been addressed in Section 4 with the examples of Midi French in contact with Occitan (4.1) and Spanish in contact with Quechua (4.3), we will concentrate in the remainder of the present section on the interaction of a Romance intonational system with lexical stress (Spanish) and, first, another of the same type (5.1) and, second, a lexical tone-based system (5.2).

5.1 Contact between two intonation-only languages

Starting with the first setting, let us turn to the prosodically best described variety of the Cono Sur area, Argentinean Porteño, which, not least because of its unmis-

takable melodic contours, has been the subject of numerous intonational studies (Colantoni/Gurlekian 2004; Gabriel et al. 2010; 2013; Gabriel/Feldhausen/Pešková 2011; Gabriel/Kireva 2014b; Thornberry 2014; Kireva/Gabriel 2015a). As early as 1964 Vidal de Battini (1964, 144) stated that “Buenos Aires habla con entonación italiana” (‘Buenos Aires speaks with Italian intonation’). According to Klee/Lynch (2009, 191) “most likely the change in intonational patterns originated in the speech of lower social classes in Buenos Aires and from there spread to the speech of more affluent groups” (our translation). As shown by Gabriel et al. (2010; 2013), based on a corpus of semi-spontaneous and spontaneous data collected from 25 Buenos Aires speakers (Gabriel 2012), the intonational system of contemporary Porteño Spanish is characterized by four aspects that evidence Italian influence.¹⁴ First, prenuclear accents are produced as rising F0 movements with the tonal peak placed within the temporal limits of the metrically strong syllable, i.e. with early peak alignment (L+H*), whereas in most pan-Hispanic varieties they surface as L+<H*, i.e. with late peak alignment.¹⁵ Consider the contour depicted in Figure 15.3.

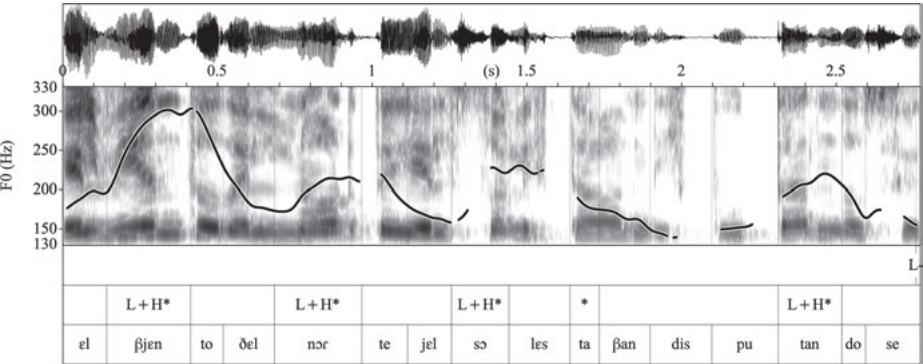


Figure 15.3: F0 contour and waveform of the first part of the neutral declarative *El viento del norte y el sol estaban disputándose (sobre cuál de ellos era el más fuerte)* ‘The North Wind and the sun were disputing (which was the stronger)’ (read speech) produced by a 24-year-old female speaker from Buenos Aires. Four out of five prenuclear accents are realized as rising pitch accents with early peak alignment (L+H*).

Second, nuclear accents are realized as low (L*) or falling (H+L*) tones, which in conjunction with the lengthening of the tonic syllable yields the so-called “long fall”

¹⁴ For the respective contours of Italian cf. Sorianello (2006) and Gili Fivela et al. (2015). A potential influence of Galician on the prosodic shape of Porteño Spanish is not to be denied, but it is hard to test empirically, since Galician today has no adult monolingual speakers with whom to test the transfer hypothesis following the methodology pursued in Gabriel/Kireva (2014b).

¹⁵ Other Spanish contact varieties such as Andean Spanish in contact with Quechua also exhibit early peak alignment (O’Rourke 2005).

(Kaisse 2001). Third, the tonal inventory includes a tritonal pitch accent (L+H*+L; F0 rise and fall within the tonic syllable), which preferentially occurs in emphatic and contrastive contexts (Gabriel et al. 2010, 289–293; Feldhausen et al. 2011; Gabriel 2014) and is also attested in some varieties of Italian (although labeled differently by Gili Fivela 2002, 341, and Gili Fivela et al. 2015, 148). Consider the example given in Figure 15.4.

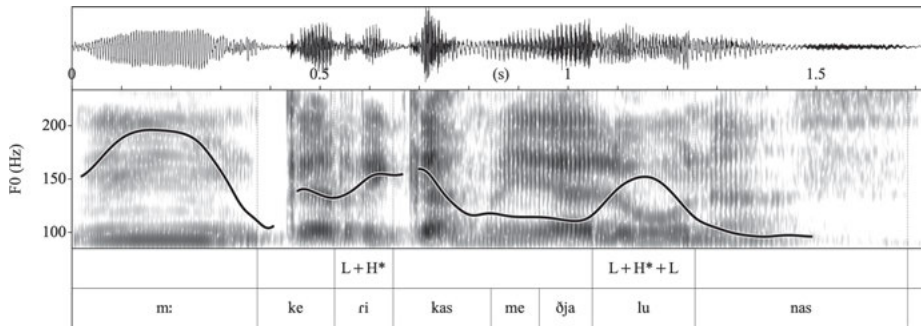


Figure 15.4: F0 contour and waveform of the emphatic exclamative *Mmmh ... ¡Qué ricos medialunas!* ‘Mmmh ... What delicious croissants!’ (semi-spontaneous speech) with a tritonal pitch accent L+H*+L in nuclear position produced by a 20-year-old male speaker from Buenos Aires.

Fourth, the final contour of information-seeking yes-no questions features an upstep of the nuclear accent (L+_iH) followed by a falling bitonal boundary tone (HL%). Such falling interrogative contours are also attested in several varieties of Italian, including southern (Naples, Salerno, Cosenza, Bari), central (Pisa, Lucca), and northern ones (Torino), whereas many other varieties present rising nuclear configurations in interrogatives (Gili Fivela et al. 2015, 169). Consider first the example given in Figure 15.5.

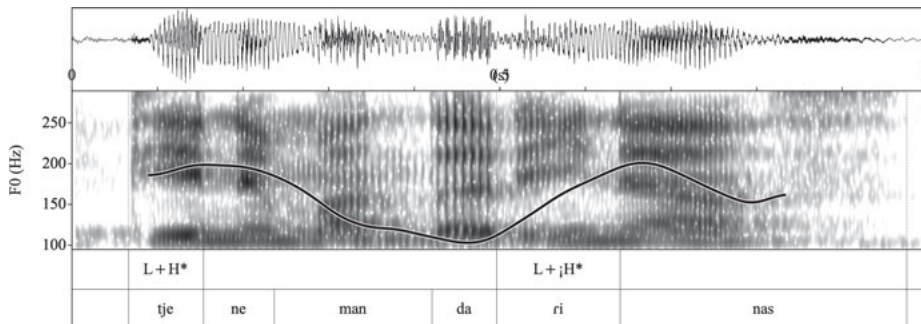


Figure 15.5: F0 contour and waveform of the neutral yes/no-question *¿Tiene mandarinas?* ‘Do you have tangerines?’ (semi-spontaneous speech) produced with an upstepped nuclear accent (L+_iH) and a falling bitonal boundary tone (HL%) by a 32-year-old male speaker from Buenos Aires.

It should be pointed out that in yes-no questions, which are realized with a falling pitch movement (HL%), independently of their pragmatic value (i.e. neutral or biased; Gabriel et al. 2010, 297–301), Portefño Spanish appears to have generalized one of the possible interrogative patterns from Italian. As shown by Gabriel/Kireva (2014b, 272), L2 Spanish data produced by Italian learners, by contrast, display a high degree of variability, including all types of both rising and falling contours. These partly show direct transfer from the learners' Italian L1 varieties and partly evidence successful acquisition of the rising interrogative pattern of the target language (Castilian Spanish), which consistently shows a final rise for (neutral) absolute interrogatives. However, final contours other than rising ones also exist in Castilian Spanish interrogatives, albeit with specific pragmatic meanings (cf. the falling final contours of confirmation-seeking yes-no questions; Hualde/Prieto 2015, 378). The great variability of Castilian Spanish question intonation poses a problem for learners to the extent that they need to acquire for one and the same clause type a large array of subtle tonal differences depending on different pragmatic nuances. This is in line with Sorace's (2011) Interface Hypothesis, discussed in Section 2, in that a phenomenon which is located at the external interfaces – in this case between prosody and pragmatics – is hard to acquire for foreign language learners and is likely to be lost in situations of language attrition. It thus comes as no surprise that learner data show a large array of variability. However, once a (former) learner variety such as the L2 Spanish spoken by (mainly, but not only) Italian-born immigrants in the less wealthy neighborhoods of Buenos Aires consolidates in the form of a contact variety, which is increasingly given the status of a standard variety, the original variability of the F0 contours decreases and solidifies in a certain direction – in this case in the sense of the generalized falling interrogative contour. Interestingly enough, this interpretation is corroborated by the outcomes of Pešková's (2021) study on the interrogative contours of Paraguayan Spanish, a variety which is used as an early L2 by many of its speakers. Based on a corpus of semi-spontaneous speech, the author shows that Paraguayan Spanish also displays a rather small inventory of nuclear configurations for yes-no questions which can be interpreted as the result of the overgeneralization of certain F0 patterns from one pragmatic context to another.

Further examples of CLI resulting from contact between a Romance language and another intonation-only language include Olivenza Spanish (Kireva 2016; Kireva/Gabriel 2016; Gabriel/Grünke/Kireva 2020), Spanish as HL in the USA (Alvord 2006; 2010), Majorcan Catalan in contact with Spanish (Simonet 2008), Spanish in the Basque country (Elordieta/Romera 2020; Romera/Elordieta 2020), Galician and Spanish in Galicia (Fernández Rei 2019), and Corsican French in contact with Italian (Boula de Mareüil et al. 2015). All of these studies focus on the tonal shape of interrogative contours, which at least partly pattern with those found in the respective contact languages. The shape of pre-nuclear accents in Bulgarian Judeo-Spanish read and semi-spontaneous speech is addressed by Andreeva et al. (2017; 2019). Finally, the broad study on Algherese Catalan in contact with Sardinian by Vanrell et al. (2020)

should be mentioned. The authors show that most nuclear configurations described for Sardinian are also found in Algherese, and each with the same pragmatic function. However, about half of the nuclear configurations also occur in other Catalan varieties, and Algherese also exhibits specific patterns (such as L+H* !H% used to mark vocatives), which appear neither in the (mainland) Catalan nor in the Sardinian data. According to the authors, this suggests that Algherese as a typical contact variety has undergone language-internal changes in addition to being influenced by its neighboring languages.

5.2 Contact between Romance and tone languages

Turning to the second setting mentioned at the beginning of this section, we briefly discuss the tonal characteristics of so-called Argenchino Spanish, already addressed in 4.3 with respect to its rhythmic patterns. As shown with the example displayed in Figure 15.6, this variety displays conspicuous traces of contact with the L1 of its speakers at the intonational level.

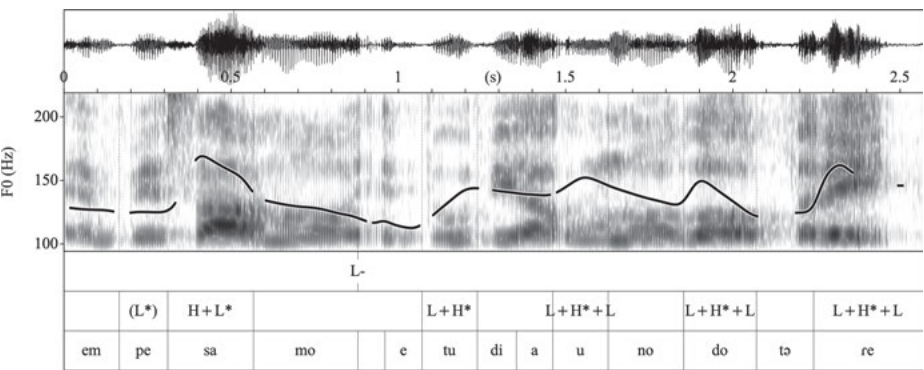


Figure 15.6: F0 contour and waveform of the utterance *Empezamos (a) estudiar: uno, do(s), tre(s)* ‘We started to study: one, two, three’ (spontaneous speech, sociolinguistic interview) produced by a 64-year-old male bilingual Mandarin Chinese-Porteño Spanish speaker from Buenos Aires (adapted from Gabriel 2018, 52).

With regard to the stress patterns of the phonological word, the example analyzed here differs from both Porteño and Mainstream Spanish in that the infinitive *estudiar* [e.ˈtu.di.a] ‘study_{INF}’ is stressed on its antepenultimate instead on its final syllable. At least as conspicuous is the additional low tonal target (L*) added to the verb form *empezamos* ‘start_{1PL,PRET}’: as can be seen in Figure 15.6, the F0 contour does not rise continuously up to the beginning of the metrically strong syllable, as would be expected from regular phonetic interpolation between the beginning of the

intonational phrase and the tonal target H. The constant low contour realized on the pre-tonic syllable *-pe-* and the abrupt rise, which contributes to the impression of separately realized syllables (called “staccato effect” in the literature on Chinese learner Spanish; cf. Cortés Moreno 2004; 2006), can be modeled within the framework of the autosegmental-metrical model (↗9 Intonation) by assuming an additional low tonal target (L*) inserted immediately before the accented syllable *-sa-*. Tonal insertions of this kind can be plausibly interpreted as a fossilized feature, typical of learners whose first language is a tone language: from their L1, they are used to the fact that every syllable is tonally specified in the mental lexicon, which makes it difficult for them to cope with a language such as Spanish that requires F0 interpolation across several metrically weak syllables.

Overall, research on the interaction of Romance with tone languages is still sparse. However, some empirical studies have recently been conducted on the intonation of several Afro-Hispanic varieties (Rao/Sessarego 2016; Fenton/Bustin/Muntendam 2020; Korfhagen/Sessarego/Rao 2021). The specific situation of these varieties consists in the fact that their present-day speakers are monolinguals, which means that the contact situation with African tone (and non-tone) languages lies in the past and that the tonal patterns that diverge from other Spanish varieties are to be considered as cases of substratum transfer. Further studies on interaction of Romance with tone languages include the work done on Yucatecan Spanish (regarding the tonal and syntactic marking of contrastive focus; cf. Gutiérrez Bravo/Sobrino/Uth 2018; Uth 2019) and on African varieties of French (cf. Avanzi/Bordal Steien 2016; Nimbona/Simon 2016; Bordal Steien/Yakpo 2020).

6 Conclusion and outlook

We have seen many instances of phonological consequences that can be attributed to the bi-, tri-, or multilingual competence of speakers in a range of speech communities. We hope to have illustrated that all domains of phonology are at stake, be it features of segments, the construction of metrical grids, its rhythmic performance in time, or the form of pitch accents and boundary tones. As we have pointed out in the beginning, we could never hope for exhaustivity, since plurilingualism is nothing special but default for most societies, and since the range of Romance-speaking societies across the world is so vast. Facing these facts, we opted to show contact-induced variation and change at different levels of phonological structure. We think that the rather complex picture that we have painted already points to our theoretical conclusion that phonological variation triggered by multilingual competences must not be reduced to single mechanisms of transfer. Rather, features, rules, and constructions available in different social scenarios of multilingualism can be combined across the boundaries of historical languages in very different ways, only few of which can be

accounted for as transfer. The systemic and social restrictions on their combination should be one of the main topics in research on multilingualism. They are visible in the linguistic behavior of speakers whose competence features more than one linguistic tradition. Thus, the study of multilingualism and language contact is not only a contribution to historical linguistics but also an important heuristic for the study of linguistic systems and social networks.

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Elissa Pustka

16 Loanword phonology in Romance

Abstract: This chapter gives an overview of the internal and external factors determining loanword phonology and discusses open questions in current theoretical research on the basis of selected examples from French, Italian, and Spanish in contact with mainly English and Latin. It presents the outcomes, in the vowel domain, of French nasal and front rounded vowels, in the consonant domain, of English /ŋ/ and French /ʒ/, and in the syllable domain of initial sibilant-plosive clusters and final consonants from Latin and English, as well as /tʃ/ from Nahuatl in (Mexican) Spanish. These cases show that spelling pronunciation plays a particularly important role in Romance languages and that English and Latin loanwords are imitated in French and adapted in Spanish, while Italian presents an intermediate case. This can be explained by the more or less transparent grapheme-phoneme correspondences in the respective languages.

Keywords: language contact, borrowing, imitation, adaptation, repair strategies

1 Introduction

“Contact phonology” (Smith 2007) can be divided into two sub-disciplines: L1-to-L2 interferences resulting in so-called “contact varieties” (≥15 The phonology of Romance contact varieties), and phonic “imitations” and “adaptations” of loans from “source languages” to “recipient languages” (van Coetsem 1988, 7–8), which are the subject of the present chapter. This “loan phonology” (van Coetsem 1988; Calabrese/Wetzels 2009) or “loanword phonology” (Kang 2011) has been broadly discussed in the framework of contact linguistics since Paul (1880/1995) and Weinreich (1953/1968). However, for a long time, loan phonology has been neglected in phonological descriptions and analyses of particular languages (cf. Smith 2007, 76, 105–106). Yet in the last decade, it has attracted increasing attention because it is particularly interesting for phonological theory in at least two important ways (cf. Smith 2007; Calabrese/Wetzels 2009; Kang 2011; Andersson/Sayeed/Vaux 2017). Firstly, the phonic *adaptation* of loans to the recipient system can provide supplemental evidence beyond production data, regarding segmental, subsegmental, and suprasegmental characteristics of a given language as well as linguistic structures in general (e.g. for the question of whether cognitive representations are rather phonological, phonetic, or mixed; cf. Section 3). Secondly, the less common *imitation* of loans can, like interferences, lead to language change and thus provide evidence for universal mechanisms of sound change (e.g. preference for elision vs. epenthesis as a repair strategy; cf. Section 4).

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Romance languages provide a broad empirical base for investigating the operation of these two processes in loanword phonology. It is important to underline that research on this topic is at present divided into two completely independent discourses. On the one hand, studies in Romance linguistics have a rather descriptive stance and often only contain some illustrative examples. Some publications report explorative analyses of dictionaries, which, in the case of Anglicisms, often signal the original English pronunciation instead of real usage, a practice that has been particularly criticized in the case of Italian (cf. Schweickard 1998, 294; Heinemann 2003, 318). The international theoretical discourse, on the other hand, is dominated by a hypothesis testing approach, but only a few studies consider Romance languages (mainly French): LaCharité/Paradis (2005) used an elicitation technique and Vendelin/Peperkamp (2006) conducted a production experiment with non-words. Corpus phonological data, in contrast, are scarce in this domain,¹ and comparative studies remain a desideratum. The aim of this chapter is therefore to bring the theoretical and the descriptive perspectives together, in order to provide a basis for further research in this field.

The chapter concentrates on the contact of the Romance languages² French, Italian, and Spanish³ with each other, and with English and Latin. English has, for political, economic, and cultural reasons, evolved since World War II as the international *lingua franca*, spreading more and more across social groups, replacing (elitist) French (cf. Dardano 1986, 231–232; Volland 1986, 13; Telling 1987, 14; Schweickard 1998, 291; Friesner 2009, 118). Prior to that time, Anglicisms in Romance typically took hold via French (cf. Schweickard 1991, 76; Rodríguez González 2002, 134), e.g. Sp. *bebé* and *biftec* (cf. 2.1.1 and 3.2). A very special case is represented by reloans, which are quite common between French and English, e.g. Fr. *desport* > Eng. *sport* > Fr. *sport*, Fr. *entrevue* > Eng. *interview* > Fr. *interview* (cf. Jablonski 1990, 7). Today, English has a bigger influence on American varieties of Romance languages than on European ones (cf. 2.2). European varieties are rather directly influenced by their Romance neighbors.

The other important contact language investigated in this chapter, Latin, has had a very special influence on Romance languages. Its role therefore differs considerably from that of the other languages. Firstly, it is a classical language, which no longer has native speakers, and secondly, it is at the same time the source of the Romance

¹ The French-language corpus PFC (cf. www.projet-pfc.net, Durand/Laks/Lyche 2002) has not been analyzed with respect to loanword phonology, even though it contains appropriate material. The loanword data in the Spanish-language corpus FEC (cf. Pustka et al. 2018) have been analyzed by Pustka (2020).

² The chapter is limited to contact between languages, without considering contact between varieties of the same language. Cf. e.g. Pustka (2007) for phonological change in Southern French as a result of Parisian influence.

³ For Portuguese, cf. e.g. Cardoso (2005) and Schmidt-Radefeldt (2007), for Romanian, Chitoran (1986) and Constantinescu/Popovici/Ștefănescu (2002).

languages and their most important contact language. It should be emphasized that progenitor language and contact language represent different varieties of Latin. While Romance native words go back to Vulgar Latin, loanwords are borrowed from Late or Medieval Latin. In a similar vein, in the case of English, American varieties of the Romance languages are more influenced by American English, whereas British English may play a major role in Europe. We will come back to these socio-historical and variational aspects in Section 2.

The chapter is structured as follows. Section 2 gives an overview of the basic concepts and open questions in loanword phonology. It first presents cognitive, emotional, and social motivations for borrowing (2.1) and then explains the two pathways of loanword phonology, imitation and adaptation (2.2). After a digression on the special case of borrowing via graphic (or written) forms (2.3), it shows how the resulting mixed phonological systems can be modeled (2.4). Sections 3 and 4 are dedicated to the discussion of Romance examples from the two most investigated levels so far, phonemes and syllable structure. With respect to vowel phonemes, I have selected cases where French is more complex than Spanish and Italian. We will see what the outcomes are of its nasal vowels (3.1.1) and front rounded vowels (3.1.2). With respect to consonant phonemes, we will examine the history of the English velar nasal /ŋ/ in Romance (3.2.1) and of the French voiced sibilant /ʒ/ in Italian and Spanish (3.2.2). Regarding syllable structure, we will analyze initial sibilant-plosive clusters from Latin and English (4.1), final consonants from Latin and English (4.2) and the cluster /tʃ/ from Nahuatl in (Mexican) Spanish (4.3).

The comparison between the three Romance languages shows that the graphic system plays a central role for loanword phonology. Whereas the transparent orthography of Spanish leads to the adaptation of loanwords, the etymological orthography of French leads to their imitation. Italian presents an intermediate case. The French case demonstrates how the integration of loanwords can complexify the phonological system, on the segmental as well as on the syllabic level.

2 Loanword phonology: basic concepts and open questions

2.1 Motivations for borrowing: cognitive, emotional, and social factors

Loanword phonology is concerned with the borrowing of lexical items. These borrowings are the result of language contact, which can occur in several contact situations. These include contact at the borders between two language territories, via individual journeys (especially in the context of trade), through wars, conquests and colonization, or by (mass) immigrations for economic or political reasons. Another favoring

factor of lexical borrowing is popular culture in its different facets ranging from music and film to online media and social networks. In fact, lexical borrowing requires only a small amount of contact, whereas influences on the grammatical, phonological, and semantic levels are usually the result of more intense contact, whence the quote “words first, grammar later (if at all)” (Thomason 2001, 64). When speakers are not fluent in the source language or if the number of bilinguals is small, only content words, mostly nouns, are borrowed (cf. Thomason 2001, 70). This change in the lexicon can trigger a change in phonology, as we will see in 2.2. The borrowing of lexical items therefore happens or does not happen for different external (sociolinguistic and psycholinguistic) reasons.

When it happens, word borrowing can have different pragmatic functions. Since Paul (1880/1995, 393), two types of loanwords have been distinguished: loans filling a conceptual gap (*necessary loans*); and loans connoting prestige (*luxury loans*), the latter being particularly criticized by purists (cf. Rey-Debove⁴/Gagnon 1981, XII; cf. below). Necessary loans concern proper names (toponyms and anthroponyms) and content words for as yet unknown referents. These can be elements of nature and cultural products of the territories and populations of the source language. Luxury loans only add new connotations with the new sign for a known referent (which can be denoted by an older sign without these connotations). When the source language carries more prestige than the recipient language, this prestige has an analogous effect on the speaker using it. Speakers can therefore present themselves as cosmopolitans (cf. Labov 1972; Blom/Gumperz 1972) using luxury loans. Other explanations for these borrowings may relate to economy and expressivity (cf. Dardano 1986, 234, 242–243). It should be underlined that by exceeding the simple language function of transmitting information, these loans also meet social and/or emotional needs of speakers (cf. Winter-Froemel 2011, 304). If we consider these different cases, it is obvious that loanwords come from both substrate and superstrate languages (cf. Krefeld 2003). In the traditional sense, substrates are the extinct languages of conquered ethnic groups with lower overt prestige, superstrates are the extinct languages of former conquerors with higher overt prestige; all other contact languages are called *adstrate* (for discussion of the terms *overt* and *covert prestige* cf. Labov 1966 and Trudgill 1972). Substrate languages denominate nature- and culture-specific realia, and with their covert prestige, they convey local authenticity. In this regard, we will see examples of both imitation and adaptation of phonotactic structures via lexical borrowing in the case of /tʃ/ from Nahuatl to (Mexican) Spanish in 4.3. The best example for a contact language with high overt prestige today is the world language English (cf. Smith 2007, 76–77). In the 18th and 19th century, French had the position of an international language in diplomacy with outstanding cultural prestige (cf. Rey/Duval/Siouffi 2007, 823–24, 1098–99). Until

⁴ Co-editor of the *Petit Robert* (PR).

then, Latin had assumed this role. Since it ceased to be a native language as early as the Middle Ages and became an erudite written language, it is treated separately in 2.3.

So far, we have presented the motivations for borrowing, but we should also keep in mind the reactions to borrowing, which may provide insights into what may prevent borrowing. This applies to loanwords in general and in particular to their effects on the phonological system (cf. Meisenburg 1993, 50; Schweickard 1991, 81–82). In fact, foreign influences are condemned by language purists, designated with polemic blends like *Franglais* (cf. Étiemble 1964), *(E)Spanglish* (cf. Otheguy/Stern 2011) or *Italiense* (cf. Dardano 1986, 242). This negative attitude towards borrowings can be found, for example, in the introduction to the *Dictionnaire des anglicismes* (Rey-Debove/Gagnon 1981) with respect to pronunciation as well as to the graphic form.

Le lecteur s'apercevra ensuite avec étonnement que si certains anglicismes ont un aspect 'barbare', comme *merchandising* ou *juke-box*, d'autres, au contraire, ont un visage familier, comme *esthète*, *mentalité*, *respectabilité*, au point qu'ils passent pour français. Et tout le monde s'accorde pour affirmer que c'est la forme originale de l'anglicisme qui risque de perturber le système de notre langue ; on s'avise alors que cette forme se manifeste tantôt dans la prononciation, tantôt dans la graphie, tantôt dans les deux. Certains mots ont gardé plus ou moins leur prononciation anglaise comme *design* [dizajn], *eye-liner* [ajlajnœʁ], et sont imprononçables ; d'autres se prononcent aisément mais ont une graphie déroutante comme *cartoon* [kɑʁtun], *tee-shirt* [tifœʁt], *feed-back* [fidbak], *tie-break* [tajbʁœk] [...] (Rey-Debove/Gagnon 1981, VI).

'The reader will then be surprised to discover that while some Anglicisms appear 'barbaric', such as *merchandising* or *jukebox*, others seem familiar, such as *esthète*, *mentalité*, *respectabilité*, to the point that they seem French. And everybody agrees that it is the original form of the Anglicism that may disrupt the system of our language; we realize then that this form is sometimes manifested in the pronunciation, sometimes in the spelling, sometimes in both. Some words have more or less kept their English pronunciation, such as *design* [dizajn], *eyeliner* [ajlajnœʁ], and are not pronounceable; others are easily pronounced but have a confusing spelling like *cartoon* [kɑʁtun], *tee-shirt* [tifœʁt], *feedback* [fidbak], *tie-break* [tajbʁœk] [...].'

The rejection of Anglicisms in French is expressed overtly, qualifying them as 'confusing' (Fr. *déroutant*), 'unpronounceable', and even 'barbarous'. In their lexicographic practice, the *Diccionario de la lengua española* (DLE) and the *Diccionario panhispánico de dudas* (DPD) are even stricter than the *Petit Robert* (PR) as shown by the citation in 4.1.

2.2 Two pathways of loanword phonology: imitation and adaptation

As pointed out in the introduction (cf. Section 1), loanwords can take two directions phonologically. They are either adapted to the recipient system or they are imitated and thus may lead to changes within the system (cf. Calabrese/Wetzels 2009, 1; Munske 2010, 31). Both possibilities – *adaptation* and *imitation* (total reproduction being quite possible) – are different results of the same borrowing process, depending

on several external (cf. 2.2) and internal (cf. Sections 3 and 4) factors. This process can be modeled in two steps – *innovation* and *diffusion* (cf. Labov 2001). I will first give a brief sketch of the universal process of (language) change and then examine in detail the contact-specific conditions of borrowing (cf. 2.1), including the psycholinguistic factor of L2 competence in individual speakers and the sociolinguistic factor of prestige of the L2 language within their community.

The diffusion of innovations always follows the same path, beginning with an innovation (of ideas or objects) and then spreading through the community; according to Rogers's (1962) Diffusion of Innovations Theory, the diffusion follows an S curve. When it comes to language, leaders of change have been identified as young cosmopolitans with weak network ties between social groups. Subsequently, early adopters are central members of the group with strong network ties. Presenting a model for others, they can cause a change of the group norms (cf. Labov 1972; Blom/Gumperz 1972; Milroy/Milroy 1985). When it comes to borrowings, the L2-competence of the individual speakers plays a role in both innovation and diffusion. In fact, borrowings (as a type of innovation) can take place within the speech of a more or less bilingual speaker (in contrast to L1-to-L2 substratum interference, which always requires a certain amount of bilingualism; cf. Thomason 2001, 75). A speaker who is fluent in the source language can produce a type of code-switching in which the different elements of the utterance follow the phonological structure of their respective systems. However, when the speaker has only little competence in the L2, the borrowed word will be adapted by the perceptual filter of his or her L1 (→ 14 Second and third language acquisition of Romance phonology).⁵

These different degrees of competence in the source language also affect diffusion. When the L2 word in question is perceived and reproduced by non-bilingual speakers of the community, it is in most cases adapted to their L1 system. Only when the number of bilingual speakers is very high can the original pronunciation of the L2 be established in the L1 community and, as a consequence, change the L1 system (cf. Paul 1880/1995, 391–397; Haugen 1952, 216; Weinreich 1953/1968, 41; Calabrese/Wetzels 2009, 1–2). Although, theoretically, it should not cause any problem to combine the two conditions of innovation and diffusion, innovation is usually realized by bilingual individuals and diffusion by monolinguals (cf. van Coetsem 1988, 9).

In addition to the psycholinguistic factor of a more or less developed competence in the L2, the sociolinguistic factor of degree of prestige of the L2 plays a crucial role in the borrowing process, especially for its phonological aspects. In speaker sub-communities in which the L2 is considered prestigious, imitation (up to faithful reproduction) of the original pronunciation of the source language functions as

⁵ In contrast to this “alternative route hypothesis” (Paradis/LaCharité 2008, 89), LaCharité/Paradis (2005, 230) claim on the basis of their study of the influence of English on French, Spanish, and Italian that the proportion of bilinguals in a linguistic community has very little effect on loanword phonology. It should be underlined that their study is only based on acceptability tests for single phonemes.

a positive identity marker; outside these sub-communities, in contrast, imitation is regarded as “phonetischer Snobismus” (‘phonetic snobbism’, Jablonski 1990, 34) or a “sign of affectation” (Rodríguez González 2002, 135), especially in the case of already adapted loans. In fact, not adapting a loan to their L1 presents a difficulty for less educated speakers (cf. Meisenburg 1993, 50). Besides the cosmopolitan orientation of the speaker, foreign language learning and practice (depending on age and education), as well as regional, cultural and economic proximity also contribute to familiarity with the L2. Imitations from English are therefore more common in the American varieties of Romance languages than in the European ones (cf. Schweickard 1991 for Spanish and LaCharité/Paradis 2005 for French; cf. also 3.1). With the expansion of English as a *lingua franca*, imitations of the original English pronunciation might become more and more common around the world.

2.3 A special case: borrowing via the graphic channel

A particular case of phonic change via loanwords is the *Buben* effect, the development of a new pronunciation on the basis of the written form, also called *spelling pronunciation* (Buben 1935). In this case, Pratt (1980, 16) speaks of “eye loans” in contrast to “ear loans”. While ear loans for a long time constituted the normal case due to prevalent illiteracy, eye loans became more and more important with compulsory schooling and the spread of the press between the end of the 19th and the mid-20th century, at least amongst educated people (cf. Pratt 1980, 16). Since that time, audio-visual mass media have inverted the impact of the two ways of borrowing (cf. Dardano 1986, 237; Rodríguez González 2002, 136–137). Current trends in internet and smartphone communication (e.g. Facebook, WhatsApp), in turn, show a balance between the two channels, whose effects on loanword phonology have yet to be studied in detail.

These historical changes in the importance of the two channels and the complex interactions between them can be illustrated by the borrowing of Eng. *meeting* into French. The 18th century “ear loan” first adapted Eng. /ɛ/ to Fr. /n/, which is reflected in the initial spelling Fr. *mitine*. Afterwards, the “reanglicization” (cf. Rey-Debove/Gagnon 1981, VII) giving the “eye loan” Fr. *meeting* generates an imitation of /ɛ/ (cf. 2.2.1). It is important to underline that there is an asymmetry between the two cases. While adapted orthographies lead to a stabilization of the adapted pronunciation, non-adapted orthographies leave more room for variation and change. It is not uncommon that parallel graphic (and phonic) forms emerge via both channels. Different graphic forms can even lead to semantic differentiations, e.g. Sp. *fútbol* (or *futbol*) ‘(European) soccer’ vs. *football* ‘American football’ (cf. Rodríguez González 2018, 359).

Furthermore, spelling pronunciation is the only possibility for borrowings from classical languages like Latin. Such learned words are particularly common in Romance

languages: Fr. *mots savants*, It. *voci dotte*, Sp. *cultismos*. Additionally, we also find semi-learned words with ‘delayed’ sound change, called Fr. *mots demi-savants*, It. *voci semidotte*, Sp. *semicultismos*,⁶ and finally relatinizations (cf. Ernst 1991, 185). We will take a closer look at these cases in 4.1, with reference to initial sibilant-plosive clusters.

2.4 Mixed systems resulting from imitation

The result of the imitation scenario described in 2.2 and 2.3 is a mixed phonological system. While older frequent everyday vocabulary is composed of a well delimited inventory of phonemes and syllable types, recent loans (as well as proper names and onomatopoeia) can, as exceptions, contain additional sounds and more complex syllables. There has been a long debate about the question of whether these exceptions are part of the phonological system of the borrowing language. In order to capture the gradual nature of the often very long borrowing process, a dynamic core-periphery model has been proposed in both the structural and generative frameworks (cf. Vachek 1966; Chomsky 1981; Itô/Mester 1995; Heinz 2014). This phonological model is corroborated by semantics and sociolinguistics. Just like other innovations, loans often appear first in technical language related to specific subcultural contexts before diffusing into the colloquial language of the whole community (cf. Humbley 2002, 112).

For the syllable structure of some Romance languages and varieties, especially Southern Peninsular and *tierras bajas* Spanish as well as Brazilian Portuguese (BPor.), this model seems to work. The cases of French, European Portuguese (EPor.), and *tierras altas* Spanish, on the contrary, show that the situation is much more complex. In these languages and varieties, complex syllable structures appear not only in erudite loanwords from Latin, but also as the result of vowel elisions like lenition processes in colloquial speech, e.g. Fr. *je crois* [ʃkʁwa] ‘believe_{1SG}’, EPor. *desprestigiar* [dʃprɛʃtiˈʒjar] ‘depreciate_{INF}’, Peruvian Spanish (*e*)*spárrago* [ˈspaɾaɾo] ‘asparagus’ (cf. Heinz 2014, 106; Pustka 2019; cf. also Section 4). Another counter-argument against the placement of innovations in the periphery of the language system relates to the sociolinguistic diffusion of borrowings. In contrast to Latin and English in past centuries, when loans were limited to educated speakers, this is not always the case with English loans today (cf. Humbley 2002, 112; Pulcini 2002, 154). When it comes to substrate influences like /tʃ/ from Nahuatl (cf. 4.3), this is not the case either.

⁶ These words are native words with a continuous transmission from Vulgar Latin to the Romance languages which have been influenced by the Medieval Latin word, namely in the religious domain. An example is (Medieval) Lat. *ROTULUS*/-A ‘small wheel’ which results in the native word It. *rocchio* ‘drum’, the learned word It. *rotula* ‘kneecap’ and the semi-learned word It. *rotolo* ‘roll’ (cf. Lüdtke 1968, 108).

3 Phonemes

At the segmental level, effects of loanword phonology can be expected where the phonemic inventories of the languages in contact differ. “When the foreign input contains a non-native segment, the segment is replaced with the ‘closest’ sound in the native language” (Kang 2011, 8). This is what Haugen (1952, 214) already called “phonemic substitution” in contrast to “phonemic importation”, which is usually limited to bilingual speakers (Haugen 1952, 226). In order to test the substitution hypothesis, we initially have to clarify if the point of origin is a phonetic or a phonological segment and how to determine the ‘closest’ sound.

Regarding the question of phonetics or phonology, the conclusion of a long debate (cf. notably Peperkamp/Dupoux 2003 for the phonetic perspective and LaCharité/Paradis 2005 for the phonological perspective) can be seen as follows:

The empirical evidence overwhelmingly suggests that loanword adaptation is not completely based on phonetic or phonological representation; rather, both types of adaptations are attested, oftentimes within a single contact situation, leading many to conclude that the adaptation process can refer to both phonological and phonetic (as well as morphological, semantic and orthographic) details of the source language. [...] From this perspective, a more appropriate question is not whether loanword adaptation is phonological or phonetic, but rather what factors make one type of adaptation more likely than the other. For example, aspects of the contact situation, such as the level of bilingualism or the spoken vs. written channel of borrowing, have been proposed as factors that help shape the adaptation pattern [...] (Kang 2011, 12).

Romance data allow for a pursuit of this discussion from a comparative perspective. Starting at (nearly) the same point of origin in Proto-Romance or even in Vulgar Latin, differentiating external factors can be perfectly isolated.

The second open question concerns the “closest” sound. The front close and rounded [y] (e.g. in French), for instance, has been replaced in some recipient languages by back [u], and in others by unrounded [i] or by a sequence of a front unrounded and a back rounded segment [ju] (cf. Kang 2011, 8). It remains to be explained why one of these solutions is adopted in one case and another solution in a different one. Romance data can provide a precious contribution to this debate.

In what follows, we will take a look at some selected cases in the domain of vowels (cf. 3.1) and consonants (cf. 3.2). Comparing French, Italian, and Spanish with English, we note that Spanish possesses the simplest phonemic inventory, followed by Italian and then French, and that the English system differs from the others in numerous respects. For this internal reason, in addition to the socio-historical importance of English and French as source languages, the present section focuses on the influence of English on the three Romance languages French, Italian, and Spanish (cf. 3.2.1)⁷ and on the influence of French on Italian and Spanish (cf. 3.1.1, 3.1.2 and 3.2.2).

⁷ For an overview of phonemic adaptations in loanwords from English cf. Humbley (2002) for French, Rodríguez González (2002) for Spanish, and Pulcini (2002) for Italian.

3.1 Vowels

The common base of the Romance vowel systems is composed of the five elements /i e a o u/. Standard Italian and Standard French (and also some Spanish varieties, e.g. Galician Spanish) additionally distinguish between half-close and half-open vowels, i.e. /e/ vs. /ɛ/ and /o/ vs. /ɔ/, although not in all their varieties. The French vowel system is much more complex, containing a series of nasal vowels (/ɛ̃ ã ɔ̃/; cf. 3.2.2), a series of marked rounded vowels (/y ø œ/; cf. 3.2.3), and finally schwa /ə/ (cf. 3.2.3).

3.1.1. French nasal vowels

A well-known case of marked phonemes which are supposed to be reduced in language contact are nasal vowels. While they are part of the French phoneme inventory, they are absent in Spanish and Italian. Table 16.1 shows the outcomes of two of the three French nasal vowels⁸ /ɔ̃/ and /ã/ in the other two Romance languages, illustrated with examples *champignon* and *restaurant*. Since the IPA transcriptions for Italian differ entirely from the accompanying sound files in the PONS dictionary, my own transcriptions are included here (labeled with “sound” in the table).

Table 16.1: Outcomes of French nasal vowels in Spanish and Italian (PONS).

French etymon	Italian	Spanish	English translation
/ɔ̃/ <i>champignon</i> [ʃãpiɲɔ̃]	<i>champignon</i> [ʃãpi'ɲɔ̃] sound: [on]	<i>champiñón</i> [ʧampi'ɲon]	'mushroom'
/ã/ <i>restaurant</i> [ʁestɔʁã]	<i>restaurant</i> [restɔ'rã] sound: [ant]	<i>restaurante</i> [restaw'rante]	'restaurant'
<i>croissant</i> [kʁwasã]	<i>croissant</i> ⁹ sound: [krui'sant]	<i>cruasán</i> [krwa'san]/ [kru'san]	'croissant'

The examples in Table 16.1 show that loanwords from French are adapted, the nasal vowel being substituted by a sequence of an oral vowel and a nasal consonant, following the graphic forms: Sp./It. [on] for Fr. *on*, Sp./It. [an] for Fr. *an*. In all cases, it is

⁸ /ɛ̃/ coincidentally does not appear in common loanwords from French to Italian and Spanish.

⁹ No phonetic transcription in this case in the PONS dictionary.

the graphic form that is reproduced, with the elision of the final mute *t* in Sp. *cruasán* from Fr. *croissant* (cf. NGLE 2011, 315).

3.1.2 French front rounded vowels

Another particularity of the French vowel system in comparison to Italian and Spanish are the rounded front vowels /y/, /ø/ and /œ/ (the last two having a tendency to complementary distribution).¹⁰ Table 16.2 shows their outcomes in Spanish and Italian.

Table 16.2: Outcomes of French front rounded vowels in Spanish and Italian (cf. PONS).

French etymon	Italian	Spanish	English translation
/y/ <i>peluche</i> [p(ə)ly]	<i>peluche</i> [pə'luʃ] sound: [e] instead of [ə]	<i>peluche</i> [pe'lutʃe]	'plush'
/œ/ <i>chauffeur</i> [ʃoʃœʁ]	<i>chauffeur</i> [ʃo'fø:r] sound: [e] instead of [œ]	<i>chofer</i> ¹¹ [tʃo'fer] / <i>chófer</i> ['tʃofer]	'chauffeur'

Table 16.2 shows that French front rounded /y/ is substituted by back rounded /u/ in both Spanish and Italian, a possibility which is known from several other languages of the world (cf. above). When we look at French front rounded /œ/, we see a substitution by front unrounded /e/.

The case of Fr. *peluche* illustrates that French schwa is not assimilated to /œ/ or /ø/ by Italian and Spanish speaker-hearers, even though its realization is much closer to it than to the theoretical neutral vowel /ə/ (cf. Bürki et al. 2008). The realization as [e] indicates instead the case of an eye loan, realizing the grapheme according to the native grapheme-phoneme mapping, a well-known process in foreign language learning (cf. Pustka/Meisenburg 2017, 134). An alternative explanation could be that [e] is the closest sound to /ə/ in the respective native languages which do not possess /œ/ and /ø/ in their phonological systems.

¹⁰ In contemporary standard French, [œ] appears exclusively in closed syllables (e.g. in *peur* [pœʁ] 'fear') and [ø] mainly in open syllables (e.g. in *peu* [pø] 'little').

¹¹ For Fr. *chauffeur* > Sp. *chófer* cf. Meisenburg (1993, 53).

3.2 Consonants

The consonant inventories of the Romance languages show many more differences than the vowel inventories. A unique feature of French, for instance, is the voiced sibilant /ʒ/. Only Italian possesses the affricates /ts/, /dz/ and /dʒ/ as well as geminates, and Spanish shows the opposition between /r/ and /r̄/ (↗18 Italian; ↗24 Spanish). In this chapter, two selected cases particularly fruitful for loan phonology discussions will be presented, namely the exceptional “phonemic importation” (Haugen 1952, 226) of the English velar nasal /ŋ/ into French (and Italian), and the outcomes of the French voiced sibilant /ʒ/ in Italian and Spanish (cf. 3.2.2).

3.2.1 English velar nasal /ŋ/

Imitation of the English velar nasal /ŋ/ in the suffix *-ing* is perhaps the most famous case of “phonemic importation” (Haugen 1952, 226) in Romance. French has integrated this foreign phoneme into its inventory. It is articulated today without any problems in frequent vocabulary of everyday speech and even appears in some pseudo-loans (e.g. *brushing* ‘blow-dry style’, *footing* ‘jogging’, *pressing* ‘dry cleaner’s’; cf. Rey-Debove/Gagnon 1981, VI). The phoneme remains quite rare, however, and is basically¹² limited to the suffix *-ing* (e.g. in Eng. *meeting* [ˈmi:tɪŋ] > Fr. *meeting* [mitɛ̃]), formerly *mitine*). The history of this borrowing has been documented in detail by Walter (1983). /ŋ/ has also been imported into Italian, where the uneducated variant It. *mitin* with the graphic adaptation to *n* coexists with normative It. *meeting* [ˈmi:tɪŋ] (cf. Schweickard 1998, 294). Pronunciation variants are the adapted [ŋ], the spelling pronunciation [ŋg] (cf. Heinemann 2003, 311), eventually with paragoge (cf. 4.2; e.g. *pudding* [ˈpuddɪŋə], Broniś 2016, 26). In Spanish, in contrast, Eng. /ŋ/ has been adapted on the graphic level to *n* as well as on the phonic level to [ŋ], e.g. Sp. *mitin/mitín* [ˈmitin]/[miˈtin] (cf. DLE; Pratt 1980, 142; Rodríguez González 2002, 135; NGLE 2011, 315). This seems even to be the case in varieties where final /n/ is velarized to [ŋ], e.g. *pan* [paŋ] ‘bread’ (cf. Hualde 2005, 105), namely Cuban Spanish, e.g. *filin* ‘romantic music’ (< Eng. *feeling*), *rating* [reitɪŋ]/[ratɪŋ] (cf. Molina 1999, 24, 34). The fact that the allophone [ŋ] does not facilitate imitation of the foreign phoneme /ŋ/ might constitute an argument for a strict separation of phonetics and phonology in this field (but cf. the contradictory case in French below).

¹² Walter (1983, 14) lists three words in which /ŋ/ appears in contexts other than *-ing*, *folksong*, *slang*, and *packfung*. The first two are absent from the PR, the third one is written *pacfung* and pronounced [pakfʊ̃]. The PR, in contrast, contains two additional words of German origin, *Sprechgesang* and *Weltanschauung*, *ginseng* and *yang* from Chinese and *linsang* from Javanese. Further, some words ending with *-ing* are of origins other than English, e.g. *riesling* (< German), *viking* (< Norse), and *ding* (onomatopoeia), and in one case from English, *-ing* is not realized as [ɪŋ]: *shampoing* [ʃäpwɛ̃].

Walter (1983) documents a total of 184 French words containing /ŋ/, of which 13 are attested before the 19th century, 46 during the 19th century and 125 during the 20th century. The first attestation of a loanword ending with *-ing* is *schilling* (1359), firstly transformed to *chelin* (1558) and then reborrowed as *shilling* (1656). Other early loans are *pouding* (1678) and *meeting* (1764; cf. PR). In the current PR (2017), on the contrary, we find only 135 items, 22 of which are attested after the publication of Walter (1983).¹³ With respect to its phonetic realization, Walter (1983) assumes that English /ŋ/ was in a first step adapted to /n/ or /ɲ/, or integrated into a nasal vowel¹⁴ in combination with the preceding vowel, and in a second step re-introduced as /ŋ/, and eventually adapted as /ŋg/. In the first phonological survey of French, Martinet (1945/1971) finds that between 65% and 78% of respondents (depending on their region of origin) report being capable of producing the /ŋ/ in *smoking* and *camping* “à l’anglaise” (in contrast to the adaptation to /n/ or /ɲ/). The realization rate is higher in Southern France where nasal vowels are substituted by combinations of oral vowels and [ŋ], e.g. in *croissant* [kʁwasan] for [kʁwasã]. This result contradicts the result in Spanish (cf. above), since the allophone [ŋ] seems to support the imitation of the foreign phoneme /ŋ/, which calls into question a strict separation of phonetics and phonology.

Walter’s (1983) conclusion is that /ŋ/ has become a phoneme of French, which fits perfectly in the consonantal system at the crossroads of the nasals /m/ and /n/ and the velar consonants /g/ and /k/: “[...] le phonème /ŋ/ est bien un phonème du français car, facile à intégrer dans le système par remplissage d’une case vide, il est employé de plus en plus naturellement dans le discours familier de la majorité de la population” (Walter 1983, 29).

3.2.2 French voiced sibilant /ʒ/

A consonant that appears in French, but not in Spanish and Italian, is the voiced sibilant /ʒ/, which for this reason is interesting to observe in borrowings. Table 16.3 shows its outcomes depending on position in the word (initial vs. final).

¹³ These 22 entries are: *aquabiking*, 2004; *bling-bling*, 2001; *canyoning*, 1990; *coaching*, 1987; *cocooning*, 1988; *darjeeling*, 1989; *debriefing*, 1985; *e-learning*, 2000; *géo-marketing*, 1995; *kickboxing*, 1993; *morphing*, 1992; *outing*, 1993; *piercing*, 1991; *rafting*, 1985; *rétro-planning*, 1995; *scrapbooking*, 1999; *strapping*, 1996; *streaming*, 1998; *tuning*, 1990; *vide-dressings*, 2008; *zapping*, 1986), including the new pseudo-loan *zoning* ‘suburb zone’, 1994 (Belgium).

¹⁴ This is suggested by phonetic notations in French 19th-century dictionaries where *schelling* (< Eng. *schilling*) is transcribed as *che-lein*, probably pronounced as [ɛ̃], and *pouding* (< Eng. *pudding*) as *pou-dinghe*, probably pronounced as [ɛ̃g] (cf. Walter 1983, 19). Rey-Debove/Gagnon (1981, 571) note the phonic variant [metɛ̃g] for *meeting*, with the graphic variant *métigue* (which is absent from the current PR).

Table 16.3: Outcomes of French /ʒ/ in Spanish and Italian (PONS).

French etymon		Italian	Spanish	English translation
Initial	<i>jaquette</i> [ʒa'ket]	<i>giacchetta</i> > [dʒak'ketta]	<i>chaqueta</i> ¹⁵ [tʃa'keta]	‘jacket’
	<i>génie</i> [ʒeni]	<i>genio</i> ['dʒɛ:nio]	<i>genio</i> ['xenjo]	‘genius’
Final	<i>garage</i> [ɡaʁaʒ]	<i>garage</i> [ɡa'ra:ʒ] sound: [ʃ]	<i>garaje</i> [ɡa'raxe]	‘garage’
	<i>rouge</i> [ʁuʒ]	<i>rouge</i> [ruʒ]	<i>rouge</i> [ruʃ] sound: [rouxe]	‘rouge’
	<i>beige</i> [bɛʒ]	<i>beige</i> [bɛ:ʒ]	<i>beige</i> [bejs]	‘beige’

The examples in Table 16.3 confirm the tendencies observed in the case of the French vowels in 3.2.2 and 3.2.3, i.e., that the Italian pronunciation of loanwords is more faithful to the French original than is the Spanish one. In initial position, Italian adapts the postalveolar voiced fricative /ʒ/ to the corresponding affricate /dʒ/ (e.g. *giacchetta* [dʒak'ketta], *genio* ['dʒɛ:nio]) and Spanish to the voiceless /tʃ/, represented by the graphic adaptation *ch* (e.g. Sp. *chaqueta*). An alternative way is to maintain the grapheme *g* and to interpret it according to the language's own grapheme-phoneme correspondences, in the case of Spanish as /x/ (e.g. *genio*). In final position, Italian adapts Fr. /ʒ/, devoicing it to /ʃ/, and Spanish also to the corresponding native sibilant /s/ (e.g. *beige* [bejs]; *beis* following the recommendations of the DPD); Spanish /x/ in *rouge* [rouxe], in contrast, is based again on the native grapheme-phoneme mapping. In *garaje* [ga'raxe], the French morpheme *-age* has been adapted as in many other cases to Sp. *-aje* (e.g. *bagaje* 'baggage', *menaje* 'household'; cf. DPD). The DPD explains that the graphic and phonic imitation ("extranjerismo crudo") as *garage* [gaʁaʒ] is typical for Hispanoamerica.

4 Syllable structure

Determining which syllable types form part of a linguistic system and which ones do not is much more difficult than establishing phoneme inventories (cf. Section 3; ↗2 Syllable structure and (re)syllabification). Are non-attested structures in production data due to the hazards of history or do they not exist because they are unpronounceable? In order to answer this question, we have to add to the positive evidence from the frequent 'core' vocabulary the negative evidence from infrequent 'periph-

¹⁵ Cf. Meisenburg (1993, 53) for Fr. *jaquette* > Sp. *chaqueta*.

eral' vocabulary (cf. 2.4), especially from loanwords. Imitation indicates that we are dealing only with accidental gaps whereas alternation confirms the hypothesis of phonotactic restrictions. When we look at adaptations, an additional theoretical point of interest related to loanword phonology on the syllable level concerns the repair strategies used. According to the 'Preservation Principle' (Paradis/LaCharité 1997), priority is given to the maintenance of segments, making epenthesis more probable than elision. However, this hypothesis has so far been confirmed cross-linguistically only for word-initial complex onsets, but not for word-final simple or complex codas (cf. Kang 2011, 13–15). Furthermore, it remains an open question as to why one and not the other strategy is used in a particular language or variety at a particular time in a particular word etc. Romance languages provide a large database for the study of these questions.

In Romance languages, the unmarked CV-syllable is quantitatively dominant and initial clusters of two or three elements are scarce. According to Hess' (1975) comparative statistics¹⁶ (cf. Table 16.4), CV-syllables constitute more than half of the syllables in French (60%), Italian (56%), and Spanish (53%). In contrast, only between 5% and 12% of syllables contain an onset with two elements (CC) and less than 1% an onset with three elements (CCC). While between 20% and 31% of syllables possess a coda, only between 0.08% and 2.11% possess a branched coda, more than two elements being (practically) unattested.

Table 16.4: Syllable types in Romance (based on Hess 1975, 258–270).¹⁷

	French	Italian	Spanish
V	7%	5%	9%
C-	79%	77%	74%
CC-	12%	10%	5%
CCC-	0.60%	0.80%	0%
-C	20.1%	31.2%	27%
-CC	2.11%	0.08%	0.17%
-CCC	0%	0%	0%

¹⁶ A certain disadvantage of Hess (1975) is that the percentages of syllable structures are based on a corpus of written texts with only between 8,000 to 10,000 syllables per language. However, it is interesting that her count of the syllable types of the three languages is based on the same principles, which makes the counts comparable.

¹⁷ The counting of onset and coda types is mine.

In view of this background, it is quite interesting to see how complex onsets, especially initial sibilant-plosive clusters from Latin and English (cf. 4.1), and codas, especially final plosives from English (cf. 4.2; for complex nuclei), behave in loanwords. We will also take a look at a very marked consonant cluster, /tʃ/ from Nahuatl in (Mexican) Spanish, which can appear in the onset as well as in the coda (cf. 4.3). In all three cases, the contact languages are characterized by more complex syllable structures than the Romance languages. We consequently expect either a complexification of the recipient language's syllable structure by imitation of loanwords, or repair strategies adapting the loans to the recipient system. In looking at these cases, we can see which ones of the rarely attested or even unattested syllable types (cf. Table 16.4) are really excluded in Romance, and how to explain why in some cases epenthesis occurs, while in others elision is preferred.

4.1 Initial sibilant-plosive clusters from Latin and English

Word-initial sibilant-plosive clusters in Romance have attracted a particular interest on the part of typologists and diachronists. It is a well-known fact that in this context, Vulgar Latin presents simplifications of the Classical Latin structures. In the majority of cases, we find epenthesis, which confirms the segment-maintaining hypothesis of Paradis/LaCharité (1997; cf. above), e.g. Lat. *SCHO.LĀ(M)* 'school' vs. VLat. *IS.CO.LA* > OFr. *escole* (cf. Rheinfelder 1937/1963, 183) > Fr. *école* and > Sp. *escuela* (but It. *scuola*). We also find some rare cases of elision, e.g. Lat. **SPASMARE* 'have_{INF} a spasm' vs. VLat. **PASMARE* > Sp. *pasmar* and > Fr. (archaic) *pâmer* 'faint_{INF}' (cf. Sampson 2010, 69). In the Romance languages, then, the situation is even more difficult to describe since we have doublets of native words and learned morphemes, e.g. Late Latin *SCHOLĀRIS* > Fr. *scolaire*, It. *scolare*, Sp. *escolar* (cf. Reinheimer Rîpeanu 2004, 384).

While "Spanish does not allow /sC-/onsets" (Hualde 2005, 77) and breaks them up with a prosthetic /e/, Italian maintains the Latin initial sibilant-plosive clusters (cf. Table 16.5). French takes an intermediate position with the doublet *école* ~ *scolaire* composed of a semi-learned word (*école*) with prothesis (but without diphthongization) and a learned loan (*scolaire*) with the complex onset /sk-/. These differences are systematic as examples like Sp. *espamo* vs. Fr. *spasme*, Sp. *estructura* vs. Fr. *structure* or Sp. *escrúpulo* vs. Fr. *scrupule* show (cf. Pustka 2019).

The change in French can be explained by orthography. The relatinization of the language under the influence of Erasmus of Rotterdam in the 16th century affected first the graphic form (e.g. *especial/espécial* → *spécial*) and then also the pronunciation. The elaboration of the Spanish norm under Alfonso X of Castile (*el sabio* 'the wise') during the 13th century, on the contrary, opted for graphic forms close to the pronunciation (e.g. *especial*) (cf. Sampson 2010, 105–106, 116, 122). In spite of these efforts at standardisation, the graphic variation in the texts of this age remains considerable (cf. Meisenburg 1996, 207–208).

Following the same pattern, more recent loans from English are imitated with initial sibilant-plosive clusters in French and Italian, whereas they are generally adapted by epenthesis in Spanish (cf. Table 16.5).

Table 16.5: Initial sibilant-plosive onsets from English in Romance (PONS).

	English etymon	French	Italian	Spanish
/sp-/	<i>spray</i> [spɹeɪ]	<i>spray</i> [spɹɛ]	<i>spray</i> ['sprɑːj]	(e) <i>spray</i> [es'praj] ¹⁸
/st-/	<i>stress</i> [stɹes]	<i>stress</i> [stɹɛs]	<i>stress</i> [stres]	<i>stress/estrés</i> [es'tres]
/sk-/	<i>scrabble</i> ['skɹæbɫ]	<i>scrabble</i> [skɹabl]	<i>scarabeo</i> [skara'beːo]	<i>scrabble</i> ¹⁹ sound EurSp. [eskrable] sound MexSp. [skrable]

When we look at the situation of Spanish in more detail, we see that realizations with initial sibilant-plosive onsets are not completely unknown, but appear in Hispanic American varieties, which are more influenced by (US American) English. The model pronunciations in the PONS dictionary give us some anecdotal evidence for this difference, Sp. *scrabble* being realized [eskrable] by the European Spanish voice and [skrable] by the Mexican Spanish voice (cf. Table 16.5). Other hints are graphic differences like EurSp. *escáner* vs. MexSp. *scanner* (cf. Sánchez 1995, 145). The DPD only accepts the forms with epenthesis, e.g. “**estrés**. Adaptación gráfica de la voz inglesa *stress* [...]. No deben usarse grafías con *s*-líquida, como *stres*, *stresante* o *stresar*”, and the DLE does not even have an entry for *stress* (even if “el stress” appears more than 2 million times on *Google* – in contrast to “el estrés” with 24 million hits; 2019-11-30). *Spray*, in contrast, appears beside *espray*.

4.2 Final consonants from Latin and English

Word-final consonants are far from being rare in Romance. Even if CV is the preferred syllable structure, a quarter to a third of syllables possess a coda (cf. Table 16.4). However, not all consonants can appear in this position, and some are limited to loanwords.

In French, we first observe a general tendency to elide final consonants in the Middle Ages (11th century; cf. Gess/Jacobs/Laks 2020). Then, from the Renaissance (16th century) onwards, grammarians tried to stop and even reverse this development in order to maintain and restore the etymological link to Latin – with considerable

¹⁸ For the borrowing of Eng. *spray* and *stress* in Spanish cf. also Schweickard (1991, 78).

¹⁹ The word *scrabble* does not figure in the DLE.

success. This interaction between the natural lenition process and the politics of re-latinization led to an important variation depending on the lexical item (cf. Laks 2005, 113, 119), e.g. *lit* [li] ‘bed’ vs. *lis* [lis] ‘lily’, *nez* [ne] ‘nose’ vs. *net* [net] ‘clear’ (cf. PR). The survey in Fouché (1959, 376–410) shows that the majority of words with final consonants are loanwords and foreign proper names.

Italian also maintains final consonants in loanwords. However, the epenthesis of a final vowel (*paragoge*) is quite common, in pronunciation, but sometimes also in the graphic representations, e.g. It. *pop* [ˈpop(pə)], *film(e)* [ˈfilm(ə)]; *bistecca* [bisˈtekka], *rosbiffe* beside *rosbif* [ˈrɔsbif].²⁰ As the examples show, the paragoge is in some contexts accompanied by the gemination of the proceeding consonant (cf. Dardano 1986, 237; Repetti 1993, 189; Pulcini 2002, 154; Heinemann 2003, 297; PONS).²¹ Whereas research has admitted for a long time that these pronunciations are limited to central and southern Italy or to uneducated speakers, Broniś (2016, 26) shows that they can also be found in educated speakers of Standard Italian.

Spanish, for its part, knows all three scenarios, i.e. imitation, adaptation by elision, and adaptation by epenthesis.

El español, a lo largo de toda su historia, y en especial en la época más reciente, ha ido admitiendo préstamos de diferentes procedencias, lo que ha ampliado el elenco de consonantes que pueden aparecer en posición de coda silábica final de palabra. Así, la serie oclusiva /p/, /b/, /t/, /k/, /g/ se presenta exclusivamente en préstamos, en general relativamente modernos, admitidos muchos de ellos a partir del siglo XIX: *crep*, *kétchup*; *club*, *querub*; *cenit* o *cénit*, *fagot*, *internet*, *mamut*, *pailebot*, *robot*; *anorak*, *bloc*, *coq*, *coñac*, *frac*, *kayak*, *tictac*, *vivac*; *airbag*, *grog*, *zigzag*. En estas palabras, la pronunciación de la consonante ([ˈklub]~[ˈkluβ]) alterna con su elisión [ˈklu] y, en algunos casos, con formas alternativas con e final ADVENTICIA O PARAGÓGICA ([ˈklu.βe]). Existen en el uso variantes alternantes del tipo [...] *club* ~ *clube* [...]. La forma preferida varía en cada caso en virtud de la historia de la palabra; también puede diferir la preferencia por una u otra variante según las zonas y el grado de formalidad (NGLE 2011, 312).

‘Spanish, throughout its history and especially in the most recent years, has been accepting loans from different sources, which has lengthened the list of consonants that can appear in the final syllabic coda position. Thus, the plosive series /p/, /b/, /t/, /k/, /g/ is presented exclusively in loans, that are generally relatively modern, many of them stemming from the nineteenth century: *crep*, *kétchup*; *club*, *querub*; *cenit* or *cénit*, *fagot*, *internet*, *mamut*, *pailebot*, *robot*; *anorak*, *bloc*, *coq*, *coñac*, *frac*, *kayak*, *tictac*, *vivac*; *airbag*, *grog*, *zigzag*. In these words, the pronunciation of the consonant ([ˈklub] ~ [ˈkluβ]) alternates with its elision [ˈklu] and, in some cases, with alternative forms with a final ADVENTITIOUS OR PARAGOGIC e ([ˈklu.βe]). There are alternating variants of the [...] *club* ~ *clube* type in use [...]. The preferred form varies in each case according to the history of the word; the preference for one variant or another may also differ according to region and degree of formality.’

²⁰ For the different morphological integration of the loanwords (+o, +a, +e) cf. Repetti (2006, 18).

²¹ In addition, Italian can insert a vowel word-internally, e.g. *football* [futˈbolla], [futəˈbolla], [futtəˈbolla], *vodka* [ˈvɔːdka], [ˈvɔːdəka], [ˈvɔddəka] (cf. Huszthy 2016, 437).

This widespread maintenance of final consonants in graphic forms against the Spanish phonotactic constraints, has led to discussions about the possibility of spelling pronunciations changing the Spanish phonological system or at least increasing the difference between the popular pronunciation (without final consonants) and the erudite pronunciation (with final consonants) (cf. Pratt 1980, 124; Meisenburg 1993, 57).

Finally, a comparative table illustrates the different strategies of the three Romance languages in the case of borrowing of final plosives from English (cf. Table 16.6).

Table 16.6: Final plosives from English in Romance (PONS).²²

	English etymon	French	Italian	Spanish
/-p/	<i>ketchup</i> ['kɛtʃəp]/['kɛtʃɒp]	<i>ketchup</i> [kɛtʃœp]	<i>ketchup</i> ['kɛtʃəp]	<i>ketchup</i> / <i>cátstup</i> ['ke ^ə ʃtʃup]/['ka ^ə ʃup]
/-b/	<i>club</i> [klɒb]	<i>club</i> [klœb]	<i>club</i> [klub]	<i>club</i> [klu ^β] sound: EurSp. [klub] MexSp. [klu]
/-t/	<i>ticket</i> ['tɪkɪt]	<i>ticket</i> [tikɛ]	<i>ticket</i> ['tikit]/['tikit]	<i>ticket</i> / <i>tíquet</i> ['tike ^ɪ] <i>tique</i> ['tike]
/-d/	<i>snowboard</i>	<i>snowboard</i> [snobɔːrd]	<i>snowboard</i> ['snoubɔːd]	<i>snowboard</i> [esnou'βoarð]
/-k/	<i>beefsteak</i>	<i>beefsteak</i> [biftɛk]	<i>bistecca</i> [bis'tekka]	<i>bistec</i> / <i>bisté</i> [bis'te]
/-g/	<i>bulldog</i>	<i>bouledogue</i> [buldɔg]	<i>bulldog</i> ['buldɔg]	<i>bulldog</i> [bul'do ^ʎ]

Table 16.6 shows that final plosives are, according to the PONS dictionaries, generally maintained in French and Italian. The only exceptions noted are the epenthesis in It. *bistecca* [bis'tekka] and the elision in Fr. *ticket* [tikɛ]. Spanish presents much more variation in pronunciation and in some cases also in the graphic forms, depending on the lexeme and the geographical variety. Sp. *ticket*/*tíquet* are the forms closest to the English input, whereas the other two variants present the two opposite repair strategies: elision of the final consonant in *tique*, and epenthesis of a final vowel in *tiquete* (in Columbia and Central America; cf. DPD). For *club*, imitation occurs in European Spanish and elision in Mexican Spanish. Furthermore, Eng. *beefsteak* leads to an elision in pronunciation, with variation in the graphic forms between *bistec* and *bisté*. Finally, in the case of *ticket* and *bulldog*, we see a partial reduction: ['tike^ɪ], [bul'do^ʎ].

²² The words *snowboard* and *bulldog* do not figure in the DLE nor the DPD. For *ketchup*, the DPD gives the alternative graphic forms *cátstup* and *catsup*.

The only two examples of the six in Table 16.6 with stable final consonants are *ketchup* and *snowboard*. It is quite remarkable that in some cases of final consonants, even the purist DPD does not clearly recommend the form corresponding to the Spanish system but allows variation (e.g. *bistec* and *bisté*).

A closer look at the words in Table 16.6 shows that the situation is even more complex, since some words were borrowed and again reborrowed and others were borrowed via the mediating language French. So, Fr. *club* was first realized as an eye loan with [y] in the 19th century and then, as an ear loan, with [œ] (cf. Humbley 2002, 115). It. *club*, for its part, has been borrowed via French, with the French pronunciation [klœb], which has been maintained at the border with France and by older people; elsewhere, the pronunciations [kleb] or [klab] are more common (cf. Pulcini 2002, 154). For Spanish, the DLE also notes the graphic form *clube* with epenthesis beside *club* noted in Table 16.6. According to Schweickard (1991, 76), Sp. *biftec* has also been borrowed via French (where indeed the final consonant is pronounced).

4.3 /tɬ/ from Nahuatl in (Mexican) Spanish

Nahuatl is the language of the Aztecs in central Mexico. It has been in contact with Spanish for five centuries and is still spoken by approximately 1.5 million people. The name of the language itself contains /tɬ/, an alveolar plosive with lateral release, which has different outcomes in Spanish. In content nouns, it has been adapted by elision of the lateral fricative /ɬ/ and epenthesis of final /e/, e.g. Nahuatl *xocoatl* > Sp. *chocolate*, Nahuatl *cacáhuatl* > MexSp. *cacahuate* (> EurSp. *cacahuete*), Nahuatl *tomatl* > Sp. *tomate* (cf. DLE). In toponyms, in contrast, it has been maintained, e.g. in the onset position in *Tenochtitlan* [te.no:ʃ.ˈti.tɬan] (original name of Mexico City) and in the coda position in *Citlaltépetl*, *Popocatépetl*, and *Iztaccihuatl*, the names of the three highest volcanoes in Mexico. In some varieties, only the spelling has maintained the *tl*, but /t/ is elided in pronunciation: [popokaˈtepel]. Sometimes, this is also reflected in spelling, e.g. in the Mexican Spanish word *súchil* ‘flower’ (instead of *flor*). In other cases, both consonants can be omitted, e.g. Sp. *nahua*, beside *náhuatl* (cf. NGLE 2011, 316). Thus, the case of /tɬ/ confirms that proper names can more easily contain exceptional structures in their peripheral position, whereas content nouns of everyday speech tend to be adapted to the core system (cf. 2.4).

Loanwords from Nahuatl with /tɬ/ provide interesting data for the discussion on syllabification in the different varieties of Spanish around the world, especially on the phonological status of /tɬ/. It is a well-known fact that /tɬ/ in Spanish native words like *atlas* has a heterosyllabic treatment of the type [ˈat.las] in Madrid, Sevilla and Barcelona, whereas a tautosyllabic treatment of the type [ˈa.tlas] can be observed in the North of Spain, the Canary Islands, and America. Acoustic analyses

show that the duration of initial /tl/ in loanwords from Nahuatl in Mexican Spanish is comparable to /pl/ and /kl/ and much longer than a simple onset. It can thus be concluded that the Nahuatl single segment, a plosive with lateral release, has been reinterpreted as a group composed of /t/ and /l/ in (Mexican) Spanish. The pronunciation of native words as *atlas* by speakers from Mexico and Madrid reveals indeed that the status of /tl/ is different in both varieties: In Madrid, /tl/ is weakened to [θ] or [ð] in final position and for this reason shorter than /pl/ and /kl/ (cf. Hualde/Carrasco 2009).

5 Conclusion

Romance languages provide a particularly interesting testing ground for phonological theories because they demonstrate how a word can be changed in various ways, be it native or a loan. They present, thus, a historical comparative testing laboratory to separate internal from external factors, in order to have a deeper insight into both. With respect to internal factors, this concerns very general questions related to borrowing like imitation vs. adaptation, but also more specific ones like the debate on phonological vs. phonetic representations as the basis for borrowing, and the priority of elision or epenthesis as a repair strategy in the case of adaptation. With respect to external factors, we can determine the impact of spelling pronunciations depending on the principles of the respective graphic systems as well as the influence of cosmopolitanism and of the prestige of particular source languages. In addition to these general tendencies, we indeed have to account for the fact that “every word has a history of its own” (Malkiel 1967). Indeed, sometimes one word can even have two or three histories (e.g. Eng. *ticket* > Sp. *tíquet/tique/tiquete*; cf. 4.2).

The discussed examples show that spelling pronunciation plays a central role in Romance languages, on the phonemic level as well as on the syllabic level. Further, we saw that English and Latin loanwords are mostly imitated in French and adapted in Spanish (cf. Schweickard 1998, 294). This can be explained neither by the phonological systems of the respective languages nor by the attitudes of their speakers towards the contact languages. The cause might again lie at the graphic level, since Spanish is characterized by a ‘flat’ orthography with a very close relation between pronunciation and spelling, in contrast to the extremely ‘deep’ orthography of French with its relatinized spellings (cf. Meisenburg 1993, 49–51). Italian can be seen as an intermediate case. On the one hand, its pronunciation is relatively close to graphic forms, on the other hand, it is very open to the imitation of foreign structures – with the exception of final consonants which are repaired by paragoge.

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II Phonetics and phonology of Romance languages

Margaret E. L. Renwick

17 Romanian

Abstract: This chapter provides an overview of the phonetics and phonology of Modern Standard Romanian, the principal Daco-Romanian variety. It describes and exemplifies the language's phonological inventory, phonological processes affecting vowels and consonants, acoustic patterns (particularly among vowels), basic stress patterns, and intonational tunes. Attention is given to phenomena that differentiate Romanian from other Romance languages, including its central vowels and diphthongs, metaphony, secondary palatalization, and tolerance for complex consonant clusters. Throughout the chapter, interactions between morphology and phonology are also highlighted. Stress patterns are shown to be largely predictable based on prosodic word boundaries, while the intonational patterns of Romanian can be captured via an autosegmental, ToBI-style approach. The chapter emphasizes recent scholarly works, including theoretical contributions, large-scale phonetic analyses, and studies of variation in Romanian.

Keywords: Romanian, diphthongs, vowel centralization, coarticulation, palatalization

1 Introduction

This chapter provides an overview of the phonetics and phonology of the Romanian language, highlighting recent contributions whose purview are features that distinguish Romanian from other Romance languages. Much current work on Romanian falls under the umbrella of laboratory phonology, in which experimental or acoustic data are used to answer questions of theoretical interest, with the goal of aligning phonological analysis with synchronic phonetic reality.

The variety of Romanian at the focus of this chapter is Modern Standard Romanian, which developed from Daco-Romanian, spoken in Romania, Moldavia, Ukraine, Hungary, and Serbia. Romanian comprises several other varieties, characterized by e.g. Rosetti (1973; 1986): Istro-Romanian, spoken in Croatia and by immigrant communities elsewhere; Aromanian, spoken in Albania, Bulgaria, Greece, and Macedonia; and Megleno-Romanian, spoken in Greece. Romanian was isolated, geographically and politically, from other Romance languages during its development, motivating many scholars to document the lexical and grammatical evidence for its Latin origins (Hall 1974; DuNay 1977; Mallinson 1988; Sala 2005; Alkire/Rosen 2010). The Slavic

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languages have had great influence on Romanian, beginning in the 7th century CE and waning in the 12th century CE (Rosetti 1954; 1986; Dimitrescu 1973; Hall 1974; Mallinson 1988; Petrucci 1999). The contact between Romanian and that family was so extensive that core lexical items such as verbs like *a iubi* [a.ju'bi] 'love_{INF}' and *a urî* [a.u'ri] 'hate_{INF}' are of Slavic origin. Other significant sources of borrowings are Turkish, particularly from the 13th–16th centuries, and Hungarian, while French is the source of many modern loanwords. Contemporary lexical borrowings come from English and other Romance varieties. Historical evidence about Romanian is typically based on direct lexical comparisons, including mapping regional variation in lexical forms, rather than reconstruction (Rosetti 1956; Vasiliu 1968; Coteanu 1981; Ivănescu 2000). Much early knowledge of Romanian comes from fragments of text, written in Old Church Slavonic or Cyrillic script, or from toponyms (Rosetti 1954; Dimitrescu 1973), corpora, and historical writing samples (Close 1974; Cuesdean 2006).

2 Phonology and phonetics of vowels

2.1 Inventory of monophthongs and diphthongs

Standard Romanian has seven phonemic monophthongs, originating in Late Latin, when front vowels *ĭ* and *ē* merged to /e/, and *ŭ* and *ū* merged to /u/ in the back of the vowel system. (Late) Latin *ī* produced /i/; *ĕ* diphthongized to /je/ in both open and closed syllables; *ā* remained /a/, and *ō* merged with *o* to give /o/ in Romanian. The modern standard phonemic inventory is that used by Chitoran (2002a, 208) and Graur/Rosetti (1938), shown in Table 17.1.

Table 17.1: Romanian phonemic vowel inventory.

	Front	Central	Back
Close	i	ɨ	u
Mid	e	ʌ	o
Open	ɛa	a	ɔa

The vowels /i e a o u/ are relatively unrestricted and can appear in both stressed and unstressed syllables, as shown in (1). Note that in word-initial position, /e/ may be preceded by a glide and realized as [je]. Additionally, word-initially, [w] may be inserted before back vowels, and a close-central [ɨ] may appear before central vowels; this is widespread in Daco-Romanian dialects, and may reflect a preference for syllables with stronger onsets (Loporcaro 2011, 97).

(1) Stressed and unstressed Rm. /i e a o u/

Vowel	Stressed	Unstressed
/i/	mic [mik] 'small _{M.SG} '	citi [tʃi'ti] 'read _{INF} '
/e/	pe [pe] 'on'	mereu [me'reu] 'always'
/#e/	el [jel] 'he _{NOM} '	era [je'ra] 'be _{3SG.IMPF} '
/a/	cap [kap] 'head'	avea [a'vea] 'have _{INF} '
/o/	om [om] 'man'	motiv [mo'tiv] 'motive _{NOM.SG} '
/u/	tu [tu] 'you _{NOM.SG} '	urma [ur'ma] 'follow _{INF} '

From a variety of sources, Romanian gained the central vowels /Λ/ and /i/ (Vasiliu 1968; Rosetti 1973); the latter is unique among the Romance languages. The mid central vowel /Λ/ is transcribed by many authors as /ə/, but I have argued (Renwick 2012; 2014) on the basis of phonological and phonetic evidence that /Λ/ is a more appropriate symbol, a practice that also finds precedent in Steriade (2008). While schwa is used as a “cover term” for a reduced vowel in many languages (↗4 From vowel weakening in Romance to French schwa), the mid central Romanian vowel does not behave like a reduced vowel: it can carry stress, and in careful speech does not exhibit greater variability or reduction in duration or phonetic characteristics than other mid vowels /e o/ (cf. Figure 17.1). The vowel is also not subject to productive, synchronic stress-based reduction (as are, e.g., the vowels /a e ε/ in Catalan, all of which reduce to [ə] in unstressed position, ↗23 Catalan). Although Romanian /Λ/ developed principally in unstressed syllables, due to the reduction of Latin /e a/ in that position, it also appears under stress. Synchronically its distribution reflects this development: based on a token-frequency analysis of broadcast news speech, /Λ/ appears in unstressed, word-final position in approximately 65% of cases, but is more rare under stress and word-initially (Renwick et al. 2016).

The close central vowel /i/ is closely related to /Λ/: [i] initially resulted from pre-nasal raising of stressed /a/ (cf. 2.2.4), placing it in free variation and eventually complementary distribution with [ə]. Due to internal changes and borrowings from the Slavic languages and Turkish, /i/ became phonemically independent; however its synchronic distribution remains highly restricted, for instance to word-initial position in the preposition /in/ ‘in’ and related words (67% of cases) and in 75% of cases overall to contexts followed by a nasal or /r/ (Renwick et al. 2016). In fact word-initially, with few exceptions such as interjections, word-initial /i/ is *always* pre-nasal (Avram 1962/2009). The contrast between /Λ/ and /i/, which themselves are relatively less frequent in the lexicon than other monophthongs, is thus a marginal one, supported by few minimal pairs (illustrated in (2)) and bearing low functional load (Renwick 2014; Renwick et al. 2016).

(2) Minimal pairs and examples of Rm. /i/ vs. /ʌ/

/i/	/ʌ/
vâna ['vina] 'vein _{DEF} '	casă ['kasʌ] 'house _{INDF} '
lâna ['lina] 'wool _{DEF} '	sută ['sutʌ] 'hundred _{INDF} '
când ['kind] 'when'	pătuț [pʌ'tuts] 'bed _{DIM} '
râu [riw] 'river'	rău [rʌw] 'bad _{M.SG} '
vâr [vir] 'thrust _{1SG} '	văr [vʌr] 'cousin _{M.SG} '
țâri [tsir] 'sea mackerel _{PL.INDF} '	țări [tsʌrʲ] 'land _{PL.INDF} '
sânii ['sini] 'breast _{PL.DEF} '	săanii ['sani] 'sled _{PL.DEF} '
câtă ['kitʌ] 'how much _{F.SG} '	cătă ['kʌtʌ] 'search _{3SG.PRET} ' ¹

Romanian has two phonemic diphthongs /ɛʌ/ and /oʌ/, which arose when /e/ and /o/ broke under stress in the context of an open vowel in the following syllable, and these are an innovation (Rosetti 1958; 1959; 1976; 1981; Vasiliu 1968; Sala 1976). Historically Romanian phonology prohibited these diphthongs in unstressed syllables, and indeed they are found most commonly under stress; however, morphologically complex sequences of /e/+a/ can create the diphthong [ɛʌ] in unstressed syllables (Renwick 2012; Niculescu 2012; 2015). While /ɛʌ/ appears in closed (final) syllables, /oʌ/ cannot, and additional restrictions are imposed by metaphonic alternation (cf. 2.2.1 below). Scholars disagree whether diphthongs are generated by rules combining glides and monophthongs (Avram 1958; 1991; Agard 1958; Vasiliu 1990), or whether they are underlying and thus listed among the phonemes (Havránek 1933; Graur/Rosetti 1938; Evdoșenco 1961). There is convincing evidence of the diphthongs' phonemic status, from (near-)minimal pairs with their mid-vowel counterparts, as shown in (3). The diphthongs are also distinct from glide-vowel sequences [ja], [wa] (Chitoran 2002b). Synchronically /oʌ/ is productive in new lexical roots, but /ɛʌ/ is not, although it is productive in morphological use, such as verb endings (Russo 2014). Romanian has relatively fewer diphthongs from breaking (e.g. /ja/) than other Romance languages, because in many contexts the glide was absorbed by palatalization into the preceding consonant and therefore disappeared (Chitoran/Hualde 2007); additionally, due to the language's conservatism with regard to diphthongization, the diphthongs have relatively low type frequency (Renwick 2012).

(3) Rm. (near) minimal pairs: /ea/ vs. /e/; /oa/ vs. /o/ (Chitoran 2002a)

Contrast	Diphthong	Monophthong
/ɛʌ/ – /e/	teamă ['tɛʌmʌ] 'fear _N '	temă ['temʌ] 'theme'
/ɛʌ/ – /e/	seară ['sɛʌrʌ] 'evening'	seră ['serʌ] 'greenhouse'
/ɛʌ/ – /e/	fleac [flɛʌk] 'trifle'	flec [flek] 'shoe heel'
/oʌ/ – /o/	toană ['tɔʌnʌ] 'whim'	tonă ['tonʌ] 'ton'
/oʌ/ – /o/	poartă ['pɔʌrtʌ] 'gate'	poftă ['poftʌ] 'appetite'

¹ *cătă* is a variant of the standard *caută*; it can also be a variant of *către* 'by, to, towards'.

2.2 Phonological vowel alternations

Modern Standard Romanian exhibits a variety of vowel alternations, including pre-nasal raising, centralization, diphthongization, and a metaphonic system in which a stressed vowel's quality is conditioned by the height of a following unstressed vowel. While some processes are productive, others are limited to certain lexical strata of the language and are not adopted in new words (Friesner 2009). The majority of vowel alternations originates in phonological conditioning, but a subset co-occurs with particular morphological contexts. This is because some alternations are triggered by neighboring vowels, whose contexts are created by morphological markers affecting post-root vowel quality. As an entrée to this, consider that while postposed morphological marking is characteristic of Romance languages, Romanian also has postposed definiteness marking, as in (4).²

(4) Postposed definite articles in Romanian

Feminine	Masculine
casă ['kasɘ] 'house _{INDF} '	pom [pom] 'tree _{INDF} '
casa ['kasa] 'house _{DEF} '	pomul ['pomul] 'tree _{DEF} '
case ['kase] 'house _{INDF.PL} '	pomi [pomɨ] 'tree _{INDF.PL} '
casele ['kasele] 'house _{DEF.PL} '	pomii ['pomi] 'tree _{DEF.PL} '

Morphological marking can cause the preceding tonic vowel to shift in height, backness, quantity, or multiple features to more closely match the characteristics of a post-tonic vowel. These changes are codified in the language's relatively transparent orthographic system. The close link between Romanian phonological alternation and morphological marking (Chitoran 2002b) has figured in recent models of their interaction and its implications for the lexicon (Steriade 2008).

2.2.1 Metaphony

Metaphony is a major force in Romanian phonology. In this process, the quality of a post-tonic (unstressed) vowel affects the height of a preceding stressed vowel. This is an instance of a weak trigger, since a stressed element is affected by an unstressed one (Walker 2005). Metaphony can also interact with other phonological processes, including centralization (2.2.3) and pre-nasal raising (2.2.4). Metaphony involves alternations between /a ʌ/, /ɛa e/, and /ɔa o/; note that the first member of each

² Romanian nouns can be feminine, masculine, or neuter (ambigeneric); the latter are declined as masculine in the singular and feminine in the plural. Romanian retains marking for three cases: nominative/accusative, genitive/dative, and vocative.

vowel pair is phonologically open, and the second is a mid vowel. Each case has a different set of triggers, as shown in (5). The more open vowel is derived from an underlying mid vowel, and the palatal gesture [j] reflects an underlying close vowel /i/ that triggers metaphony (cf. 2.2.2).

(5) Rm. metaphonic alternations: nouns and adjectives

Singular	Plural
carte ['karte] 'book'	cărți [kartsʲ] 'book _{PL} '
mare ['mare] 'sea'	mări [marʲ] 'sea _{PL} '
baltă ['balta] 'puddle'	bălți [baltsʲ] 'puddle _{PL} '
seara ['sɛara] 'evening _{DEF.SG} '	seri [serʲ] 'evening _{PL} '
beat [bɛat] 'drunk _{M.SG} '	beți [betsʲ] 'drunk _{M.PL} '
poama ['pɔama] 'fruit _{DEF.SG} '	poame ['pɔame] 'fruit _{PL} '
doamnă ['dɔamna] 'lady'	doamne ['dɔamne] 'lady _{PL} '
noapte ['nɔapte] 'night'	nopti [noptsʲ] 'night _{PL} '

The central alternation /a ʌ/ is morphologically restricted to feminine nouns (Golopenția-Eretescu 1967). The two diphthongs have different phonological restrictions: [ɔa] can precede a wider range of vowels, including [e], which [ɛa] cannot precede; on the other hand, [ɛa] can appear in a word-final syllable, while [ɔa] cannot, and thus the latter does not appear in monosyllabic words (Chitoran 2002a). Chitoran (2002a) links this restriction to the tendency for /ɔa/ to appear in the feminine forms of adjectives, which have a final desinence vowel, but whose masculine counterparts have no final vowel, may be monosyllabic, and contain monophthongal /o/. She analyzes these alternations in the framework of Optimality Theory as an interaction of vowel lowering under stress, which promotes the diphthongs, vs. the force of metaphony, which encourages matching of height features between a suffix and the stressed vowel that precedes it. Furthermore, Chitoran (2002a, 219) proposes that the historical phonological conditions which triggered [ɛa] and [ɔa] disproportionately targeted certain morphological classes, like verbs and adjectives, such that when these phonological rules ceased to be active, most instances of the diphthongs were reinterpreted as morphological markers. Both diphthongs are morphologized in multiple ways, including in alternations between feminine and masculine forms (6) and verb forms (7); for an in-depth discussion cf. Renwick (2014, 63–83).

(6) Metaphony in Rm. feminine vs. masculine forms

Feminine	Masculine
hoată ['hɔatsʌ] 'thief _F '	hoț [hots] 'thief _M '
oarbă ['ɔarbʌ] 'blind _F '	orb [orb] 'blind _M '
aviatoare [avi.a'tɔare] 'aviator _F '	aviator [avi.a'tor] 'aviator _M '
fondatoare [fonda'tɔare] 'founder _F '	fondator [fonda'tor] 'founder _M '

(7) Metaphony in Rm. verb forms

Monophthong	Diphthong
citește [tʃi'teʃte] 'read _{3SG} '	(să) citească [tʃi'teaskɬ] 'read _{3SG.SBJV} '
găsești [gɬ'seʃtʃ] 'find _{2SG} '	(să) găsească [gɬ'seaskɬ] 'find _{3SG.SBJV} '
zbor [zbor] 'fly _{1SG} '	zboară ['zboarɬ] 'fly _{3SG} '
zbori [zborʲ] 'fly _{2SG} '	(să) zboare ['zboare] 'fly _{3SG.SBJV} '

Metaphonic alternations illustrate that the Romanian vowel system is captured neatly using particle phonology (Chitoran 2002a): under this analysis, which can account for alternations based in stress and vowel height, the language uses the tonality particles |i| (palatality) and |u| (labiality), as well as aperture particle |a| (cf. Schane 1984; 1995 for a characterization of this feature system). Thus close front /i/ has only a palatality particle; mid front /e/ has one |i| and one |a| particle; /ɛa/ has two aperture particles and one palatality particle, while /qa/ has two aperture particles and one labiality particle, making the diphthongs relatively more complex and highly specified than other vowels.³ In Chitoran's (2002a) Optimality Theoretic account, metaphonic alternations violate faithfulness constraints in which the output's particles do not match those in the input.

2.2.2 Desyllabification of word-final /i/

Romanian /i/ does not always surface as [i], particularly in word-final position; instead, under certain morphophonological conditions including plural forms of nouns and adjectives, as well as certain verb forms (e.g. Rm. *merge* ['merdze] 'go_{3SG}' vs. Rm. *mergi* ['merdzʲ] 'go_{2SG}'), it is reduced to a palatal gesture [ɨ], as shown in (8). This morpheme can also trigger a change in a preceding alveolar or velar obstruent (cf. 3.2.1). If a form is both definite and plural, final [i] surfaces.

(8) Desyllabification of word-final /i/

Singular	Plural	Plural definite	Gloss
lup [lup]	lupi [lupʲ]	lupii ['lupi]	'wolf'
domn [domn]	domni [domnʲ]	domnii ['domni]	'gentleman'
pește ['peʃte]	pești ['peʃtʃ]	peștii ['peʃti]	'fish'
copac [ko'pak]	copaci [ko'patʃ]	copacii [ko'patʃi]	'tree'

³ Under this analysis close central /ɨ/, on the other hand, has no particle specifications, which may be linked to its use as a default epenthetic vowel (Renwick 2014).

2.2.3 Post-labial vowel centralization

Romanian exhibits an alternation between front and central vowels that is conditioned by a preceding labial consonant and also interacts with metaphony. As a result of the so-called “Labial Effect”, central vowels are favored within a paradigm, following another labial consonant (Vasiliu 1966). Crucially, the central vowels only appear when a front vowel does *not* follow in the next syllable. The examples in (9) show that based on the Latin etymons, we would expect stressed /e/ (or [e̞], if /a/ or /ʌ/ follow) in Romanian; however this only surfaces in the plural form. Instead, in feminine forms, [a] in the singular alternates with [e] in the plural; this indicates an interaction between the labial’s centralizing effect, and a fronting (and metaphonic) effect of a following /e/. In masculine and neuter forms, [ʌ] results from centralization and alternates with [e] in the context of a following /i/, without metaphonic height effects.

(9) Vowel centralization in Romanian

Latin	Rm. singular	Rm. plural
FĒTA(M)	fată ['fatʌ] ‘girl’	fete ['fete] ‘girl _{PL} ’
VĒR	vară ['varʌ] ‘summer’	veri [verʲ] ‘summer _{PL} ’
VĒRU(M)	văr [var] ‘cousin _{M.SG} ’	vere ['vere] ‘cousin _{VOC.SG} ’
FĒTU(M)	făt [fat] ‘boy’	feți [fetsʲ] ‘boy _{PL} ’
MĀLU(M)	măr [mar] ‘apple tree’	meri [merʲ] ‘apple tree _{PL} ’
PILU(M) ⁴	păr [par] ‘hair’	peri [perʲ] ‘hair _{PL} ’
HOSPITIU(M)	ospăț [os'pats] ‘banquet’	ospete [os'petse] ‘banquet _{PL} ’
VIDEŌ	văd [vʌd] ‘see _{1SG} ’	vezi [vezʲ] ‘see _{2SG} ’

Like metaphony, this alternation is morphologically conditioned, principally by changes in number or gender to a noun or adjective. Historically, the Labial Effect is assumed to have arisen via carryover coarticulation from the labial consonant, which resulted in a lower second formant on the vowel and was phonologized as a more central vowel. Simultaneously, the prosodically weak following vowel is hypothesized to have had an effect of anticipatory coarticulation, particularly in the plural, which maintained vowel frontness in that condition. In fact both of these coarticulatory patterns remain synchronically, as discussed in 2.3.

2.2.4 Pre-nasal raising

A widespread historical process in Romanian is pre-nasal raising. This caused non-close vowels /e a ʌ o/ to raise to [i i u] in stressed position before a (usually tautosyllabic) nasal consonant, as in (10). While this is not an active phonological process,

⁴ A change from Lat. /l/ to Rm. /r/ is common.

Russo (2014) points out that in words like *bun*, metaphony would be expected based on the Latin vowel and following context, giving *['bqanΛ] in the feminine singular. The fact that this does *not* occur indicates that pre-nasal raising predates metaphony; if one assumes the Latin roots as underlying forms, this leads to a phonological bleeding relation, in which pre-nasal raising applies first and removes inputs to metaphony.

(10) Pre-nasal raising in stressed syllables

Latin	Romanian
BENE	bine ['bine] 'well _{ADV} '
ANĒLLU(M)	inel [i'nel] 'ring'
CĒNA(M)	cină ['tʃinΛ] 'dinner'
PLĒNU(M)	plin [plin] 'full _{M.SG} '
CAMPU(M)	câmp [kɪmp] 'field'
LĀNA(M)	lână ['linΛ] 'wool'
MANU(M)	mână ['minΛ] 'hand'
BONU(M)	bun [bun] 'good _{M.SG} '
*FRŌNDIA	frunză ['frunzΛ] 'leaf'
MŌNTE(M)	munte ['munte] 'mountain'

In rare cases, the Labial Effect (2.2.2) interacts with pre-nasal raising, as in (11). The stressed vowel follows a labial consonant and precedes a nasal; in the singular, the post-tonic syllable contains a central vowel, but when a front vowel is added to pluralize these forms, the stressed vowel is also front. In *vinete* and *vineți* this stretches leftward across two syllables.

(11) Interaction between pre-nasal raising and metaphony

Singular	Plural
vânăță ['vinΛtΛ] 'eggplant _{SG.NOM} '	vinete ['vinete] 'eggplant _{PL.NOM} '
vânăt ['vinΛt] 'eggplant _{M.SG} '	vineți ['vinets] 'eggplant _{M.PL} '
vână ['vinΛ] 'vein'	vine ['vine] 'vein _{PL} '

2.2.5 Deletion of /i/ in pronouns and word-initially

In word-initial position, /i/ may be deleted, particularly following another vowel within a single prosodic phrase, but also from clitic pronouns when a vowel-initial word follows, or even preceding a consonant cluster. The first case is illustrated in (12), in which the reduction of /i/ → ∅ simplifies surface phonological structures by avoiding a hiatus sequence (cf. 2.2.6), although this deletion can also variably result in a syllabic nasal. In fact, Avram (1962/2009) argues that [#in] is an allophone of the archiphoneme /N/ (cf. discussion of nasal place in 3.2.3 and of /i/ in 2.3). In the second case (13), note that if a pronoun stands alone (or is immediately followed by a consonant) the initial /i/ provides

a syllabic nucleus for the following nasal consonant; however if another vowel follows, the nasal syllabifies as its onset, and /i/ is deleted rather than remaining as a V syllable.

(12) Deletion of Rm. /i/ before a nasal or nasal-plosive cluster

să întreb [sʌn'treb] 'ask_{1SG.SBJV}'
 ea împarte [ɛam'parte] 'she_{NOM} share_{3SG.SBJV}'
 reîncarcă [ren'karkʌ] 'reload_{3SG}'
 întreb [ɪ'treb] 'ask_{1SG}'

(13) Deletion of Rm. /i/ from pronouns

a.	îmi	dă	[im'dʌ]	
	me _{DAT}	give _{3SG}	'he gives me'	
b.	el	îmi	dă	[jelim'dʌ]
	he _{ACC}	me _{DAT}	give _{3SG}	'he gives it to me'
c.	să-mi	dea	[sʌm'dɛa]	
	that-me _{DAT}	give _{3SG.SBJV}	'that he give it to me'	
d.	îi	spun	[iispun]	
	he _{DAT}	tell _{1SG}	'I say to him'	
e.	îl	cunosc	[ilku'nosk]	
	he _{ACC}	know _{1SG}	'I know him'	
f.	i-	am spus	[iʌmʃpus]	
	he _{DAT}	have _{1SG}	tell _{PST.PTCP}	'I (have) told him'
g.	l-	am văzut	[lamvʌ'zut]	
	he _{ACC}	have _{1SG}	see _{PST.PTCP}	'I saw him'

2.2.6 Treatment of vowels in hiatus

Romanian retains a contrast between diphthongs and vowels in hiatus (Chitoran/Hualde 2007), as shown in (14), including for the sequence /au/. Nevertheless, recent work has shown a variety of repairs for these /VV/ sequences, including glide formation, diphthongization, and elision, both within and across words (Niculescu 2015), shown in (15).

(14) Rm. hiatus sequences

Sequence	Examples	
/i.a/	fiacru [fi'akru] 'carriage'	fiară [i'fjarʌ] 'beast'
/i.a/	tiară [ti'arʌ] 'tiara'	iarbă [i'jarʌ] 'grass'
/i.e/	fief [fi'ef] 'fief'	fier [fi'er] 'iron'
/a.u/	aur [a'ur] 'gold'	autobus [a.uto'bus] 'bus'

(15) Rm. hiatus repairs (Niculescu 2015)

Sequence	Repair type	Example
/i.e/	Glide formation	copilărie /kopil ^Λ rie/ [kopil ^Λ 'rije] 'childhood'
/e.a/	Diphthongization	realizezi /realizezi/ [rɛali'zez] 'realize _{2SG} '
/e.a/	Diphthongization	de atunci /de#atuntʃ/ [dɛ̞a'tuntʃ] 'since then'
/u.o/	Elision	fructuos /fruktuos/ [fruk'tos] 'fruitful _{M.SG} '
/e.i/	Elision	scrie în /skrise#in/ ['skrisen] 'write _{PST,PTCP,F,PL} in'

Chitoran/Hualde (2007, 53) speculate that Romanian hiatus sequences are slowly becoming diphthongs; non-initial hiatus sequences are found to be shorter in duration than others, and are predicted to slip into diphthong status first.

2.2.7 Variable vowel alternations

Recent work has begun to shed light on sources of variation in vowels' realization in Romanian. Hualde/Chitoran (2016) describe processes of vowel coalescence, not yet studied experimentally, as well as vowel+vowel coarticulation across word boundaries in running speech, which can lead to changes in segmental quality. Variable centralization of /e/ to /^Λ/ in words like *pe* 'on', *de* 'of', or the reflexive clitic pronoun *se* is also reported (Chitoran et al. 2018). In continuous speech vowels are frequently affected, particularly at word boundaries, by a range of reduction phenomena including glide formation, coalescence, blending, deletion (especially in unstressed position), or full deletion of VC or CV syllables (Chitoran/Hualde/Niculescu 2015, 3).

2.3 Phonetics of Romanian vowels

The acoustic phonetic properties of Standard Romanian vowels have been described in both careful laboratory speech and continuous speech. The monophthongs /i e a ^Λ ɨ o u/ are indeed monophthongal in nature, without great dynamic movement, while the diphthongs /ɛa ɔa/ transition from an initial mid-vowel target to a central open target (Renwick 2012; 2014). The typical F1, F2 placements of vowels for female speakers are shown in Figure 17.1; males have a similar arrangement, though with a more compressed F1, F2 range. In careful speech, unstressed vowels are somewhat more variable and less peripheral than their stressed counterparts; this is illustrated in Figure 17.2.

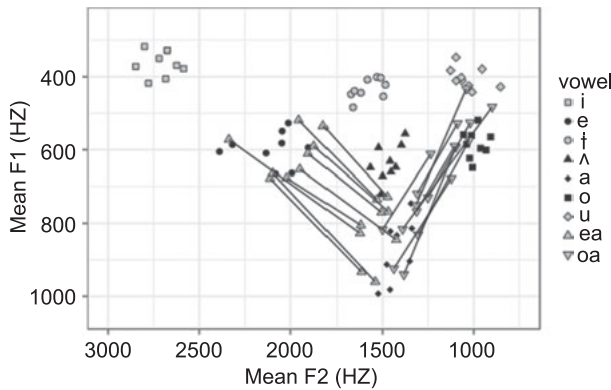


Figure 17.1: Mean F1 and F2 values for stressed vowels by eight female speakers. Points connected by solid lines indicate diphthongs: from [e] to [a] in [ea]; from [o] to [a] in [oa]. Monophthong measurements taken at vowel midpoint; diphthong measurements taken at 10% ([e], [o]) and 70% ([a]) of diphthong duration (cf. Renwick 2014).

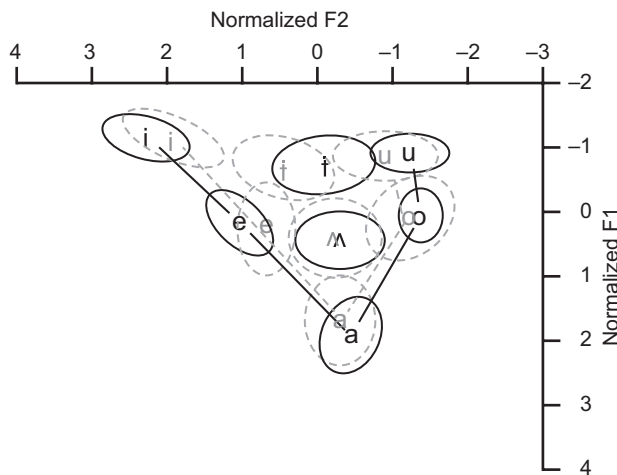


Figure 17.2: Normalized F1 – F2 vowel space for female speakers of Standard Romanian, across stressed (solid black lines) vs. unstressed (dashed gray lines) vowels in laboratory speech. Stimuli and methods in Renwick (2014).

The position of /ʌ/ in these figures shows that the mid-central vowel has a clear phonetic target in both the first and second formants (F1, F2); additionally, its duration is not subject to greater reduction than other full vowels with comparable levels of stress and syllable structure (Renwick 2014). In careful speech /i/ and /ʌ/ are also phonetically distinct, which provides evidence of their phonemic contrast, even though they are in nearly complementary distribution. On the other hand, in continuous speech, the vowels' acoustic distinction may be neutralized: the F1 of /i/ raises

to overlap strongly with /ʌ/ in those conditions (Vasilescu et al. 2016). In fact, in a system designed for Automatic Speech Recognition (ASR) of Romanian (Vasilescu/Vieru/Lamel 2014), the close and mid central vowels can be adequately modeled as a single phoneme without a decrease in word recognition, because phonological context rather than acoustic characteristics can predict lexical vowel quality (Renwick et al. 2016). It is an open question whether Romanian listeners rely on vowel quality or contextual information to perceive /i/ vs. /ʌ/ (but cf. Renwick 2014, 150–170).

Romanian stressed vowels are subject to considerable coarticulation, particularly with preceding consonants and with a following unstressed vowel (Renwick 2012). After labial consonants, which are known to induce a low second formant, vowels' F2 drops sharply. When a stressed vowel is followed by front vowel /i/, on the other hand, its F2 may rise as much as 200 Hz. These acoustic shifts parallel the Labial Effect, in which /i e/ are phonologically centralized only if a front vowel does not follow. Coarticulatory patterns are also found in continuous speech, and persist across word boundaries. In a study using an ASR system, the /e/ in Rm. *pe* /pe/ 'on' and Rm. *de* /de/ 'of' was automatically classified as either [e] or [ʌ]; an increase in [ʌ] results is found (a) in labial-initial *pe* vs. *de*; (b) when [r] follows the vowel; (c) when the next vowel is back, rather than front (Chitoran et al. 2018). More research is needed on the acoustics and variation of Romanian vowels, including beyond the standard variety.

2.3.1 The phonetics of diphthongs vs. glide-vowel sequences

Romanian diphthongs /ɛa ɔa/ are typologically rare due to their unitary phonological structure, meaning they share syllable nucleus and behave as a single phonological unit (Chitoran 2002b). This property has spurred their consideration from an Articulatory Phonology perspective (Marin 2005; 2007; 2014; Marin/Goldstein 2012), to explore the timing of their internal speech gestures. One question regarding the diphthongs is their phonological distinctness from monophthongs /e o/, with which they alternate: diphthongs often appear under stress, while the single vowels appear in unstressed position; as shown in (3), however, there is distributional evidence for their phonemic distinctness. Speech production and perception studies have also tested whether the diphthongs are distinct from glide-vowel sequences [ja], [wa] (Chitoran 2002b; Chitoran/Hualde 2007). While they are all distinct, front /ɛa/, /ja/ are more different from one another than are back /ɔa/, /wa/.

Marin (2007) proposes that /ɛa/ is composed of a sequence of simultaneously articulated /e a/ vowels and tests this hypothesis by comparing the articulatory characteristics of /ɛa/ with the monophthong /e/. The results of this study and others (Marin 2007; 2014; Marin/Goldstein 2012) show that the four-way contrast in Romanian between single vowels /e o/ (which may be derived or underived, a difference with additional acoustic consequences), diphthongs /ɛa ɔa/, glide-vowel sequences /ja wa/, and hiatus /e.a o.a/ can be modeled through manipulation of several parameters: timing relations

(coupling) between vowel gestures, duration, tongue height, and stress. These results and relationships, some of which are also detectable in acoustic studies of coarticulation (Renwick 2012, 182–252), illustrate the remarkable range of Romanian vowel contrasts which are phonologically and experimentally supported.

3 Phonology and phonetics of consonants

3.1 Inventory

There is less variability in scholars' inventories of consonants than for vowels, although Petrovici (1956) argues that a series of palatalized consonants exist in parallel to plain ones (cf. Steriade 2008). Table 17.2 adopts the non-palatalized inventory shown in Chitoran (2002c, 10); it includes eighteen consonants.

Table 17.2: Romanian consonant inventory.

	Labial	Dental	Palatal	Velar	Glottal
Plosive ⁵	p b	t d		k g	
Affricate		ts	tʃ dʒ		
Fricative	f v		ʃ ʒ		h
Nasal	m	n			
Trill ⁶		r			
Lateral		l			

3.2 Phonology and phonetics of Romanian consonants

3.2.1 Palatalization

As in other Romance languages, the whole-segment process of palatalization affects Romanian velar consonants /k g/, typically meaning they are realized as alveolar or post-alveolar affricates /ts dz tʃ dʒ/ or fricatives /ʃ ʒ/, particularly before front vowels and especially before /i/. The examples in (16) also show frication of /d/ to [z] before /i/, illustrating the fact that alveolar /d t/ may become fricatives or affricates in certain vocalic contexts.

⁵ Steriade (2008) additionally includes the palatal plosives [c ɟ] in her inventory of Romanian segmental contrasts; however, it is not clear if these are argued to be phonemic, as the palatal versions appear before [e i] only.

⁶ The Romanian rhotic is primarily realized as a tap [ɾ], but can be a trill, for instance word-initially (Chitoran 2002c). It is transcribed [r] for simplicity due to the lack of contrast with other rhotics.

Palatalized consonants may be found before synchronic /a/, due to intermediate historical stages in which a front glide developed during diphthongization, leading from /ɛ/ to /je/ and later to /jea/, triggering palatalization of the preceding consonant and simplifying to [a]. Examples include *șapte* /'ʃapte/ 'seven' < SEPTem; *țară* /'tsarə/ 'earth' < TERRA.

(16) Palatalization of Rm. velars before underlying front vowels

1sg	2sg	3sg	
zic [zik]	zici [zitʃʲ]	zice ['zi.tʃe]	'say'
merg [merg]	mergi [merdʒʲ]	merge ['mer.dʒe]	'go'

The controversy over the Romanian consonant inventory stems from the fact that, as in many Romance languages, consonants may be realized as palatalized versions of themselves. As described in 2.2.2, word-final /i/ is realized as a palatal gesture in many morphological contexts; we now consider the consequences of this for consonants. Romanian is the only Romance language to exhibit *secondary palatalization*, which all consonants can receive; it occurs in word-final position only, and is thus a typologically rare example of the phenomenon in a weak position (Spinu 2010). Secondary palatalization is morphologically predictable, appearing in plural forms of nouns and adjectives, and in the second-person singular of verbs in the present indicative. For this reason, many scholars analyze secondary palatalization as an underlying /i/ that surfaces as a palatal gesture; this results in minimal pairs between plain and palatalized forms, as shown in (17) (Spinu 2010, 28). On the other hand, native-speaker intuitions are that it is a full-fledged [i], which acts as the coda of a syllable rather than a syllabic nucleus (Spinu 2010, 30–31).

(17) Morphologically-predictable secondary palatalization in Romanian

Singular	Plural
vulpe ['vulpe] 'fox'	vulpi [vulpʲ] 'fox _{PL} '
zuluf [zu'luf] 'curl'	zulufi [zu'lufʲ] 'curl _{PL} '
ceh [tʃeh] 'Czech _{M.SG} '	cehi [tʃehʲ] 'Czech _{M.PL} '
grav [grav] 'grave'	gravi [gravʲ] 'grave _{PL} '
pom [pom] 'tree'	pomi [pomʲ] 'tree _{PL} '
sar [sar] 'jump _{1SG} '	sari [sarʲ] 'jump _{2SG} '
boală ['boalə] 'illness'	boli [bolʲ] 'illness _{PL} '

Word-final /i/ does not always surface as a palatal gesture; when preceded by a possible onset cluster, it surfaces as [i] (Steriade 1984). Additionally, when a definite morpheme is added to a plural form, the vowel is realized (18):

(18) Rm. secondary palatalization in plural indefinite vs. definite forms

Singular	Plural	Plural definite
lob [lob] 'lobe'	lobi [lobʲ] 'lobe _{PL} '	lobii ['lobi] 'lobe _{DEF.PL} '
puști [puʃtʲ] 'kid'	puști [puʃtʲ] 'kid _{PL} '	puștii ['puʃti] 'kid _{DEF.PL} '

paj [paʒ] 'page'	paji [paʒʲ] 'page _{PL} '	pajii ['paʒi] 'page _{DEF,PL} '
an [an] 'year'	ani [anʲ] 'year _{PL} '	anii ['ani] 'year _{DEF,PL} '

Secondary palatalization may also be accompanied by assibilation, change in primary place of articulation, or coronalization (19) (Spinu 2010, 41–42):

(19) Rm. secondary palatalization with further consonantal changes

Plain	Palatalized
pot [pot] 'can _{1SG} '	poți [poʦʲ] 'can _{2SG} '
plec [plek] 'leave _{1SG} '	pleci [pleʦʲ] 'leave _{2SG} '
rog [rog] 'beg _{1SG} '	rogi [roʦʲ] 'beg _{2SG} '
pas [pas] 'step'	pași [paʃʲ] 'step _{PL} '
treaz [tɾɛaz] 'awake _{M,SG} '	treji [tɾɛʒʲ] 'awake _{M,PL} '

Phonetically and perceptually, secondary palatalization has been studied in greatest detail on fricatives (Spinu 2007; 2010; Vogel/Spinu 2009; Spinu/Vogel/Bunnell 2012). Consonants with secondary palatalization are typically longer than their plain counterparts; the secondary gesture includes formant structure or noise at frequencies expected for [j], with low F1 and high F2. Secondary palatalization is most clearly perceived at labial places of articulation, and least detectable in postanterior coronal /ʃ/; acoustic measures of cepstral coefficients, argued to detect secondary palatalization most effectively, likewise show a larger distinction in labials than in /ʃ/ (Spinu 2010).

3.2.2 Characteristics of obstruents

This section briefly addresses additional phonetic and phonological properties of Romanian obstruents, including plosives, fricatives, and affricates. With respect to other Romance languages, it is worth noting that Romanian phonotactics permit a wide range of consonant clusters and syllable types. Word-initially, three-consonant clusters including /spl ʃpr zgr/ occur, as well as initial CC-clusters including /ml mr mn hr hl ʒn ks kt/. Word-finally, a wide variety of clusters are permitted, including liquid+plosive, plosive+fricative, plosive+plosive, as well as triconsonantal clusters like /rkt rst/. Examples of these relatively infrequent forms, which may be restricted to certain lexical subclasses (borrowings, learned words etc.) appear in (20).

(20) Consonantal clusters in Romanian

splină ['splinɔ] 'spleen'	șplit [ʃplit] 'grit _{NOM} '
zgrepțăna [zɡɾɛptsɔ'na] 'scratch _{INF} '	mlădiță [mlɔ'ditsɔ] 'shoot _{NOM} '
mnemonic [mne'monik] 'mnemonic'	hrană ['hranɔ] 'food'
jneapăn ['ʒneapɔn] 'juniper'	ctitor ['ktitor] 'founder'
infarct [in'farkt] 'infarction'	hârști [hir'ʃti] 'scratch _{INF} , snap _{INF} '

Romanian voiced plosives show true voicing during the closure, and thus have negative Voice Onset Time (VOT). Romanian voiceless plosives show little aspiration, though under stress, VOT may extend more than 50ms. Romanian has three voiced and three voiceless plosives, at the bilabial, coronal, and velar places of articulation; coronal plosives /t d/ are dental, rather than alveolar. Velar /k g/ may be realized as fronted variants [k̟ ɡ̟] where the Latin etymon had /kl/, including Rm. *chema* [k̟e'ma] 'call_{INF}' < CLAMARE, and Rm. *gheață* [ˈɡ̟eats̩a] 'ice' < GLACIE(M).

The timing relations among Romanian coda consonants, including plosive+ plosive clusters and plosive+liquid clusters (Marin 2013; Marin/Poupplier 2014), have been used to test the predictions of Articulatory Phonology (Browman/Goldstein 1986; 1992). These characteristics are typically measured via electromagnetic articulography (EMA). A comparison of the gestural timing of complex onsets vs. codas shows that fricative-initial clusters like /sp sk sm/ have a cross-linguistically typical "c-center" organization, in which timing is linked to the center of the consonant cluster, while the reverse clusters in coda position have a typical "left edge" organization (Marin 2013). On the other hand, the relatively rare word onsets beginning with plosives (/ps ks kt kn/) have a different articulatory organization, suggesting a greater overlap of the onset with the following vowel, or alternatively that these clusters syllabify differently from others (Marin 2013).

Little recent research has addressed the acoustic phonetic characteristics of Romanian plosives. However, weakening of coda consonants in spontaneous speech has been observed; for instance, *act de* /akt de/ is reduced to [akde] (Hualde/Chitoran 2016, 29). In fact, recent results indicate that consonant deletion is widespread in casual speech; common phenomena include the reduction of voiceless plosives via voicing, or to fricatives including [h]; and the realization of voiced plosives as approximants, in addition to wholesale deletion (Chitoran/Hualde/Niculescu 2015). Additionally, final voiced plosives undergo devoicing, particularly in casual speech, immediately before a pause (Hutin et al. 2020).

The phonetics and perceptual properties of fricatives have been studied with regard to their characteristics in plain vs. palatalized contexts (Spinu 2007; 2010; Vogel/Spinu 2009; Spinu/Vogel/Bunnell 2012). The fricatives /s z/ have a laminal articulation. The phoneme /h/ has a wider distribution than in many languages, as it can appear word-finally; however it has two allophones in addition to [h], including [ç] (Sarlin 2014), and [x], the latter particularly before liquids and word-finally, e.g. in Rm. *paroh* [pa'roh]/[pa'rox] 'vicar', *valah* [va'lah]/[va'lax] 'Wallachian' (Mallinson 1988; Sarlin 2014; Spinu/Lilley 2016). On the other hand, the palatal fricative [ç] appears predictably in plural forms; thus e.g. *parohi* has the morphophonological form [pa'rohⁱ], but in a close phonetic transcription is [pa'roç] 'vicar_{PL}'; similarly, *valahi* [va'lahⁱ] is realized as [va'laç] 'Wallachian_{PL}' (Spinu/Lilley 2016). Worth noting with regard to affricates is that, as pointed out by Mallinson (1988), while [dz] does not appear in the standard Daco-Romanian variety, it occurs in Arumanian, arising from e.g. Lat. DIE(M); cf. Rom. *zi* [zi] 'day' but Arum. /dzuə/ 'day'.

3.2.3 Characteristics of sonorant consonants

Romanian has two phonemic nasals, /m/ and /n/. However, nasal place assimilation results in neutralization of the nasal contrast according to the place of articulation of the following consonant. This increases the phonetic inventory of the language before velars, where [ŋ] can optionally be found (Hualde/Chitoran 2016, 29). Nasals appear word-finally in consonant clusters including /sm/ and /mn/ (e.g. *basma* [basma] ‘fairy-tale’, *domn* [domn] ‘lord’), and in this position they may variably devoice (Petrovici 1930; Vasiliu 1965; Tucker/Warner 2010). Tucker/Warner (2010) found in a production study that nearly 75% of /m/ tokens in /sm#/ clusters were completely devoiced, even preceding another voiced consonant. However, they argue that devoicing is gradient in both rate and extent of occurrence, and that it is conditioned by syllable structure and the strength of a following prosodic boundary. Additionally, /mn#/ clusters are found to undergo partial devoicing, though to a lesser degree than /sm#/ clusters in which a voiceless segment is already present. Since partial devoicing of single nasals, particularly in utterance-final position, is also possible, Tucker/Warner (2010) argue that some level of paradigm uniformity conditions the phenomenon.

Turning to liquids, the approximant /l/ is a clear lateral, while the rhotic is primarily realized as a tap [ɾ], but can be a trill, for instance word-initially (Chitoran 2002c). It is transcribed [r] for simplicity due to the lack of contrast with other rhotics. Recasens (2012) includes Romanian in a survey of the acoustics of /l/ in 23 languages. He finds that /l/ coarticulates strongly with surrounding vowels, giving a wide range of F2 values, but that Romanian /l/ has relatively high F2 values overall, consistent with its clear realization. The articulatory and phonetic characteristics of liquids including /r l/ have been investigated (Marin 2013; Marin/Poupplier 2014). One question is how coda clusters involving /l r/ are organized articulatorily, i.e. to what degree do they overlap with the preceding vowel (compared to onset clusters with the same sounds, for instance /pl lp/) (Marin/Poupplier 2014). In fact, /l/ and /r/ do not behave identically; Marin/Poupplier (2014) find that onset clusters are timed farther apart than coda clusters, and this effect is strongest for rhotic clusters – that is, rhotics differ more in their timing across positions than laterals. Romanian thus patterns more similarly to German, which also has a clear /l/, than to American English, whose coda /l/ is very dark; however, the alveolar rhotic, when trilled, patterns differently in coda position especially. This might be due to its relative articulatory complexity or acoustic similarity to dark /l/ (Marin/Poupplier 2014).

Word-final /l/, used to mark definiteness as in Rm. *om* [om] ‘man’ vs. *omul* [‘omul] ‘man_{DEF}’, is variably realized in Romanian (Chitoran et al. 2014); it is subject to deletion, particularly before words beginning with a consonant and in spontaneous speech (Vasilescu et al. 2019).

4 Suprasegmentals

This section focuses on suprasegmental phonology and phonetics in Romanian. The foci are, first, an overview of stress patterns, with mention of their interaction with segmental phonology (vowel quality and reduction); and second, an overview of intonation patterns in the standard Romanian variety.⁷

4.1 Stress patterns

In Romanian, stress can appear on a variety of syllable positions: stress may be final, penultimate, antepenultimate, or preantepenultimate. Despite this surface variation, Romanian stress patterns are largely predictable rather than lexical, and a unified account is possible for primary and secondary stress in nouns, adjectives, and verbs (Chitoran 2002c). A lexical stress analysis is tempting, because there are stress-based minimal pairs, such as Rm. *acele* ['atʃele] 'needle_{DEF.PL}' vs. *acele* [a'tʃele] 'this_{F.PL}' (Mallinson 1988, 392). Additionally, syllable weight appears to be relevant due to the presence of words with unstressed final light syllables but also stressed final heavy syllables (e.g. Rm. *casa* ['kasʌ] 'house' vs. *castel* [kas'tel] 'castle'). However, regularity emerges when the interplay of phonology and morphology is acknowledged.

The unmarked pattern in Romanian is that primary stress falls on the rightmost syllable of the *prosodic word*, while for a lexically-specified subset of words, antepenultimate stress occurs. In Romanian, the prosodic word includes the stem of a word only (usually equivalent to the root), while all inflectional material that follows is not within the domain of the prosodic word; thus there is a mismatch between morphological and prosodic word boundaries (Chitoran 2002c, 57). For verbs, stress typically falls on the final syllable of the root, including a final theme vowel (which carries stress in infinitive forms) or stem extenders (e.g. stress-bearing /ez esk/), but ignoring any following inflectional suffix (Chitoran 2002c). Similarly for nouns and adjectives, primary stress falls on the final syllable of the stem, to the exclusion of desinence vowels or suffixes (Chitoran 2002c). A crucial piece of the puzzle is an acknowledgment of the locations of morpheme and prosodic word boundaries: due to the historical apocope of final syllables including /u/, as in *castel* [kas'tel] 'castle' < CASTELU(M),

⁷ This section does not discuss the characterization of speech rhythm in Romanian, which is a percept triggered by the confluence of a variety of suprasegmental properties (78 Comparing and deconstructing speech rhythm across Romance languages). Little work addresses this property in Romanian, although Grabe/Low (2002) analyze acoustic data from one speaker and find that Romanian patterns similarly to French, on the one hand, and Estonian, on the other. Romanian has not been classified in terms of its speech rhythm; phonologically, it exhibits properties of both syllable-timed languages, which have little vowel reduction (e.g. French), and stress-timed languages, which allow complex consonant clusters (e.g. English).

many masculine stems end in closed syllables, while feminine nouns and adjectives (e.g. *casă* ['kasA] 'house') retain their final, post-stem desinence vowel. For the purposes of stress assignment, words with heavy final syllables have an underlying (yet unrealized) final /u/, allowing a unified analysis of penultimate stress dependent on the prosodic word (Chitoran 2002c). Examples appear in (21), where internal brackets indicate the root/stem.

(21) Rm. stress patterns

cânta [[kin'ta]] 'sing _{INF} '	dormi [[dor'mi]] 'sleep _{INF} '
cânt [[kint]] 'sing _{1SG} '	cântaseră [[kin'ta]serA] 'sing _{3PL.PST.PRF} '
lucrezi [[lu'krez]] 'work _{2SG} '	lucrează [[lu'kreaz]A] 'work _{3SG} '
balon [[ba'lon]] 'balloon'	balcon [[bal'kon]] 'balcony'
sare [['sar]e] 'salt'	carte [['kart]e] 'book'
trece [['tref]e] 'pass _{INF} '	crește [['kref]e] 'grow _{INF} '

If the prosodic word is the unit of primary stress assignment, syllable weight does not play a role; nor is metricality relevant for primary stress. This permits a unified Optimality Theory analysis, depending largely on the conflict between two constraints: **RIGHTMOST**, an alignment constraint which penalizes forms whose main stress is not the final syllable in the prosodic word; and the lower-ranked **NON-FINALITY**, which penalizes head syllables that are final in the prosodic word (Chitoran 2002c). However for a subset of words, a highly-ranked lexically-specific constraint favors penultimate stress (e.g. *treceam* [['tref]e]m] 'pass_{3PL}' or *galben* [['galben]] 'yellow_{M.SG}'). This pattern cannot be derived, but must be learned.

Secondary stress, on the other hand, is metrical, and it is assigned separately from primary stress, "by left to right trochees up to the main stress, avoiding clash" (Chitoran 2002c, 87). This includes derivational prefixes. Romanian thus adheres to the constraint of **FOOT-BINARITY**, meaning feet must be disyllabic. An alignment constraint ensures that feet are aligned to the left edge of the prosodic word: **ALIGN(Foot, Left; PW, Left)** (Chitoran 2002c, 88). This is dominated by **PARSE-σ**, penalizing syllables not parsed by feet.

Romanian also has apparently exceptional stress patterns, including imperfect verb forms with stem-final stress (e.g. *mergeam* [mer'dʒeam] 'go_{1SG.IMPF}'), or feminine words with final stress (e.g. in loanwords such as *pijama* [piʒa'ma] 'pajama', *cafea* [ka'feə] 'coffee'); cf. (22). In the imperfect forms, diphthongs arise from the merging of two moras, one of which belonged to the verb stem, meaning that the stem-final syllable is inseparable from following inflectional material. Feminine words with final stress, on the other hand, lack a desinence vowel, largely because they are borrowings; thus stress remains root-final.

Additionally, primary stress may fall more than two syllables from the end of the word (22). Certain nouns and verbs with antepenultimate stress are argued to

belong to a special lexical class where non-finality (with respect to the root) is more highly ranked. A small set of words with preantepenultimate stress, mostly including feminine diminutives, can be accounted for by acknowledging that their stress is maintained by analogy to a masculine form in the same paradigm (Chitoran 2002c). With the post-lexical addition of unstressed suffixes and clitics at words' right edge, Romanian prosodic words can extend for several syllables past the main stress, which does not shift rightward under those circumstances (Loporcaro 2011). Preantepenultimate stress is tolerated in certain diminutives and numerals, although the latter may be abbreviated (e.g. *unșpe* ['unʃpe] 'eleven') or undergo post-lexical swapping of primary and secondary stress (e.g. *unsprezece* [unʃpre'zetʃe] 'eleven').

(22) Apparent exceptions to root-final stress in Romanian

Stress pattern	Example
Final (post-stem)	cântai [kin'taj] 'sing _{1SG.PRET} '
Final (post-stem)	cântam [kin'tam] 'sing _{1SG.IMP} '
Final (feminine)	stea [stea] 'star _{INDF.SG} '
Final (feminine)	basma [baz'ma] 'scarf _{INDF.SG} '
Preantepenultimate	veverițele ['veve,ritsele] 'squirrel _{DEF.PL} '
Preantepenultimate	timpurile ['timpu,rile] 'time _{DEF.PL} '
Preantepenultimate	bivoliță ['bivo,litsɔ] 'female buffalo' (cf. <i>bivol</i> ['bivol] 'male buffalo')
Preantepenultimate	doctoriță ['dokto,ritsɔ] 'female doctor' (cf. <i>doctor</i> ['doktor] 'male doctor')
Preantepenultimate	unsprezece ['unspre,zetʃe] 'eleven'
Preantepenultimate	nouăsprezece ['nowɔspre,zetʃe] 'nineteen'

To summarize, Romanian primary stress is based on right-edge prominence in prosodic words, while secondary stress is assigned based on feet (and is dependent on primary stress location). Generally, the domain for the prosodic word and stress includes the root and derivational material, for nouns, adjectives and verbs; but inflectional material, in the form of suffixes, is outside the stress domain. Root-final stress is the unmarked case, while penultimate stress is marked. Other, more complex patterns also exist, but are not treated here for brevity.

4.2 Intonation

This section provides an overview of intonational tunes and accent placement in Romanian, based on recent phonological analyses in the autosegmental ToBI (Tones and Break Indices) style (Beckman/Hirschberg/Shattuck-Hufnagel 2006); cf. also ↗9 Intonation. In Romanian, the nuclear accent is usually placed on the accented

(lexically stressed) syllable of the last item of an intonational phrase (Ladd 2008), but this can be moved to an earlier syllable, especially if it presents new information, or carries contrastive focus (Iordan/Robu 1978).

Under declarative, broad-focus conditions, Romanian speakers place pitch accents on all lexically stressed syllables; these utterances show a general pattern of pitch declination, and pre-nuclear accents tend to align with a post-tonic syllable (Manolescu/Olson/Ortega-Llebaria 2009). In a discourse-completion task eliciting intonation contours in Transylvanian and Moldavian varieties of Romanian, nuclear configurations for broad-focus statements were $L^* L\%$, and $H+L^* L\%$ (more commonly); thus the nuclear accent is low (Jitcă et al. 2015).

In yes-no questions, the nuclear accent falls on the main verb, but without a major pitch excursion (Grice/Ladd/Arvaniti 2000); this is typically a L^* , followed by a final rise-fall sequence, although Moldavian speakers show a final rise in this context (Jitcă et al. 2015, 300). In yes-no echo questions or confirmation questions, speakers from Transylvania and Moldavia show a final rise, usually with the sequence $L^* H\%$, though a more detailed analysis shows that both $L^* H-L\%$ and $L^* L-H\%$ are possible (Grice/Ladd/Arvaniti 2000). Wh-questions show a different pattern: the wh-word typically carries the nuclear accent, which is high (H^*) rather than low as in many other conditions (Ladd 2008; Jitcă et al. 2015). Pitch drops after the nuclear accent, leading to a basic $H^* L\%$ contour.

In contrastive-focus statements and in epistemically biased utterances, the common pitch contour is $H^*+L L\%$, with a high accent on the contrastive, contradicted, or confirmed element (Jitcă et al. 2015; cf. Swerts 2007). Manolescu/Olson/Ortega-Llebaria (2009) note that under contrastive focus conditions, the focused syllable receives an expanded pitch range, and the focus accent aligns with the focused syllable, while non-focused stressed elements are uttered with a reduced pitch range and shortened syllable durations. In other words, the durational difference between stressed and unstressed vowels is greatest when the word under stress has contrastive focus, and is smallest in pre- and post-focal contexts. Optionally, under focus conditions, a pre-focal accent may not be completely flattened; or, pitch may start low utterance-initially, but rise via interpolation through the focused syllable (Manolescu/Olson/Ortega-Llebaria 2009).

In negative sentences, which may have double negation, a negative word other than *nu* 'no' carries the accent; however, *nu* itself may carry a lexical accent (Jitcă et al. 2015). In exclamatives, the most common pitch accents are $L+H^*$ and L^*+H , where the latter expresses more enthusiasm or intensity (Jitcă et al. 2015, 298). Table 17.3 shows a summary of typical Romanian pitch accents and boundary tones, described by Jitcă et al. (2015) via the Ro_ToBI analysis system.

Table 17.3: Inventory of Romanian pitch accents and boundary tones, using the Ro_ToBI system (after Jitcă et al. 2015, 313–314).

Pitch accent	Typical context
H*	Information-seeking wh-questions
L*	Broad focus statements, information-seeking wh-questions, commands, yes-no questions with final nuclear accent
L+H*	Narrow focus
L+<H*	Broad focus (on the initial prosodic word), imperatives, yes-no echo questions
H+L*	Broad focus (end of statement)
L*+H	Local focus within counterexpectational yes-no questions
H*+L	Strong narrow focus on nuclear accent
Boundary tone	Typical context
L%	Statements, information-seeking wh-questions, imperatives, insistent vocatives
H%	Yes-no questions (confirmatory or counterexpectational), echo wh-questions
HL%	Echo yes-no questions (Transylvania)
!H%	Initial vocative calls

5 Conclusions

This chapter has outlined the phonology and phonetics of Romanian, including its inventories of vowels, consonants, stress patterns, and intonational tunes. Additionally, attention has been given to the wide range of morphophonological processes currently active in the language. Due to the interaction between the historical development of the Romanian inventory and its morphology, some sounds tend to appear more in certain contexts than others, in particular the diphthongs /ɛa ɔa/ and secondarily palatalized consonants.

With respect to other Romance languages, Romanian is under-resourced (Trandabăţ et al. 2012), meaning that it is covered by relatively fewer studies, and fewer modern technological analyses are applied to it. The areas in which most work is underway on Romanian are, coincidentally or not, precisely the areas in which it differs from other Romance languages. Among vocalic phenomena these include the diphthongs' articulation and alternation, since they are typologically rare; Romanian central vowels, which are nearly unique among Romance languages, particularly with regard to /i/; and post-labial centralization of vowels. Consonantal phenomena currently under investigation involve the articulation and acoustics of consonants, especially those with secondary palatalization; consonant clusters; and the (variable) phonetic realization of the postposed definite article /l/. Much work remains to be

done on Romanian, particularly its synchronic phonology, which is under-characterized in deference to historical processes; intonational phonology; linguistic variation; non-standard varieties; and the realization of consonants independent of Articulatory Phonology approaches.

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Martin Krämer

18 Italian

Abstract: In this chapter, an overview is provided of the segmental and suprasegmental lexical and post-lexical phonology of Italian, as well as some of the variation found in local varieties. I discuss the most central aspects of Italian phonology, i.e. its segment inventory, segmental contrasts, syllable phonotactics, foot structure, word and phrase stress, intonation, and the most prevalent phonological processes in the language, such as vowel-glide alternations, intervocalic /s/-voicing, palatalization, vowel elision and epenthesis, vowel lengthening, syntactic gemination, stress shift, and metaphony. Microvariation and loanword phonology are also discussed in the chapter, in light of recent theoretical developments and new empirical findings. Beyond summarizing current research, I provide a new analytical sketch of Italian syllable phonotactics and its foot structure, and discuss an innovative approach to the analysis of microvariation.

Keywords: Italian, loanword phonology, palatalization, vowel lengthening, gemination, *raddoppiamento sintattico*, layered foot, vowel reduction, metaphony

1 Introduction

Italian phonology is an extraordinarily well-studied subject. It is therefore not among the aims of this chapter to give an exhaustive overview of the literature on Italian phonology. It is intended, though, to pick up at the point of Krämer's (2009a) work and at least point out some of the theoretical progress made in the context of Italian phonological data. Besides this modest goal, the chapter also aims to provide a condensed overview of the phonological characteristics of Italian. A more detailed account can be found in Krämer (2009a).

Regional variation is a delicate issue in connection with Italian. Hardly any author misses the opportunity to state that Italian must be the most fragmented daughter of Latin with an impressive number of dialects. Once this is said, it is a matter of debate whether these varieties of Romance spoken on the Italian peninsula can actually be considered dialects of Italian or if they have to be seen as languages in their own right. Gili Fivela et al. (2015) take the following position:

Italian vernaculars (It. *dialetti*) cannot be considered as local variants of a standard language; rather, they are linguistic systems largely autonomous from the common language, as they represent the continuation of Latin as spoken in the different territories of Italy.

(Gili Fivela et al. 2015, 140, fn. 2)

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Indeed, the relationship between Standard Italian and the regional varieties spoken in Italy is special. Standard Italian is based on the Florentine (Tuscan) variety, more specifically its 12th-century form, and was introduced in most regions only very recently, after the unification of various political entities in the modern Italian Republic in 1861. And only after World War II did Italian become more widely spoken outside its Tuscan home territory, propagated mainly through the school system and mass media. Even though Standard Italian is based on Florentine, Tuscan has features which are not considered standard but rather dialectal, such as the *gorgia toscana*, a process of intervocalic spirantization of plosives (cf. Marotta 2008; Ramsammy 2018). On the other hand, some phonological patterns from other regions are acceptable in local instantiations of the standard, such as Northern Italian intervocalic /s/-voicing.

The differences in the phonologies of the Italo-Romance varieties are so large and manifold that one cannot do them justice in a book chapter such as this. I will thus only present a brief discussion of this linguistic diversity, with a focus on theoretical issues. The two observations, that Tuscan Italian displays dialectal features itself and that some non-Tuscan regional features are accepted as local variants in the standard language, result in a linguistic oddity, quite typical of standard varieties, namely that one could conclude that Italian does not really exist and that it has to be considered a theoretical ideal or constructed norm rather than a privileged variety from a group of dialects/vernaculars (compare e.g. Norwegian).

This chapter is organized as follows. In Section 2, we look into word phonology, the segment inventory and segmental phonological processes, in particular velar palatalization. Syllable organization, foot form and stress placement as well as prosody dependent processes are treated in Section 3. Section 4 goes beyond the word domain and discusses phrasal issues such as vowel elision, phrasal stress and sandhi phenomena such as syntactic doubling (*raddoppiamento sintattico*), and their relevance for theoretical questions such as the autonomy of syntax and phonology, as well as intonation and the methodological and theoretical difficulties emerging in research on this matter. Section 5 considers variation and advocates a new methodological direction for dialectology. Section 6 reports on some current theoretical debates, i.e. whether the specifics of *raddoppiamento sintattico* of an Abruzzean dialect call into question the prosodic hierarchy above the word; and if some other well-known processes, namely stress retraction and phrase-final lengthening, swing the pendulum back in favor of the prosodic hierarchy; as well as if Italo-Romance metaphony changes our understanding of segmental representations and optimization. The last issues to be discussed are the integration of loanwords in different varieties of Italian and Italian second language phonology. Loanword phonology, heritage phonology, i.e. the Italian spoken by communities outside Italy, for example in Germany, the United States or South American countries, as well as acquisition and phonological disorders, are areas that have not yet received the attention they deserve. Section 7 recapitulates the major points of discussion.

2 Segmental phonology

In this section, we will first take stock of the Italian segment inventory and then look at velar palatalization and discuss, among other aspects of the pattern, whether it is determined by foot structure.

2.1 The segment inventory

Standard Italian makes use of the consonants shown in Table 18.1. The transcriptions in this table do not aspire to phonetic precision. For instance, the plosives in the column headed alveolar/dental are shown as simple alveolars even though they are usually realized as dentals, e.g. [t̪]. There are quite a few consonants in parentheses in this chart. Symbols are placed in parentheses for two reasons. They might be allophones, such as the trilled rhotic [r̄], which is a way of producing it if it is not produced as a tap. The voiced alveolar fricative is only marginally contrastive and an allophone of /s/ in intervocalic position in northern varieties of Standard Italian. The velar nasal [ŋ] only surfaces as the result of assimilation to a following velar obstruent. The status of the remaining symbols in parentheses as segments is a matter of analytical choice.

Table 18.1: Italian consonant chart.

	Labial		Alveolar/Dental		Postalveolar	Palatal	Velar	
Plosive	p	b	t	d			k	g
	(pʲ)	(bʲ)	(tʲ)	(dʲ)			(kʲ)	(gʲ)
	(pʷ)	(bʷ)	(tʷ)	(dʷ)			(kʷ)	(gʷ)
Affricate			ts	dz	tʃ	dʒ		
Fricative	f	v	s	(z)	ʃ			
	(fʲ)	(vʲ)	(sʷ)	(sʲ)				
	(fʷ)	(vʷ)						
Nasal		m		n		ɲ		(ŋ)
Lateral				l(lʷ)(lʲ)		ʎ		
Trill				(r)(rʷ)				
Tap				r				
Approximant		(w)					(j)	

Considering first the two glides at the bottom, it is a legitimate question whether these two are segments in their own right or simply close vowels in non-nuclear position

in words such as [ˈwɔmo] *uomo* ‘man’, [ˈjɛna] *iena* ‘hyena’, [ˈkawza] *causa* ‘cause’, [ˈbajta] *baita* ‘cabin’. On the one hand there are minimal pairs that suggest that one has to distinguish between glides and close vowels at a deeper level, such as [paˈura] *paura* ‘fear’ versus [ˈpawza] *pausa* ‘pause/break’, while on the other hand, vowels and glides predictably alternate in many related forms, depending on the position of stress in relation to the glide/vowel. This will be discussed in more detail in 2.4 (cf. van der Veer 2006 for an in-depth discussion).

Furthermore, almost any consonant, except for the palatals, can be found with a following labial or palatal glide and this opens various options for analysis. Latin had a labialized dorsal plosive /kʷ/, which was lost in some words but not in others, and the language might have expanded the system into one with contrastive labialization and contrastive secondary palatalization. Alternatively, these sequences might just be complex onsets, as the evolution of some of these from Latin consonant+lateral sequences suggests. Historical diphthongization, which still causes some stress-dependent alternations in the so-called mobile diphthongs, e.g. in [ˈnwɔvo] *nuovo* ‘new’ vs. [noviˈta] *novità* ‘news’, suggests an analysis of many, if not all of these sequences, as a simple consonant followed by a glide that is the weak part of a diphthong, which monophthongizes when unstressed.¹ The result of this, though, would be a rather over-populated system of diphthongs. That is, either analysis has its drawbacks.

If we consider consonant-glide combinations as sequences and all glides as reduced high vowels and have faith that the difference between words like *diavolo* and *dialogo* will find an explanation outside the contrastive system, the Italian system of contrastive consonants looks as shown in Table 18.2.

Table 18.2: Italian consonant phonemes (adapted from Vincent 1988, 280).

	Labial		Dental		Alveolar		Postalveolar		Palatal	Velar	
Plosive	p	b	t	d	ʈ͡ʂ	ɖ͡ʐ	ʈ͡ʂ	ɖ͡ʐ		k	g
Fricative	f	v			s	(z)	ʃ				
Nasal	m				n				ɲ		
Lateral					l				ʎ		
Trill					r						

¹ (Historical) diphthongization of mid vowels and (synchronic) monophthongization of such diphthongs into mid vowels when stress is removed, referred to as mobile diphthongs (It. *dittonghi mobili*) in the Italian context, is a cross-Romance phenomenon, as exemplified for instance by Spanish. Compare Sp. *bueno* ‘good’ with *bondad* ‘goodness’ and *diente* ‘tooth’ with *dental* ‘dental’ (↗3 Processes affecting vowels; ↗24 Spanish).

This chart differs from Vincent's chart in that it does not list the affricates as a different manner class. Given that, historically, these consonants emerged as the result of palatalization of plosives, the alveolar affricates resulting from palatalization of dental plosives and the postalveolar affricates from palatalization of velar plosives, I treat them as such and distinguish them from the plosives by their place of articulation. Just like the postalveolar affricates, the postalveolar fricative results from original sequences of the alveolar sibilant and a velar plosive followed by a front vowel, as evidenced in alternations such as *finisco* [fi'nisko] 'finish_{1SG}' – *finisce* [fi'niʃ'e] 'finish_{3SG}'. In a more abstract analysis one can thus conflate the manner categories and line up the affricates with the plosives as plosives at a place of articulation between dental and velar. The voiced alveolar fricative is kept in brackets, because there is a marginal contrast between /s/ and /z/ in intervocalic position in some varieties.

A contrastive property of the Italian consonants not represented in the charts so far is length. In intervocalic position, all consonants but the postalveolar and palatal ones, and the alveolar affricates, occur as both long and short. This is illustrated in (1) for the dental/alveolar consonants. Forms are given in Italian orthography, which represents the length distinction.

(1) Length in consonants

a.	[ˈfaːto]	fato	'fate'
	[ˈfatːo]	fatto	'fact'
b.	[ˈkaːza]	casa	'house'
	[ˈkasːa]	cassa	'box, cash register'
c.	[ˈnɔːno]	nono	'ninth'
	[ˈnɔnːo]	nonno	'granddad'
d.	[ˈpaːla]	pala	'shovel'
	[ˈpalːa]	palla	'ball'
e.	[ˈbaːra]	bara	'stretcher'
	[ˈbarːa]	barra	'bar, rod, pole'

The exceptional consonants are short in word-initial position and long between vowels, compare, e.g. [ˈʃarpa] *sciarpa* 'scarf' with a short postalveolar fricative and [ˈfaʃa] *fascia* 'bandana' with a geminate. However, the exceptional consonants behave in an extraordinary way in word-initial position, for example in determiner selection in nouns. Masculine nouns take the determiner *il* if they start with a consonant or complex onset other than a sibilant+consonant cluster (2a), in which case the determiner is *lo* (2b). Masculine nouns starting with the postalveolar fricative take *lo* (2d) as do nouns that begin with the alveolar affricate, but not those starting with the postalveolar affricate (2c). The palatal nasal and lateral only occur word-internally. The very few words beginning with this nasal behave like those with an initial postalveolar fricative (2d).

(2) Determiner selection in masculine singular nouns

a.	[il'sale]	il sale	'the salt'
	[il'no:me]	il nome	'the name'
b.	[lo'spats:jo]	lo spazio	'the space'
c.	[il'tʃe:lo]	il cielo	'the sky'
	[il'dʒo:ko]	il gioco	'the game'
d.	[lo'ʃɔpero]	lo sciopero	'the strike (industrial action)'
	[lo'dzi:ɔ]	lo zio	'the uncle'
e.	[lo'ɲɔk:ɔ]	lo gnocco	'the lump/dumpling'
	[lo'ɲɔ:mo]	lo gnomo	'the gnome'

Turning now to vowels, the monophthongs found in stressed syllables are given in Table 18.3.

Table 18.3: Monophthongs.

	Front	Central	Back
Close	i		u
Close-mid	e		o
Open-mid	ɛ		ɔ
Open	a		

The seven-vowel system uses backness, and four levels of height or rather three levels of height and a tense/lax distinction among mid vowels, referred to here as close-mid (tense) and open-mid (lax). This distinction is neutralized in unstressed syllables. Furthermore, in word-final unstressed syllables the close back vowel is missing, too. Vowel length is fully predictable, occurring in open stressed syllables in penultimate position in the word.

All seven vowels combine with a non-identical close vowel/glide in diphthongs. In the following chart the diphthongs with falling sonority are given.

Table 18.4: Falling diphthongs (adapted from Mioni 1993).

	Front	Central	Back
Close-mid	(ej) ew		oj
Open-mid	(ɛj) ɛw		ɔj
Open	aj aw		

The two diphthongs in brackets, [ej] and [ɛj], occur only in derived environments, as in the contraction of the preposition *di* and the determiner *i* to *dei*, as well as in the

pronoun *lei*. Removing the derived diphthongs and ignoring the one pronoun, the system is remarkably restrictive: sonority falls and the diphthong has to change in backness. Only the open vowel is compatible with both the front and the back glide and thus presumably underspecified for backness/place of articulation.

Looking at diphthongs with the glide as the first part we see that anything is possible, even combinations of the two close vocoids² and of two front or two back vocoids.

Table 18.5: Rising diphthongs (Mioni 1993).

	Front	Central	Back	Front	Central	Back
Close			ju	wi		
Close-mid	je		jɔ	we		wɔ
Open-mid	jɛ		jɔ̃	wɛ		wɔ̃
Open		ja			wa	

Even in rising diphthongs though, the weak or non-prominent part has to be a close vowel.

Sequences of two mid vowels or a mid plus an open vowel are usually considered heterosyllabic, as illustrated in (3) (cf. van der Veer 2006 for more details).

(3) Hiatus of non-close vowels

[be'a:to]	be <u>a</u> to	'happy, blessed'
[te'ɔlogo]	te <u>o</u> logo	'theologian'
[teo'lɔdʒiko]	te <u>o</u> lɔg <u>i</u> co	'theological'
[po'etiko]	po <u>e</u> tico	'poetic'
[po.e'zi:a]	po <u>e</u> s <u>i</u> a	'poetry, poem'

As indicated in the discussion of Table 18.1, the glide-vowel combinations in Table 18.5 can potentially be analyzed in various ways. The question is whether both vocoids are in the syllable nucleus or whether the initial glide is in the onset. In Italian (unlike Spanish for example), none of these diphthongs, stemming from the historical diphthongization of mid vowels, occurs in closed syllables. Exceptions such as ['kwɛrtʃa] *quercia* 'oak' or ['pjɔdʒ:a] *pioggia* 'rain' have a different historical origin (in the latter case the palatalization of a lateral in a complex onset). The open syllable context for historical mid vowel diphthongization suggests that even rising diphthongs add complexity to the syllable rhyme, but on the other hand, there are virtually no rising diphthongs in syllables with complex onsets. The virtual absence of restrictions on vocoid combinations in rising diphthongs is another argument for an analysis of

² A vocoid is a vowel or a glide.

these glides as onsets rather than as part of the nucleus. However, alternations involving the mobile diphthongs, which are realized as diphthongs when stressed and as monophthongal when unstressed, strongly suggest a nucleus analysis. We will come back to this issue in the subsection on stress-dependent alternations.

2.2 Segmental alternations

Of the phonological alternations that are probably not prosodically conditioned the most prominent is velar palatalization (cf. Repetti 2016 for the broad picture of palatalization in Romance and ↗5 Palatalization in Romance). The process is controversial since its high number of exceptions suggests that it is not synchronically active. Whether stress or prosodic structure plays any role is also a matter of debate. Lexical class or category, however, is an important factor in the description of application and blocking of velar palatalization.

In second and third conjugation verbs, the morpheme-final velar plosives /k/ and /g/ are realized as the corresponding postalveolar affricates /tʃ/ and /dʒ/ and the cluster /sk/ is realized as a postalveolar fricative /ʃ/ if followed by a front (close or mid) vowel (4a, b). This does not happen in first conjugation verbs and in certain denominal or deadjectival verbs in the other two classes (c). As can be seen in (4c), a verb derived in this way is mixed: the denominal/deadjectival root does not undergo palatalization, but the stem extension *-isc-* does. In nouns and adjectives, the situation is mixed (4d–f). Some nouns undergo palatalization and others do not. Even those that alternate do so only if a close front vowel follows (compare 4d and 4e).

(4) Velar palatalization

a.	diri[dʒ]ere 'direct _{INF} ' indu[tʃ]ere 'induce _{INF} '	diri[g]o 'direct _{1SG} ' indu[k]o 'induce _{1SG} '	diri[dʒ]i 'direct _{2SG} ' indu[tʃ]i 'induce _{2SG} '	
b.	mar[tʃ]ire 'rot _{INF} '	mar[tʃ]i[sk]o 'rot _{1SG} '	mar[tʃ]i[j]i 'rot _{2SG} '	
c.	ri[k:]o 'rich _{M.SG} '	ri[k:]i 'rich _{M.PL} '	arri[k]ire 'enrich _{INF} '	arri[k]i[j]e 'enrich _{3SG} '
d.	ami[k]o 'friend _{M.SG} '	ami[tʃ]i 'friend _{M.PL} '		
e.	ami[k]a 'friend _{F.SG} '	ami[k]e 'friend _{F.PL} '		
f.	anti[k]o 'old _{M.SG} '	anti[k]i 'old _{M.PL} '		
g.	fanati[k]o 'fanatic _{M.SG} '	fanati[tʃ]i 'fanatic _{M.PL} '		

It is unclear if palatalization is synchronically a productive process. Even though there are alternations, it is not predictable which morphemes undergo or cause them. Celata/Bertinetto (2005) used a priming experiment to find out if velar palatalization is still active in present-day Italian, measuring reaction times for plural productions of palatalizing and non-palatalizing morphemes. They did not find a statistically significant difference between palatalizing and non-palatalizing velars, but they did find one between stems ending in velars and those ending in non-velar consonants. Words with a root ending in a velar are accessed faster than words with roots ending in a non-velar, regardless of whether the plural has a velar or a palatal. They conclude that all stems ending in velars are lexically stored with their plural form while the plurals of stems with non-velars are produced online. This online production incurs a processing cost which is avoided in words with velars since they involve lexical look-up only and no morphological operation. Thus, palatalization is not synchronically active and is rather a lexically stored remnant of a past state of the phonology. One might argue though, that the difference between the velars and the non-velars is not a difference in access route (direct access versus online computation), but a difference in the perception of place of articulation. The majority of stimuli in the non-velar set were coronals. And coronals have been found to behave differently from labials and dorsals in other lexical access studies (cf., e.g., Walter/Hacquard 2004; Friedrich/Lahiri/Eulitz 2008). If coronals are underspecified for place of articulation they are compatible with both coronal and non-coronal representations in lexical access, while dorsals are specified for place and thus incompatible with any other representation. This results in slower lexical access for items containing coronals than for those containing dorsals.

Giavazzi (2008) argues that palatalization only seems irregular and unpredictable, but is actually dependent on the prosodic environment. If the palatalization context, a front vowel to the right of a velar plosive, is present, but this occurs within a foot, palatalization is blocked, as in (4f) *an(tichi)*, while it applies outside the foot, as in (4g), *fa(nati)ci*. One might add that a palatal vowel on both sides of the consonant improves the chances of palatalization applying. Giavazzi (2012) reconfirms her foot-based analysis with a nonce-word test. Krämer (2009a; 2009b) also uses a nonce-word test, which only establishes that some speakers apply palatalization to novel forms and others do not. Thus, the process is productive for some speakers and unproductive for others. On the basis of the existing Italian lexicon, the foot hypothesis, while a good rule-of-thumb, is not tenable, since there are too many exceptions, displaying palatalization inside the foot and blocking it outside the foot, as shown in (5a, b), respectively.

(5) Velar palatalization and the foot (indicated by parentheses)

- a. a(mico) – a(mici) ‘friend_{M.SG}’ – ‘friend_{M.PL}’
- b. a(nalo)go – a(nalo)ghi ‘analogous_{M.SG}’ – ‘analogous_{M.PL}’

3 Suprasegmental phonology

In this section, we explore Italian syllable structure and phonotactics, and discuss word stress as well as prosodically-driven alternations, such as the raising of mid-open vowels to mid-close as well as the behavior of mobile diphthongs, i.e. vocoids that alternate between mono- and diphthongal form.

3.1 Syllables

Italian syllable structure is severely restricted. In this subsection, I discuss the constraints on syllabic constituents, i.e. the nucleus, the rhyme and the coda, as well as the onset.

Italian nuclei, even those of unstressed syllables, have to be vocalic. Onsets and rhymes can be complex, while codas are always simple. Complex onsets have to be of rising sonority, unless the first consonant is an /s/. In that case almost any other consonant, except for palatals, and any of the complex onsets consisting of two consonants can follow. We can thus conclude that initial /s/ takes up a special position, often referred to as an appendix (cf., e.g. Davis 1990; Hermes 2012; Hermes/Mücke/Grice 2013, cf. Goad 2011 on /s/+C clusters in general). This is confirmed by determiner selection, which was briefly discussed in 2.1, cf. examples in (2). Words starting in /s/+C take the same determiner as the palatals, except the postalveolar affricates, which is different from the form chosen for words starting with the sibilant alone or with any other consonant or consonant combination.

Once initial /s/ in /s/+C clusters or /s/+C(C) sequences has received this special treatment, the remaining complex onsets are maximally binary and almost always of rising sonority. Long vowels and (falling) diphthongs almost only occur in open syllables. Thus, codas are only found after short vowels. Branching of the rhyme is thus also maximally binary, either in the nucleus or at the rhyme level.

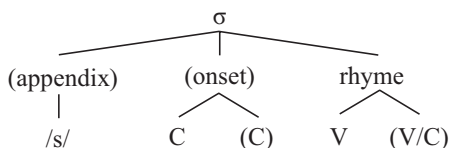


Figure 18.1: Italian syllable structure.

The set of consonants admissible in Italian codas is highly restricted, consisting of only the sonorants and /s/ (Itô 1988). In addition, geminates are never preceded by a consonant, a diphthong, or a long vowel. Since the presence of codas is so restricted from two sides, that is, the preceding nucleus cannot be long or a diphthong and the following consonant cannot be long, it is helpful to analyze the rhyme in terms

of moras, whereby coda consonants receive weight by position, vowels are moraic, long vowels are bimoraic, and geminates also contribute a mora, which is associated with the coda position of the preceding syllable. If Italian does not allow more than two consecutive moras, the co-occurrence restrictions holding between nuclei, codas, and following geminates are elegantly explained. Long vowels, diphthongs, codas, and geminates exclude each other since each of them contributes an additional mora to a rhyme, and any additional mora would exceed the maximum number of two in a row. This has an effect on penultimate lengthening. The vowel in a stressed penultima is usually long, unless the syllable is closed by a consonantal coda or followed by a geminate consonant.

There are a couple of exceptions to this generalization about the maximal size of syllable rhymes in Italian. The first syllable in words such as *austriaco* ‘Austrian’ or *claustrofobia* ‘claustrophobia’, [aws] and [klaus], respectively, consists of a rhyme with a complex nucleus and a coda, which, according to the reasoning above adds up to three moras. These are, however, very rare and always involve coda /s/. One might wonder if the medial /s/ in these /str/ clusters is in an appendix, as it would be at the beginning of a word, as in *strada* ‘street’.

Returning to the second mora of heavy syllables, these are thus associated with the second half of a long vowel, the first half of a geminate, the offglide of a diphthong of falling sonority, a sonorant consonant or /s/. A coda consonant that is not simultaneously associated to the following onset, as geminates are assumed to be, thus has to be of high sonority or /s/. A nucleus has to be of higher sonority still. Word-internal /s/ codas, such as that in *cosmo* [ˈkɔzmo] ‘cosmos, outer space’ or *chiostro* [ˈkʲɔstro] ‘cloister’, could be considered as an appendix, just as the /s/ in word-initial clusters, such as *smercio* [ˈzmɛrtʃo] ‘sale, distribution’. The shortness of the vowel in these syllables, e.g. the vowel in the syllable [ˈkʲɔs.] of *chiostro*, though, speaks against this analysis, since the internal appendix /s/ would then leave the second mora unoccupied and the preceding vowel should be long, as every other stressed vowel in penultimate open syllables, which is not the case. A possible solution to the coda /s/ conundrum is to conclude that the sibilant occupies its own stratum in the sonority hierarchy (as proposed by Selkirk 1984, cf. as well Goad 2016 on the special status of /s/ in the sonority hierarchy) and the cut-off line for coda acceptability in Italian is below this stratum. In the hierarchy in (6), the classes tolerated in the second mora/coda that do not have to be linked to a following onset are underlined.

- (6) Italian sonority hierarchy and end-of-syllable acceptability
obstruents < sibilant < nasals < approximants < vowels

This coda condition, which is not unique to Italian, only holds on word-internal codas. In the native lexicon all words end in a vowel, thus word-finally the coda filter is complete, not allowing any consonants. This state of affairs, however, is seriously undermined by loanwords such as those in (7).

(7) Word-final consonants in recent loanwords

chat	‘(web) chat’	slum	‘slum’
smog	‘smog’	bar	‘café’
bus	‘bus’	film	‘movie’

Some speakers in central and southern varieties of the standard language produce a vowel, a schwa, or a clearly audible release at the end of these consonant-final words. This will be discussed in more detail in 6.3.

If loanwords with word-internal codas are taken into consideration, the coda condition can be regarded as relaxed, i.e. a historical artefact, since coda consonants in words like *badminton* [‘bedminton] do not get repaired in any way, unlike the vowels.

Sonority is also a useful concept in the analysis of complex onsets, bar those with an initial /s/. Sonority has to rise from the first to the second consonant by a considerable degree. Obstruent+nasal sequences are not attested. Some loans, such as *psicologia* ‘psychology’, display initial sequences of obstruents that do not start with /s/, but such clusters, like other obstruent-obstruent sequences, are absent from the native vocabulary. Historical sequences of obstruent+lateral shifted the lateral up the sonority hierarchy to a palatal glide, as in *fiore* ‘flower’ < FLORE (cf. e.g. Krämer 2016 and references cited therein). The contemporary lexicon contains new initial C+lateral sequences, as in *flotta* ‘fleet’. Since this palatalization or sonorization did not happen to obstruent+rhotic clusters, one can assume that laterals are lower in sonority than rhotics. Thus, the category approximant in (6) has to be broken up into at least two strata (for more details cf. Parker 2002).

This is also reflected in syllable contacts. While both rhotics and laterals can be in a coda, we only find coda-onset sequences in which the rhotic precedes the lateral, e.g. *perla* ‘pearl’, *urlo* ‘scream’, and not **pelra* or **ulro*. This gap can be explained if sonority has to fall between a coda and the following onset, as stated in Vennemann’s (1988) Syllable Contact Law. That this restriction is active in Italian is also evident from the absence of word-internal nasals followed by a liquid. These sequences cannot be parsed as a complex onset and thus would have to be coda-onset sequences. While nasals are generally allowed in word-internal codas they are banned from this position if the following onset starts in a liquid.

If, based on this, we say that sonority has to rise at least three strata in Italian onsets, we have to separate laterals from rhotics and regroup the sibilant with the nasals, as in (8) (cf. Parker 2011; Alber/Meneguzzo 2016 for a more formal approach to calculating sonority distances).

(8) Italian sonority hierarchy final

1	2	3	4	5
obstruents < sibilant, nasals < laterals < rhotic, glides < vowels				

This analysis gives us a partial answer to a question raised earlier, how to analyze the glides in rising diphthongs. In words such as *ruota* ['rwɔta] 'wheel' or *luogo* ['lwɔgo] 'place' the labial glide cannot be in the onset together with the preceding liquid. Even if we assume that rhotics and glides occupy different strata on the sonority hierarchy, these would be adjacent and not three levels apart. The lateral is also too close to the glides to share an onset with them.

As one of the editors suggests, determiner selection might be seen as evidence in favor of a nucleus analysis of at least some prevocalic glides. Many nouns starting in a glide, such as *uomo* 'man', select the same definite determiner as vowel- or nucleus-initial nouns. Compare *l'uomo* [lwɔmo] 'the man', *l'orso* 'the bear', and *il torso* 'the torso, body'. However, some glide-initial nouns, especially recent loans, behave like consonant-initial stems, e.g. *il water* 'the water closet'. An additional argument for an analysis of postconsonantal glides as being in the nucleus and not in the onset will come from the mobile diphthongs discussed below.

3.2 Word stress and stress-dependent processes

In this subsection default word stress, penultimate vowel lengthening,³ and unstressed syllable reduction are discussed. The latter includes the tensing of mid lax vowels as well as the alternation between rising diphthongs and mid vowels.

Word stress seems to be unpredictable, since it can occur on any of the last three syllables (9a–c). In some inflected forms of some verbs it can even be on the preante-penultimate syllable (9d). However, in other inflected forms of the same verbs, stress is located further back in the word (9e).

(9) Word stress

a.	tribù	[tri'bu]	'tribe'
b.	casino	[ka'zi:no]	'chaos'
c.	asino	['azino]	'donkey'
d.	qualificano	[kwa'lifikano]	'qualify _{3PL} '
e.	qualifichiamo	[kwali'fika:mo]	'qualify _{1PL} '

Stress is largely unpredictable and has to be marked in lexical representations. However, there are several issues related to prosodic structure worth discussing.

First, most researchers agree that Italian has trochaic feet. All data, bar examples such as those in (9a), which constitute less than 5% of the Italian lexicon, are compatible with this conclusion. Iambic forms as in (9a) cause syntactic doubling, by which

³ This has an effect on global speech rhythm; ⁷⁸ Comparing and deconstructing speech rhythm across Romance languages.

the initial consonant of a word is lengthened if it is preceded by a word with a final stressed open syllable, as the lateral in *caffè lungo* ‘long coffee’.

Second, these feet are right-edge oriented. Rightward stress movement in (9e) versus (9d) can be considered evidence for the right-edge orientation of the stress foot. If two lexical stresses compete, in this case one on the stem /kwa'lifik-/ and one on the affix /-i'amo/, main stress is realized on the rightmost one (cf. Krämer 2009a for a discussion of lexical stress competition in Italian and Meinschaefer 2011 on stress in verbs in Romance).

Third, if there are right-aligned trochaic feet, there must be a default that is not lexically marked. Candidates for this are (9b) and (9c). (9b) is straightforwardly analyzed as a bisyllabic trochee constructed at the right edge of the word. The vowel in an open stressed syllable in such a trochee is lengthened to satisfy Stress-to-Weight (‘stressed syllables should be heavy’). If the latter is the case one has to explain why vowels in antepenultimate stressed syllables such as the one in (9c) do not lengthen. (9c), i.e. antepenultimate stress as the default stress position, requires an additional assumption, such as extrametricality of the final syllable and then a trochee that is binary at the syllabic level.

Fourth, if there is a default stress mechanism involving foot construction, is the system quantity-sensitive? Researchers have put forth both weight-sensitive and weight-insensitive analyses (Sluyters 1990; D’Imperio/Rosenthal 1999; Morén 2001; Krämer 2009a; 2009c vs. den Os/Kager 1986; Nespor 1993). The following facts regarding vowel length might be decisive. Stressed vowels in open penultimate syllables are much longer than stressed vowels in the antepenultimate, which are only slightly lengthened compared to unstressed vowels (Hajek/Stevens/Webster 2007; though cf. McCrary 2004). Stressed vowels in syllables closed by a consonant do not lengthen significantly either. Final stressed vowels are always short. Closed syllables do not behave uniformly. Closed penults are almost always stressed, as in the example in (10a). There are very few words with an unstressed heavy penult, like the one in (10b). Closed antepenults are sometimes stressed, sometimes not, as shown in (10c) and (10d). Word-final closed syllables, which do not occur in the core lexicon but in neologisms in the form of acronyms and loanwords, are not stressed, as exemplified in (10e), though they can be, as shown in (10f).

(10) Heavy syllables and stress

a.	secondo	[se'kondo]	‘second’
b.	polizza	['pɔlits:a]	‘(insurance) policy’
c.	candido	['kandido]	‘trusting, naïve’
d.	bandito	[ban'di:to]	‘bandit’
e.	ENEL	['ɛ:nel]	(an electricity company)
f.	bazar	[ba'dzar]	‘market place’

Nonce-word reading experiments carried out by Krämer (2009a; 2009c), yielded clear results for closed penults and antepenults. Closed antepenults do not attract stress, while closed penults do. This leads to the conclusion that for penultimate syllables, stress placement is weight-sensitive, while it is not for other positions – which is puzzling. However, it correlates with the vowel lengthening pattern. This does not necessarily identify the penult as the position of default stress. In trisyllabic words of open syllables, just over 50% of realizations are stressed on the penult and just under 50% are stressed on the antepenult. With quadrisyllabic test items with light syllables only, the preference dramatically shifts to the penult. Krämer concludes that the reason for this is the possible construction of a second foot that arises with the additional syllable. If stress is placed on the antepenult, the initial syllable cannot be footed.

Trisyllabic forms with light syllables constitute a dilemma for footing. Feet are generally preferred if bisyllabic. With bisyllabic or bimoraic feet either the initial or the last syllable remains unfooted in trisyllabic forms. Compare *ca(sino)* and *(asi) no* in (9), above. Krämer (2018) examines truncated forms and analyzes them as aspiring perfect words, i.e. perfect alignment of the optimal foot and word edges (Itô/Mester 2015) in either the deleted part or the realized part (e.g. *cinematografo* ‘movie theatre’, *frigorifero* ‘refrigerator/fridge’). Trisyllabic words with initial stress as well as bisyllabic words with initial stress show perfect alignment of word and foot edges if a layered trimoraic foot (Martínez-Paricio 2013) is assumed, as in the following examples.

(11) The perfect word in Italian

- ((‘μ μ) μ)
 a. ((‘kavo)lo) cavolo ‘cabbage’
 ((‘μ μ) μ)
 b. ((‘ka:)vo) cavo ‘cable’

Words like *casino* ‘chaos’, with three light syllables and penultimate stress, still have one unfooted syllable in this analysis. However, we can now explain why vowel lengthening only happens in the penult. To construct a trimoraic layered foot on the last two syllables a third mora is needed, hence the lengthening. In words with antepenultimate stress, lengthening is not necessary, since in such strings three moras are available. This foot and its alignment to the right edge explain the stress-repellent behavior of heavy antepenults as well as the apparent weight-sensitivity of heavy penults. Heavy antepenults are stress-repellent because there is a stray mora at the right edge of the word if the foot is built on this heavy syllable and the next mora to the right, as illustrated in (12a). The majority of Italian words has the main stress foot aligned with the right edge of the word (12b–e). This also holds for bisyllabic iambic forms (e.g. *metà* ‘half’; not listed in 12). Even a light syllable in the penult can be stressed since vowel lengthening seems to come at a low cost (12b). A heavy

penult always receives stress, since this results only in a stray mora at the left edge, not at the right edge (12c). Words with three light syllables can be footed as in (12d) or (12e). The advantage of (12d) might be that the stress is closer to the right edge of the word, which might be more important for those that prefer penultimate stress in nonce-words of this type, and less important than the avoidance of mora insertion for those who prefer antepenultimate stress in such forms. Thus, for the former speakers, penultimate stress is the default and for the latter it is antepenultimate. All forms that do not correspond to the respective default have to be marked as exceptionally stressed. For the former speakers words with antepenultimate stress in the lexicon have to be lexically marked for stress and for the latter all words with penultimate stress have to be lexically marked, and those of the type in (12a) have to be lexically marked for stress for all speakers.

(12) The perfect foot at the right edge

	((μ μ) μ) μ		
a.	(('kan) di) do	candido	'trusting, naïve'
	μμ (('μμ) μ)		
b.	kan (('ti :)na)	cantina	'basement'
	μ (('μμ) μ)		
c.	se (('kon)do)	secondo	'second'
	(('μ μ) μ)		
d.	(('azi no)	asino	'donkey'
	μ (('μμ) μ)		
e.	ka (('zi :)no)	casino	'chaos'

In unstressed syllables the vowel inventory is reduced to five vowels, since the two lax mid vowels are tensed if not stressed, as illustrated in (13).

(13) Unstressed vowel tensing

a.	ortopedia	[ortope'di:a]	'orthopedics'
	ortopedico	[orto'pɛdiko]	'orthopedist/-pedic'
	appendo	[ap'pɛndo]	'hang _{1SG} '
	appendiamo	[appen'dja:mo]	'hang _{1PL} '
	bene	['bɛ:ne]	'well'
	beneficio	[bene'fi:tʃo]	'benefit'
b.	logica	['lɔdʒika]	'logics'
	logicamente	[lɔdʒika'mente]	'logically'
	copri	['kɔ:pri]	'cover _{2SG} '
	coprite	[ko'pri:te]	'cover _{2PL} '
	porto	['pɔrto]	'carry _{1SG} '
	portiamo	[por'tja:mo]	'carry _{1PL} '

Orthogonally to this, some of the mid vowels alternate with rising diphthongs. The diphthongal form occurs if they are stressed, as in the examples in (14b), and the monophthong in unstressed syllables, as in the morphologically related forms in (14a). However, while the first example in (14a, b) is a verb, the process is far from regular in verbs. The form in (14c) can variably be produced with a mid monophthong or diphthong, but the diphthongal form is the dominant one, even though the diphthong is in an unstressed syllable. Some verbs have vowels that are always diphthongal, as (14e, f) and some verbs have mid vowels that never diphthongize, as the one in (14g, h).

(14) Mobile diphthongs (stress marked by underlining)

a. vol <u>ere</u>	'want _{INF} '	b. <u>vu</u> ole	'want _{3SG} '
novit <u>à</u>	'news'	<u>nu</u> ovo	'new _{M.SG} '
movim <u>ento</u>	'movement'	<u>mu</u> overe	'move _{INF} '
c. m(u)ov <u>ia</u> mo	'move _{1PL} '	d. <u>mu</u> overe	'move _{INF} '
e. nuot <u>are</u>	'swim _{INF} '	f. <u>nu</u> oto	'swim _{1SG} '
g. not <u>are</u>	'note _{INF} '	h. <u>no</u> to	'note _{1SG} '

One is tempted to conclude that some of these stems have an underlying diphthong that *has* to be monophthongized in unstressed position, some have an underlying diphthong that *can* be monophthongized in unstressed position, some have an underlying diphthong that *cannot* be reduced to a monophthong, and some forms have an underlying mid vowel (which never diphthongizes).

Close vowels and the corresponding glides also alternate depending on stress, forming diphthongs that do not necessarily involve mid vowels. When the addition of a morpheme retracts the stress from a close vowel adjacent to another vowel, this close vowel turns into a glide, avoiding a hiatus that is tolerated inside the main stress foot but not outside it. The pattern is illustrated in (15).

(15) Stressed vowel to unstressed glide (van der Veer 2006)

a. avvio	[av'vi:.o]	'start'
circuito	[tʃir'ku.ito]	'circuit'
invio	[imj'vi:.o]	'sending'
b. avviamento	[avvja'mento]	'start'
circuitale	[tʃirkwi'ta:le]	'of a circuit'
inviabilità	[imvjabili'ta]	'sendability'

Vowel hiatus is also tolerated at the left edge of the main stress foot, but not further away from it, as shown by the vowel-glide alternations in (16).

(16) Pre-tonic vowel to glide (adapted from van der Veer 2006, 75)

a.	biologo	[bi'ɔlogo]	'biologist'
	cliente	[kli'ente]	'client'
	consueto	[konsu'ɛ:to]	'usual'
b.	biologia	[bjolo'dʒi:.a]	'biology'
	clientela	[kljen'te:la]	'clientele'
	consuetudine	[konswe'tudine]	'habit'

A possible explanation for this distribution is that glide formation reduces the number of unfooted syllables. If, however, a vowel is in a stressed syllable, it has to be faithful to its underlying features, especially [+vocalic].

(17) Avoiding unfooted syllables

a.	tʃir.kwi.('ta:.)le)	*tʃir.ku.i.('ta:.)le)
b.	tʃir.('ku.i.)to)	*tʃir.('kwi:.)to)
c.	kli.('ɛn.)te)	*('kljɛn.)te)

The form *cliente* in particular reveals that avoidance of unfooted syllables is subordinate to the avoidance of unfaithfulness in stressed syllables, since the blocking of gliding yields an unfooted syllable (cf. van der Veer 2006; Krämer 2009a, 88–95, for more elaborate discussion).

In some instances, gliding does not solve the problem and vowels are entirely deleted. This happens usually at morpheme boundaries, as presumably in the disappearance of the theme vowel of verbs in some forms in the paradigm, but mostly in clitics. This will be considered in the next section, which deals with phenomena that happen in domains larger than the word.

4 Beyond words

Phonological processes beyond the word in Italian have played an important role in theoretical discussions on the syntax-phonology interface ever since Nespor/Vogel (1986) used syntactic doubling, phrase-final lengthening and other phenomena from Italian in their ground-breaking work on the prosodic hierarchy. We will restrict this section to vowel elision, stress, and focus, touching briefly on syntactic doubling. Syntactic doubling, together with phrase-final lengthening and stress retraction, will be picked up again in Section 6.

4.1 Elision

Vowel deletion occurs in several contexts word-internally, at word boundaries and in clitics. Sequences of vowels are avoided at morpheme boundaries, at the clitic-word boundary, and between words.

(18) Elision

a.	fama + -oso →	famoso	‘famous’
b.	la + anatra →	l’anatra	‘the duck’
c.	dare + mi →	darmi	‘give me’
d.	le + amiche →	le amiche / l’amiche ⁴	‘the (female) friends’

There is a lot of variation in these patterns, which range from obligatory deletion, to optional, to unlikely, and to impossible. In her study, Garrapa (2011) reconfirms earlier scholars’ insight that vowel elision in determiners is more likely than in other proclitics and that it is determined by morphosyntactic features. Vowels associated with feminine and plural are less likely to delete than those associated with masculine and singular. She opts for an allomorphy analysis, while Krämer (2009a) proposes a deletion analysis. While the allomorphy account loses the generalization that in most cases we are dealing with systematic vowel deletion, the deletion analysis has to refer to morphosyntactic features in the phonological grammar, which is not compatible with a strictly modular view of grammar. Another area that blurs the boundaries between syntax and phonology is phrasal stress.

4.2 Phrasal stress

Stress placement at the phrasal level is more rigid than at the word level. Usually the nuclear or main phrasal stress is placed on the rightmost word stress. In some cases, this results in syntactic movement, for instance when a constituent requires phrasal stress due to focalization (cf. Samek-Lodovici 2005; 2015; as well Dufter/Gabriel 2016 for an overview). However, some syntactic movement operations trump right-alignment of phrasal stress, as in the case of focused verbs, which move past adverbs even if they are in focus. Both instances are illustrated with examples from Samek-Lodovici (2015) in (19). In (19b) the subject is placed at the end of the domain because it is focused and therefore should receive main stress, while in (19c) the verb is focused and stressed, but it nevertheless does not remain *in situ*. It moves to T to the left of the adverb (Samek-Lodovici 2015, 253).

⁴ With *le amiche* being more common than *l’amiche*.

- (19) Focus, movement and stress
- a. Context: 'What happened?
'Gianni ha riso. 'John laughed.'
 - b. Context: 'Who has laughed?
'Ha riso GIANni. 'JOHN laughed.'
 - c. Context: What does Gianni always do?
Gianni BEve sempre. 'John always drinks.'

However, focus can also be expressed by pitch accents (D'Imperio 2002). The inventory of pitch accents is discussed in 4.4, below.

4.3 Raddoppiamento fonosintattico

The literature on syntactic doubling (*raddoppiamento sintattico*, RS) is vast, cf. e.g. Passino (2008; 2013) and sources cited there. Stevens (2012) recently re-examined the phonetics of RS. This synchronic gemination occurs in two different contexts: if a word ends in a stressed open syllable and the next word begins with a consonant or two, but not an /s/+C cluster; and after some functional items, regardless of stress. The latter is unpredictable and generally thought to be an effect of historical final consonant deletion in the function words that cause gemination without stress.

- (20) Syntactic and lexically idiosyncratic gemination at the word edge
- a. Farò [b:]ene. 'I'll do well.'
Sto [b:]ene. 'I'm well.'
 - b. a [l:]ui 'to him'
come [t:]e 'like you' (Stevens 2012, 17)

Stress triggered gemination can be understood as a side effect of foot binarity or Stress-to-Weight, that is, as an optimization of prosodic structure. Word-final vowels are generally short (though cf. discussion and references in Stevens 2012, 34–35) and thus only monomoraic, which is insufficient for a stress foot.

If the first syllable of the second word in such a sequence is stressed, stress is often retracted from the final syllable in the first word, which interacts opaquely with RS, because, at least in the Roman vernacular, it still applies even though its context has been removed by the retraction operation (cf. Saltarelli 2004; Krämer 2009a, 231). Stress is in the expected locations and RS applies as expected in a phrase like *caffè macchiato* 'stained coffee (espresso with a drop of milk)', while in *caffè latte* 'coffee with milk' stress is removed from the last syllable of *caffè*, resolving the clash with the stress on the initial syllable of *latte*, and the initial consonant of the following adjective, *latte*, is geminated nevertheless.

While RS has been considered to be restricted to the domain of the phonological or syntactic phrase (Nespor/Vogel 1986) this has been questioned by a number of scholars, who also maintain that not even pauses are a reliable indicator for phrase boundaries (e.g. Absalom/Hajek 2006). The set of function words that causes consonant lengthening varies considerably across dialects and we will discuss this as well as some other phrasal phenomena in more detail in Section 6.

4.4 Intonation

Work on Italian intonation faces the same empirical challenges as work on any other aspect of Italian phonology, mentioned earlier: one has to expect a wide range of geographic variation. The high functional load of intonation in the phonology of Italian can be appreciated by considering two facts. First, yes/no-questions can be expressed in Italian by altering only the tonal contour of a sentence rather than the word order. Similar to what is possible in English, the question ‘Does Giulia love prosecco?’ can be asked in several ways, as illustrated in (21a, b) and (21c, d), respectively. Second, focus can also either be expressed by syntactic movement, as discussed above, or by an intonational difference (21a, c).

(21) Questions and intonation

a. Giulia ama il prosecco.	‘Giulia loves prosecco.’
b. Giulia ama il prosecco?	‘Giulia loves prosecco?’
c. Ama il prosecco Giulia.	‘Giulia does love prosecco.’
d. Ama il prosecco Giulia?	‘Does Giulia love prosecco?’
e. Il prosecco, Giulia lo ama.	‘Prosecco, Giulia loves it.’

The declarative intonation is a falling contour while the yes/no-question intonation is characterized by a final rise. Lepschy (1978) identifies three more contours, a level tune for incomplete utterances or uncertain statements, a falling-rising one that expresses doubt or surprise, and a rising-falling intonation used to contradict or correct an interlocutor. Gili Fivela et al. (2015), in their investigation of 13 varieties, distinguish nine different pitch accents and six edge tones, of which a handful occur in all varieties, some in only one. They also identify 21 tonal contours for different sentence types used across varieties. For instance, broad focus statements, wh-questions and commands are realized in the same way across varieties, while yes/no questions exploit all options across varieties, with rising-falling, falling-rising, rising-falling-rising and falling-rising-falling contours.

Recent analyses of Italian intonation usually refer to some local variety, acknowledging that there is no standard intonation. Grice et al. (2005) propose a unified transcription within Autosegmental-Metrical (AM) Phonology, which should make comparison of different varieties much easier. In the AM framework, intonation

derives from discrete H (high) and L (low) primitives, providing reference for transcription standards and comparability. For example, the extreme variation among different varieties in the realization of yes/no questions is analyzed as L+H* L%, H+L* LH%, L+H* LH% and H+L* HL%,⁵ respectively, by Gili Fivela et al. (2015). However, the fact that early peak accent in polar questions in the Roman variety can be analyzed as L+H* (Savino 2012) or H*+L (Gili Fivela et al. 2015) suggests that the framework is still in need of further standardization.

While the prosodic domain of tone assignment is generally assumed to be the Intonational Phrase (IP), Grice et al. (2005) argue for the necessity of an intermediate phrase (ip) in some constructions, in some varieties (cf. as well D'Imperio 2002; Gili Fivela et al. 2015).

Surprisingly, the regional variation found in intonation patterns so far does not align with the dialectal divisions established in other areas to be discussed in the next section, which might be owed to the fact that research in intonation, at least with advanced technology and theory, can be regarded as still in its early stages. We can expect further progress in this area in the future. For more discussion of the state of the art of research on Italian intonation, cf. Gili Fivela et al. (2015).

5 Variation

As is the case for most other languages with a sufficiently large number of speakers, Italian varies along a range of dimensions, geographically and socially. Since, as pointed out in the introduction and reiterated by almost anyone writing about dialectal variation, the geographically restricted indigenous varieties spoken on the Italian peninsula are sister languages which all developed more or less independently from a common ancestor, Latin, and since the standard variety is thus one among many that just happens to be more prestigious, we find, in addition to local dialects, regional variants of the standard language, i.e. Tuscan with a local non-Tuscan accent. However, even if the reasons for this choice of standard are political, cultural, and economic, rather than linguistic, Tuscan is in a special position as the variety right between Eastern and Western Romance, together with Lazian, Umbrian, and southern Marche, as can be seen by the bundling of isoglosses on the La Spezia–Rimini line to the north and the Roma–Ancona line to the south (Rohlf 1937), which together cut a triangle out of the center of the Italian peninsula.

⁵ In the AM framework, three types of intonational tone are distinguished, pitch accents, marked by an asterisk (e.g. H*), phrasal accents, marked by a hyphen (e.g. H-), and boundary tones, marked by a percent sign (e.g. H%).

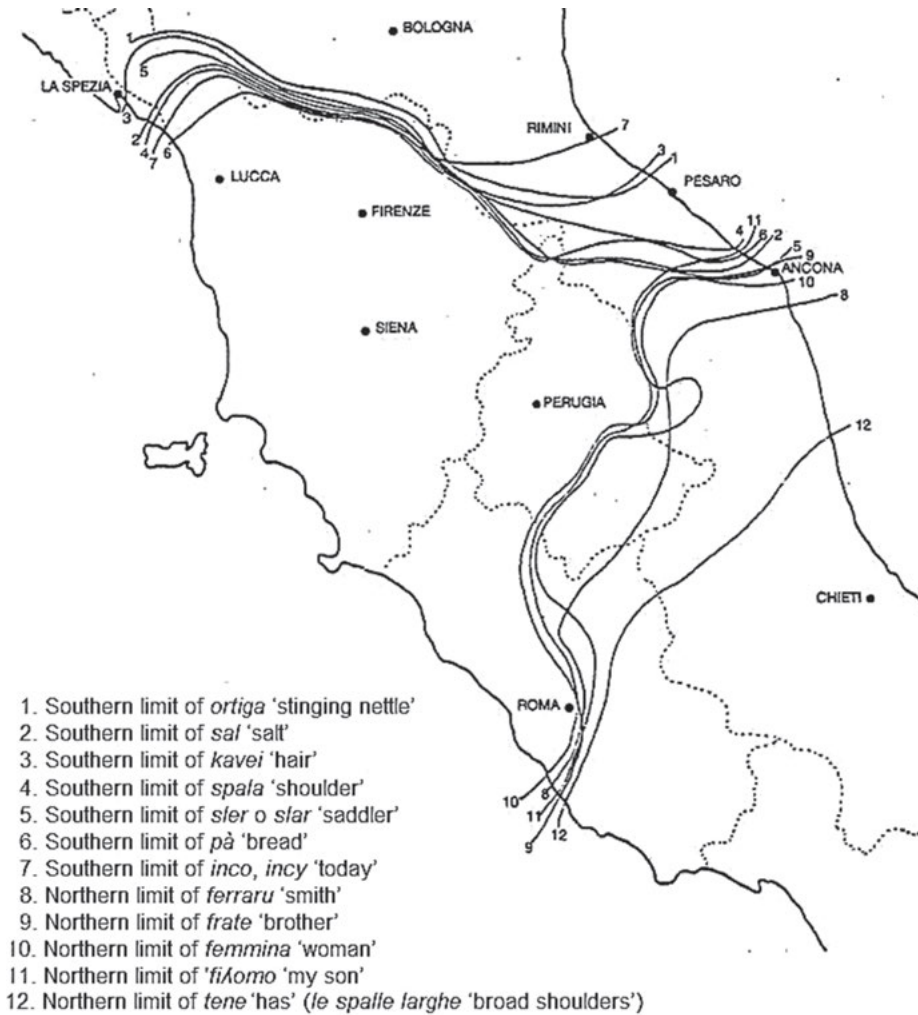


Figure 18.2: La Spezia-Rimini and Roma-Ancona isoglosses (adapted from Rohlfs 1937, 10).

The isoglosses also tell a story of geographic spreading. Some changes spread from some point of origin and stopped at some geographic or political barrier, suggesting that the various varieties found on the peninsula today did not develop in parallel, completely independently from one another, as the usual narrative goes. Also the distribution of typical dialectal features such as metaphony suggests mutual influence rather than multiple spontaneous developments of the same or very similar patterns (for recent work on metaphony in Italo-Romance varieties cf. Torres-Tamarit/Linke/van Oostendorp 2016).

While dialectologists have identified the parameters according to which language varieties differ on the Italian peninsula (cf. e.g. Loporcaro 2009 for an overview),

they disagree on how to group the varieties. There is relatively broad agreement on a division into northern (*settentrionale*), central, upper and lower southern (*meridionale*) varieties (e.g. Harris 1988, 18–20). Scholars disagree, however, on where to draw the line to other dialect continua descended from Latin and whether to classify some as separate strands of Romance (e.g. Sardinian, Friulian or Ladin; ↗19 Sardinian; ↗20 Rhaeto-Romance: Friulian, Ladin, and Romansh), while for others this question is purely a terminological matter.

Dialectometric analysis allows to quantify the distance between varieties of Italo-Romance (cf. Goebel 2008). With recent developments in generative linguistics, it should be possible to make progress on these questions at a deeper level. With the introduction of Optimality Theory, it has become technically possible to measure the distance between dialects as a difference in constraint rankings, that is, determine the qualitative difference. However, research in typological variation has shown that differences between varieties are not directly quantifiable as differences in the ranking of individual constraints, but rather in ranking conditions for groups of constraints that determine individual typological parameters. Alber (2015) proposes that the distance between dialects can be calculated in terms of *properties*, which consist of elementary ranking conditions (ERCs; Prince 2002) determining whether a variety displays a particular pattern or not (for an introduction to Property Theory cf. Alber/Prince 2021). She compares northern Italian varieties that differ with respect to the consonant groups they allow in word-final codas (created by historical apocope).

Most northern varieties apocopate after all consonants, while Venetian and Ligurian only apocopate after sonorants. Central and southern varieties do not apocopate at all (Alber's data come from the AIS – *Atlante linguistico ed etnografico dell'Italia e della Svizzera meridionale* 'Linguistic and ethnographic atlas of Italy and southern Switzerland'). She thus identifies a scale of apocope.

(22) Apocope microtypology

a.	no apocope	
	<i>sole</i> 'sun', <i>sordo</i> 'deaf'	(Central and southern varieties)
b.	postsonorant apocope	
	<i>sol</i> 'sun', <i>sordo</i> 'deaf'	(Ligurian, Venetian)
c.	all-out apocope	
	<i>sol</i> 'sun', <i>sord</i> 'deaf'	(Northern varieties)

The coda condition (Itô 1988, henceforth CODACOND as an OT constraint) bans obstruents from codas and can be considered the central factor in this typology, which has exceptionless apocope (caused by FINAL-C; McCarthy 1993) and exceptionless vocalic word-endings (caused by NoCODA; Prince/Smolensky 1993/2004) as its two extremes, and in between varieties with apocope only after sonorants. Below are the constraints and candidate set assumed by Alber (2015). The first constraint, *V#, is violated by words that end in a vowel. The second constraint, *T#, is violated by word-final

obstruents and $\ast\{T,N\}\#$ is violated by word-final consonants, i.e. codas. There are two inputs with two output candidates each to be evaluated. An underlying sequence of an obstruent followed by a vowel can be mapped to a faithful output, i.e. $TV\#$, or one with vowel deletion. The same holds for the input with a sequence of a nasal consonant and a vowel at the end of the word, i.e. $NV\#$.

(23) Italian apocope typology in OT

- a. Constraints $FINAL-C: \ast V\#$ ($V=\text{vowel}$)
 $CODACOND: \ast T\#$ ($T=\text{obstruent}$)
 $NoCODA: \ast\{T, N\}\#$ ($N=\text{sonorant}$)
- b. Candidates i.a $/TV\#/ - [TV\#]$
 i.b $/TV\#/ - [T\#]$
 ii.a $/NV\#/ - [NV\#]$
 ii.b $/NV\#/ - [N\#]$

The two constraints $CODACOND$ and $NoCODA$ are in a stringency relation. The violations of $CODACOND$ are a proper subset of those of $NoCODA$. Both constraints are in conflict with the constraint that causes apocope. The typological question is whether a language allows at least some apocope or no vowel deletion at all, which is decided by the ranking between $FINAL-C$ and the conflicting constraint with the wider scope, $NoCODA$. Once that property is set the next question is whether there is resistance to apocope or apocope in all contexts, unless the value of the first property was set to no apocope by the ranking $NoCODA \gg FINAL-C$. For the second property the question is thus if $FINAL-C$ outranks both $CODACOND$ and $NoCODA$ or just one of them.

For an enlightening analysis of a similar micro-typology of an aspect of syllable phonotactics cf. Alber/Meneguzzo (2016) on variation in complex onsets in Germanic and Romance varieties in northern Italy, as well as Meneguzzo (2018) for more detailed presentation of the data as well as a discussion of complex codas. For a decomposition of $NoCODA$ into a sonority-based family of constraints ($\ast/p\ t\ k/ \gg [...] \gg \ast/s/ \gg \ast/N/ \gg \ast/l/ \gg \ast/r/$) in the context of Old French, cf. Gess (1998).

Let us look at a slightly more complex case, the distribution of intervocalic s-voicing, the microvariation of which was analyzed in OT by Krämer (2005). The patterns and their analysis have been reconfirmed by Ouddeken's (2018) fieldwork and phonetic measurements, which also show how an apparently gradient phenomenon does not allow any fuzziness at all in its phonological distribution. Ouddeken also provides a detailed account of the phonetic variation of the pattern. We base the discussion here on Krämer's (2005) analysis. For previous accounts of parts of the pattern, cf. Nespor/Vogel (1986), Kenstowicz (1996), Peperkamp (1997), and van Oostendorp (1999).

Northern varieties voice the intervocalic spirant, as in *casa* 'house', word-internally, while the spirant is always voiceless at the beginning and end of words. At the prefix-stem boundary, voicing applies if the spirant is part of the prefix, as in *dis-abilità* 'disability'; otherwise it stays voiceless, as in *a-sociale* 'asocial'. Tuscan

has a voicing contrast word-internally, contrasting, e.g. *chie*[z]*a* ‘church’ with *ca*-[s]*a* ‘house’, while prefix-final spirants are voiced if the stem begins with a vowel, as in northern varieties.

Krämer’s (2005) analysis deploys four constraints that are central to the pattern of variation listed in (24). The candidate set is given in (25), with examples of the structural types on the right.

- (24) Constraints on /s/-voicing (cf. Krämer 2005 for proper definitions)
- a. Markedness
 - *VsV: No voiceless spirant between vowels within a prosodic word.
 - *Vs-V (ALIGNL): No voiceless spirant between vowels at the end of a prefix.
 - *z: No voiced spirant.
 - b. Faithfulness
 - IDENT: No change in voicing is allowed.
 - */s/ – [z], */z/ – [s]
 - CONTIGUITY: No changes within a string.
 - */VsV/ – [VzV], */VzV/ – [VsV]

- (25) Candidates
- | | | | |
|--------|----------------|------------------|---------------|
| /VsV/ | – [VsV, VzV] | <i>casa</i> | ‘house’ |
| /VzV | – [VsV, VzV] | <i>chiesa</i> | ‘church’ |
| /Vs-V/ | – [Vs-V, Vz-V] | <i>disonesto</i> | ‘dishonest’ |
| /V-sV/ | – [V-sV, V-zV] | <i>asociale</i> | ‘anti-social’ |

According to Ouddeken (2018), the positioning of CONTIGUITY with respect to the other constraints yields the variation between Tuscan (L1 in Table 18.6) and Emilia-Romagna/Lombardian (L2).

Table 18.6: Intervocalic /s/-voicing typology (adapted from Ouddeken 2018, 165–166).

L1	CONTIGUITY » *VsV, *Vs-V » *z » IDENT
L2	*VsV, *Vs-V » CONTIGUITY, *z » IDENT

There is a central ranking condition visible here, i.e. whether CONTIGUITY dominates or is dominated by the contextual markedness constraints. If CONTIGUITY dominates, intervocalic s-voicing will be restricted to morpheme boundaries. Further fieldwork is necessary to determine if other varieties predicted by this constraint set exist, and the analysis of such constraint systems promises to yield a deeper understanding of the relations between dialects as well as local varieties of the standard.

6 Current issues

There are several recent discussion strands within phonological theory that involve Italian data as core evidence or in which Italian phonological patterns pose the challenge. In a theoretical argument against the higher levels of the prosodic hierarchy and for an enriched model of Phase Theory, D'Alessandro/Scheer (2015) rely crucially on syntactic gemination data from Abruzzean. I will review this argument first. The more generally Romance dialectal phenomenon of metaphony has received continued attention for several decades, most recently in an edited volume on metaphony in the languages of Italy (Torres-Tamarit/Linke/van Oostendorp 2016). The chain-shift nature of the process and its typological variation challenge views of abstractness of phonological representations and/or computation. After discussing this we will review some results of current research into loanwords and second-language phenomena, which enhance our understanding of Italian phonology and which deserve more attention in future work.

6.1 Syntactic doubling and the prosodic hierarchy

D'Alessandro/Scheer (2015) argued that the specifics of lexical doubling in a variety of Eastern Abruzzean shows that the upper half of the prosodic hierarchy has to be discarded in favor of a completely revised theory of phases. This provoked a direct response by Bonet et al. (2018) who debunk both the claim that phonology above the word can be entirely explained by phases and that the Abruzzese data can only be accounted for with an extremely relaxed version of phase theory.

The Abruzzese pattern is special not so much for the functional particles that cause gemination but for the fact that the same particles cause gemination in some contexts, while in others they do not. This is illustrated in (26). The auxiliary causes gemination in the participle but not in the passive construction (data and transcription from D'Alessandro/Scheer 2015). The potentially geminating consonant is bold-faced.

(26) Abruzzese geminating particle in different contexts

a.	So	rr əspətətə			'I am respected.'
	be _{1SG}	respect _{PTCP.SG}			
b.	So	ɾəspətətə	la	leggə	'I have respected the law.'
	be _{1SG}	respect _{PTCP.SG}	the _{F.SG}	law _{F.SG}	

Bonet et al. (2018) criticize D'Alessandro/Scheer's (2015) account and offer two alternative analyses of the Abruzzese data that make at least as much sense as theirs. D'Alessandro/Scheer's analysis relies crucially on the assumption that doublets like the two instances of *so* in (26a) and (26b) are forms of the same auxiliary. However, they might just be homophonous forms of two distinct auxiliaries, as in the English glosses or the

Standard Italian renditions of the same sentences (*Sono rispettato* and *Ho rispettato la legge*, respectively – underlining marks the auxiliary). That is, the passive is formed with the auxiliary *essere* ‘be_{INF}’ and the perfect with the auxiliary *avere* ‘have_{INF}’. Accordingly, the auxiliary ‘be_{INF}’ causes gemination and the other auxiliary does not. Of course, this requires a parallel analysis of other particles that behave this way, i.e. that cause gemination in some syntactic contexts but not in others. In each case, two lexically distinct but largely homophonous morphemes have to be assumed.

Another alternative is that gemination is caused independently of the particle by a morpheme that consists of a floating mora and docks on to the word-initial consonant in this particular context (van Oostendorp 2015).

Bonet et al. (2018) further show that D’Alessandro/Scheer’s (2015) Modular PIC (Phase Impenetrability Condition)⁶ is too restrictive because it cannot account for a range of prosodic effects in other languages, mainly from the Bantu family. The general problem is that even the modular PIC phase edges do not always coincide with prosodic edges that are needed for tone sandhi, intonation and other phenomena. The problem of prosodically determined size restrictions on domains is illustrated by Bonet et al. (2018) with data from Basque. They could have used data from Standard Italian as well, that have been known for some time. D’Alessandro/Scheer (2015) cite Nespor/Vogel (1986) extensively, who discuss stress retraction and final lengthening in great detail.

Stress retraction happens when two words come together, of which one has final stress and the other one initial stress, moving the former further toward the beginning of the first word (Nespor/Vogel 1979). However, the process does not happen generally between any two words. They have to be in the same phonological domain and in case this domain potentially contains more than two prosodic words, stress retraction is blocked, suggesting that the domain is broken up into two. These two domains then do not coincide with the respective syntactic boundaries, as shown below with examples adapted from Nespor/Vogel (1986, 174–175). The stress on the final vowel of the noun *città* is retracted to avoid a clash with the initial stress of the following adjective *nordiche* in (27b), suggesting that the two words are in the same domain. In (27c) stress does not retract, suggesting that *molto* and *nordiche* form a domain separate from that of *città*. However, the DP is a phase while AP is not.

(27) Northern Italian stress retraction

a.	metà torta	→ [ˈme.taˈtɔr.ta]	‘half a cake’
b.	le città nordiche	→ [leˈtʃitːaˈnɔrdike]	‘the Nordic cities’
c.	le città molto nordiche	→ [leˈtʃitˈtaˈmoltoˈnɔrdike]	‘the very Nordic cities’

⁶ A phase is a syntactic domain (Chomsky 2000). The phase impenetrability condition requires movement of syntactic units to the left edge of their phase before they can be moved out of it. It is a matter of debate which projections can constitute a phase (cf. Chomsky 2008).

In Standard Italian, the last stressed vowel of a phonological phrase is lengthened. However, phonological phrases are maximally binary. If a syntactic domain is too big, i.e. contains more than two prosodic words, it is split up into two phrases, which creates a mismatch between syntactic and phonological phrasing, as illustrated in the data below (from Nespor/Vogel 1986, 176). In (28a) final lengthening applies to the stressed vowel of the last word, *ripieni*, but not to the stressed vowel of *pasticcini*. In (28b), however, the penultimate stressed vowel of *pasticcini* receives additional length while the stressed vowel of *ripieni* is not lengthened. The relevant syllables are underlined.

(28) Final lengthening

- a. Ho mangiato dei pasticcini ripieni.
'I ate some filled donuts.'
- b. Ho mangiato dei pasticcini ripieni di cioccolata.
'I ate some donuts filled with chocolate.'

Nespor/Vogel suggest that *pasticcini ripieni* is one prosodic domain in (28a), which is why lengthening does not apply to *pasticcini*, while in (28b) *pasticcini* is one domain and *ripieni di cioccolata* form another one. Thus, in the latter domain, *ripieni* is not lengthened, but the stressed vowel of *cioccolata* is.

Phase theory does not provide any explanation for the restructuring observed in these data. Binarity is a common requirement in prosodic constituents, as in the maximally binary branching of feet or syllable constituents and can be observed as a constraint on phrases in Italian, which explains the locus of lengthening (cf. Truckenbrodt 2007 for an OT account).

6.2 Metaphony and abstractness

In many varieties of Italy, but also in other Romance varieties, word-final close vowels cause the raising of preceding vowels, usually targeting the stressed vowel, and often pulling intervening post-tonic vowels up as well. One puzzling characteristic of the patterns is that every targeted vowel moves only one step up the height scale, that is, while tense-mid vowels move up to close, the lax-mid vowels only raise to tense-mid if they move at all, and the open vowel raises to lax-mid if it moves. In terms of features this involves a change of [-high] to [+high] or a change of [-ATR] (Advanced Tongue Root) to [+ATR] or of [+low] to [-low], respectively, rather than one operation involving the same feature for all vowels. Metaphony is not always a chain shift. In Foggiano, both mid vowels raise to close (Calabrese 2011). Comparison of dialects reveals that the open vowel only raises if open-mid vowels raise, which they only do if tense mid vowels raise. There is thus no variety in which only the open vowel raises. Another typical aspect is that the triggering vowel often is not close on the

surface, but rather realized as a schwa or even deleted. The raising patterns and the micro-typology are schematized in (29).

(29) Metaphonic vowel raising and dialectal variation (Maiden 1991, 115)

a.	Chain shift:	a	→	ε	→	e	→	i
b.	Height scale:	open—		lax-mid—		tense-mid—		close
	Veneto							
	Southern Umbrian							
	Ischia							

The implicational relation between the targeted vowels indicated by the brackets in (28) has a couple of apparent exceptions, though (cf. Maiden 1991; Savoia/Maiden 1997; Krämer 2016).

In their analysis of the Campidanian Sardinian pattern (Bolognesi 1998; Frigeni 2002), in which tense mid vowels occur in stressed syllables only as an effect of metaphonic raising of lax-mid vowels, Torres-Tamarit/Linke/Vanrell (2017) propose an account in Turbidity Theory.⁷ The crux lies in their representation of vowel height. Mid vowels are not distinguished by an ATR feature (Advanced Tongue Root), i.e. [+ATR] for /e/, /o/ and [−ATR] for /ε/, /ɔ/, but by the features [close] and [open]. The lax mid vowels are specified as [open] and are distinguished from the open vowel /a/ by specification of a place feature, which /a/ lacks. The tense mid vowels are specified for both [close] and [open]. This is unusual, since the consensus since Chomsky/Halle (1968) seems to have been that mid vowels are negatively specified for these features and a combined specification of close and open is universally excluded. This notwithstanding, the problem is that the analysis runs into the same problems as analyses which regard [ATR] as the crucial feature in metaphony. In varieties in which the open vowel also raises, this raising from open to open-mid is seemingly unmotivated, since it results in the association of neither [+ATR] nor [+close] with the stressed vowel.

In Campidanian Sardinian, mid vowels are by default lax, but tense mid vowels occur not only in stressed syllables as a result of metaphonic raising. Bolognesi (1998, 16) provides the forms in (30). The forms in (30a) behave as expected under Torres-Tamarit/Linke/Vanrell's (2017) analysis. The word-initial mid vowel in the first form is not subject to metaphonic raising for two reasons. First, there is an open stressed vowel intervening between the initial lax-mid vowel and the final close vowel. Second, Campidanian raising is analyzed as driven by a constraint demanding the licensing of the feature [close] in the final unstressed vowel by a stressed syllable. The

⁷ Turbidity Theory (Goldrick 2001; Revithiadou 2007; van Oostendorp 2008) is a version of OT which revives the original idea of Containment, proposed in Prince/Smolensky (1993/2004). Everything that is present in an input is also present in every output candidate related to this input. No phonological material can be deleted, it can remain phonetically unrealized though.

initial vowel in the first form is not stressed and it is followed by the stressed syllable. Metaphonic raising happens to the stressed word-medial vowel in the second form in (30a) and thus there is no need for the feature [close] to spread to the initial mid vowel, which remains lax.

(30) Campidanian Sardinian (Bolognesi 1998, 16)

a.	[ɛ'ðaði]	'age'
	[ɔ'βet:u]	'open'
b.	[e's:iri]	'go out _{INF} '
	[ot:u'l:ãu]	'horticulturist'
	[tɛrevizi'ʃi]	'television' (Bolognesi 1998, 19)

The first form in (30b) contains a pretonic tense mid vowel and the second form contains a tense mid vowel followed by an unstressed pretonic close vowel. This suggests that vowel raising in Campidanian Sardinian (↗19 Sardinian) is not driven by the need to license a close vowel in a stressed syllable but rather that close vowels generally spread one vowel to the left.

Another central issue is the lexically specific nature of metaphony. Which affixes trigger metaphony is synchronically not surface-transparent. Some affixes contain a close vowel and thus contribute the triggering environment but do not cause metaphonic raising in stem vowels. Other affixes contain a schwa and thus do not provide a triggering environment at the surface but do cause metaphonic raising in stem vowels.

6.3 Loanword and second language phonology

The investigation of loanword phonology (↗16 Loanword phonology in Romance) and second language phonology (↗14 Second and third language acquisition of Romance phonology) has received more attention recently and is promising to yield more results in the future. With the increased use of the internet in the last decades it can be expected that more loanwords have entered and are entering the Italian lexicon.

In Standard Italian, only relatively recent loanwords can end in a consonant or a consonant cluster, while northern dialects, as discussed above, show apocope and thus do not have a problem with loanwords ending in consonants. Southern and central dialects are stricter on the prohibition of final codas than the standard and show a tendency to repair such loanwords by the addition of a vowel.

Grice et al. (2015) suggest that, in the Bari variety, this epenthesis is driven by intonational factors rather than by syllable phonotactics. The additional vowel, they argue, occurs only if additional space for tones is needed. This is at odds with Blumenfeld's (2006) claim that tone-driven epenthesis does not exist.

In the Florentine dialect consonant-final loanwords that are not stressed on the last syllable show two types of behavior: obstruent-final loanwords display vowel epenthesis, while final sonorants delete and the nasality of deleted nasals is realized on the preceding vowel, e.g. ['tɪkɛtə] 'ticket', but ['dɪzɛ] 'diesel' and ['awθā] 'Autan'. Bafille (2005) analyzes this as a structural difference between obstruents and sonorants. She concludes that word-final obstruents are syllable onsets followed by an empty nucleus that materializes as a schwa in Florentine, while sonorants are codas and thus there is no vocalic position to their right to be filled and the only solution to avoid these word-final consonants is their deletion.

The standard variety of Rome contributes another interesting detail to the typology of coda repair strategies in loanwords. In Roman, the probability of vowel epenthesis in monosyllabic loans and longer ones with stress on the last syllable is significantly higher than in those with non-final stress (Broniś 2016), suggesting that foot well-formedness and parsing of syllables into feet play a role in whether an offensive coda is repaired or not. A further finding by Broniś is that word-final obstruents are geminated in conjunction with vowel epenthesis. This is not surprising given the patterns of phono-syntactic gemination in central and southern varieties (cf. 5.2). On the other hand, word-internally vowel lengthening is preferred to consonant gemination whenever weight is needed for a stressed syllable, as observable in the length alternation of the low vowel in e.g. ['ka:za] *casa* 'house_{F.SG}' vs. [ka'zet:a] *casetta* 'house_{DIM.F.SG}'.

Repetti (2012) investigates the quality of epenthetic vowels in loanwords and concludes that this depends on the position in the word. While /i/ is the default in non-final position, word-final epenthetic vowels range from mid-central to front rounded and unrounded, as well as open, depending on a range of factors; cf. as well Repetti (1993; 2006; 2009) for other aspects of Italian loanword phonology.

Huszthy's (2016) study is a fine example of how loanword adaptation and second language phonology can inform the study of Italian phonology. Italian is generally considered as a language with a voicing contrast among obstruents, rather than an aspiration contrast. From the vantage point of laryngeal realism (Honeybone 2002; 2005), such a language should display regressive voicing assimilation as well. However, the very restrictive phonotactics of Italian do not create the kind of environment in which regressive voicing assimilation usually applies, i.e. obstruent clusters. The only context in which we observe voicing assimilation in Italian is in /s/+C clusters, in which /s/ assimilates to the following consonant, regardless of whether it is contrastively voiced or redundantly so, i.e. a sonorant (compare [sp] in *spalla* 'shoulder', [zb] in *sbaglio* 'mistake', and [zm] in *smettere* 'stop doing'). As Huszthy (2016) shows, obstruent clusters display voicing assimilation in neither (semi-assimilated) loanwords (e.g. *afgano* 'Afghan') nor in words in a foreign language spoken by Italians (e.g. an Italian's rendition of German *gibt* 'give_{3SG}' as *gi[bt]*).

The study of loanwords, of Italian accents in second and third language phonology, as well as heritage Italian phonology in Italian-speaking communities outside Italy and Switzerland, are promising but largely uncharted territory.

7 Conclusions

It is hoped that this chapter proves useful as a concise overview of the main characteristics of Italian phonology and of major contemporary controversies surrounding it. Given space restrictions, however, it should be kept in mind that such an overview must necessarily be incomplete and superficial.

The Italian segment inventory can be analyzed in several ways, but is most likely to be characterized by a large number of places of articulation rather than manner classes. Furthermore, the abundance of post-consonantal glides does not support an analysis with a large consonant inventory in which almost all consonants would contrast secondary palatalization and labialization. It is controversial if the glides are analyzed as segments different from close vowels, although some facts remain difficult to account for without this distinction. It is also debatable if prevocalic glides are in the syllable onset or if they form complex nuclei, i.e. diphthongs with the following vowel. Here we have concluded in favor of the diphthongal analysis, which is supported, among other things, by the mobile diphthong patterns.

While sonority is a helpful concept for the analysis of both syllable-internal organization as well as syllable contact restrictions, the Italian consonant inventory does not straightforwardly yield to the standard divisions on the sonority hierarchy.

Italian word stress is lexically specified in many items. However, the default stress position can be identified as the antepenultimate mora in the word, yielding a layered trochaic foot as the most attractive analysis.

The post-lexical phonology of Italian continues to be a fruitful testing ground for theoretical controversies related to prosodic structure and the syntax-phonology interface. The same can be concluded about microvariation on the Italian peninsula, which still informs theoretical discussions on the architecture and organization of phonological grammars as well as on segmental representations.

At the time of writing, a range of areas of Italian phonology are severely understudied. While some progress has been made in the investigation of loanword phonology, one hopes that the theoretically driven study of Italian as a heritage language, of other forms of bilingualism involving Italian, as well as the acquisition and disorders of Italian phonology will receive more attention in the future.

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Rosangela Lai

19 Sardinian

Abstract: Sardinian is widely regarded as the most conservative Romance language. Its purported conservativeness, though, does not change the fact that various innovative and peculiar features are found in the language. Traditionally, the internal classification of Sardinian admits two main varieties (Logudorese and Campidanese), but in phonological terms a much richer variation is observed. The language is especially well-known for its weakening processes (e.g. intervocalic lenition), but it also includes forms of strengthening (e.g. phono-syntactic doubling) as well as several assimilation processes affecting consonants in final coda position. As for vowels, we find metaphony and the so-called ‘vowel-zero alternation’, i.e. the insertion of different types of epenthetic vowels in certain contexts.

Keywords: Sardinian, metaphony, epenthetic vowels, metathesis, lenition, phono-syntactic doubling

1 Introduction

Sardinian is a minority language of the Romance group, the descendant of Vulgar Latin as historically spoken in the wider part of the island of Sardinia.¹ It has been identified as a language (as opposed to a dialect) since the earliest published linguistic studies.

Sardinian is among the Romance languages with a substantial number of medieval administrative, legislative and judicial documents, the oldest of which date back to the 11th century. During the Middle Ages, Sardinia experienced a peculiar form of self-government. It was divided into four independent kingdoms (*Kálaris*, *Torres*, *Arborea* and *Gallura*), each ruled by a *judike* or *judice* ‘judge’ (from OSrd. *judice* < IUDĬCE(M); cf. Ortu 2017).² These states adopted the local Sardinian dialects as their official languages. The extant corpus is composed of collections of private legal acts (the so-called *condaghes*) and legal codes (e.g. *Carta de Logu*, ‘Charter of the land’) and are of great importance for the history of the Sardinian language, as well as for the history of law in the Middle Ages (cf. Solmi 1917/2001; Ortu 2017).

¹ The major exceptions are Sassarese and Gallurese, spoken in the extreme North of the island, which are Italo-Romance varieties. Other minority languages in Sardinia are Catalan, historically spoken in the city of Alghero, and Tabarchin, the Ligurian variety of two communities in the South-West of the island.

² Here and elsewhere, the Sardinian etyma are taken from Wagner’s etymological dictionary of Sardinian (Wagner 1960–1964/2008).

The place of Sardinian in the Romance language tree is debated, with some earlier studies identifying it as belonging to the Eastern Romance branch, while more recent textbooks often recognize it as a branch of its own (cf. Campbell/Poser 2008, 84). It is not unusual for Sardinian to be described as the most conservative of the Romance languages. Various Latin features are preserved in Sardinian, e.g. Latin *s*-stem neuters such as /tempus/ ‘time’ (< TEMPUS) and many Latin lexemes that disappeared from other Romance languages have Sardinian outcomes, e.g. /dɔmɔ/ ‘house’ (< DOMO; cf. Wagner 1951/1997, 175–179; Contini/Tuttle 1982, 178, fn. 1). Equally remarkable is the extremely limited amount of non-Romance influence in the language. Unlike other Romance languages, words of Germanic origin are just about non-existent in Sardinian. The few exceptions were already found in Latin as loanwords, e.g. /frisku/ ‘fresh_{M.SG}’ (< FRISCU; cf. Wagner 1951/1997, 175–179). A certain number of toponyms, names of plants and animals, on the other hand, are regarded as originating from a pre-Latin, Proto-Sardinian substratum (cf. Wagner 1951/1997, 254–280; Loporcaro 2009, 170; Blasco Ferrer 2010).

The internal classification of Sardinian is a controversial topic (cf. Molinu/Floricić 2017). Sardinian is traditionally divided into two main groups: Campidanese in the south and Logudorese in the central and northern areas.³ This classification is still the most widely accepted (cf. Blasco Ferrer 1984, 172; Jones 1993). Some linguists (e.g. Viridis 1978, 5) adopt a division into three groups: Campidanese (southern area), Logudorese (northern-western area) and Central Sardinian (central-eastern area, including Nuorese). This choice emphasizes the internal differences within Logudorese, which is further split into two groups. Other linguists favor a four-way division that involves the western transitional region, the Arborense area (Viridis 1988, 901). I will adopt here the division into two main groups, (the Logudorese and the Campidanese area), but this is not meant to detract from the fact that several dialectal sub-groups can be identified within each of them. A transitional area can be identified between Campidanese and Logudorese that shares features of both macro-areas but also displays original developments of its own (cf. Blasco Ferrer 1988; Loporcaro 2009, 159; Pisano 2016; cf. also 6.2).

Important historical changes distinguish Logudorese and Campidanese, and divergences can also be observed within each group. Some of these concern the vocalic and consonantal systems, but the most notable ones affect the syllabic structure of words: different consonant cluster evolutions, various kinds of metathesis,

3 In the last few decades, some linguists started upholding the opposite view, namely, that there are no sufficient commonalities within each purported dialectal macro-area to justify a partition of Sardinian into Logudorese and Campidanese. It is worth mentioning, though, that this view was promoted in a context of political tension with regard to proposals of standardization (cf. below), to which these dissident linguists have been far from extraneous. Most importantly, the dissident view assisted the proponents of one Sardinian standard language, who regarded the traditional scientific notion of two major macro-areas as a stumbling block, and contested it on political grounds (Lai 2017a; 2018a).

liquid deletion, epenthesis and syncope have all contributed to the differentiation of Sardinian dialects since the Middle Ages. Besides these ancestral differences, further changes are observed that are due to contact with a number of dominant languages. As a matter of fact, at least since the 13th century, Sardinian has coexisted with Old Pisan and Old Genoese, Catalan, Spanish, Modern Italian (in that order). The history of the Sardinian language, as is plain to see, is a history of constant language contact that contributed to producing a high degree of linguistic variation.

Despite the recognition as a minority language by the Italian Republic in 1999 (Law 482/99), Sardinian is classified as ‘definitively endangered’ by the UNESCO (cf. Salminen 2007). Today, in the vast majority of Sardinian families, Italian has replaced Sardinian in all domains and contexts of use and younger generations can be regarded as heritage speakers (Marongiu 2007; Rindler Schjerve 2000; 2017; Lai 2017a; 2018a).⁴ Various proposals for a standardization of Sardinian have been made. In 2006, the Autonomous Region of Sardinian approved its own, officially sanctioned standard called *Limba Sarda Comuna* (LSC, ‘Sardinian Common Language’). While the LSC was originally proposed exclusively for administrative documents and legislation, attempts were made to popularize it as an all-purpose standard in various media, with little success (Tufi 2013; Lai 2017a; 2018a). In June 2018, the Regional Law 22/2018 on language policies established a new Sardinian language board with a mandate to evaluate proposals for a standard language while taking into account, among other things, the two macro-varieties: Campidanese and Logudorese and the local varieties. The new law seems to spell the end of LSC as we know it.

The contents of the chapter are the following. In Section 2, the vowel systems of the two main areas (Logudorese and Campidanese) are presented. Section 3 deals with the consonant system. In turn, the Logudorese and Campidanese systems are presented and further differentiation within each macro-area is discussed. Section 4 presents two remarkable phonological processes involving vowels, namely metaphony and epenthesis. Section 5 details weakening and strengthening processes affecting consonants. Section 6 concludes by discussing the stress patterns of clitic pronouns and a sketch of the intonational phonology of Sardinian.⁵

⁴ On speakers of autochthonous minority languages as heritage speakers cf. Montrul (2016, 15).

⁵ Henceforth, all data for which no source is given are my own. Data from Wagner (1941/1984), Pittau (1972), Virdis (1978), and Contini (1987) have been transliterated from the original phonetic transcription systems to modern IPA. In other cases, data that were given in the common Latin alphabet were also transliterated to IPA. For the sake of consistency, slight alterations to some authors’ data have been made, e.g. the transcription of mid vowels has been made consistent with the discussion of metaphony in 4.1, below. On the ratio for the transcription of geminates cf. the end of 3.2.

2 Vowel inventory

The stressed vowel system of Sardinian evolved via the neutralization of the Latin length distinction.⁶ As represented in Figure 19.1, Classical Latin had ten distinctive vowels /i:/, /i/, /e:/, /e/, /a:/, /a/, /o:/, /o/, /u:/, /u/, traditionally written as *ī*, *ĭ*, *ē*, *ĕ*, *ā*, *ă*, *ō*, *ŏ*, *ū*, *ŭ*; length oppositions (e.g. /i:/ vs. /i/) were lost in Sardinian.

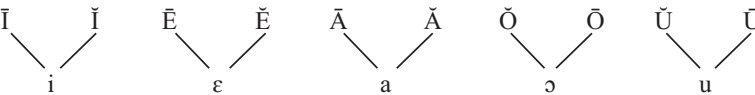


Figure 19.1: The evolution of the Latin vowel system in Sardinian.

As for the post-tonic vowels, there are notable differences between the two macro-areas. In Campidanese (Southern Sardinian), final open-mid vowels /ε/ and /ɔ/ were raised to close vowels [i] and [u], respectively. As reported in Wagner (1941/1984, 36–37) and Loporcaro (2015, 56), this change originated in the 11th century in Cagliari (as was often the case with linguistic innovations) and radiated until it spread to the near totality of the South. Thus, the outcome of CANE(M) in Campidanese is ['kani] ‘dog’, while Logudorese (Northern Sardinian) retains ['kanε]. This feature constitutes one of the main isoglosses that distinguish Campidanese from Logudorese (cf. Virdis 1988, 908) and, as will be described below, has important consequences for the phonology of the language.

In drawing up an inventory, while we find clear evidence that Logudorese has a five-vowel system (depicted in Table 19.1, below), the same cannot be said of Campidanese (cf. below).

Table 19.1: Logudorese vowel system.

	Front	Central	Back
Close	i		u
Open-mid	ε		ɔ
Open		a	

As we will see in 4.1, Sardinian also displays metaphony. Sardinian metaphony raises stressed open-mid vowels /ε/ and /ɔ/ to close-mid vowels [e] and [o] respectively, when followed by the close vowels /i/ and /u/. For instance, one has /bɔnu/ → ['bonu]

6 This same vowel system is found in the so-called *Lausberg* area, located between Southern Lucania and Northern Calabria (cf. Lausberg 1939; Trumper 1997, 356).

‘good_{M.SG}’, but /bɔna/ → [ˈbɔna] ‘good_{F.SG}’. In Campidanese, for reasons that will be explained in 4.1, there is a small number of minimal pairs opposing [ɛ] to [e] and [ɔ] to [o]: e.g. [ˈoru] (< ORU(M)) ‘edge, rim’ vs. [ˈɔru] ‘gold’ (< It. *oro*), [ˈbeni] (< VĒNI) ‘come_{2SG.IMP}’ vs. [ˈbɛni] (< BĚNE) ‘well’.⁷

As summarized by Loporcaro (2015, 56), these facts can motivate two different hypotheses on the Campidanese vowel system, depending on the author’s theoretical orientation: some regard it as a seven-vowel system, others as a five-vowel system. The seven-vowel hypothesis is the most traditional (e.g. Wagner 1941/1984, 69–71; Virdis 1978, 24–27; 1988, 900–902; Blasco Ferrer 1984, 178), but it still has its supporters (Mensching/Remberger 2016, 272). These authors’ insight is that final vowel raising must not be regarded as an active synchronic process and that the instances of metaphony are actually lexicalized outcomes. The existence of minimal pairs should be taken to mean that Campidanese (unlike Logudorese) has the seven-vowel system summarized in Table 19.2.

Table 19.2: Campidanese vowel system – 1st hypothesis: seven-vowel system.

	Front	Central	Back
Close	i		u
Close-mid	e		o
Open-mid	ɛ		ɔ
Open		a	

By contrast, scholars from various phonological frameworks (e.g. Bolognesi 1998, 16–22; Frigeni 2002; Savoia 2015; 2016; Molinu 2017, 350–352) maintain that in the southern area both metaphony and final vowel raising are synchronic processes. More precisely, a metaphony rule would apply before a vowel raising rule (counterfeeding order, cf. 4.1). For this reason, a five-vowel system (i.e. /i ɛ a ɔ u/), as shown in Table 19.1, is assumed to be adequate for both Campidanese and Logudorese. In this chapter, we will adopt for Campidanese the seven-vowel system depicted in Table 19.2.

⁷ The corresponding Logudorese forms are as follows: [ˈoru] (< ORU(M)) ‘edge, rim’, [ˈɔɾɔ] ‘gold’ (< It. *oro*), [ˈbeni] (< VĒNI) ‘come_{2SG.IMP}’, [ˈbɛnɛ] (< BĚNE) ‘well’.

3 Consonant inventory

As mentioned in Section 1, Logudorese and Campidanese diverge internally and from each other, and several dialects can be identified within each macro-area. In the presence of such a strong diatopic variation, it comes as no surprise that there is not a common consonant inventory: over the centuries, Latin segments and clusters resulted in different outcomes in various Sardinian dialects. A given segment is attested in different varieties as outcome of different Latin phonemes. In some cases, a phoneme is present in a dialect but only to the extent that it is included in Italian loanwords.

For ease of exposition, I will choose for each macro-area a dialect that presents a common core of properties shared by all dialects in the same macro-area. The other varieties will be presented in terms of further differentiation from the reference dialect.

3.1 Logudorese

Let us start with Logudorese. I will first describe the variety spoken in the city of Núoro (henceforth, Nuorese). Central varieties (among them Nuorese) are traditionally regarded as Logudorese varieties, even though they differ from Logudorese in the narrow sense in various diachronic and synchronic aspects. Broadly speaking, Central Sardinian varieties can be claimed to represent a prior evolutionary stage with respect to other Logudorese varieties.⁸ In most traditional literature, central Sardinian dialects are regarded as the closest to Latin (Wagner 1951, 83; Pittau 1972, 2). The phonemes of Nuorese are listed in Table 19.3. The table is based on the descriptions in Wagner (1941/1984); Pittau (1972, 15–61); Jones (1988, 319); Mensching/Remberger (2016, 275).⁹

⁸ The most conservative dialects are in the eastern area: for Logudorese, the varieties spoken in Núoro and neighboring towns (i.e. Central Sardinian); for Campidanese, the Ogliastra and the Lower Barbagia area (cf. Viridis 1988, 901–902).

⁹ Henceforth, following Jones (1988), phonemes only observed in recent loanwords are set in parentheses. The inventory given here for Nuorese, though, is partially different from his. As a matter of fact, Jones (1988) presented the variety spoken in Lula which, while very close to Nuorese, differs in some minor aspects. Jones put /v/ in parentheses, but I will not follow him in this regard, since the phoneme is attested in the native lexicon in Nuorese, albeit with restrictions (it only occurs in intervocalic position).

Table 19.3: Consonant inventory of Logudorese Sardinian.

	Bilabial		Labio-dental		Dental	Alveolar		Post-alveolar	Retroflex	Palatal	Velar
Plosive	p	b				t	d		ɖ		k g
Affricate						ts	ɖʒ	(tʃ) (dʒ)			
Fricative			f	v	θ	s					
Nasal		m					n			(ɲ)	
Lateral							l				
Trill							r				
Approximant		(w)								j	

The voiced and voiceless plosives in Table 19.3 are present in all Sardinian varieties. These include the voiced retroflex plosive, which is the outcome of a Latin geminate lateral. In Logudorese (Central Sardinian excluded, cf. Wagner 1941/1984, 119, and 5.1), word-initial /p t k/ in intervocalic position are realized, respectively, as [β, [ǃ] and [ɣ]. Voiced plosives are just deleted (Wagner 1941/1984, 136). In some Barbagia dialects of the Logudorese area (i.e. Oliena, Orgosolo, Mamoiada etc.) the voiceless velar plosive in intervocalic and post-consonantal position is realized as the glottal plosive [ʔ], while in others (i.e. Dorgali, Urzulei) it is realized as [h] (Wagner 1941/1984, 123).

As far as affricates are concerned, Logudorese includes the alveolar affricates /ts/ and /ɖʒ/. The affricate /ts/ is found only in old and recent loanwords from Catalan, Spanish, and Italian. It can be found in word-initial position, e.g. [tsi(t)'taðe] ‘town’ (from Olt. *cittade*), in intervocalic position, e.g. [barrat'tsellu] ‘local police’ (from Sp. *barrachel*), or in post-consonantal position, e.g. [pun'tsi(t)ta] ‘nail’ (from Sp. *puncha* or Cat. *punxa*) (Pittau 1972, 57). It can also be found in the adaptation of Italian loanwords that display [kjV] sequences, e.g. [pa'rittʃɔz(ɔ)] ‘several’ (from It. *parecchi*).¹⁰

The affricate /ɖʒ/ is found in intervocalic position as the outcome of VLat. [lj], e.g. FOLIA > [fɔddʒa] ‘leaf’, in post-consonantal position (before nasal) in items that in Vulgar Latin had [nj], e.g. CALCANEU(M) > [kar'kanɖʒu] ‘heel bone’ (Pittau 1972, 44), and in word-initial position in Italian loanwords, e.g. [dʒente] ‘people’ (from It. *gente* [dʒente]). One aspect that Central Sardinian shares with the rest of Logudorese is the absence of the palatalization of velar plosives before front vowels, as in [kɛna] (< CENA(M)) ‘dinner’, [durkɛ] (< DULCE(M)) ‘sweet’, [gɛneru] (< GENERU(M)) ‘son-in-law’. Today, Logudorese is the only Romance variety that retains the Latin velar plosive before front vowels.¹¹

¹⁰ On geminates cf. 3.2, below.
¹¹ Another was Dalmatian, now extinct, cf. Maiden (2016, 127).

As for the fricative series, the labiodental voiceless fricative is a phoneme not only in Logudorese but in all Sardinian dialects. In several Logudorese dialects, /f/ alternates with [v] in intervocalic position (Pittau 1972, 25–26, 61). The labiodental voiced fricative is found to be a phoneme in some Logudorese varieties, e.g. Nuorese, but only occurs in intervocalic position (e.g. ['bivɛrɛ] 'live_{INF}'), (cf. Wagner 1941/1984, 169–170; Pittau 1972, 25–26). However, in the dialects of Bitti and Lula, both /v/ and /b/ occur in word-initial position, as one can see from the following examples taken from Bitti: ['va(k)ka] (< VACCA(M)) 'cow', [vi(k)'kinu] (< VICINU(M)) 'neighbor', ['bu(k)ka] (< BUCCA(M)) 'mouth', [buɖ'djɛrɛ] (< BULLIRE) 'boil_{INF}' (Wagner 1941/1984, 165; Jones 1993, 10).¹² All other Sardinian dialects underwent betacism, so the merger between Latin /b/ and /w/ was complete in favor of /b/, e.g. ['ba(k)ka] (< VACCA(M)) 'cow', ['bu(k)ka] (< BUCCA(M)) 'mouth'.

The dental fricative /θ/ is the outcome of VLat. [kj] and [tj], at least in some villages and towns of central Sardinia (cf. Wagner 1941/1984, 181–185, 232–236; Pittau 1972, 26–27, 44–45; Jones 1988, 328). However, /θ/ does not occur in most of the Logudorese area, in which [kj] and [tj] developed to [(t)t]. The result of consonant-glide clusters in general, and of [kj] and [tj] more specifically, varies remarkably in the Logudorese area. In the city of Nùoro (and today presumably in other neighboring towns), /θ/ has long been losing ground and has ended up being replaced in all contexts by /t/. Pittau (1972, 26–27) reports that already in the nineteen-seventies only the elderly distinguished between ['praθa] 'square' (< PLATĒA(M)) and ['pra(t)ta] 'silver' (< Sp. *plata*).¹³ Today, the current pronunciation is ['pra(t)ta] for both. In most Logudorese varieties, the voiceless alveolar fricative /s/ alternates with its voiced counterpart [z] in intervocalic position. In final coda, /s/ alternates with the trill [r], the lateral [l], the fricative [ʃ], and the two lateral fricatives [ɬ] and [ɮ] depending on the dialect and the consonant that follows (Pittau 1972, 32, 48; Molinu 2006).

The bilabial and the alveolar nasal are the only two nasal phonemes that result from the evolution of Latin nasals, while /ɲ/ is only included in loanwords. The alveolar nasal assimilates to the place features of the consonant that follows (both in internal and external sandhi), e.g. /nk/ → [ŋk], /np/ → [mp], /nd/ → [nd].

The alveolar lateral appears exclusively in word-initial and intervocalic position. It is not available in plosive-liquid clusters (e.g. ['frɔrɛ] < (FLORE(M)) 'flower') or in coda position (e.g. ['farɛ] < FALCE(M)) 'scythe, sickle') because in the evolution from Latin to Sardinian it became a trill.¹⁴

All Logudorese dialects allow for /r/ in word-initial position, unlike Campidanese dialects, in which the initial /r/ was diachronically repaired by the insertion of an

¹² On the non-distinctiveness of geminates cf. 3.2, below.

¹³ Pittau (1972, 26–27) reports that in intervocalic position, the evolution of [kj] and [tj] > /θ/ is occasionally realized as [tθ], e.g. ['pratθa] 'square'.

¹⁴ For exceptions cf. fn. 19.

epenthetic vowel, e.g. /rɔsa/ → [ˈrɔza] ‘rose’ (Logudorese) vs. /arrɔsa/ → [arˈrɔza] ‘rose’ (Campidanese).

The palatal approximant /j/ is the autochthonous outcome of VLat. /j/ and /dj/, e.g. [ˈjanna] (< IĀNUA(M)) ‘door’, [ˈraju] (< RADIU(M)) ‘lightning’. However, it is important to emphasize that a concurrent pronunciation with [dʒ] is also available (cf. Pittau 1972, 42–43).

Most consonants in Table 19.3 can occur word-initially, except for /w/, /ɲ/, and /dʒ/.¹⁵ In internal coda position, one can find the nasals /n/ and /m/, the fricative /s/, or a trill. At a phonological level, /n/, /s/, /t/, and /r/ can occur in final coda. These final consonants, though, are affected by epenthesis (if in absolute final position) or assimilation to the following consonant (cf. 5.2), e.g. /numɛn/ [ˈnumɛn(ɛ)] (< NOMEN) ‘name’; /kras/ [ˈkraz(a)] (< CRAS) ‘tomorrow’; /kantat/ [ˈkantat(a)], [ˈkantað(a)] (< CANTAT) ‘sing_{3SG}’; /batɔr/ [ˈba(t)tɔr(ɔ)] (< QUATTUOR) ‘four’ (Pittau 1972, 33–34, 67–68; Jones 1988, 326; Molinu 2017, 344–345).

As for clusters, Logudorese varieties allow for plosive-liquid clusters: internally (e.g. [ˈsɔkra], [ˈsɔʎra] ‘mother-in-law’),¹⁶ word-initially (e.g. [ˈkrastula] ‘blabbermouth’, [ˈpranu] ‘plateau’), and in post-consonantal position (e.g. [imprɛˈare] ‘use_{INF}, employ_{INF}’). Some plosive-yod clusters are only attested in Northern Logudorese, namely /pj fj bj/, that resulted from the palatalization of Old Logudorese /pl fl bl/ (cf. Wagner 1941/1984, 255–262). In the rest of Logudorese and Campidanese the same clusters have evolved into /pr fr br/. Unlike in Campidanese, /sC/ clusters are not allowed in word-initial position: As happens in Spanish, every cluster of this type was re-adjusted diachronically by adding a prosthetic vowel, e.g. Campidanese /skɔla/ [ˈskɔla] ‘school’ vs. Logudorese /iskɔla/ [isˈkɔla] (cf. 4.2).

3.2 Campidanese

In Campidanese, as well, a fair amount of variation exists and different phonemic inventories are attested (Virdis 1978, 13–15).

Table 19.4 summarizes the inventory of Southern Campidanese. The most peripheral areas of the Campidanese domain (Sulcis, Ogliastra, Lower Barbagia) have partially different inventories. Table 19.4 is slightly adapted from Mensching/Remberger

¹⁵ Initial /dʒ/ is only observed in two terms of endearment, e.g. [ˈdʒɛdʒu] and [ˈdʒɛdʒa], used in addressing babies or young children (male and female, respectively), Pittau (1972, 24, 74). In Logudorese the Latin labialized velar consonant [kʷ] changed to [(b)b] in the Logudorese area, [ˈa(b)ba] (< AQUA(M)), [ˈlimba] (< LINGUA(M)). The same thing happened in the Ogliastra area, cf. Wagner (1941/1984, 227–230), Virdis (1978, 71), Contini (1987, 68–69), and Bolognesi (2001, 32–38), among others.

¹⁶ The form [ˈsɔʎra] with the diachronic lenition of Latin -CR- is widespread in Logudorese but not in Central Sardinian dialects, in which lenition did not apply: [ˈsɔkra]. In other areas, it is possible to find forms with a metathesized liquid, e.g. [ˈsɔrya] (cf. Virdis 1978; Molinu 1999; Lai 2014).

(2016, 275). The main differences from that work concern the phonemes /v/, /ʃ/ and /dʒ/. Specifically, my addition of parentheses around /v/ and /dʒ/ is motivated by the fact that these segments are only observed in recent loanwords from Italian. Further, I added /ʃ/, attested in the entire Campidanese domain as the outcome of various Latin clusters, i.e. SCE, SCI, XCE, XCI (Virdis 1978, 61, 73). Note that these Latin clusters in Campidanese give a geminate postalveolar fricative, e.g. [ˈnaʃʃi] ‘be born’ (< NASCERE).

Table 19.4: Consonant inventory of Campidanese Sardinian.

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Retro-flex	Palatal	Velar
Plosive	p b			t d		ɖ		k ɡ
Affricate				ts (dʒ)	tʃ dʒ			
Fricative		f (v)		s	ʃ			
Nasal	m			n			(ɲ)	
Lateral				l				
Trill				r				
Approximant	(w)						j	

Like most Logudorese varieties, Campidanese has lenited intervocalic plosives. Across word boundaries, the voiceless plosives /p/, /t/, and /k/ in intervocalic position are realized as [β], [ð], and [χ], respectively (e.g. /ssa pala/ → [saˈβala] ‘the shoulder’), while voiced plosives are deleted (e.g. /ssu dinari/ → [suiˈnari] ‘the money’) (Wagner 1941/1984, 136; Virdis 1978, 45).¹⁷ In Campidanese, the postalveolar affricates also undergo lenition (cf. 5.1).

Unlike Logudorese, Campidanese includes postalveolar affricates, resulting from the palatalization of velar plosives (both voiced and voiceless) before front vowels, e.g. CENA(M) > [ˈtʃena] ‘dinner’, DULCE > [ˈdurʃi] ‘sweet’, GENERU > [ˈdʒeneru] ‘son-in-law’ (Wagner 1941/1984, 126–129; Virdis 1978, 46). /dʒ/ in Northern Campidanese (Lower Barbagia area) is also a result of the evolution of VLat. [lj] (Virdis 1978, 66).

The alveolar affricate /ts/ is available in most Campidanese varieties as an outcome of VLat. [kj] and [tj], e.g. [ˈprattsə] (< PLATĒA(M)) ‘square’ (Virdis 1978, 64). In the Ogliastra area (Northern Campidanese), the same clusters evolved in the geminate /s/, e.g. [ˈprassa] (< PLATĒA(M)), while in the Sulcis area (Southern-Western Campidanese), the outcome is the affricate /tʃ/, e.g. [ˈpratʃa] (< PLATĒA(M); Virdis 1978, 64–65). When looking at Table 19.4, then, it must be borne in mind that /ts/ is not present in all Campidanese varieties. Unlike in Logudorese, in Campidanese /dʒ/ is

¹⁷ The overall picture of voiced plosives is more complex than that; cf. 5.1.

highly uncommon and is only to be found in intervocalic position in recent loanwords from Italian, e.g. [bid'dzarru] 'irritable_{M.SG}' (< It. *bizzarro*); cf. Virdis (1978, 82).

Let us now turn to fricatives. The labiodental voiceless fricative /f/ is among the consonants that undergo lenition: namely, initial /f/ alternates with [v] in intervocalic position, /ssu fillu/ → [su'villu] 'the son'. The fricative /v/ as a phoneme is not an autochthonous development, and is only attested in recent loanwords from Italian, e.g. ['vaska] 'bathtub' (< It. *vasca*).¹⁸ The voiceless alveolar fricative /s/ alternates with its voiced counterpart [z] in intervocalic position. For final coda /s/, a range of different realizations is observed, i.e. [s], [r], or [ʃ], depending on the dialect, the consonant that follows, and idiolectal variation (Wagner 1941/1984, 302–309). In the far south, /s/ is usually assimilated to a following voiced obstruent, nasal, or lateral, e.g. /is manus/ → [im'manuz(u)] 'the hand_{PL}' (Wagner 1941/1984, 302–304; Virdis 1978, 39; cf. 5.2). As already stated, the voiceless postalveolar fricative /ʃ/ in Campidanese is a phoneme, and results from the palatalization of Latin /sk+{i,e}/ (e.g. ['piʃʃi] (< PISCE(M)) 'fish'), and /(e)ks.k+{i,e}/ (e.g. [ʃi'ðai] (< EXCITĀRE) 'wake_{INF} somebody up'), cf. Wagner (1941/1984, 286); Virdis (1978, 61, 73). The phoneme /ʒ/ is only present in a small area of North-Western Campidanese, where it is the outcome of VLat. [lj], e.g. ['fiʒu] (< FĪLIU(M)) 'son' (Virdis 1978, 66).

In Campidanese, /m/ and /n/ are both phonemes and result from the evolution of Latin M and N. In some Campidanese varieties, intervocalic /n/ is deleted and the vowel that precedes /n/ is nasalized, e.g. /kani/ → ['kāi] (< CANE(M)) 'dog', /luna/ → ['lūa] (< LUNA(M)) 'moon' (Wagner 1941/1984, 109–113; Virdis 1978, 41, 53; Bolognesi 1998, 26; Molinu 2002). This process is active and still applies to loanwords (Virdis 1978, 53, 81). Note also that in the Sulcis area (South-Western Sardinia) both intervocalic /n/ and /l/ are realized as [ʔ] (Virdis 1978, 41; Molinu 2009). Like in Logudorese, in internal and external sandhi, /n/ assimilates to the place features of the consonant that follows, e.g. /nk/ → [ŋk], /np/ → [mp], /nd/ → [ŋd] (Wagner 1941/1984, 293–298). The palatal nasal /ɲ/ appears in a few loanwords from Italian, e.g. ['baɲɲu] 'bathroom' (< It. *bagno*) although it is usually reanalyzed as /ndʒ/ or /nn/ (Virdis 1978, 81).

As for the laterals, Campidanese has the lateral alveolar approximant /l/. In some varieties, /l/ can occur both in intervocalic and in initial position. In others, in intervocalic position, /l/ undergoes various processes that change it into [w], [β], [gw], [ɸ], [ʔ], [L] or [Ø], depending on the variety (Wagner 1941/1984, 200–212; Virdis 1978, 55–58; Contini 1987, 355–356; Molinu 2009; Cossu 2013, 87, 102, 107). According to Wagner (1941/1984, 211), the underlying basis of these realizations would actually be the velar lateral approximant /L/. The phenomenon is seemingly still active and is observed in Italian loanwords (Virdis 1978, 81). The lateral /l/ doesn't occur in plosive-liquid clusters or in coda-clusters, because historically it changed into a trill,

¹⁸ In this regard, it must be pointed out that the near totality of Sardinian dialects underwent betacism (Wagner 1941/1984, 162, 165; Virdis 1978, 52).

e.g. [ˈfrɔri] (< FLORE(M)) ‘flower’, [ˈfarʃi] (< FALCE(M)) ‘scythe, sickle’.¹⁹ Liquids in coda position as in [ˈfarʃi] are only accepted in Northern Campidanese, while in the rest of Campidanese, rhotics were moved to other positions through metathesis (Virdis 1978, 75–76; Molinu 1998; 1999; Lai 2013a; 2014) resulting e.g. in [ˈfrattʃi] (< FALCE(M)). The palatal lateral approximant /ɬ/ is a phoneme only in North-Eastern Campidanese, where it evolved from VLat. [lj]. In most of Campidanese, the same cluster results in a lateral geminate instead (Virdis 1978, 65–66). Other evolutions (e.g. [ʒ] and [dʒ]) are also possible depending on the area.

As for the rhotics, the alveolar trill occurs in all Campidanese varieties as a phoneme, and occurs both in coda and in intervocalic position. In some Southern varieties, it is deleted in intervocalic position, e.g. /ssu frɔri/ → [suˈvrɔi] ‘the flower’ (Wagner 1941/1984, 214). In Northern Campidanese, it is also one of the possible realizations of pre-consonantal /s/ when preceded by a voiced obstruent or a nasal, e.g. /is murus/, [irˈmuruz(u)], ‘the wall_{PL}’. Latin alveolar trills in word-initial position were diachronically repaired by the insertion of an epenthetic vowel, e.g. /arrɔsa/ → [arˈrɔza] (< ROSA(M)) ‘rose’ (Southern Campidanese; cf. Virdis 1978, 58–59; cf. also 4.2). In word-initial position the alveolar trill is found only in recent loanwords. In these it undergoes a synchronic epenthesis that inserts the vowel [i] when a consonant-final word precedes the trill, e.g. the loanword [ritˈʃɛ(t)ta] ‘recipe’ (< It. *ricetta*) when it is preceded by the plural article /is/ displays the epenthetic vowel [i]: [izirritˈʃɛ(t)taz(a)] ‘the recipe_{PL}’. The same epenthetic vowel does not surface if the preceding word ends with a vowel, e.g. the singular feminine article /ssa/: [sarritˈʃɛ(t)ta] ‘the recipe’ (Lai 2015b, 55–56).²⁰ In some Southern Campidanese varieties, the alveolar tap is the realization of the voiceless dental plosive in intervocalic position, e.g. /ssa taula/ → [saˈraul] ‘board, plank’.

As mentioned above, every consonant can occur word-initially, except for /w/, /ɲ/ and /d/ (/d/ only in the object proclitics [dɖa(s)], [dɖu(s)], [dɖi(s)]). In internal coda position, one finds /n/, /m/, /s/ and /t/. The trill can occur in coda position in Northern Campidanese (e.g. Ogliastra area) but it is banned from this position in Southern Campidanese as a result of metathesis and/or consonant assimilation. Both /s/ and /t/ can be found in word-final coda position, e.g. /tempus/ [ˈtempuz(u)] ‘time’, /kantat/ [ˈkantað(a)] (< CANTAT) ‘s/he sings’. It should also be mentioned that third person plural present tense verb forms in Campidanese end in /-nt/, but a paragogical vowel is inserted under certain phonological conditions, e.g. /narrant/, [ˈnarrant(a)] (< NARRANT) ‘say_{3PL}’ (cf. 4.2).

As for clusters, Campidanese can have plosive-liquid clusters word-initially and word-internally (in intervocalic and post-consonantal position). A certain degree of

¹⁹ In very few varieties from Northern Campidanese and Lower Barbagia (e.g. the varieties of Baunei, Aritzo, Gadoni), the lateral /l/ can occur in coda position, e.g. [ˈfalʃɛ] (< FALCE(M)) ‘scythe, sickle’ (cf. Wagner 1941/1984, 289).

²⁰ In word-initial position, /r/ is probably to be regarded as geminate (cf. Lai 2015b, 55).

variation is observed, though, due to metathesis. Metathesis in South-Western Campidanese also resulted in initial sequences that are strikingly unusual in the Romance domain: /sr tʃr tsr lr mr/, e.g. [ˈsroyu] (< SOCRU(M)) ‘father-in-law’, [tʃroˈβeqdu] (< CER(E)BELLU(M)) ‘brain’, [ˈtsru(p)pu] < OSrd. *thurpu* ‘blind’, [ˈlrayuzu] (< LARGUS) ‘far away’, [ˈmramuri] (< MARMOR) ‘marble’ (Wagner 1941/1984, 381–382; Viridis 1978, 76; Bolognesi 1998, 419; Molinu 1998; 1999, 164–165; Cossu 2013, 120; Lai 2015a, 286–291). Most varieties of Campidanese also display the consonant glide sequences /kw/ and /gw/ that come from Latin /kʷ/ and /gʷ/, e.g. [ˈa(k)kwa] (< AQUA(M)) ‘water’, [aŋˈgwid̪a] (< ANGUILLA(M)) ‘eel’ (Viridis 1978, 71). The origin of these sequences in Campidanese is highly debated.²¹ In Northern Campidanese and in Logudorese, Latin /kʷ/ and /gʷ/ evolved in /b/ or /bb/, e.g. > [ˈa(b)ba] (< AQUA(M)) ‘water’, [amˈbid̪a] (< ANGUILLA(M)) ‘eel’ (Wagner 1941/1984, 224–229).

In all Sardinian varieties, the existence of word-internal geminates is a controversial matter. It is traditionally held that Sardinian in its evolution has preserved Latin geminate plosives, e.g. [ˈbu(k)ka] (< BUCCA(M)) ‘mouth’, and weakened simple intervocalic plosives (except for Central Sardinian), as in [ˈaʃ̌u] (< ACU(M)) ‘needle’. While the latter claim is uncontroversial, the former has long been debated. The fact is that length is not distinctive for obstruents in Sardinian. Unlike Italian, Sardinian does not have minimal pairs with respect to length (unlike e.g. It. *bruto* ‘brute’ vs. *brutto* ‘ugly_{M.SG}’). There is no other phonological diagnostic that can reliably assess the length of word-internal obstruents. From a hearer’s point of view, obstruents are most usually pronounced long, but shorter realizations are always possible and an acceptable alternative: One speaker may at times alternate between various realizations. For these reasons, in this chapter, I have inserted parentheses in some transcriptions, e.g. [ˈbu(k)ka] (< BUCCA(M)): parentheses are meant to make clear that the geminate realization is optional. Some authors, on the other hand, choose to never notate word-internal geminates in the phonological form, e.g. /buka/ in Viridis (1978, 50). It is important to point out that, by contrast, consonant length is distinctive for liquids, e.g. [ˈfilu] (< FILU(M)) ‘string’ vs. [ˈfillu] (< FILIU(M)) ‘son’, [ˈkaru] (< CARU(M)) ‘dear, expensive_{M.SG}’ vs. [ˈkaru] (< CARRU(M)) ‘cart’ and for the alveolar nasal, e.g. [ˈmanu] (< MANU(M)) ‘hand’ vs. [ˈmannu] (< MAGNU(M)) ‘big_{M.SG}’ (Southern Campidanese data from Viridis 1978, 90).²² As for consonant length in initial position, studies are scarce but there are arguments in different theoretical frameworks (Bolognesi 1998, 158–165, 411; Lai 2015b) that suggest that some initial geminates do exist in Campidanese (various dialects),

²¹ It is disputed whether the Campidanese sequences [kw] and [gw] evolved from Latin /kʷ/ and /gʷ/ or are later adaptations from Italian. Wagner (1941/1984, 227) assumes an adaptation from Italian. However, Bolognesi (2001) and Lőrinczi (2007) refute Wagner’s hypothesis on strong historical and phonological grounds.

²² For further discussion on word-internal geminates in Sardinian, cf. Wagner (1941/1984, 318); Contini (1987, 55, fn. 12, 58–59, 101–107); Lőrinczi (1996); Bolognesi (1998, 158–165, 411); Frigeni (2005); Ladd/Scobbie (2003); De Iacovo/Romano (2015); Lai (2015b, 46–47).

e.g. /ssugu/ ['suɣu] (< JUGULU(M)) 'neck' vs. /sugu/ ['suɣu] < It. *sugo* 'pasta sauce'.²³ The same phenomenon can be observed in the definite article in most varieties (i.e. *su_M* /ssu/ (< IPSU(M)) and *sa_F* /ssa/ (< IPSA(M))).

4 Vocalic processes

4.1 Metaphony

Both Logudorese and Campidanese Sardinian show metaphony. Sardinian metaphony is a long-distance vocalic process in which stressed open-mid vowels are raised to close-mid when preceding a final close vowel (in Sardinian /i/ and /u/), e.g. /bɔnu/ → ['bonu] 'good_{M.SG}'. If the final vowel is /a ε ɔ/ the stressed vowel is unaffected, hence /bɔna/ → ['bɔna] 'good_{F.SG}'. Below, I report on some data from Campidanese (first column) and the corresponding items from Logudorese (second column). Data are adapted from Wagner (1941/1984, 31). As one can see in Table 19.5.a, stressed open-mid vowels undergo raising, while in b metaphony does not apply.

Table 19.5: Metaphony rule in Campidanese and Logudorese.

Campidanese	Logudorese	
a. Items with metaphony		
['sorɣu]	['soɣru]	'father-in-law'
['bonu]	['bonu]	'good _{M.SG} '
['tʃentu]	['kentu]	'one hundred'
b. Items without metaphony		
['sɔɣra]	['sɔɣra]	'mother-in-law'
['bɔna]	['bɔna]	'good _{F.SG} '
['seɖa]	['seɖa]	'silk'

However, Campidanese data are *prima facie* problematic, because there are a fair number of items that, although including a stressed open-mid vowel followed by a close vowel, do not exhibit metaphony. Compare Table 19.5.a with the examples below.

²³ /sugu/ is a recent loanword from Italian. A more traditional term for 'pasta sauce' is /baɣɣa/, from Genoese or Piedmontese (Wagner 1951/1997, 251); cf. also 4.2.

- (1) Camp. a. ['beni] 'well_{ADV}'
 b. ['benniri] 'come_{INF}'
 c. ['dɛu] 'I_{NOM}'
 d. ['nɔi] 'nine'

Items such as ['dɛu] and ['nɔi] create the context for metaphony (a final high vowel), but the raising of the mid-low vowel is not observed: ['deu] and ['noi] are ungrammatical. These data have two different analyses, which relate to different views on the vowel inventory of Campidanese. As already mentioned, the phonological inventory of vowels in Campidanese is debated (a five-vowel system vs. a seven-vowel system) and it depends on the phonological status given to final vowels (cf. Section 2).

The scholars that support the view that Campidanese has a seven-vowel system argue that the raising of open-mid vowels in final position is the result of a diachronic process, i.e. /ɛ/ and /ɔ/ evolved in /i/ and /u/, respectively. Thus, with respect to Logudorese, Campidanese displays a reduced vowel inventory in the final syllable: /i u a/ (cf. Wagner 1941/1984, 29–32; Viridis 1978, 34–37; 1988, 900; Loporcaro 2011; Mensching/Remberger 2016, 272–274). In their view, metaphony is a diachronic process in Campidanese and the items that show a metaphonic vowel are in fact lexicalized. This originated a state of affairs that is now characteristic of Campidanese, i.e. minimal pairs only differing in the quality of a mid-vowel. It is the case of ['oru] 'edge' vs. ['ɔru] 'gold', or ['beni] 'come_{2SG.IMP}' vs. ['beni] 'well_{ADV}', with the following phonological forms: /oru/ vs. /ɔru/ and /beni/ vs. /beni/ (cf. Section 2).

By contrast, the proponents of a five-vowel system for Campidanese believe that both final raising and metaphony are active rules (Bolognesi 1998, 20–21; Frigeni 2002; Molinu 2017, 350; Savoia 2015; 2016; Torres-Tamarit/Linke/Vanrell 2017). One way to formalize this view is to assume the existence of two rules: the rule of metaphony applies before the rule of final raising. Since final raising would (in principle) create contexts for metaphony, this amounts to a counter-feeding ordering. The derivation of the above-mentioned minimal pairs is shown in Table 19.6.

Table 19.6: Metaphony and final vowel raising in Campidanese.

	'edge'	'gold'	'come _{2SG.IMP} '	'well _{ADV} '
Underlying forms	/ɔru/	/ɔɾɔ/	/beni/	/benɛ/
Metaphony	oru	—	beni	—
Final vowel raising	—	ɔru	—	beni
Surface forms	['oru]	['ɔru]	['beni]	['beni]

It is easy to see that there is a clear analogy between the two analyses: Each sound change of the former analysis corresponds to one phonological rule in the latter, and

the actual chronology of the former corresponds to the rule ordering of the latter. Generally speaking, there is no strong evidence in favor of one or the other. One piece of evidence that final raising might still be active is given by the fact that usually it does apply to recent loanwords. This generalization, though, is not without exceptions: It. *foto* ['fɒtɒ] 'picture' is ['fɒ(t)tɒ] and not ['fɒ(t)tu] (or ['fo(t)tu]) In a similar fashion, the presence of metaphony in loanwords is not systematic: Some items display the metaphonic vowel, e.g. Cat. *clavel* → Camp. [gra'vellu] 'carnation', while others do not, e.g. Sp. *bote* → Camp. ['bɒ(t)tu] 'tin, jar' (Virdis 1978, 78).

4.2 Epenthetic vowels

In this section, I will use the term epenthesis to refer to all types of vowel addition. More specifically, we will see that in Sardinian one can find epenthetic, paragogic, and prosthetic vowels. Epenthesis proper, i.e. insertion of a vowel (usually a schwa) in the middle of a word, is attested only in some varieties in the regions of Baronia, Barbagia di Ollolai, and Ogliastra, as reported by Wagner (1941/1984, 90–95) and Contini (1987). Contini (1987, 469) regards this type of vowel addition as systematic: "Several varieties have a tendency to develop a vocalic element within *all* groups involving [r]" (translation and emphasis mine) and reports the following examples, with the addition of a schwa: /pɔrku/ → ['pɔr^aku] 'pig', /ɛrba/ → ['ɛr^aβa] 'grass', /surdu/ → ['sur^aʝu] 'deaf' (Contini 1987, 469–471). Here schwa occurs systematically in coda-onset sequences. This phenomenon seems to be highly widespread, especially in the Baronia region. In another particularly interesting context schwa insertion is observed less regularly: in the data in Contini (1987, 470), we can see that schwa breaks the plosive-liquid clusters, e.g. /iskra/ → ['isk^ara] instead of ['iskra] 'fertile ground', /truɖɖa/ → [t^aruɖɖa] 'wooden ladle', /kras/ → [k^araʃ(a)] 'tomorrow'. These data are especially valuable because, if the process were to prove active and systematic, one would be led to conclude that these varieties include heterosyllabic plosive-liquid clusters,²⁴ which would make them unique in the Sardinian domain.²⁵

In Section 3, I mentioned that Sardinian preserves Latin word-final consonants. We can thus find several words ending in a consonant. These words display an alternation between paragogic and non-paragogic forms. The paragogic vowel is added in utterance final position and it is in fact an echo vowel, i.e. a copy of the preceding vowel, e.g. /matas/ → ['ma(t)taz(a)] 'tree_{PL}', /pipius/ → [pi(p)'piuz(u)] 'child_{PL}', /kanis/ → ['kaniz(i)] 'dog_{PL}'. If the consonant-final word is not in utterance-final position, i.e. if it is followed by any other word, it does not undergo vowel addition, e.g. /pipius

²⁴ On plosive-liquid clusters and heterosyllabicity cf. Lowenstamm (2003) and Ségéral/Scheer (2005).

²⁵ Cf. Lai (2013a) for the alternation between tautosyllabic and heterosyllabic plosive-liquid clusters in the evolution from Latin to present-day Sardinian varieties. For analogous examples in French and Spanish cf. Colantoni/Steele (2005).

pitikus/ → [pi(p)'piuspi(t)'ti(k)kuz(u)] ‘small child_{PL}’ (data from Northern Campidanese, Tertenía).

The third type of vowel addition concerns prosthetic vowels. In diachrony, several prosthetic vowels were added in word-initial position. In Campidanese, for instance, words starting with a rhotic developed prosthesis systematically. In present day Campidanese, we observe the outcomes of this diachronic insertion, e.g. Southern Camp. /arɔsa/ [ar'ɔza] and Northern Camp. /ɔrrɔsa/ [ɔr'ɔza] vs. Log. /ɔrsa/ [r'ɔza] (< ROSA(M), cf. 3.2). This development is already attested in medieval Campidanese documents with the form now present in Northern Campidanese (the southern form results from a more recent evolution; cf. Wagner 1941/1984, 95–101). Another diachronic process can be found in Logudorese: word-initial heterosyllabic clusters (e.g. /sC/ clusters) were systematically repaired with a prosthetic /i/. Compare for example Log. /iskɔla/ vs. Camp. /skɔla/ (< SCHOLA(M)).

I mention these diachronic processes also in order to avoid confusion with the synchronic prosthetic vowels that appear in Campidanese in external sandhi and are better regarded as an altogether different phenomenon. Campidanese, unlike Logudorese, presents word-initial heterosyllabic clusters: some are /sC/ clusters, others are word-initial geminates (cf. Bolognesi 1998, 158–171, 411; Lai 2015b). When a heterosyllabic cluster is preceded by a consonant final word, a prosthetic vowel, (namely [i]), appears at the word boundary. Compare the alternations in (2). In the first column, the heterosyllabic clusters are preceded by a vowel-final word (the singular articles *su_M* and *sa_F*), while in the second column a consonant-final word (the plural article *is*) precedes the cluster.

(2)	a.	/ssa skɔva/ [sas'kɔva] ‘the broomstick’	/is skɔvas/ [izis'kɔvaz(a)] ‘the broomstick _{PL} ’
	b.	/ssa spɔndʒa/ [sas'pɔndʒa] ‘the sponge’	/is spɔndʒas/ [izis'pɔndʒaz(a)] ‘the sponge _{PL} ’
	c.	/ssu strandʒu/ [sus'trandʒu] ‘the foreigner’	/is strandʒus/ [izis'trandʒuz(u)] ‘the foreigner _{PL} ’
	d.	/ssu ʃʃaloriau/ [suʃʃalori'au] ‘the idiot’	/is ʃʃaloriaus/ [iziʃʃalori'auz(u)] ‘the idiot _{PL} ’

These data are from the Campidanese variety of Tertenía (cf. Lai 2015b), but the same kind of vowel addition is widespread in Campidanese, while in Logudorese it is not available due to the lack of word-initial heterosyllabic clusters. The alternation between prosthetic and non-prosthetic forms is known as ‘vowel zero alternation’. This sandhi phenomenon is a valuable diagnostic test to investigate syllabic struc-

ture. Some applications relevant to Sardinian can be found in Scheer (2014, 89–90) and Lai (2015b). They concern the structure of initial geminates, of plosive-liquid clusters, and complex segments.

5 Consonantal processes

5.1 Weakening processes

In Sardinian, various obstruents are weakened in intervocalic positions. This process is usually referred to as ‘lenition’. In the past, lenition was an active process both word-internally (i.e. internal sandhi) and at word-boundaries (i.e. external sandhi). Today, word-internal lenition is no longer productive. However, it should be mentioned that in the past, every intervocalic obstruent was systematically affected (even in plosive-liquid clusters).²⁶

I will focus on the intervocalic weakening process that affects the obstruents /p t k b d g f s/ in Logudorese (only /f/ and /s/ in Nuorese), to which Campidanese adds the affricates /tʃ dʒ/ that resulted historically from the palatalization of Latin velar plosives before front vowels (cf. 3.2). Two types of lenition are observed and both apply only to word-initial segments. The first one affects voiceless obstruents and changes them into the corresponding voiced fricatives, as exemplified below in (3). The second one deletes voiced obstruents, as shown in (4). Postalveolar affricates undergo lenition only in Campidanese: if voiceless, they become voiced affricates in Northern Campidanese and voiced fricatives in the south; if voiced, they fall.

- (3) a. /ssa piska/ → [sa'βiska]
 ‘fishing’
 b. /ssa tɛrra/ → [sa'ðɛrra]
 ‘the earth, the soil’
 c. /ssa kanna/ → [sa'ʎanna]
 ‘the reed, the cane’
 d. /ssa farra/ → [sa'varra]
 ‘the flour’
 e. /ssu santu/ → [su'zantu]
 ‘the saint’
 f. /ssa tʃida/ → [sa'dʒiða], [sa'ʒiða]
 ‘the week’

²⁶ The process was active both within and across morpheme boundaries.

- (4) a. /ssu bentu/ → [su'entu]
 'the wind'
 b. /ssu dominigu/ → [suo'miniʝu]
 'the Sunday'
 c. /ssa ganga/ → ['saŋga]
 'the throat'
 d. /ssu dʒeneru/ → [su'eneru]
 'the son-in-law'

Regarding voiceless plosives, lenition also applies to recent loanwords. As for the voiced series, by contrast, it is important to emphasize that only voiced obstruents from the native lexicon (words from Latin) undergo lenition, and are, as a result, deleted. Loanwords (be they ancient or modern) do not show weakening of any kind (e.g. /ssa butega/ → [sabu(t)'teʝa] 'the shop' (< It. *bottega*), cf. Wagner (1941/1984, 140–141); Lai (2009). The lenition of voiced obstruents also shows diatopic variation. The data in (3) and (4) are from Northern Campidanese (Tertenía variety), a conservative area where the original Sardinian lenition pattern is preserved. One observes various degrees of weakening, with voiceless obstruents replaced by fricatives and voiced obstruents deleted altogether.

Today, this balance is broken in Southern Campidanese. Namely, Southern Campidanese speakers have lost the lenition rule for voiced obstruents. This process was already under way in the first half of the 20th century, as noted by Wagner (1941/1984, 138–141). The pattern is now described in Bolognesi (1998, 37), where it is apparent that the author's informants, speakers of a far south variety, are gradually losing this rule. The only seeming counterexamples in Bolognesi (1998, 37, Tables 45, 46) show an optional deletion (not phonologically motivated) in voiced obstruents. This optionality may itself be a clue as to the progressive loss of the rule. It should be mentioned that the data come from Sestu, a town near Cagliari where most Sardinian speakers are likely to be heritage speakers (a situation common to Southern Campidanese more generally, cf. Marongiu 2007). Interestingly, I observed the same behavior in young (heritage) speakers from Northern Campidanese, who are losing the deletion rule and, more often than not, preserve voiced plosives in intervocalic position (Lai 2018b, 63–66).

Lenition also applies to the obstruent in a plosive-liquid cluster, along the same lines exemplified in (3) and (4), e.g. /ssa pruna/ → [sa'βruna] 'the plum', /ssa trempa/ → [sa'ðrempa] 'the cheek', /ssa krai/ → [sa'ʝrai] 'the key', /ssu fradili/ → [suvra'ðili] 'the cousin', /ssa gruta/ → [sa'ru(t)ta] 'the cave', /ssu brunku/ → [su'runku] 'the muzzle' (data from Northern Campidanese, Tertenía; cf. Wagner 1941/1984, 252–278).

Incidentally, it is worth adding that in most Logudorese varieties the voiced velar plosive has been replaced by the voiced bilabial plosive (Wagner 1941/1984, 141–142). Compare for example Central Sardinian /gula/ ['gula] 'throat' with /bula/ ['bula], the corresponding form in the rest of the Logudorese area. However, these voiced bila-

bial plosives undergo lenition like any other voiced obstruents in Logudorese. In 3.1, I mentioned that Central Sardinian patterns differently with respect to the rest of the Sardinian domain: As a matter of fact, the weakening phenomena illustrated in (3) and (4) do not apply. In this area, though, voiced plosives in intervocalic position become voiced fricatives (Wagner 1941/1984, 136–138). However, in contrast to the other synchronic lenition phenomena, this also applies word-internally.

5.2 Strengthening processes

Phono-syntactic doubling or *raddoppiamento fonosintattico* (RF) is a *sandhi* strengthening process widespread in some Romance varieties from the south and the center of the Italian peninsula (≈18 Italian), as well as in Sardinian and Corsican (cf. Kaye/Lowenstamm/Vergnaud 1990, 206–207; Loporcaro 1997a; Ledgeway 2016, 214). As we will see, the most common manifestation of RF is the strengthening of word-initial consonants in external sandhi. Two main types of RF are attested. One is stress-induced, while the other is triggered by some monosyllables (cf. Loporcaro 1997a, 42–43). In stress-induced RF, oxytonic words induce the lengthening of the initial consonant of the following word: e.g. Central It. *città piccola* /tʃitta pikkola/ → [tʃit'ta'ppikkola], ‘small town’. This type of RF is absent in Sardinian: RF is triggered only by some unstressed monosyllables that ended in a coda consonant in Latin, e.g. the preposition *a* (< AD) ‘to’, the conjunction *e* (< ET) ‘and’, the negative marker *no* (< NON) ‘not’, the negative conjunction *ne/ni* (< NEC), the interrogative particle *a* (< AUT) (cf. Wagner 1941/1984, 326–333; Pittau 1972, 37–38; Loporcaro 1997a, 47; 1997b, 111; Molinu 2006, 278; Passino 2013, 335). The latter particle is only available in Logudorese varieties.

Let us turn our attention to some examples from Logudorese (Bonorva variety) adapted from Loporcaro (1997b, 111). Note that in the phonological form of these RF-inducing particles I have added an empty consonant slot (i.e. C) to make it clear that the particles in question must be assumed to include an empty consonantal position, which is involved in the gemination of the following onset (cf. also Molinu 2006, 279): /aC miɛ/ → [am'miɛ] ‘to me_{1SG.ACC}’, /aC pɔdɛs/ → [ap'pɔdɛz(ɛ)] Q can_{2SG} ‘can you?’, /ɛC tuɛ/ → [ɛt'tuɛ] ‘and you_{2SG}’, /nɔC pɔdɛs/ → [nɔp'pɔdɛz(ɛ)] NEG can_{2SG} ‘you cannot’, /nɛC tuɛ/ → [nɛt'tuɛ] NEG you_{2SG} ‘you neither’.

RF and lenition, whose application has been shown to vary depending on lexical stratification and dialectal variation, interacts in complex ways in some varieties as far as voiced plosives are concerned (cf. for instance Bolognesi 1998, 31, 50; Molinu 2006; Lai 2009; Molinu/Pisano 2016, 133).

Note also that RF has a lengthening effect on all consonants, even in plosive-liquid clusters, e.g. /aC krɔbus/ → [ak'krɔβuz(u)] ‘to crows’, while it does not apply to heterosyllabic word-initial clusters, e.g. /aC skɔla/ → [ais'kɔla], not *[asskɔla] ‘to school’ (data are from Tertenía). Logudorese does not have word-initial heterosyllabic clusters.

Sardinian RF can be observed in the medieval Sardinian corpus (cf. Wagner 1941/1984, 331–332; Loporcaro 1997b, 112). There, the outputs of RF are usually notated by duplicating the word-initial grapheme after certain monosyllables, e.g. *a lLukia* ‘to Lucy’, *a cKipriane* ‘to Cyprian (name)’, *e nmaraitimi* ‘and tell_{3SG.PRET} me’, *e ccollat* ‘and descend_{3SG.PRET}’ (from S. Pietro di Silki’s Condaghe, Soddu/Strinna 2013).

I will briefly present another strengthening process reported by Blasco Ferrer (1986, 37) and Loporcaro (1997b, 114–115), with Campidanese data of my own. Data are from Northern Campidanese (Tertenía variety). Sardinian is peculiar in that it preserves Latin final consonants. In Section 3, I mentioned that Sardinian presents /-t/, /-s/, /-n/, /-r/ in final coda position. These final codas are direct evolutions of the corresponding Latin consonants.

I will focus on the strengthening effect that arises from the assimilation of the final coda /t/ (the 3rd person singular verbal ending). One observes two surface manifestations of /t/, e.g. /papat pani/ ‘eat_{3SG} bread’ can be realized in one of two ways, namely as [pa(p)paðaʔani] or as [pa(p)papʔani] (both grammatical). In the first form, one can see that the final coda /-t/ is followed by a paragodic vowel and, since /t/ is in an intervocalic position, lenition applies and it surfaces as [ð]. Because of the paragodic vowel, the word-initial obstruent /p/ of the word that follows (in our case /pani/) is now in intervocalic position as well and as a result it is weakened and becomes [β]. The fortition process can be seen in the second realization (i.e. [pa(p)papʔani]). Here the final coda /-t/ is assimilated to the following consonant, resulting in a strengthening effect. This synchronic fortition process is proof of the close relationship between anticipatory assimilation and RF (cf. Loporcaro 1997b, 114).

An analogous situation can be found with final coda /-s/, which is either the nominal plural marker or a verbal ending marking first person plural or second person (singular or plural). In some Sardinian varieties (like that of Cargeghe, described in Molinu/Pisano 2016, 129) one observes anticipatory assimilation of /s/ as a plural marker. Within phrase boundaries, plural /s/ assimilates to the following consonant, thus inducing gemination in the latter: /sɔs pittsinɔs/ → [sɔppitʔsinɔz(ɔ)] ‘the boy_{PL}’. In other varieties (e.g. Pula, Southern Campidanese area) the application of this process is sensitive to syntactic categories (cf. Molinu/Pisano 2016, 131).

5.3 Metathesis

Sardinian is well known for the metathesis of liquids. Sporadic metathesized items can be found in Logudorese but only in some Campidanese varieties was metathesis a regular process that affected all liquids in specific positions. Two relevant cases are liquids in plosive-liquid clusters and liquids in coda position. In both cases, the liquid moved and gave rise to new plosive-liquid clusters in word-initial position, e.g. [krastu] < OSrd. *crastu* (< CASTRU(M)) ‘fortress/big stone’ and /druttʃi/ < [durtʃi] (< DULCE) ‘sweet’ (Lai 2013a; 2014). Most kinds of metatheses are diachronic in nature

(Geisler 1994; Molinu 1998; 1999; Lai 2013a; 2013b; 2015a); two are synchronic. I will first focus on the metathesis from the South-Western Campidanese area discussed in Virdis (1978, 76), Contini (1987, 401–402), Geisler (1994), Bolognesi (1998), Molinu (1998; 1999), Alber (2001), and Frigeni (2005). The only comprehensive data sets available are in Bolognesi (1998, 419), with data from the town of Sestu, and in Molinu (1999, 165), with data from the villages of Genoni and Senorbì. Bolognesi (1998, 419) describes the pattern as follows: “In Sestu Campidanian and other related dialects, the liquid /r/ is found in coda position only in a limited set of words, all of which exhibit the same prosodic structure [...]. All these words begin with a vowel and are disyllabic. When these words are preceded by a determiner, the final vowel of the determiner is deleted and /r/ *Metathesis* takes place.” Data in (5) are adapted from Bolognesi (1998, 419): I added the phonological form, the intermediate form and glosses. Data in (6) and (7) are adapted from Molinu (1999, 165).

- (5) a. /ssu ordʒu/ → ['sordʒu] → ['sroʒu]
 ‘the barley’
 b. /ssa ardʒa/ → ['sardʒa] → ['sraʒa]
 ‘the spider’
 c. /kustu arku/ → [kus'tarku] → [kus'traku]
 ‘this arc’

The data in Molinu (1999, 165) confirm that this metathesis can also take place when the same words are preceded by verbs, namely the 3rd person of ‘eat_{INF}’ /papat/ and ‘have_{INF}’ /at/ as well as the preposition *de*.

- (6) a. /nun tʃi at ɛrba/ → ['nuntʃa'drɛβa]
 ‘there is no grass’
 b. /papat ɛrba/ → ['pa(p)pa'drɛβa]
 ‘eat_{3SG} grass’
 c. /unu kundʒadu dɛ ɛrba/ → [ũŋun'dʒaɖudri'ɛβa]
 ‘a field of grass’

This metathesis is puzzling, in that it applies when the word is preceded by a range of arguably unrelated elements, such as determiners, verbs and the preposition *de*. Also, some words that induce this metathesis in a following word end in a vowel, others end in a consonant. In Molinu (1999, 165) we can find the following examples:

- (7) a. /is ɛrbas/ → [i'srɛβaz(a)]
 ‘the grass_{PL}’
 b. /ssa ɛrba/ → ['srɛβa]
 ‘the grass’

In (7a) /ɛrba/ is preceded by the plural article *is*, and in (7b) by the singular feminine article *sa*. As one can see, both *is* and *sa* trigger metathesis. Thus, the nature of the final segment does not seem relevant for the application of this metathesis.

The second synchronic metathesis is actually a residual metathesis. Data are available in Lai (2013a, 98–100) and Scheer (2014), but since the object language is my mother tongue (Sardinian from Tertenía) I am able to exemplify the patterns more extensively. It applies only to the paradigm of the verb /dormiri/ ‘sleep_{INF}’ and the noun /bentri/ ‘belly’. However, with respect to the previous metathesis, in this case a true phonological rule can be formulated. Consider the following data with /dormiri/ and /bentri/ in various phonological contexts.²⁷

Table 19.7: Forms of /dormiri/ in different positions.

Word-initial position	Intervocalic position	Post-consonant position	Phono-syntactic doubling
/dormendu/	/soi dormendu/	/ses dormendu/	/a dormiri/
[dro'mendu]	[sɔior'mendu]	[serɔ̞ro'mendu]	[aɔ̞ro'miri]
sleep _{PROG}	be _{1SG} sleep _{PROG}	be _{2SG} sleep _{PROG}	to _{PREP} sleep _{INF}
‘sleeping’	‘I am sleeping’	‘you are sleeping’	‘to sleep’

Table 19.8: Forms of /bentri/ in different positions.

Word-initial position	Intervocalic position	Post-consonant position	Phono-syntactic doubling
/bentri/	/ssa bentri/	/tres bentris/	/a bentri/
[ˈbrenti]	[ˈsɛntri]	[trɛrˈβrentiz(i)]	[aˈβrenti]
‘belly’	‘the belly’	‘three bellies’	‘in (the) belly’

As one can see, metathesis takes place only when the word-initial consonant is in strong position, thus in word-initial and post-consonant positions or in a phono-syntactic doubling context. In a weak position, such as the intervocalic one, the liquid stays *in situ* and the word-initial voiced plosive is deleted due to lenition. Thus, liquids move if there is a stronger position available, in keeping with a strength hierarchy of positions hypothesized by Lai (2013a) for the diachronic metatheses.

²⁷ In Northern Campidanese, in phono-syntactic doubling contexts, voiced plosives are realized as voiced fricatives, e.g. [aβu(k)ka]. In intervocalic position, their counterparts are elided, e.g. [sa'u(k)ka] (for important qualifications on this claim cf. Lai 2018b, 66). A similar process has been observed in other dialects (Bolognesi 1998, 50, 414; Molinu 2017, 350).

6 Word stress and intonation

6.1 Word stress in the main Sardinian varieties

Sardinian is a language with variable stress (Wagner 1941/1984, 15–28; Pittau 1972, 20–22; Bolognesi 1998, 65–71; Lai 2002, 52). The stress system of Sardinian allows for paroxytone and proparoxytone words, e.g. Logudorese [sa'pɔnɛ], [sa'βɔnɛ], Campidanese [sa'βɔni] (< SAPŌNE(M)) 'soap'; Logudorese ['pipɛɾɛ], ['piβɛɾɛ], Campidanese ['piβiri] (< PIPERE(M)) 'pepper'. In these examples the macro-varieties pattern alike, but this is not always the case. For some words and in certain dialects, stress deviates from the Latin source, e.g. Central Sardinian and Northern Campidanese [kampana] as opposed to the rest of Logudorese and Campidanese [kam'pana] (< CAMPĀNA) 'bell' (Wagner 1941/1984, 15–17; Pittau 1972, 20, fn. 1). Historically, oxytone loanwords developed a paragogical vowel, e.g. It. *caffè* → Camp. Srd. *caffèi*. In Campidanese, we find a small number of monosyllables that usually resulted from the deletion of an intervocalic voiced plosive: [dʒu] (< IUGU(M)) 'yoke', [ni] (< NIVE(M)) 'snow', [di] (< DIĒ(M)) 'day', [fa] (< FABĀ(M)) 'broad bean', [kru] (< CRŪDU(M)) 'raw' (Wagner 1941/1984, 26). In phrase-final position, some words are repaired by inserting the epenthetic syllable [ri], thus obtaining a trochee, e.g. /ssa di/ → [sa'diri] 'the day' (Sestu variety, from Bolognesi 1998, 292).

6.2 Stress placement with clitics

In most Romance languages (e.g. Italian and Spanish), clitics are stress-neutral: when they attach to a verbal host, they have no effect on stress placement (Loporcaro 2000). By contrast, Sardinian is among the few Romance languages that display stress shift with clitics: when clitics attach to imperative and gerund forms, stress placement changes, usually shifting from the host to the clitic sequence (cf. Bafile 1994; Kim/Repetti 2013). In Sardinian, we find clitic personal pronouns, locative and partitive clitics (Jones 1993; Mensching/Remberger 2016; Mensching 2017). Stress placement is related to the number and type of clitics attached to the verbal host.

Three different patterns of stress shift are attested in Sardinian varieties (Lai 2016; Pisano 2016, 51–54). One is observed in Logudorese, the second in Campidanese, whereas the last one is found in the transitional area between the two. In the case of clitic sequences (of two or three clitics), all Sardinian varieties pattern alike: stress shifts to the penultimate syllable of the whole sequence. Compare, in (8) and (9) the forms for the three mentioned areas (data from Lai 2016, 145; 2017b, 189; Bafile/Lai 2018). The Logudorese data are from Nuorese, the Campidanese data stem from Terenía and the data from the transitional area are from Villagrande Strisàili variety (in Sardinian *Biddamanna Strisàili*). The same sources are used in (10).

- (8) a. batti='mi-la (Logudorese)
 bring_{2SG.IMP=1SG.DAT-3SG.ACC}
 'bring it to me'
 b. betti='mi-dɔa (Campidanese)
 bring_{2SG.IMP=1SG.DAT-3SG.ACC}
 'bring it to me'
 c. batti='mi-dɔa (Transitional area)
 bring_{2SG.IMP=1SG.DAT-3SG.ACC}
 'bring it to me'
- (9) a. batti=mi-'kɛ-la (Logudorese)
 bring_{2SG.IMP=1SG.DAT-LOC-3SG.ACC}
 'bring it there for me'
 b. betti=mi-n'dɛ-dɔa (Campidanese)
 bring_{2SG.IMP=1SG.DAT-LOC-3SG.ACC}
 'bring it there for me'
 c. batti=mi-n'dɛ-dɔa (Transitional area)
 bring_{2sg.imp=1sg.dat-loc-3sg.acc}
 'bring it there for me'

In the case of adjunction of a single clitic, a fair degree of variation is observed (cf. Lai 2016; 2017b; Pisano 2016, 51–54; Bafille/Lai 2018). Compare, in (10), the behavior of the three main areas with respect to the adjunction of a single clitic.

- (10) a. 'batti=mi (Logudorese)
 bring_{2SG.IMP=1SG.DAT}
 'bring (sth) to me'
 b. betti='mi (Campidanese)
 bring_{2SG.IMP=1SG.DAT}
 'bring (sth) to me'
 c. bat'ti=mi (Transitional area)
 bring_{2SG.IMP=1SG.DAT}
 'bring (sth) to me'

In Logudorese, the combination of the host with a single clitic does not affect the stress placement on the host. In the transitional area, the adjunction of a single clitic (of any category) shows the same stress placement as in the case of clitic sequences: the stress falls on the penultimate syllable. The most interesting pattern is found in Campidanese, in which single clitics induce a different stress placement depending on the type of clitic attached to the host. 1st and 2nd person clitic pronouns induce a stress shift to the final syllable of the verb-clitic sequence (e.g. [betti='mi] bring_{2SG.IMP=1SG.DAT} 'bring me', [betti=ʔi] bring_{2SG.IMP=2SG.DAT} 'bring you') while (non-reflexive) 3rd person clitics, partitive,

and locative clitics do so to the penultimate syllable (e.g. [la'ma=d̪da] call_{2SG.IMP=3SG.F.ACC} 'call her', [na're=d̪d̪i] tell_{2SG.IMP=3SG.M.DAT} 'tell him', [pi'ya=ndi] take_{2SG.IMP=PART} 'take some of them').

Stressed enclitics are not the only peculiarity of stress placement in Sardinian: proclitics can receive stress as well. Interestingly, clitic clusters in proclisis have the same stress pattern as clitic clusters in enclisis, compare the following examples from Nuorese: [batti=mi-'kɛ-la] bring_{2SG.IMP=1SG.DAT-LOC-3SG.F.ACC} 'bring it there for me' with [mi'kɛla 'battit(i)]_{1SG.DAT-LOC-3SG.ACC=}bring_{3SG} 's/he brings it there for me' (cf. Lai 2017b, 194–196). More generally, one observes that strings of clitics behave like a single prosodic unit, both in enclisis and proclisis. This feature suggests that in Sardinian, strings of clitics should be regarded as constituting an independent prosodic word on their own (Lai 2017b, 196).

6.3 Intonation

While some valuable contributions on Sardinian intonation can be found in the previous literature (e.g. Lai 2002), the interested reader should now refer to Vanrell et al. (2015). Since space limitations make a thorough summary of this work unviable, I will limit myself to few remarks.²⁸

As observed by Jones (2013), it can be assumed that in the general case, nuclear stress falls on the rightmost constituent of the clause in Sardinian, not counting right dislocated material. The only conspicuous exceptions are clauses with constituent fronting, which is commonly employed in the language for a whole range of pragmatic purposes (Mensching/Remberger 2010; Remberger 2010; Jones 2013; Mensching 2016). In clauses with fronted constituents, the nuclear stress of the clause falls on the rightmost element of the fronted constituent.

One feature worth emphasizing is the near universal use of L% as a boundary tone. This extends to yes-no and wh-questions that in Sardinian, as a result, do not have the final rising intonation that is typical of questions in some languages (e.g. English). This, while not unheard of in a Romance context (cf. Frota/Prieto 2015), is nevertheless remarkable. When one takes pitch accents into account, the nuclear configurations of broad-focus declaratives and (information-seeking) yes-no questions are in fact very similar, i.e. H+L* L% and ;H+L* L%, the difference being an extra-high peak in the questions.

More generally, Vanrell et al. (2015) enumerate seven nuclear configurations, two of which are only realized in vocative utterances. As they point out, with such a small inventory, it is not surprising that Sardinian resorts so widely to syntactic

²⁸ To the best of my knowledge, Sardinian speech rhythm has not been investigated to date.

means (fronting, left peripheral particles) in order to differentiate, e.g. between different subtypes of yes-no questions.

Lastly, it is not without interest, in the light of the otherwise considerable internal variation discussed above, that the authors found no difference in the intonational phonology of their Logudorese and Campidanese informants. This shows that even a *prima facie* elusive facet of linguistic competence like intonation can turn out to be more cross-linguistically consistent than, e.g., segmental phonology or syllabic structure.

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Paolo Roseano and Franco Finco

20 Rhaeto-Romance: Friulian, Ladin, and Romansh

Abstract: The three Rhaeto-Romance varieties (Friulian, Dolomitic Ladin, and Romansh) have some features in common, as well as some distinctive characteristics, both at the segmental and suprasegmental levels. As far as vowel systems are concerned, one can point out that such languages have (or had in previous stages) a contrast between long and short stressed vowels. The same can be said for the palatal plosives /c/ and /j/, which characterize the Rhaeto-Romance area. Other common features (shared also with other Romance varieties of Northern Italy) are the absence of a contrast between long and short consonants and the devoicing of final obstruents. As far as intonation is concerned, the three languages share the same nuclear configuration for broad focus statements (H+L* L%). In addition, Ladin and Friulian share the same set of contours in yes-no questions (L* H%, L+H* LH%, and L+H* L%).

Keywords: Friulian, Ladin, Romansh, vowel length, vowel harmony, palatal plosives, intonation

1 Introduction

The aim of this chapter is to describe the phonetics and phonology, from both a segmental and a suprasegmental point of view, of three Romance languages that are traditionally included in the Rhaeto-Romance group: Friulian, Ladin, and Romansh (cf. Section 2). For this reason, the text contains some general remarks about the relationship between these languages and one section on each of them. The largest section is dedicated to Friulian, which has the largest number of speakers and is the most studied of the three Rhaeto-Romance languages from a phonetic and phonological point of view. For each language, we describe the vowel and consonant inventories, the main phonological processes and some of its suprasegmental features. The most relevant aspects of dialectal variation are dealt with, too, but we exclude from our analysis the recently-born standard varieties. The descriptions we provide are based

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mainly on the works published about each single language and, to a more limited extent, on unpublished data that are discussed for the first time in these pages; cf. 3.2.3 (Friulian vowel harmony), 4.2 and 5.2 (intonational patterns of Ladin and Romansh).

2 The Rhaeto-Romance languages

A particular affinity between Romansh, Ladin, and Friulian varieties had already been recognized during the first half of the 19th century (Benincà/Vanelli 2005, 20–21; Benincà/Vanelli 2016, 139; Melchior/Schwägerl-Melchior 2017, 16–17). The first clear statement about the existence of a Rhaeto-Romance linguistic subfamily was by Schneller, who claimed the existence of a *friaulisch-ladinisch-churwälscher Sprachkreis* (1870, 9–10; ‘Friulian-Ladin-Romansh language circle’). Three years later Ascoli published his influential work *Saggi ladini* and labeled as *zona ladina* ‘Ladin zone’ the area that included some territories from the upper Rhine to the upper Adriatic (Ascoli 1873, 1). Around this core region there was a discontinuous and somewhat fuzzy belt of territories that he called *anfizione* ‘surrounding areas’, whose local Romance varieties displayed some features in common with the core dialects of the *zona ladina*. Figure 20.1 shows a map based on Ascoli’s ideas.

Ten years later, Gartner (1883, xxi) used and spread the label Rhaeto-Romance (*Rätoromanisch* in German). In spite of this different label, his ideas did not differ dramatically from Ascoli’s, insofar as they both agreed that there existed a Romance subfamily that had Friulian, Ladin, and Romansh as its core varieties, potentially including a few surrounding varieties. Crucially, both authors concurred on two main points: 1) the varieties spoken in the Ladin or Rhaeto-Romance areas shared some common features, and 2) such varieties could be differentiated from neighboring Romance varieties. In other words, the Rhaeto-Romance varieties were (rather) similar to each other and different from the rest. The same position was held, although with some differences, by influential linguists of the following decades like von Wartburg (1950), Rohlfis (1981), and Goebel (1986; 1989). Other linguists, on the other hand, rejected more or less radically the existence of a Rhaeto-Romance subfamily, and were more keen on highlighting the commonalities among the three languages in question and the Romance varieties of Northern Italy (e.g. Salvioni 1917; Battisti 1937; Pellegrini 1970; 1991; Benincà/Vanelli 2005, 5–18). This difference of opinion forms the basis of the debate known as *questione ladina* (cf. Haiman/Benincà 1992; Krefeld 1994; Kramer 2000; Heinemann 2015a; Thiele 2014, 393–395; and Iliescu 2015 for an overview).

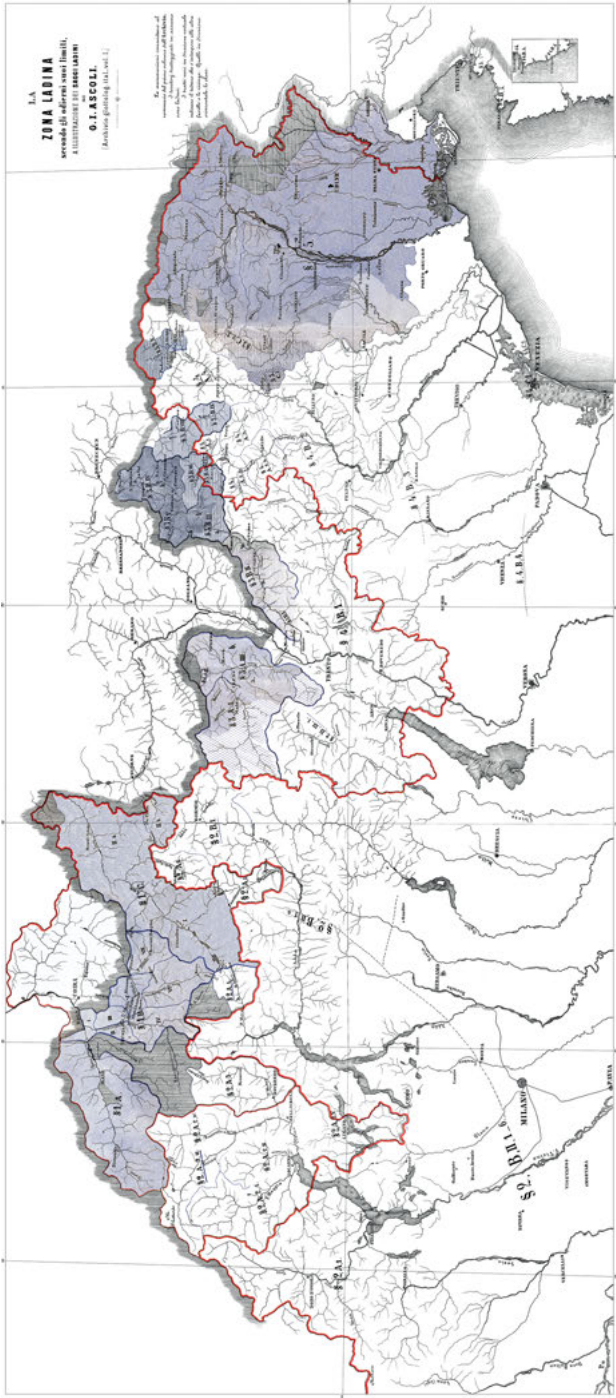


Figure 20.1: Ascoli's *zona ladina* 'Ladin zone' shaded in grey (Ascoli 1873, reprinted in Goebel 1991).

3 Friulian

Friulian (Friul. *Furlan*) is the easternmost Rhaeto-Romance variety spoken in Friuli, a historical region in Northeastern Italy. Estimates regarding the number of speakers range from 300,000 (Simons/Fennig 2018) to 600,000 (Melchior 2015, 3). The classification of Friulian dialects is largely based on the vowel system (both stressed and, to a lesser extent, unstressed; cf. 3.1.1). Scholars agree that Friulian can be divided into three main core dialectal areas: northern, western, and central. In addition to these core dialectal areas, one can mention Ertan (the transitional variety of Erto in the Dolomitic area of Friuli), the strip called *fascia di transizione friulano-veneta* in Italian (which corresponds to an abrupt but not clear-cut transition from Friulian to Venetian), Bisiac (a Venetian variety with Friulian features) and, finally, Tergestin and Muglisan (Rhaeto-Romance varieties close to Friulian spoken respectively in Trieste and Muggia, which disappeared in the 19th century; cf. Francescato 1966; Frau 1984; Roseano 2015; Heinemann 2015b; Heinemann/Melchior 2015 for an overview on Friulian dialects and neighboring varieties). The map in Figure 20.2 shows the borders of the main dialectal areas as well as the names of the towns and villages mentioned in the text.

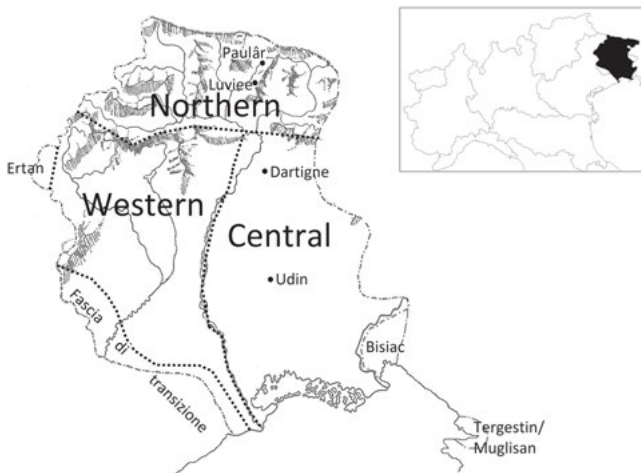


Figure 20.2: Friulian dialectal areas and neighboring varieties (adapted from Roseano 2015).

3.1 Vowel and consonant inventories

This brief overview of the phonetics and phonology of Friulian focuses on central dialects, on which the standard language is based, but it also includes information on

other varieties. The most complete descriptions of Friulian segmental phonology and phonetics may be found in Frau (1984), Miotti (2002; 2015), and Finco (2015).

3.1.1 Vocalism

As shown in Table 20.1, Friulian vowels display four degrees of aperture, while unstressed vowels only have three. Unlike Ladin and Romansh, no Friulian dialect has front rounded vocalic phonemes. The vowel system of Central Friulian includes two sets of 7 stressed phonemes (long and short) and a set of 5 unstressed short phonemes.

Table 20.1: Vowel phonemes in Central Friulian.

Stressed				
Short		Long		
/i/		/u/	/i:/	/u:/
/e/		/o/	/e:/	/o:/
/ɛ/	/ɔ/	/ɛ:/		/ɔ:/
	/a/		/a:/	
Unstressed				
/i/		/u/		
/e/		/o/		
	/a/			

There is a contrast between long and short vowels: /'nul/ 'null' ~ /'nu:l/ 'cloud', /'mil/ 'thousand' ~ /'mi:l/ 'honey', /can'ta/ 'sang_{3SG.PRET}' ~ /can'ta:/ 'sing_{3SG.PRET}' etc. The opposition between mid-open and mid-close vowels, either long or short (/ɛ/ ~ /e/, /ɛ:/ ~ /e:/, /ɔ/ ~ /o/, /ɔ:/ ~ /o:/), has a low functional load, insofar as there are only a few minimal pairs, which are not documented in all Friulian varieties: /'fjɛr/ 'fair' ~ /'fjɛr/ 'fever', /'sɛd/ 'silk' ~ /'sɛd/ 'seat, site', /'vɛrɪs/ 'wedding rings' and 'true_{F.PL}' ~ /'vɛrɪs/ 'glasses, pieces of glass', /'mɛ:s/ 'my_{F.PL}' ~ /'mɛ:s/ 'month', /'forɪn/ 'bear_{3PL.PRET}' ~ /'forɪn/ 'be_{3PL.PRET}', /'dɔ:s/ 'two_F' ~ /'dɔ:s/ 'doge'.

Short stressed /i u/ are articulated more often as [ɪ ʊ], or even as [e o] in the area northeast of Udine/Udin.

The presence and the diphthongization of long vowels are two of the most important criteria used to classify Friulian dialects. The first difference is between dialects that have long vowels and those that do not, which are the most peripheral eastern and western varieties (Figure 20.3, left panel, represents the presence/absence of long vowels). The second difference is between dialects like Central Friulian where Vulgar Latin mid vowels give birth, in certain contexts, to a long vowel (e.g. ['ne:f] 'snow', ['lo:f] 'wolf') and those where they evolve into diphthongs (like western and north-

ern varieties: e.g. ['neɪf]/['niaf]/['nief]/['niof], ['louf]/['luaf]/['luef]/['luof]). The right panel of Figure 20.3 contains a simplified mapping of such differences (for a more detailed description, cf. Francescato 1966; Frau 1984).

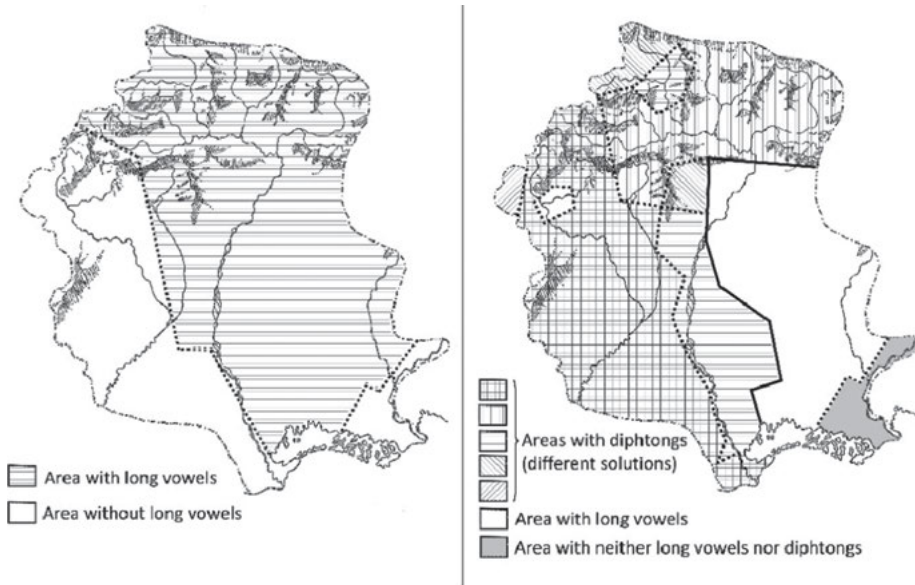


Figure 20.3: Friulian dialectal areas with or without long vowels (left panel) and with or without diphthongs (right panel) (adapted from Roseano 2015).

Unstressed final vowels are also an aspect that is often given importance in the classification of Friulian dialects. The Latin unstressed final vowels have generally fallen (in some contexts replaced by a supporting vowel /i/ or /e/), except for -A, which turned into /e/ in most central varieties (where e.g. CASA > ['caze]) but into /a/ in eastern and western varieties, articulated as [ɛ], [a], [ɐ], [ɑ], [æ] (like in CASA > ['cazɛ], ['caza], ['caza], ['cazæ]). In a few marginal areas, the result is the back vowel /ɔ/ ['cazɔ] or a central vowel ['cazə]. Figure 20.4 shows the geographic distribution of such different outcomes.

3.1.2 Consonantism

The consonantal system of Friulian comprises the 25 phonemes listed in Table 20.2. Contrary to the situation with vowels, the quantity of consonants does not have a distinctive value. All consonants are phonologically and phonetically short.

Central Friulian has four pairs of plosives: bilabial /p/ and /b/, dental /t/ and /d/, palatal /c/ and /ɟ/, and velar /k/ and /g/. The plosives /t/ and /d/ are usually articulated as dental in free variation with alveolar allophones, while the postalveolar artic-

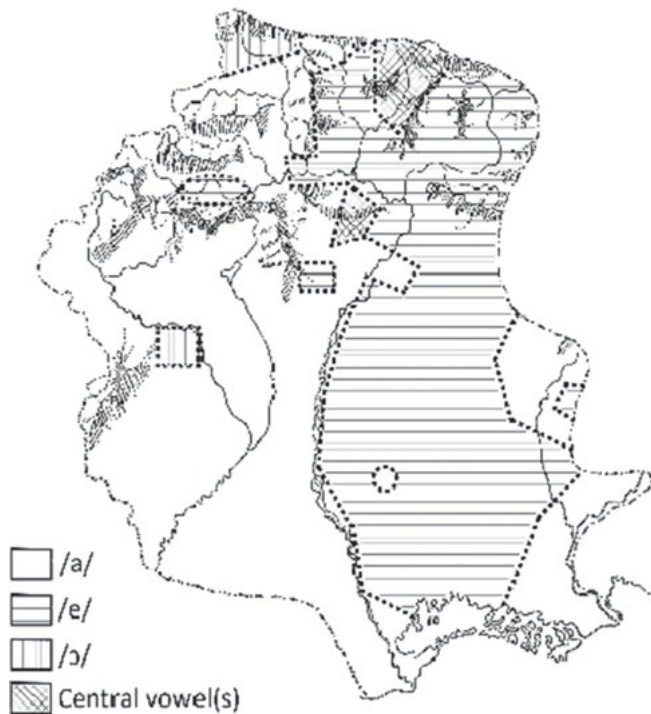


Figure 20.4: Geographic distribution of the different outcomes of Vulgar Latin unstressed -A in word-final position (adapted from Roseano 2015).

Table 20.2: Consonantal phonemes in Central Friulian.

	Bilabial	Labio-dental	Dental	Alveolar	Postalveolar	Palatal	Velar	Labiovelar
Plosive	/p/ /b/		/t/ /d/			/c/ /ɟ/	/k/ /g/	
Affricate			/tʃ/ /dʒ/		/tʃ/ /dʒ/			
Fricative		/f/ /v/		/s/ /z/	/ʃ/ /ʒ/			
Nasal	/m/			/n/		/ɲ/		
Trill				/r/				
Approximant						/j/		/w/
Lateral				/l/				

ulation [d] is much less frequent and more peripheral. In several northern varieties /d/ is pronounced as a retroflex [d̠], while in the westernmost varieties it can be articulated as a fricative [ð] between sonorants, but not systematically. The palatals /c/

and /j/ are articulated mostly like slightly affricated palatal ([t͡ɕ] and [t͡ɕj]) or prevelar ([t͡ɕx] and [t͡ɕɣ]) phones, but also like true palatal plosives. For the classification of Friulian dialects, one has to bear in mind that the palatal plosives are conserved only in some dialects, while some innovative varieties have substituted them with the corresponding postalveolar affricates (for example, while Central Friulian has ['can] 'dog' and ['jat] 'cat', southeastern and southwestern dialects have ['t͡ɕan] and ['d͡ɕat]). The right panel of Figure 20.5 shows the distribution of dialects that preserve the palatal plosives versus those that do not.

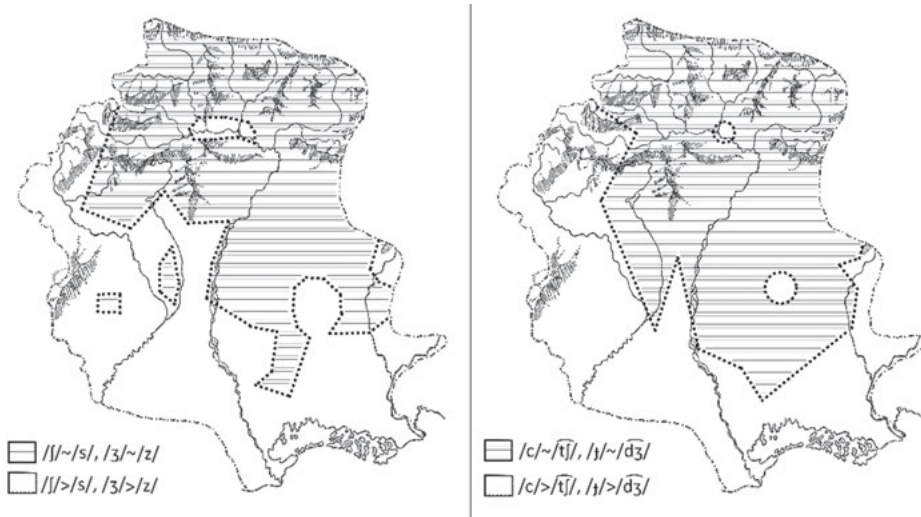


Figure 20.5: Areas that preserve postalveolar fricatives (left panel) and palatal plosives (right panel) (adapted from Roseano 2015, based on Francescato 1966).

Friulian has two pairs of affricates: the dental /t͡s/ and /d͡z/, and the postalveolar /t͡ʃ/ and /d͡ʒ/. The affricates /t͡ʃ/ and /d͡ʒ/ (found in words like /'t͡ʃi:l/ 'sky', /'d͡ʒu:k/ 'game', /'pit͡ʃul/ 'small', and /vja'd͡ʒa:/ 'travel_{INF}') are articulated mostly as postalveolar, but one observes also, in free variation, the velarized [t͡sʷ] and [d͡zʷ] or alveolo-palatal [t͡ɕ] and [d͡ɕ] allophones. The dental rendition as [t͡s] and [d͡z] (called *zicament* in Friulian) and the merger with /t͡s/ and /d͡z/ are found in few subdialects and are stigmatized by speakers of other varieties. In the urban and suburban areas of Udine/Udin and in most of the western, eastern, and lowlands dialects, these affricates have evolved into alveolar sibilants, merging with the phonemes /s/ and /z/; this phenomenon is known in Friulian as *sicament*. In the westernmost dialects they can be articulated as interdental fricatives ([θ] and [ð], respectively). Figure 20.6 maps the above-mentioned phenomena.

The phonemes /t͡s/ and /d͡z/ usually appear in loanwords from Venetian, Italian, German, and Slovene (like It. *zucchero* > /'t͡sukar/ 'sugar', It. *stazione* > /sta't͡sjon/ 'station', It. *benzina* > /bin'd͡zine/ 'gasoline', It. *zona* > /'d͡zɔne/ 'zone'). Such pho-

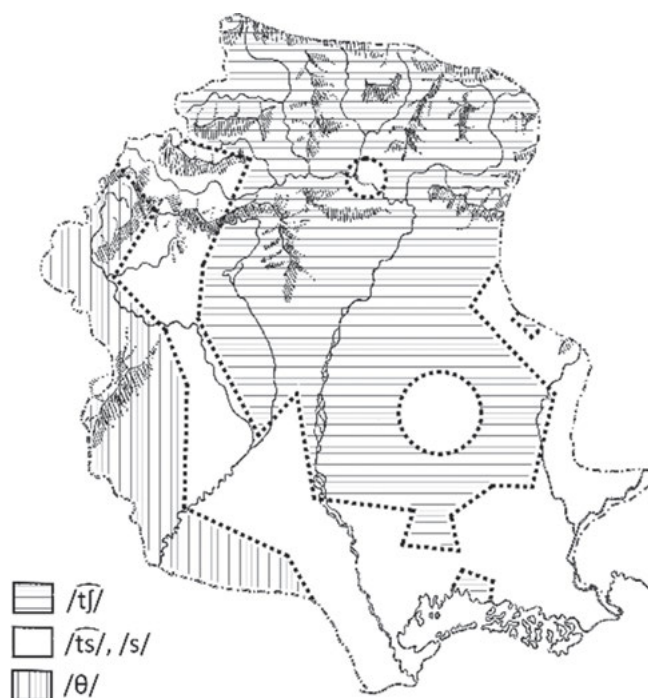


Figure 20.6: Areas that preserve the unvoiced affricate /tʃ/, areas where it has evolved to /tʃ/ or /s/, and areas where the interdental fricative /θ/ is used (adapted from Roseano 2015, based on Francescato 1966).

nemes are not very common and they have a limited functional load. Nevertheless, the unvoiced affricate /tʃ/ is more frequent than /dʒ/, because it also results from a morphological process that consists in adding the plural morpheme /+s/ to nouns ending in /t/ or /tʃ/ (like in /'frut+s/ → /'fruts/ 'child_{PL}', and /'bratʃ+s/ → /'brats/ 'arm_{PL}'). As far as dialectal differences are concerned, one has to point out that most innovative varieties, as well as many central ones, have merged /tʃ/ and /dʒ/ with /s/ and /z/, respectively (although these affricates can re-emerge in more recent Italian loans).

The sibilants /s/ and /z/ are articulated mainly as alveolar [s] and [z], respectively, in variation with dental [s̪] and [z̪] or labialized [sʷ] and [zʷ]. The voicing opposition is neutralized before any consonant, insofar as the sibilant takes on the voicing of the following consonant; for example, the prefix /diz/ is realized with [z] in [dizberde'a:] 'disentangle_{INF}', but with [s] in [dispete'na:] 'ruffle_{INF} (hair)'. In northern varieties /s/ and /z/ in preconsonantal position are realized as their postalveolar allophones [ʃ] and [ʒ], in words like /'spɔrk/ → ['ʃpɔrk] 'dirty', /'paste/ → ['paʃte] 'dough', /boz'nak/ → [boʒ'nak] 'Bosnian', /zdru'ma:/ → [ʒdru'ma:] 'to demolish', while in some central varieties they surface as labialized [sʷ] and [zʷ].

The postalveolar fricatives /ʃ/ and /ʒ/ may be regarded as peripheral phonemes for two reasons, geographic and functional. From a geographic point of view, they are

used nowadays only in some central varieties (and in most northern dialects). From a functional point of view, they play a limited role, although they participate in a few minimal pairs in dialects in which they appear, like /ku'jin/ 'pillow' ~ /ku'zin/ 'cousin', /'pasin/ 'pass_{3PL}' ~ /'pafin/ 'graze_{3PL}', /vi'zin/ 'let know_{1PL}' ~ /vi'zin/ 'member of a commune'. The opposition /s/ ~ /ʃ/ has a more important morphological role, as it distinguishes the singular from the plural form in nouns (like /'pas/ 'step_{SG}' ~ /'paʃ/ 'steps_{PL}', /'fa/ 'bundle_{SG}' ~ /'fas/ 'bundle_{PL}'), and 1st vs. 3rd person singular of some verbs (like /'ta:s/ 'keep quiet_{2SG}' ~ /'ta:ʃ/ 'keeps quiet_{3SG}'); for a more detailed description cf. Francescato (1970, 99–117) and Roseano (2013). In most contemporary central varieties, the opposition /s z/ ~ /ʃ ʒ/ has been lost and only alveolar sibilants survive: while northern dialects still pronounce [ʃje'ra:] 'close_{INF}' and [bru'ʒa:] 'burn_{INF}', most central varieties nowadays have [sje'ra:] and [bru'za:]. The left panel of Figure 20.5 shows the distribution of dialects that preserved the postalveolar fricatives in the first half of the 20th century, although one has to bear in mind that this area is now more reduced.

There are three nasal phonemes (/m/, /n/, and /ɲ/), whose phonological status is shown by minimal pairs and triplets like /'mame/ 'mum' ~ /'mane/ 'bundle' ~ /'mape/ 'grass snake', /'mu:l/ 'mule' ~ /'nu:l/ 'cloud', /'nu:f/ 'nine' ~ /'ɲu:f/ 'new'. Before a tautosyllabic consonant (and in most varieties even before a heterosyllabic consonant) this contrast is neutralized: ['stamp] 'mould', [stam'pa:] 'print_{INF}', [ʒglomf] 'swollen, inflated', [ʒglom'fa:] 'inflate_{INF}', [prɔ̃n] 'ready', [prɔ̃'ta:] 'prepare_{INF}', [pɛn'tɕ] 'dense, thick', [kwɪn'tɕa:] 'season_{INF}', [tɔ̃nɕ] (somewhere [tɔ̃nɕ]) 'many', [maɲ'ca:] 'lack_{INF}', [lunɕ] 'long', [brɪn'ka:] 'seize_{INF}'. Word-final /n/ is usually articulated as a velar [ŋ] or prevelar [ɲ]: [maɲ]/[l'maɲ] 'hand', [vɪn]/[l'vɪn] 'wine'. Also final /m/ is articulated as velar or prevelar, and it can surface as bilabial only if it is preceded by the rounded vowel /u/ (in some cases also /o/), but not in all varieties: PRĪMU(M) > [prɪn] or [prɪn] 'first' ([l'prime]_F), NŌME(N) > [nɔ̃n] or [nɔ̃n] 'name', FAME(M) > [faɲ] or [l'faɲ] 'hunger', HOMO > [ɔ̃m], [ɔ̃n], [ɔ̃mp] 'man', FŪMU(M) > [fum], [fun], [fump] 'smoke'. As shown in the previous examples, in some central varieties there is an epithesis of [p] after /m/ in final position. In most central varieties, a final /ɲ/ tends to split up; for example, /'puɲ/ is realized as [pɪuɲ] or [pɪuɲ] 'punch', and /'raɲ/ is realized as [raɲ] or [raɲ] 'spider'.

The rhotic phoneme /r/ is usually realized as an alveolar tap [ɾ] in any position, as in [r'wɛde] 'wheel', [z'mare] 'annoyance', [k'la:r] 'clear', [k'warɲul] 'cornel', [b'arce] 'boat', [f'radi] 'brother'. However, as free variants, one can also find the velarized variant [rʲ] and, occasionally, the alveolar trill [r]. In the northern variety spoken in Paularo/Paulâr, the rhotic is realized as uvular [ʁ] or [R]. All Friulian dialects have two approximant phonemes (/j/ and /w/, found in words like /ju'da:/ 'help_{INF}', /pa'ja:/ 'pay_{INF}', /wɛs/ 'bone', /a'wa:l/ 'on a level'). In many varieties /w/ is pronounced [vw] if it is the first element of a syllable onset or after a voiced sibilant: [wɛɹt]/[l'vwɛɹt] 'empty', [zwar'ba:]/[zvwar'ba:] 'blind_{INF}'.

The lateral approximant /l/ is homorganic with a following dental, postalveolar, palatal, or velar consonant, as in [sɔ̃lt] 'jump', [dɔ̃ltɕ] 'sweet', [fo'ɬca:] 'press down_{INF}', and [alʲk] 'something'; in all other contexts it is alveolar [l].

3.2 Phonological processes

The following paragraphs briefly illustrate the most relevant phonological processes of Friulian.

3.2.1 Final-obstruent devoicing

In all Friulian varieties, the voice contrast is neutralized in final position, due to the devoicing of final obstruents (cf. Table 20.3).

Table 20.3: Comparison between masculine (devoiced) and feminine (voiced) forms of adjectives.

Latin	Final devoiced obstruents	Voiced obstruents
CAL(I)DU(M)	['calt] 'warm _{M.SG} '	['calde] 'warm _{F.SG} '
CRUDU(M)	['kru:t] 'raw _{M.SG} '	['krude] 'raw _{F.SG} '
ORBU(M)	['warp] 'blind _{M.SG} '	['warbe] 'blind _{F.SG} '
NOVU(M)	['nu:f] 'new _{M.SG} '	['nove] 'new _{F.SG} '
MEDIU(M)	['mjɛtʃ] 'half _{M.SG} '	['mjɛdʒe] 'half _{F.SG} '
GULOSU(M)	[go'lo:s] 'gluttonous _{M.SG} '	[go'loze] 'gluttonous _{F.SG} '

As we will see in 3.2.2, in certain contexts the devoicing of the final obstruent triggers the lengthening of the adjacent stressed vowel. If the final obstruent is preceded by a consonant, devoicing can lead to the loss of distinctiveness, as in MÖRDI(T) > {'mward} ['mwart] 'bite_{SG}' = ['mwart] 'dead' < MORTUU(M), and MUNDU(M) > {'mond} ['mɔnt] 'world' = ['mɔnt] 'mountain' < MONTE(M) etc.

3.2.2 Vowel lengthening

Vowel lengthening results from different phonological processes in Central Friulian, some of which are still active, while others were productive in Ancient Friulian but are no longer. The main processes that result in vowel lengthening are: a) devoicing of the voiced obstruent in final position (cf. 3.2.1), unless the obstruent is a postalveolar affricate or a palatal plosive: NĪDU(M) > ['nidə] > ['ni:t] 'nest', TRABE(M) > ['travə] > ['tra:f] 'beam, rafter', but MĚDĪU(M) > ['mjɛdʒə] > ['mjɛtʃ] 'half'; b) before an etymologically simple liquid: CĀRU(M) > /'ca:r/ 'dear' ~ /'car/ 'cart' < CARRU(M) etc.; c) monophthongization of [eɪ] and [ou] of various origins: DĪGĪTU(M) > ['deɪt] > ['de:t] 'finger', PŌPŪLU(M) > ['poɪl] > ['po:l] 'poplar'; d) compensatory lengthening from fallen consonants:

MĀTRE(M) > ['maðrə] > ['ma:ri] 'mother', NŮC(Ů)LA(M) > ['noɣla] > ['no:le] 'hazelnut' etc. (cf. Baroni/Vanelli 2000; Finco 2015, 32–36).

As mentioned in 3.1.1, in western and northern varieties the stressed close-mid vowels of Vulgar Latin evolved into diphthongs instead of long vowels: NĪVE(M) > ['ne:və] > ['neɪf] 'snow', ACĒTU(M) > [a'ze:də] > [a'zeɪt] or [a'zeɪt] 'vinegar', LŪPU(M) > ['lo:və] > ['loʊf] 'wolf', NEPŌTE(M) > [ne'vo:də] > [ne'voʊt] 'nephew, grandson' (vs. Central Friulian /'ne:f/, /a'ze:t/, /'lo:f/, /ne'vo:t/). In a very limited number of varieties (e.g. in Artegna/Dartigne and Lovea/Luviee) the lengthening of /a/ goes hand in hand with its anteriorization to [æ:] or [ɛ:], like in CLAVE(M) > ['kle:f] 'key', NASU > ['nɛ:s] 'nose', CANTĀRE > [can'tɛ:] 'sing_{INF}' (vs. Central Friulian /'kla:f/, /'na:s/ and /can'ta:/). This phenomenon is now gradually disappearing (cf. Finco 2009).

3.2.3 Vowel harmony

In pretonic position, the unstressed mid vowels /e/ and /o/ are usually assimilated in degree of openness to the following stressed close vowels /i/ and /u/, as in MĒDĪCĀRE > [mede'a:] 'medicate_{INF}', but MĒDĪCĪNA > [mede'zina] > [midi'zine] 'medicine'; PŌRCU(M) + ĀRIU [por'ca:r] 'swineherd', but + ĪTTU [pur'tʃit] 'pig'; PĪRU(M) + ĀRIU [pe'ra:r] 'pear tree', but + ŪCĒU [pi'ruʃ] 'pear'; FĒMĪNA > ['femine] 'woman' → [feme'nate] 'woman_{PEJ}', but [fimi'nute] 'woman_{DIM}'; ['legri] 'cheerful', but [li'grie] 'cheerfulness'; [pen'sa:] 'think_{INF}', but [pin'si:r] 'thought'; ['roze] 'flower' → [ru'zute] 'flower_{DIM}'; ['pes] 'fish' → [pi'sut] 'fish_{DIM}'; etc. The presence of a low vowel blocks this regressive assimilation: ['kode] 'tail' → [ko'done] 'tail_{AUG}', [ku'dute] 'tail_{DIM}', [kudu'ru:l] 'tailbone', but [koda'ru:l] 'rump'; [konta'din] 'farmer', not *[kunta'din], [beca'rie] 'butcher shop', not *[bica'rie], [ponta'ru:l] 'awl', not *[punta'ru:l] etc.

The assimilation process applies also to loanwords: It. *poesia* > [pu'i'zie] 'poetry, poem', It. *pericolo* > [pi'rikul] 'danger', It. *filosofia* > [filuzu'fie] 'philosophy'. This phenomenon is not found throughout the Friulian area, and is regressing under the influence of the Italian model. Even morphological analogical leveling can block this assimilative process, especially in the verbal inflection: ['coli] 'take_{INF}' [co'lin] 'take_{1PL}', not *[cu'lin], but not always: ['tɛnis] 'hold_{2SG}' and ['tɛnin] 'hold_{3PL}', but [ti'nin] 'hold_{1PL}' and [ti'pu:t] 'held_{PST.PTCP}' etc.

3.3 Syllable structure

Table 20.4 shows the frequency of words according to the number of syllables they have. Disyllabic words are the most frequent in Friulian with nearly 40% of occurrences (Finco 2015, 50).

Table 20.5 shows the inventory of syllabic types in Friulian and the frequency of their occurrence. The only distinction made here is between two main categories

of phonemes: vowels (V) and consonants (C), and the latter category also includes approximants.

Table 20.4: Word frequency according to number of syllables in Friulian.

Number of syllables	Frequency
1	16.786 %
2	39.867 %
3	29.376 %
4	11.761 %
5	2.098 %
6	0.110 %
7	0.002 %

Table 20.5: Frequency of the syllabic types in Friulian syllables.

Syllabic types	Examples	Frequency
CV	['ca.ze] 'house', ['we.li] 'oil'	53.973 %
CVC	['man] 'hand', ['can.te] 'sing _{3SG} '	21.872 %
V	[a'mi.e] 'friend _r ', [a.je] 'aunt'	10.372 %
VC	['an] 'year', [on.gu.le] 'fingernail', [ur'ti.e] 'nettle'	4.977 %
CCV	['kra.je] 'dirt', ['ma.gle] 'stain', [sjo.re] 'lady, rich _r '	3.892 %
CCVC	['prin] 'first', [klam.fe] 'stirrup, bracket', [pje] 'skin, leather'	2.146 %
CVCC	['dijnc] 'tooth _{PL} ', [sort] 'deaf', [lamp] 'flash, lightning'	1.323 %
CCVCC	['spint] 'spend _{3SG} ', [blanj] 'white', [pwart] 'port'	0.818 %
CCCV	['stra.de] 'road', [sklo'pa:] 'explode, burst _{INF} ', [in.stre'tʃa:] 'braid _{INF} '	0.370 %
CVCCC	['camps] 'field _{PL} ', [banjks] 'desk, bench _{PL} '	0.074 %
VCC	[alt] 'high', [ɔrt] 'vegetable garden'	0.052 %
CCVCV	['strak] 'tired', [sklap] 'fissure', [skwa:l] 'chub'	0.043 %
CCVCCC	['sporks] 'dirty _{PL} ', [fresks] 'fresh _{PL} ', [kwarps] 'body _{PL} '	0.030 %
CCCVCC	['strent] 'narrow, tight', [stramp] 'strange, odd', [stwart] 'crooked'	0.021 %
VCCC	[arks] 'arch, arcade _{PL} ', [ɔlms] 'elm _{PL} '	0.017 %
CCCVCCC	['stramps] 'strange, odd _{PL} '	0.013 %

As seen in the table above, the first element of a syllable with a triconsonantal onset must be a sibilant, while the other segments are aligned according to increasing sonority. Friulian also allows triconsonantal codas but only in the last syllable of the word, where the third element is a sibilant, i.e. the plural morpheme {+s}.

3.4 Intonational patterns

Studies about Friulian intonation are not as abundant as work on the segmental aspects of this language. In this section we will refer to two of them (Roseano 2012; Roseano/Vanrell/Prieto 2015).

Intonation in Friulian has the same linguistic functions as in most Romance languages, that is: a) marking lexical stress / word prominence, along with other suprasegmental features; b) marking phrasal units; c) conveying information status and focus marking; d) conveying information about the semantico-pragmatic value of an utterance typically related to speech act type. In the following sections we provide information about how F0 modulation is used to carry out the above-mentioned functions.

The conventions for the transcription of Friulian intonation are known as Fri_ToBI (Roseano/Vanrell/Prieto 2015), which is the implementation with respect to Friulian of the general rules of the Tones and Break Indexes framework (Beckman/Hirschberg/Shattuck-Hufnagel 2005; ↗9 Intonation). A contour is transcribed with symbols that stand for two types of tonal events: pitch accents and edge tones (which can be either phrase accents or boundary tones). Pitch accents are F0 movements that associate with stressed syllables, making them intonationally prominent or accented, cf. 3.4.1). Edge tones are F0 movements that associate with the edges of prosodic phrases and can be divided into intermediate boundary tones (cf. 3.4.2) and intonational phrase boundary tones (cf. 3.4.4). Tones are represented in terms of low (L), mid (!H), high (H) and superhigh (jH) targets. By convention, for pitch accents an asterisk ‘*’ indicates its association with a stressed syllable, while for edge tones ‘%’ indicates association with the final edge of an utterance and, finally, ‘-’ indicates association with an utterance-internal phrase boundary. This phonological representation of tones is mapped onto a phonetic representation through specific implementation rules (cf. 3.4.5).

The phonological inventory of tones of Friulian includes 6 pitch accents (L*, L*+H, L+H*, L+jH*, H+L*, H*+L) and 5 phrase tones and final boundary tones (L%, H%, !H%, H!H%, HL%) (Roseano/Vanrell/Prieto 2015).

3.4.1 Marking lexical stress

The most important acoustic correlates of stress are F0 and vowel duration. As far as duration is concerned, it has been shown (Roseano 2012) that stressed short vowels are significantly longer than unstressed vowels, and stressed long vowels are – in turn – significantly longer than stressed short vowels. Figure 20.7 contains an accental minimal pair: the words [ˈmovino] ‘do they move?’ and [moˈvino] ‘do we move?’ uttered as echo questions. One can see that the vowels of the first two syllables of

each word ([o] and [i], respectively) are longer when they are stressed. From an intonational point of view, an F0 rise characterizes the stressed syllables of each word ([ˈmo] and [ˈvi], respectively).

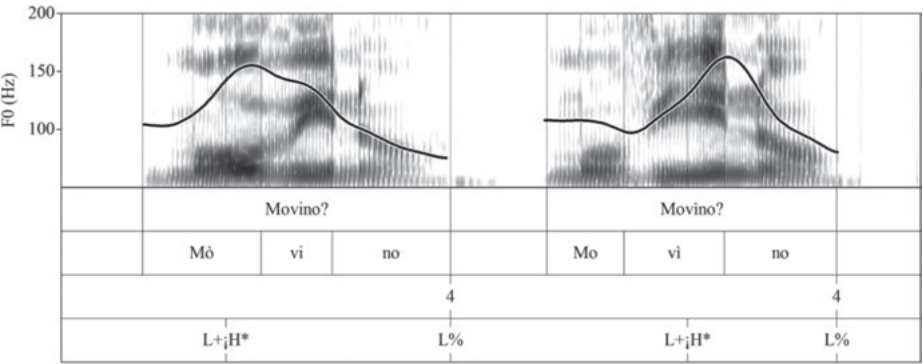


Figure 20.7: Spectrogram, F0 contour, orthographic transcription (by words and by syllables) of the utterances [ˈmovino] ‘Do they move?’ and [moˈvino] ‘Do we move?’ uttered as echo questions by a male speaker of Northern Friulian.

The three most common stress positions in Friulian are the last, the penultimate, and the antepenultimate syllables. With respect to stress positions, dialectal differences are found only in verbs: most Friulian dialects allow only oxytone and paroxytone verbs (like [albratʃoˈla] ‘he=cradle_{3SG.PRET}’ and [albraˈtʃole] ‘he=cradle_{3SG}’ in Central Friulian), while some peripheral northern varieties also allow proparoxytone verbs (like [alˈbratʃula] ‘he=cradle_{3SG}’ in a subdialect of the Gorto/Guart Valley).

3.4.2 Marking phrasal units

The end of an intermediate phrase or of an intonational phrase is marked by means of an F0 movement anchored to the last syllable of the unit itself. Whereas there is a certain variety of boundary tones for intonational phrases (cf. 3.4.4), for intermediate phrases only two boundary tones have been described: the high one (transcribed as H) and the low one (transcribed as L). Figure 20.8 contains an enumeration formed by four elements, each of them containing two stressed words. At the end of each element of the enumeration (except for the last) there is a high boundary tone. The high boundary tone is higher than the immediately previous high tone, which belongs to the pitch accent. Such H- boundaries, thus, differ from the high tones of the pitch accents in two respects: they are higher and are associated with the end of the word.

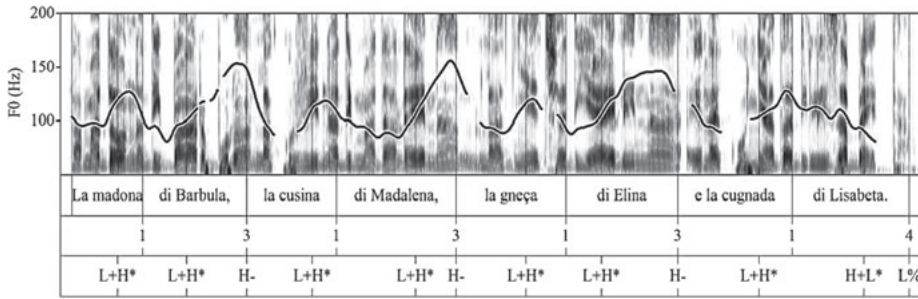


Figure 20.8: Spectrogram, F0 contour, orthographic transcription (by words) and prosodic transcription of the enumeration *La madona di Barbula, la cusina di Madalena, la gneça di Elina e la cugnada di Lisabeta* ‘Barbara’s mother-in-law, Madeleine’s cousin, Helen’s niece and Elizabeth’s sister-in-law’ uttered by a male speaker of Northern Friulian.

3.4.3 Marking focus

In Friulian there are different strategies for marking focus. If focus is marked *in situ* (i.e. if there is no syntactic cue), the focused element is identified prosodically by means of a rising pitch movement, while the rest of the sentence (both the pre-focal and, especially, the post-focal stretches) show extremely compressed pitch movements, if any at all. Figure 20.9 contains two examples of *in situ* focalization within a yes-no question. The focused elements (*mandulas* ‘almonds’ in the first question, *Barbara* (proper name) in the second) show a clear F0 rising movement associated with the stressed syllable.

3.4.4 Marking sentence-type

Sentence-type in Friulian can be encoded by different linguistic means, basically by using syntax, lexicon, and intonation. As far as syntax is concerned, Friulian has subject clitics (henceforth SCLs) with indicative, subjunctive, conditional, and optative verbal moods. The position of SCLs encodes modality because they are proclitic in statements, enclitic in questions and wishes, and do not appear in imperatives. The presence and position of SCLs is therefore clearly related to sentence type (Renzi/Vanelli 1982; Rizzi 1986; Brandi/Cordin 1989; Poletto 1991; Vicario 1998, among others). Two sets of lexical items contribute to encoding sentence-type. On the one hand, Friulian has *wh*-words, which characterize *wh*-questions and some exclamatives, as in other Romance languages. On the other hand, Friulian displays a rich set of modal particles that seem to convey epistemic information (Prieto/Roseano 2016).

In the following sub-sections we will describe some basic intonational patterns of Friulian, focusing only on the nuclear configuration (cf. Roseano/Vanrell/Prieto 2015 for a more complete description).

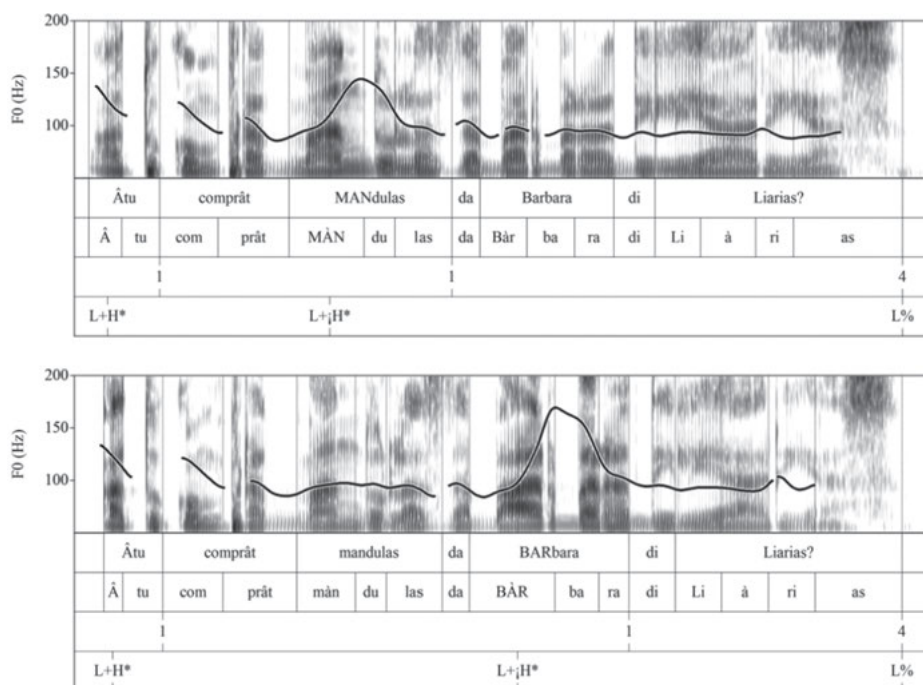


Figure 20.9: Spectrogram, F0 contour and orthographic transcription (by words and by syllables) of the yes-no questions with focused element *Âtu comprât MANDulas da Barbara di Liarias?* 'Did you buy ALmonds from Barbara from Liarias?' (upper panel) and *Âtu comprât mandulas da BARBara di Liarias?* 'Did you buy almonds from BARBara from Liarias?' (lower panel) uttered by a male speaker of Northern Friulian.

Statements can be classified according to several criteria, like syntax (i.e. if they contain one constituent or more, or if they have a canonical or non-canonical word order), focus type (broad focus vs. narrow focus), or epistemic stance (neutral vs. biased). In this section we shall present only one type of statement (i.e. broad focus statements with no epistemic bias containing more than one prosodic word in canonical word order). We decided to focus on this kind of sentence for two reasons: 1) because it is considered one of the most basic intonational patterns, and 2) because it allows for the detection of some dialectal differences in Friulian. Figure 20.10 contains two broad focus statements: in both cases the nuclear accent is H+L* (i.e. a fall on the last stressed syllable). The main difference lies in the final boundary tone. While in Northern and Western Friulian it is generally low or very shallowly rising, in Central Friulian it is sharply rising (cf. Roseano 2012 for its phonological interpretation as a L% tone in both cases).

The classification of questions is, possibly, even more complex (cf., among others, Bolinger 1989). In this chapter, we have chosen three question types that are considered basic: information-seeking yes-no questions, non-biased wh-questions, and echo questions.

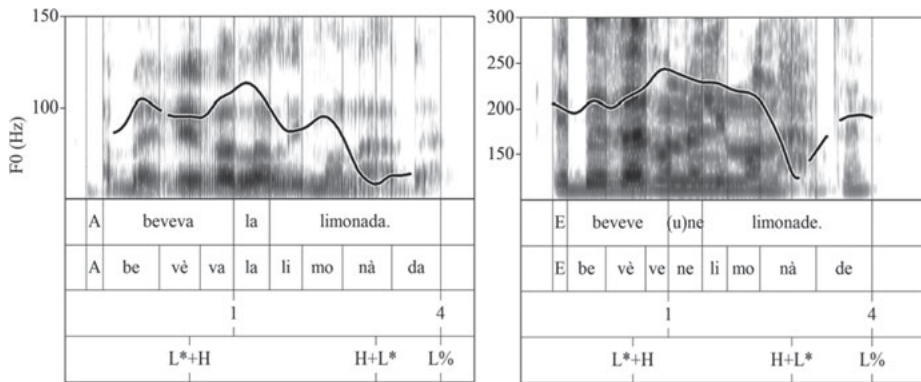


Figure 20.10: Spectrogram, F0 contour, orthographic transcription (by words and by syllables) and prosodic annotation of the broad focus statements *A beveva la limonada* ‘She was drinking the lemonade’ uttered by a male speaker of Northern Friulian (left panel), and *E beveve une limonade* ‘She was drinking a lemonade’ uttered by a female speaker of Central Friulian (right panel).

As for information-seeking yes-no questions, three intonational patterns have been described in Friulian. The first pattern (Figure 20.11, left panel) shows a rising L* H% nuclear configuration, the second (Figure 20.11, central panel) displays a rising-falling L+H* L% pattern, while the third (Figure 20.11, right panel) has a chanted contour, which has been transcribed phonologically as L+H* !H% but phonetically is [L+H* LH%]. The pragmatic difference between the three contours is not completely clear, but it has been suggested (Roseano/Vanrell/Prieto 2015, 121) that the first could be more polite, the second could be less formal, and the third has a phatic function.

For echo questions, Friulian displays a very sharp rising-falling movement in the nucleus (L+_iH* L%), as shown in Figure 20.12.

The pitch contour of non-biased wh-questions displays a falling H*+L L% configuration (Figure 20.13). It has been suggested that there might be dialectal differences in the alignment of the nuclear configuration, but further research is needed.

Regarding the intonation of vocatives, one has to point out that in Friulian, as in other Romance languages, the degree of imperativity/insistence is encoded intonationally. Whereas the default contour is L+H* H!H% (Figure 20.14, left panel), the insistent or imperative tune is L+H* HL% (Figure 20.14, right panel).

3.4.5 Phonological processes in intonation

The most noteworthy phonological process affecting tones is tonal truncation (Roseano/Fernández Planas 2018). In short, if a nuclear configuration with three tones is associated with a word having the stress on the last syllable and this syllable is light (i.e. it only has one mora) or if it has an unvoiced coda, the last tone is not realized. Figure 20.15 shows four echo questions. While in the first two the L+_iH* L%

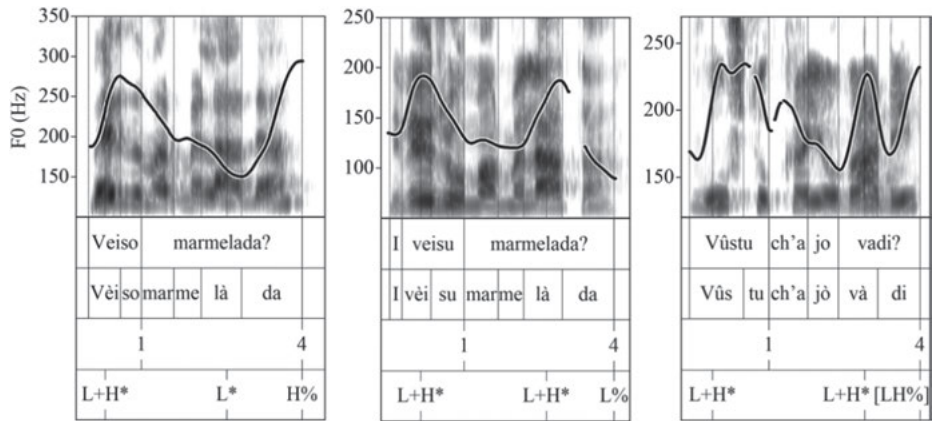


Figure 20.11: Spectrogram, F0 contour, orthographic transcription (by words and by syllables) and prosodic annotation of three information-seeking yes-no questions: *Veiso marmelada?* 'Do you have any jam?' produced by a female speaker of Northern Friulian (left panel), *I veisu marmelada?* 'Do you have any jam?' produced by a male speaker of Western Friulian (central panel), and *Vûstu ch'a jo vadi?* 'Do you want me to go?' produced by a male speaker of Northern Friulian (right panel; source of the audio: Kattenbusch 1998–2018).

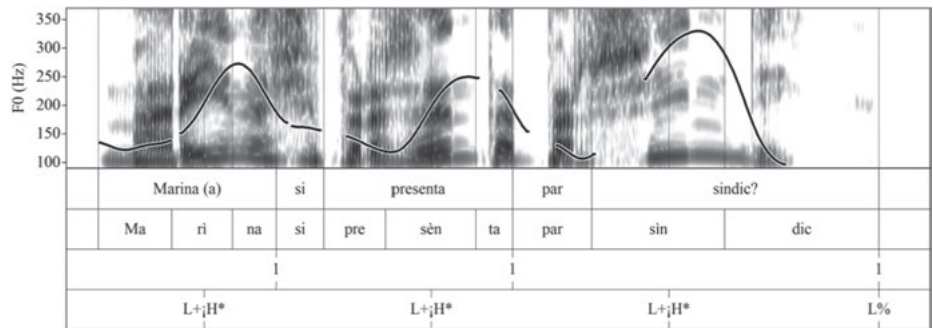


Figure 20.12: Spectrogram, F0 contour, orthographic transcription (by words and by syllables) and prosodic annotation of the echo question *Marina a si presenta par sindic?* 'Marina is running for mayor?' produced by a male speaker of Northern Friulian.

configuration surfaces entirely because it is associated with an oxytone word with long vowel (like ['tre:]) or with a syllable with voiced coda (like ['pan]), in the last two the L% tone is truncated because it is associated with an oxytone word with unvoiced coda (like ['jat]) or with no coda (like ['re]).

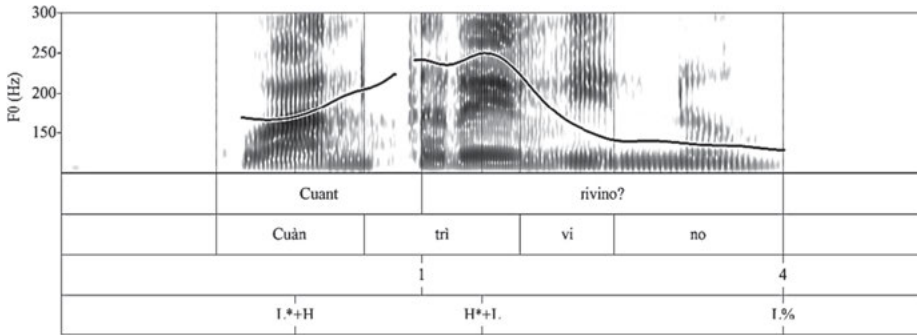


Figure 20.13: Spectrogram, F0 contour, orthographic transcription (by words and by syllables) and prosodic annotation of the wh-question *Cuant rivino?* 'When will they arrive?' produced by a female speaker of Northern Friulian.

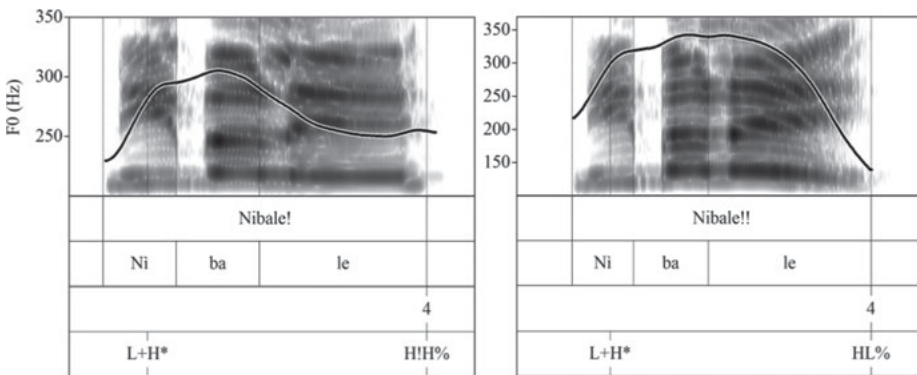


Figure 20.14: Spectrogram, F0 contour, orthographic transcription (by words and by syllables) and prosodic annotation of a default vocative (left panel) and of an insistent vocative (right panel) produced by a female speaker of Northern Friulian.

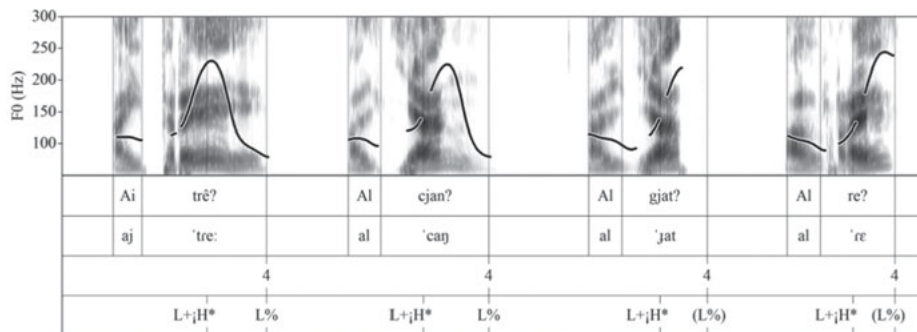


Figure 20.15: Spectrogram, F0 contour, orthographic transcription, broad phonetic transcription and prosodic annotation of the echo questions *Ai trê?* 'On the third (day)?', *Al cjan?* 'To the dog?', *Al gjat?* 'To the cat?', and *Al re?* 'To the king?' produced by a male speaker of Northern Friulian.

4 Ladin

Ladin is a group of varieties spoken in the Central-Eastern Alps. The varieties spoken in some valleys around the Sella massif are traditionally considered part of the core Ladin area, also known as Dolomitic Ladin: Fascian (spoken in Fassa Valley), Badiot and Mareo (spoken in Gadera and Mareo Valleys), Gherdëina (spoken in Gardena/Gherdëina Valley), Fodom (spoken in the Livinallongo/Fodom Valley) and Anpezan (whose area corresponds to Cortina d'Ampezzo/Anpezo). In these valleys, the number of speakers of Ladin is 40,000, approximately. In addition, there are a few Ladin *anfi-zone* (cf. Section 2), like Cadore, Val di Sol and Val di Non, for which belonging to the Ladin area has been the object of scientific and political debates (Politzer 1967; Zamboni 1984; Mastrelli Anzilotti 1995; Vanelli 1998; 2016; Rührlinger 2005; Toso 2008, 201–202; Bauer 2009; Guglielmi 2010). Figure 20.16 provides a map of the main dialects of Dolomitic Ladin with the name of the village mentioned in this chapter (Moena).

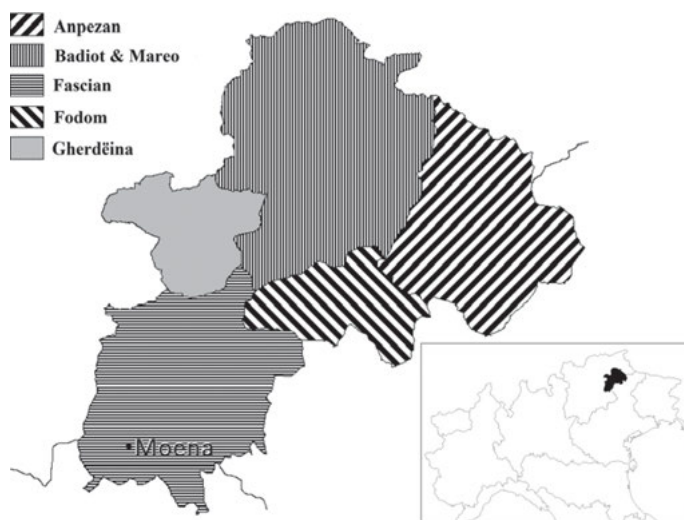


Figure 20.16: Ladin dialectal areas around the Sella massif.

4.1 Vowel and consonant inventories

In this section we offer an overview of Ladin segmental phonology and phonetics, which are described in more detail in Elwert (1943/1972), Heilmann (1955), Urzì (1961), Plangg (1973), Kramer (1977; 1978), Zamboni (1984), Haiman/Benincà (1992), Toth (2007), Gsell (2008), and Salvi (2016).

4.1.1 Vocalism

There is considerable phonemic variation among the Dolomitic Ladin dialects (Salvi 2020, 70). The vowel systems of some varieties are shown in the panels of Table 20.6.

Table 20.6: Stressed vowel systems in some Ladin varieties.

Badiot and Mareo							
Short				Long			
/i/	/y/		/u/	/i:/	/y:/		/u:/
	/e/	/ø/	/o/		/e:/	/ø:/	/o:/
		/ɛ/	/ɔ/		/ɛ:/		/ɔ:/
		/a/			/a:/		
Gherdëina				Fascian and Anpezan			
/i/			/u/	/i/			/u/
	/e/		/o/		/e/		/o/
		/æ/	/ɔ/		/ɛ/	/ɔ/	
		/a/			/a/		
Moenat				Fodom			
/i/			/u/	/i/			/u/
	/e/	/ø/	/o/		/e/		/o/
		/ɛ/	/ɔ/		/ɛ/	/ʌ/	/ɔ/
		/a/			/a/		

The major split among the core Ladin varieties concerns the presence of rounded front vowels. Badiot and Mareo have both /y/ and /ø/, e.g. /'kry/ 'raw', /'kø:r/ 'heart' (Plangg 1973, 15; Mair 1973, 18–20), while the variety spoken in Moena (Lower Fassa Valley) has only /ø/, e.g. /'føk/ 'fire' (Heilmann 1955, 262–263; Yang et al. 2021, 16, 19). In Fascian the old /'ø/ was delabialized to /'e/, e.g. /'føk/ > /'fek/ 'fire', /'nøt/ > /'net/ 'night' (Kramer 1977, 76–77). Other Ladin dialects have no rounded front vowel phonemes. For the Gherdëina Ladin the phonemes /ə/ and /ɛ/ have also been proposed (Leonard 1972, 66; Salvi 2020, 70), but these vowels occur more likely in complementary distribution. The phonemic status of /ʌ/ in Fodom is confirmed by minimal pairs like /'trʌtʃa/ 'braid' ~ /'tratʃa/ 'trace', /'bʌtʃ/ 'billy-goats' ~ /'bɔtʃ/ 'stocky' (Toth 2007, 33–34).

Contrastive vowel length is preserved today only in Badiot and Mareo, while it has lost its relevance in the rest of the Dolomitic varieties (Plangg 1973, 15; Craffonara 1977, 78; Videsott 2001, 154; Loporcaro 2015, 109–110): e.g. /'ara/ 'wing' ~ /'a:ra/ 'farm-yard', /'val/ 'valley' ~ /'va:l/ 'something', /'per/ 'pear' ~ /'pɛ:r/ 'pair', /'ros/ 'brown' ~ /'ro:s/ 'pipe_{pl}', /'ʃkri/ 'write_{INF}' ~ /'ʃkri:/ 'write_{3SG}', /'myʃ/ 'donkey' ~ /'my:ʃ/ 'face_{pl}' (Craffonara 1977, 78–82).

4.1.2 Consonantism

Table 20.7 shows the consonantal phonemes of Dolomitic Ladin. The phonemes in parentheses are present in some dialects only.

Table 20.7: Consonantal phonemes in Dolomitic Ladin.

	Bilabial	Labio-dental	Dental	Alveolar	Postal-veolar	Palatal	Velar	Labio-velar	Glottal
Plosive	/p/	/b/	/t/	/d/		(/c/) (/ɟ/)	/k/	/g/	
Affricate			/tʃ/		/tʃ/	/dʒ/			
Fricative		/f/	/v/	/s/	/z/	/ʃ/	/ʒ/		(/h/)
Nasal	/m/			/n/			/ŋ/		
Trill				/r/					
Approximant						/j/		/w/	
Lateral				/l/					

The majority of Ladin varieties have lost the palatal plosives /c/ and /ɟ/, which merged with affricate or fricative phonemes. The plosive /c/ is maintained in Badiot-Mareo (/ɟ/ only in Badiot), where we find the opposition /c/ ~ /tʃ/ in pairs like /'camp/ 'field' ~ /'tʃamp/ 'left', /'cɛ:r/ 'dear' ~ /'tʃɛ:r/ 'certain' (Pizzinini/Plangg 1966, xxxvi; Kramer 1977, 108–109, 114–115; Craffonara 1979; Toth 2007, 30, 115, 119). Moenat lacks the affricate /tʃ/ (Yang et al. 2021, 3).

In most Ladin varieties, preconsonantal sibilants are pronounced [ʃ] or [ʒ] depending on the sonority of the following consonant (Kramer 1977, 157). In Moena, on the other hand, the palatalization of /s/ before consonants is optional (Heilmann 1955, 15). Sibilants are palatalized to [ʃ ʒ] before /i/ in almost all Ladin varieties (Kramer 1977, 116, 139). Badiot-Mareo and Gherdëina have incorporated the phoneme /h/ (often realized as a velar [x]), through the many German loans, e.g. Gherd. [hekəl'ne] 'crochet_{INF}' < Ger. *häkeln* (Salvi 2016, 158).

In most Ladin varieties a final /n/ is realized as a velar [ŋ]. Badiot-Mareo and Fodom, nevertheless, show a contrast between final /n/ and final /ŋ/: e.g. Mareo: /'ʒɛ:n/ (proper name) ~ /'ʒɛ:ŋ/ 'go_{1SG.PRET}', /'gran/ 'great' ~ /'gram/ 'fearful', Fodom: /'son/ 'sleep' ~ /'son/ 'sound' ~ /'som/ 'peak' (Belardi 1965, 190; Pizzinini/Plangg 1966, xxxv; Mair 1973, 25; Toth 1993, 103–104). Rhotic /r/ is generally articulated as a uvular [ʁ] in Gherdëina and Badiot-Mareo, but as an alveolar tap [ɾ] in Fascian, Anpezan, and Fodom.

As far as major phonological processes are concerned, Dolomitic Ladin shows devoicing of final obstruents: vĭvU(M) > {'viv} ['vif] ~ ['viva] 'alive_{M/F}', NŪDU(M) > {'nud} ['nut] ~ ['nuda] 'naked_{M/F}' in Fascian; {'viv} ['vif] ~ ['viva] 'alive_{M/F}', {dez'nud} [deʒ'nut] ~ [deʒ'nuda] 'naked_{M/F}' in Gherdëina. In addition, Pizzinini/Plangg (1966, xxxvi) note

a phonological rule (epenthesis) in Badiot, which converts underlying /ls/, /ms/, and occasionally /ns/, into [lʃs], [mʃs], and [nʃs]: e.g. FALSA(M) > ['falʃsa] 'false_F'.

4.2 Intonational patterns

There are few studies about Ladin intonation, most of them dealing only with some of the central varieties of the language (namely Gherdëina, Fascian, and Badiot-Mareo). In addition, such studies do not deal explicitly with all four of the main linguistic functions of F0 modulation mentioned at the beginning of 3.4. For this reason, in this section we will summarize the content of existing work (mainly Chiocchetti 1992 and Hack 2012; 2015), but we will also put forward some new considerations based on data we gathered for this chapter. These data were collected in Ghërdeina and Badia Valleys by means of Discourse Completion Tasks (Félix-Brasdefer 2010; Vanrell/Feldhausen/Astruc 2018), which is the same method used to gather the Friulian data discussed earlier, as well as by analyzing the content of oral corpora available on the web. Among the latter, the most useful resources for the description of intonation are the online versions of the *Dizioner Ladin de gherdëina-talian* (Forni 2013) and of the *VIVALDI* atlas (Kattenbusch 1998–2018).

In order for the transcription of Ladin intonation to be comparable to the Friulian data contained in this chapter, we decided to use the same conventions as in Fri_ToBI (cf. 3.4). To date we do not have a complete picture of the phonological inventory of tones of Ladin, but studies published so far (as well as the data contained in this chapter) show occurrences of the pitch accents L*, H*, L*+H, L+H*, and H+L*, as well as of the boundary tones L%, H%, H!H%, and LH%.

4.2.1 Marking lexical stress

The most evident acoustic correlate of stress in Ladin is F0. Figure 20.17 contains an accentual minimal pair in Gherdëina Ladin: the words ['mandula] 'almond' (stress on the antepenultimate syllable) and [ba'nana] 'banana' (stress on the penultimate syllable) uttered as broad focus statements. One notes that the F0 peak falls within the stressed syllable in both cases.

4.2.2 Marking phrasal units

As is the case for other Romance languages, F0 modulation is used to mark the right edge of intonational units. Figure 20.18 shows an enumeration formed by three elements, each of them containing two stressed words. At the end of each element of the enumeration (except for the last) there is a high tone, which is higher than the

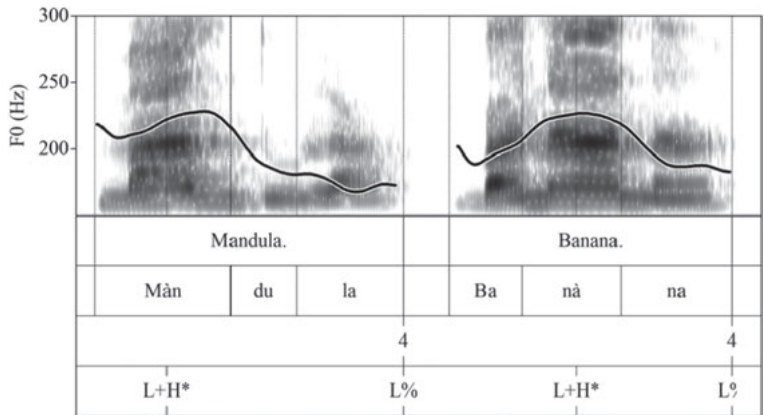


Figure 20.17: Spectrogram, F0 contour, orthographic transcription (by words and by syllables) and prosodic annotation of the words ['mandula] 'almond' and [ba'nana] 'banana' uttered as broad focus statements by a female speaker of Gherdëina (source of the audio: Forni 2013).

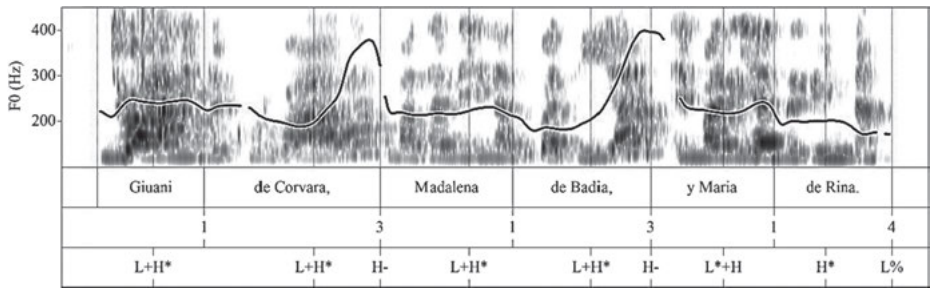


Figure 20.18: Spectrogram, F0 contour, orthographic transcription and prosodic transcription of the enumeration *Giuni de Corvara, Madalena de Badia, y Maria de Rina* 'John from Corvara, Madeleine from Badia, and Mary from Rina' uttered by a speaker of Badiot Ladin.

previous high tone (which is part of the pitch accent of the previous word), similarly to what we described for Friulian.

4.2.3 Marking focus

Ladin has different strategies for marking focus. As Hack (2015, 246) points out, focusing can be achieved syntactically and/or prosodically, both in statements and in questions. If focus is marked *in situ*, the focused element bears a rising pitch movement, while the post-focal stretch shows no or very reduced F0 movements, as in Friulian. Figure 20.19 shows a statement where the speaker places a contrastive focus on the pronoun *ie* 'I', which bears an L+H* pitch accent.

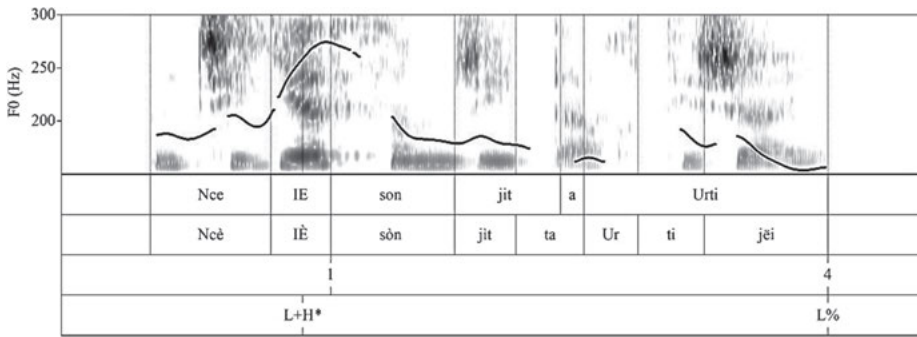


Figure 20.19: Spectrogram, F0 contour and orthographic transcription (by words and syllables) of the statement with focused element *Nce IE son jit a Urtijëi!* 'ME too went to Urtijëi (and not only he)!' uttered by a speaker of Gherdëina Ladin (source of the audio: Forni 2013).

4.2.4 Marking sentence-type

Ladin, like Friulian, encodes sentence-type using a variety of linguistic means: syntax, lexicon, and intonation. Among the most noteworthy lexical cues of interrogativity, one can mention *wh*-words and the interrogative particle *pa* (cf. Haiman/Benincà 1992, 179–181). Syntax is used to mark interrogativity by means of the inversion of verb and subject clitic, although this feature is not shared by all Ladin varieties (cf. Chiocchetti 1992; Hack 2012).

As far as intonation is concerned, the literature describes six types of sentences: broad focus statements, narrow focus statements, information-seeking yes-no questions, information-seeking yes-no questions with narrow focus, information-seeking *wh*-questions, and *wh*-questions with narrow focus. In what follows we will summarize the information available about the most important sentence types described in previous studies, and we will add some new information about vocatives.

Broad focus statements show the same intonational pattern in all Ladin varieties (Hack 2015) and are characterized by a falling $H+L^* L\%$ nuclear configuration, which is the same as we find in Friulian. The final $L\%$ is realized as a low tone or occasionally as a very shallow rise, as in Northern and Western Friulian varieties. Figure 20.20 shows a broad focus statement (variety of Badiot).

Hack (2015) describes the same generalized intonational pattern for yes-no questions in Gherdëina, Badiot, and Fascian varieties. This type of contour is characterized by a $L+H^* LH\%$ nuclear configuration, which is phonetically very similar to the phatic contour we described for Friulian (cf. 3.4.4). Analysis of the online corpora mentioned previously shows that this type of contour is in use also in the other Dolomitic dialects, i.e. Anpezan and Fodom. In addition, the corpora suggest that Ladin probably shares with Friulian other question contours (i.e. the rising-falling $L+H^* L\%$ and the rising $L^* H\%$). As in the case of Friulian, the description of the pragmatic

difference between the three contours requires more investigation. Figure 20.21 offers an example of such contours.

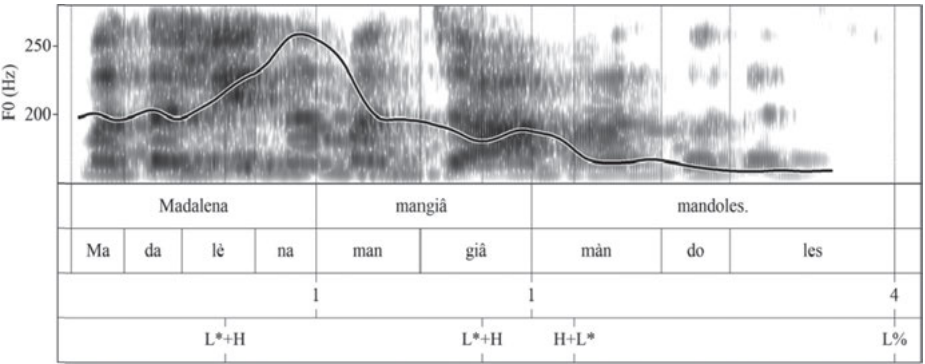


Figure 20.20: Spectrogram, F0 contour, orthographic transcription (by words and syllables) and prosodic annotation of the broad focus statement *Madalena mangiâ mandoles* 'Madeleine was eating almonds' produced by a speaker of Badiot.

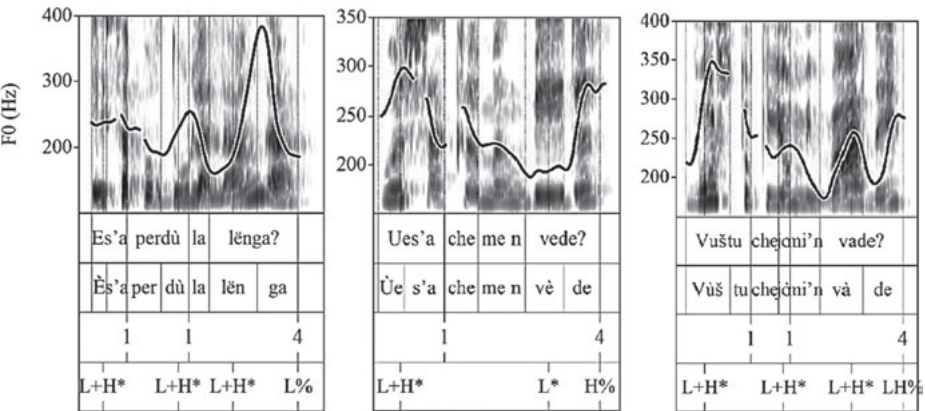


Figure 20.21: Spectrogram, F0 contour, orthographic transcription (by words and syllables) and prosodic annotation of three information-seeking yes-no questions: *Es'a perdù la lënga?* 'Have you lost your tongue?' produced by a female speaker of Gherdëina (left panel; source of the audio: Forni 2013), *Ues'a che me n vede?* 'Do you want me to go away?' produced by a female speaker of Gherdëina (central panel; source of the audio: Kattenbusch 1998–2018) and *Vuštu che jo mi'n vade?* 'Do you want me to go away?' produced by a female speaker of Anpezan (right panel; source of the audio: Kattenbusch 1998–2018).

Information-seeking *wh*-questions display, according to Hack (2015) and Chiocchetti (1992), syntactic and intonational differences across Ladin dialects. The most widespread pattern consists in a $L+H^*$ pitch accent associated with the verb, after which the tone remains low till the final $L\%$ tone (a $H\%$ final boundary tone is also observed,

and is described as optional). Figure 20.22 offers two examples of *wh*-questions in Gherdëina (the second shows the optional final rise).

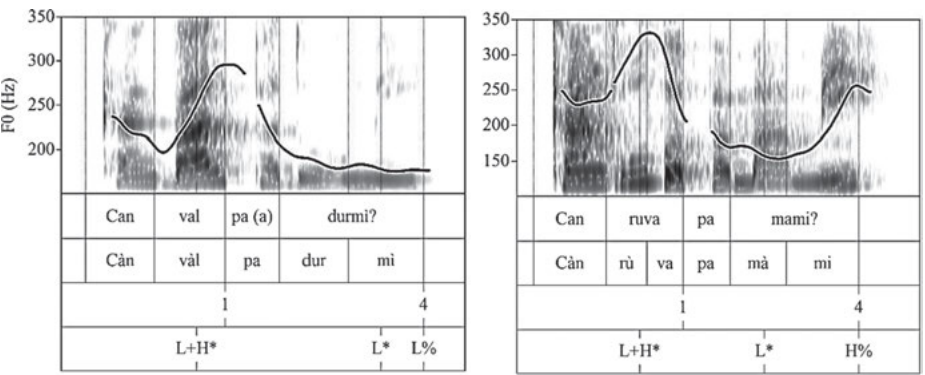


Figure 20.22: Spectrogram, F0 contour, orthographic transcription (by words and syllables) and prosodic annotation of the *wh*-questions *Can val pa a durmi?* ‘When is he going to sleep?’ (left panel) and *Can ruva pa mami?* ‘When is mum arriving?’ (right panel) produced by a female speaker of Gherdëina (source of the audios: Forni 2013).

The only contour we have observed in Ladin vocatives (Figure 20.23), regardless of the degree of insistence, is L+H* H!H%, which has also been described for Friulian, as well as for other Romance languages of the Italian peninsula (Gili Fivela et al. 2015).

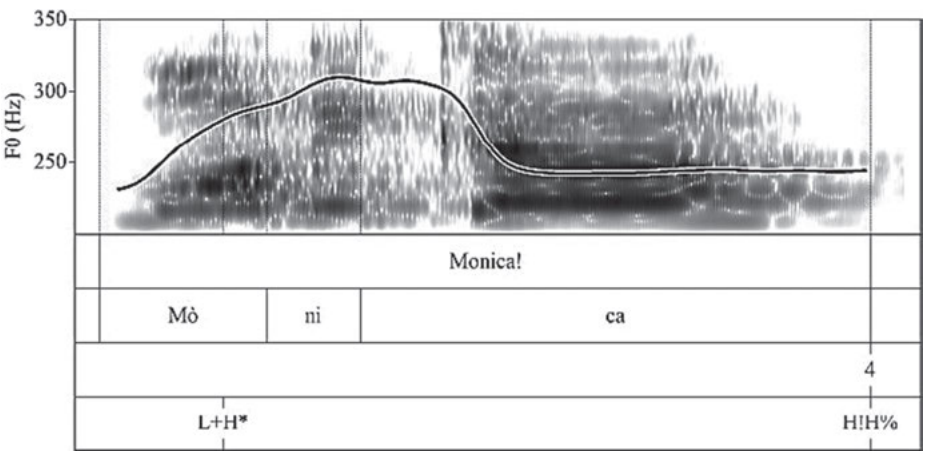


Figure 20.23: Spectrogram, F0 contour, orthographic transcription (by words and syllables), and prosodic annotation of the vocative *Monica!* produced by a female speaker of Badiot.

4.2.5 Phonological processes in intonation

Hack (2015) argues that each main Ladin dialect has different ways of solving tonal crowding when a complex L+H* LH% nuclear configuration is associated with an oxytone word. Fascian either lengthens the syllable to fit all tones or truncates the L component of the boundary tone. Badiot can only truncate the L component of the boundary tone. In Gherdëina Ladin if the final stressed syllable is open, the L+H* pitch accent does not surface and what remains of the nuclear configuration is the boundary tone; if the syllable is closed, speakers may either lengthen the syllable and realize all phonological tones or truncate the L+H* pitch accent.

5 Romansh

Romansh (Rom. *Rumantsch*) is a cluster of Romance varieties spoken in the Swiss canton of Grisons, where approximately 40,000 native speakers reside. In addition to the recently created common standard variety, called Rumantsch Grischun (Cathomas 2012), there are five varieties that traditionally have a written standard: Sursilvan (spoken in the area called Surselva), Sutsilvan (in Sutselva), Surmiran (in Surmeir), Putèr (in the Engiadin'Ota, Upper Engadine), and Vallader (in the Engiadina Bassa, Lower Engadine). Furthermore, a few local (sub)varieties must be mentioned. Among them, the most important are Tuatschin (spoken in Tujetsch and Val Medel) and Jauer (spoken in Val Müstair) (cf. Anderson 2016). Figure 20.24 contains a map of the main dialects of Romansh within the borders of the canton of Grisons.

5.1 Vowel and consonant inventories

The following pages contain an overview of Romansh segmental phonology and phonetics, which are described more in depth in Haiman/Benincà (1992), Liver (1999), and Anderson (2016), among others.

5.2 Vocalism

The panels of Table 20.8 (adapted from Haiman/Benincà 1992, 29–33) allow for a comparison of the vocalic systems of the main Romansh varieties. The front rounded vowels /y/ and /ø/ appear only in the Engiadina dialects (Putèr, Vallader, and Jauer), where they are perceived as a signature feature. Phones in unstressed syllables are normally [i], [u], [ʌ], [ə], the latter as unstressed allophone of the tonic vowels /a/, /ɛ/, and /e/.

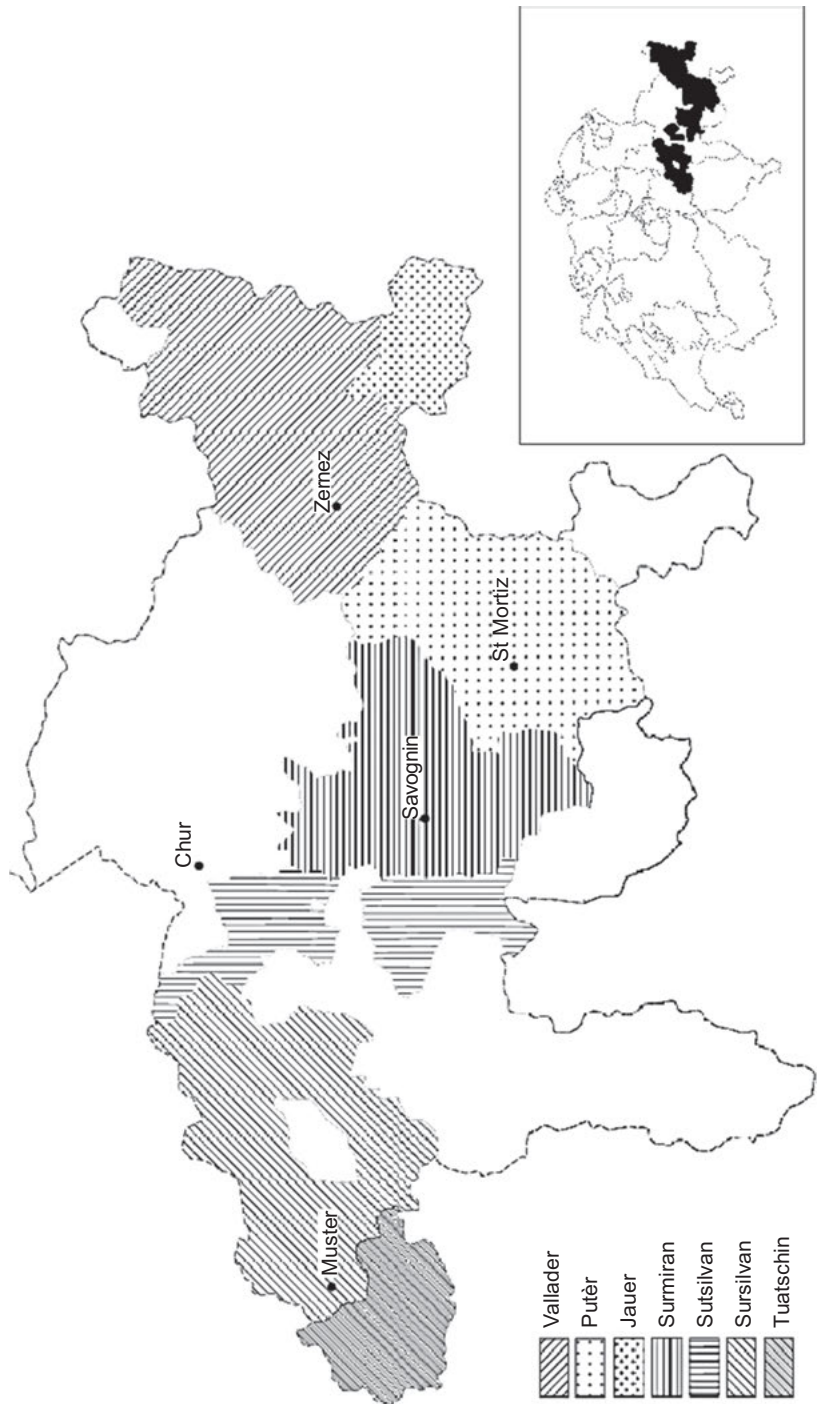


Figure 20.24: Romansh varieties within the borders of the Canton of Grisons (adapted from Anderson 2016).

Table 20.8: Vowel systems in some Romansh varieties.

Sursilvan				Sutsilvan			
/i/			/u/	/i/			/u/
/e/			/ʊ/	/ɪ/			
	/ə/			/e/	/ə/	/o/	
	/ɛ/	/ɔ/		/ɛ/	/ɔ/		
	/a/				/a/		
Surmiran				Putèr-Vallader (Engiadina)			
/i/			/u/	/i/ /y/			/u/
/e/	/ə/	/o/		/e/ /ø/		/o/	
/ɛ/		/ɔ/		/ɛ/		/ɔ/	
	/a/				/a/		

Minimal pairs between mid-vowels can be found e.g. in Surmiran /'kɔ/ 'here' ~ /'ko/ 'where?', /'erə/ 'age' ~ /'erə/ 'be_{3SG.IMP}'. Sursilvan has minimal pairs like /'pɛr/ 'pair' ~ /'per/ 'pear', but lacks the contrast /o/ ~ /ɔ/, although there is a contrast between tense and lax /u/ ~ /ʊ/ (Anderson 2016, 171). The phonemic status of /ɪ/ in Sutsilvan is confirmed by minimal pairs like /'lɪc/ 'read_{PST.PTCP}' ~ /'lec/ 'lake' (Luzi 1904, 6).

Vowel length is contrastive in some Romansh varieties. In Surmiran one can find minimal pairs like /'er/ 'also' ~ /'e:r/ 'field', /'got/ 'drop' ~ /'go:t/ 'forest', /iɰ/ 'the_{M.SG}' ~ /i:ɰ/ 'eye' (Thöni 1969, 16, 275; Anderson 2016, 171). In Vallader we have /'lat/ 'milk' ~ /'la:t/ 'broad', /'car/ 'wagon' ~ /'ca:r/ 'dear', /'cel/ 'that' ~ /'ce:l/ 'sky', /'fit/ 'rental' ~ /'fi:t/ 'trust_{1SG}', /'myt/ 'dumb' ~ /'my:t/ 'change dress_{1SG}', /'fɔsa/ 'grave' ~ /'fɔ:sa/ 'false_F', /'be/ 'only' ~ /'be:/ 'beautiful' (von Essen 1964; Gredig 2000, 59; Loporcaro 2015, 113–114). Sursilvan and Sutsilvan are normally described as lacking contrastive vowel length, but it is found in the Sursilvan subvariety spoken in the Tujetsch Valley (Caduff 1952, 23–29; Loporcaro 2015, 114–115). Romansh vowel length requires further investigations.

As far as processes affecting vowels are concerned, one can point out that in Sutsilvan, Surmiran, Vallader, and Putèr one finds the *Verschärfung* ('hardening') of post-vocalic glides /j/ and /ɰ/ (and, according to Haiman/Beninca 1992, 31, in Surmiran also /ə/), i.e. their change to velar plosives before a consonant: e.g. /'nɛjf/ > ['nɛkf] 'snow', /'ɔɰrə/ > ['ɔgɛə] 'hour' (Montreuil 1999, 539; Liver 1999, 157–158; Eichenhofer 1999, 79).

5.2.1 Consonantism

The consonant systems of Romansh varieties are roughly the same, as illustrated in Table 20.9. The phonemes in parentheses are present in some dialects only.

Table 20.9: Consonantal phonemes in Romansh varieties.

	Bilabial	Labio-dental	Dental	Alveolar	Postalveolar	Palatal	Velar	Labio-velar	Glottal
Plosive	/p/ /b/		/t/ /d/			/c/ /ɟ/	/k/ /g/		
Affricate			/tʃ/ (/dʒ/)		/tʃ/ (/dʒ/)				
Fricative		/f/ /v/		/s/ /z/	/ʃ/ /ʒ/	/ç/			/h/
Nasal	/m/			/n/		/ɲ/	/ŋ/		
Trill				/r/					
Approximant						/j/		/w/	
Lateral				/l/		/ʎ/			

The palatal plosives /c ɟ/ are often referred to as affricates /t͡ʃ d͡ʒ/, but there is no agreement among scholars on this (Schmid 2010, 192; Schmid/Negrinelli 2015). One finds minimal pairs like /can'tar/ 'sing_{INF}' ~ /t͡ʃan'tar/ 'sit_{INF}' in Vallader, /'faca/ 'done_{PST.PTCP.F.SG}' ~ /'fat͡ʃa/ 'face' in Sursilvan (Liver 1999, 130), /'fat͡ʃa/ ~ /'fat͡ʃa/ in Surmiran (according to the transcription used by Anderson 2016).

The opposition /ʃ/ ~ /ʒ/ allows for the distinction of, e.g. in Sursilvan, /'fɛɲ/ 'leave_{IPL}' ~ /'ʒɛɲ/ 'say_{IPL}', /pi'fada/ 'urination' ~ /pi'ʒada/ 'butter'. Similarly to Ladin and Northern Friulian, in almost all Romansh varieties the oppositions between sibilants /s/ ~ /z/ ~ /ʃ/ ~ /ʒ/ are neutralized in favor of postalveolar allophones [ʃ] and [ʒ], which appear before a voiceless and a voiced non-sonorant consonant, respectively: /'ʃpada/ 'sword', /'ʒbaʎ/ 'mistake'. In contrast to the above-mentioned Rhaeto-Romance varieties, in Romansh [ʃ] appears before nasals and liquids, as in /fmi'na:ʁ/ 'have a feeling_{INF}' or /fla'da:ʁ/ 'enlarge_{INF}'. The glottal fricative /h/ only occurs in German loanwords, palatal /ç/ only occurs in some dialects, notably Putèr, and only word-finally as in /a'miç/ 'friend'.

In final position /n/ is normally realized as [ŋ], although a few instances of final [n] are found as the reflex of original long -NN-: /'ɔn/ 'year' < ANNU(M). In non-final position [ŋ] appears only as a result of the assimilation of /n/ to a following velar, but with exceptions: e.g. the paradigm of /bun/ /'bun/ 'good' in Surmiran, where the final [ŋ] is often maintained in intervocalic position in the feminine singular form /'buna/ or /'buŋa/, suggesting the existence of at least a minimal pair for /n/ ~ /ŋ/ (Anderson 2016, 171). The rhotic /r/ is generally articulated as a uvular [ʁ].

Probably the most noteworthy process affecting consonants is the devoicing of the final obstruent, as in GRAVE(M) > /'gʁɛ:f/ 'heavy' or NĪVE(M) > Surs. /'nɛɪf/, /'naɪf/, or /'nɔɪf/ 'snow' (depending on the subdialect). In addition, in Sursilvan there is a rule of epenthesis, which converts underlying /ls/, /ʎs/, and /ns/, to /lʎs/, /ʎʎs/, and /nʎs/ (Haiman/Benincà 1992, 36): e.g. vŮLSU(M) > /'buls/ /'bulʎs/ or /'bulʎs/ 'blunt'.

5.3 Intonational patterns

Studies on the intonation of Romansh are, to the best of our knowledge, extremely limited. In addition to Rinaldi's (1976; 1985) studies on the transition variety of Bregaglia, that also describe some intonational patterns of the Romansh variety of Engiadina'Ota 'Upper Engadin', one finds very few references to intonation in studies about the language in question (e.g. in Raselli 1988), while other suprasegmental aspects are dealt with more in depth (cf., among others, Kamprath 1987a; 1987b; Roca 1999). Due to the limited number of studies on intonation, in this section we shall cautiously put forward some tentative considerations based on the analysis of two online corpora: the multimedia dictionary *Dicziunari Bargunseñer* (Nicolay 2016), which contains recordings of plenty of words in a Surmiran subdialect, and the *Atlant linguistisch dl ladin dolomitich y di dialec vejins* (Goebel 2012), which contains audio files collected in 12 locales in the region Engiadina Bassa / Val Müstair.

In order for the transcription of Romansh intonation to be comparable with the Friulian and Ladin data contained in this chapter, we have decided to use the same conventions as in Fri_ToBI (cf. 3.4). All in all, the intonation labelling of Romansh utterances in the following pages must be considered provisional and phonetic.

Unsurprisingly, F0 modulation is used in Romansh to convey acoustic information about the position of lexical stress. Figure 20.25 contains an accentual minimal pair in the subvariety of Bergün/Bravuogn: the words [ˈmɛl:ən] 'yellow' (with stress on the penultimate syllable) and [mɛˈlɔm] 'white hellebore' (with stress on the last syllable). One notices that the F0 peak falls within the temporal limits of the stressed syllable in both cases.

As one could reasonably expect, intonation conveys information about sentence modality in Romansh as well. Broad focus statements seem to share the same nuclear configuration that has been described for Friulian and Ladin, that is, phonetically speaking, [H+L* L%] (cf. Figure 20.26).

For yes-no questions, the data contained in the *Atlant linguistisch dl ladin dolomitich y di dialec vejins* (Goebel 2012) strongly suggest that the most common nuclear configuration in Vallader and Jauer is a rising-falling one, which can be phonetically labeled as [L+_iH* L%], like the one in Figure 20.27. It is worth pointing out that Ladin and Friulian yes-no questions can also display rising-falling configurations.

Wh-questions seem to have a high tone associated with the wh-word, followed by a fall throughout the sentence until the final low boundary tone, as one can observe in Figure 20.28.

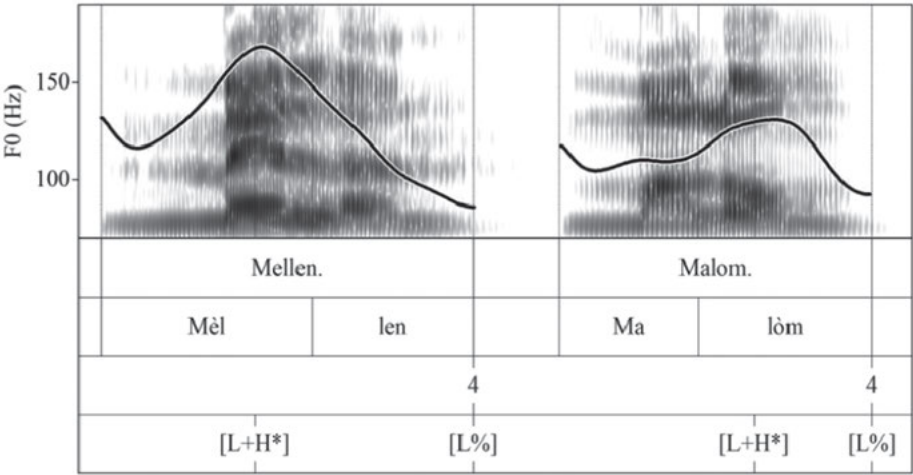


Figure 20.25: Spectrogram, F0 contour, orthographic transcription (by words and syllables) of the words *mellen* [ˈmɛl:ən] ‘yellow’ and *malom* [məˈlɔm] ‘white hellebore’ uttered as statements by a male speaker of Bargunseñer Romansh (source of the audio: Nicolay 2016). Both words were uttered as statements.

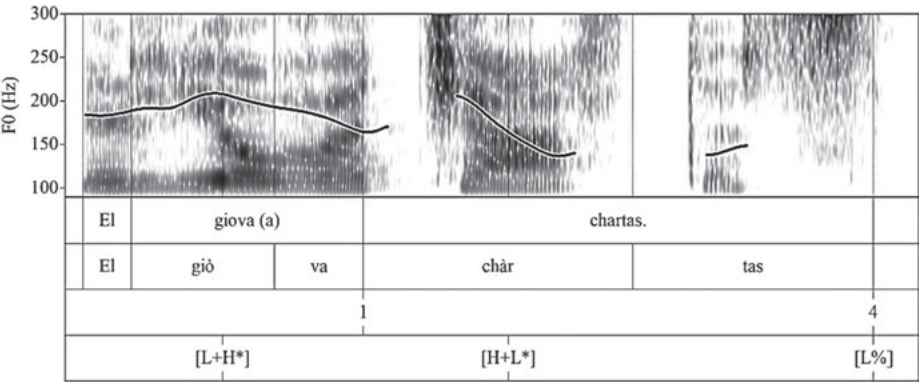


Figure 20.26: Spectrogram, F0 contour, orthographic transcription (by words and syllables) of the broad focus statement *El giova a chartas* ‘He plays cards’ uttered by a female speaker of Vallader (source of the audio: Goebel 2012).

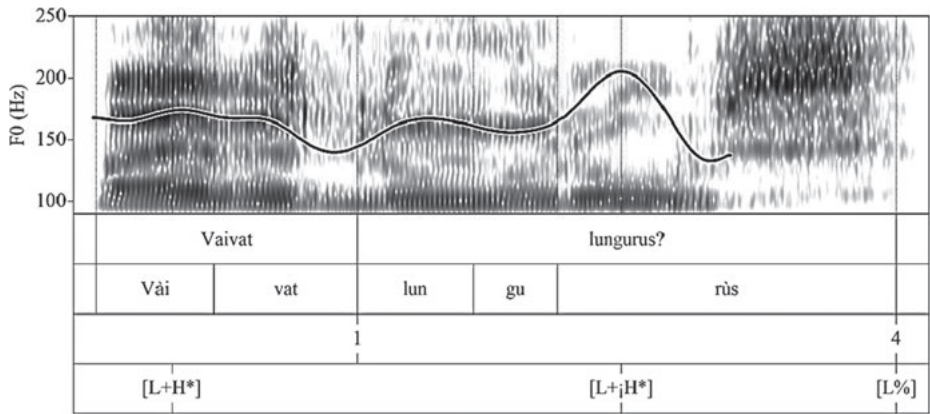


Figure 20.27: Spectrogram, F0 contour, orthographic transcription (by words and syllables) of the yes-no question *Vaivat lungurus?* 'Are you getting bored?' uttered by a male speaker of Vallader (source of the audio: Goebel 2012).

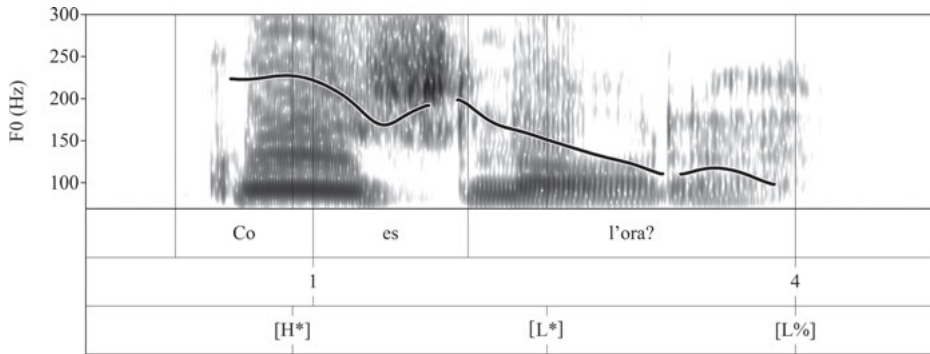


Figure 20.28: Spectrogram, F0 contour, orthographic transcription (by words and syllables) of the yes-no question *Co es l'ora?* 'How's the weather?' uttered by a male speaker of Vallader (source of the audio: Goebel 2012).

6 Conclusion

Our comparison of the segmental and suprasegmental features of the three Rhaeto-Romance varieties (and their main dialects) allows us to draw some conclusions, outlined in the following paragraphs on the vowel systems, the consonant systems, and intonation.

As far as vowel sounds are concerned, one can point out that all Rhaeto-Romance varieties have four degrees of aperture, only the two westernmost Romansh varieties have near-close phonemes /ɪ/ or /ʊ/. Contrastive vowel length is best preserved

today in Central and Northern Friulian, in Badiot-Mareo, in Surmiran and Vallader, while the other Rhaeto-Romance varieties have no contrastive vowel length. This notwithstanding, even the dialects that nowadays display no vowel length contrast at all preserve traces of such a contrast for previous stages in the outcomes of stressed vowels, i.e. fronting of [‘a:] > [‘ε(:)] or diphthongizations (e.g. [‘e:] and [‘o:] > [‘e̯i] and [‘ou̯] in Western Friulian and Fodom). It is reasonable to think that contrastive vowel length once stretched over all the Rhaeto-Romance territories and was a common feature, originally, of the whole of Rhaeto-Romance (cf. Lüdtke 1955, 237; Leonard 1972; Loporcaro 2015, 109–115). The presence of front rounded vowels has no characterizing value, since they appear as phonemes only in some varieties of Romansh and Ladin, while they are very common in most Gallo-Italic dialects. Even the presence of *verhärtete Diphthonge* (‘hardened diphthongs’) has no characterizing value for the whole Rhaeto-Romance area, since it is limited to some Romansh varieties and to a few Western Friulian varieties only, where they arose under partially different conditions (cf. Francescato 1970, 146–151).

With respect to the consonant systems, the phonemic value of the palatal plosives /c/ and /ɟ/ (also uttered as alveolo-palatal affricates [t͡ʃ] and [d͡ʒ]) is characteristic of the Rhaeto-Romance area. In most of these varieties /c/ contrasts with the post-alveolar affricate [t͡ʃ], but only in Friulian and Badiot (not in Mareo) do we find the corresponding voicing opposition /ɟ/ ~ /d͡ʒ/. In other Ladin dialects palatal plosives merged into the postalveolar affricates. Like the Romance varieties of Northern Italy, Rhaeto-Romance languages generally do not have distinctive long consonants, although long pronunciations appear. Devoicing of final obstruents can be found throughout the Rhaeto-Romance area, but also in some neighboring Romance dialects (Lombard, Northern Venetian) and above all in German (*Auslautverhärtung*). Even the velarization of final nasals (often also of internal coda nasals) is a common Rhaeto-Romance feature, with few exceptions. This led to a phonologization of /ŋ/ in Badiot-Mareo, Fodom, and perhaps in Surmiran. In most Ladin and Romansh varieties, but also in Northern Friulian, preconsonantal sibilants are pronounced [ʃ] or [ʒ] depending on the sonority of the following consonant, while in Romansh [ʃ] appears before nasals and liquids following a German-like distribution.

As far as intonation is concerned, the patterns of Ladin and Friulian show some interesting commonalities, like the presence of the same set of contours in yes-no questions, namely L* H%, L+H* LH% (which is not documented, to the best of our knowledge, in neighboring non-Rhaeto-Romance areas) and L+H* L%. The latter is also documented in Romansh. Broad focus statements show a H+L* L% nuclear configuration (which is found also in Central and Northern Italy) in the three languages. On the whole, thus, there seems to be a certain number of tunes in common, but more studies are needed.

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21 French

Abstract: The phonology of French has a long descriptive and theoretical tradition, which however has been partly built on an idealized standard variety of the language, overlooking its wide array of dialectal variation. Recent corpus-based work has brought about significant advances in the description and understanding of the sound system of French, as it is spoken around the world. This chapter presents the main segmental, suprasegmental, and morphophonological features of French, including schwa and liaison. It focuses on a standard variety, globally defined as spoken in the northern half of France without a perceptible dialectal or sociolectal accent, and on the main dialectal features, found more specifically in three geographical areas: Canada, southern France, and Switzerland.

Keywords: French, schwa, liaison, gliding, cluster reduction

1 Introduction

The phonology of French has a long descriptive and theoretical tradition. Several phenomena specific to French, notably schwa and liaison, have challenged learners of French as well as phonological theory for decades. But this tradition has relied largely on a language variety that can be characterized as an idealized standard, without adequate consideration of the rich dialectal variation that exists in French.

We present here the main segmental, suprasegmental, and morphophonological features of the language. Priority is given to empirical generalizations rather than theoretical accounts: analytical issues are mentioned, but not necessarily resolved. This chapter has benefited from recent advances in the description and understanding of the sound system of French brought about by the research program “Phonologie du français contemporain” (PFC; Durand/Laks/Lyche 2002). The limited survey presented here obviously does not exhaust the range of phenomena or variation that can be observed across the French-speaking world, but Durand/Laks/Lyche (2009), Gess/Lyche/Meisenburg (2012), and Detey et al. (2010; 2016) offer more detailed descriptions.

We focus on a standard variety and address dialectal variation mainly, but not exclusively, through three geographical areas: Canada, southern France, and Switzerland. With respect to pronunciation, the concept of “standard variety” may itself refer to two distinct notions: (1) the pronunciation of speakers perceived as “stan-

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dard” and characterized by their geographical origin (Paris or more generally urban northern France), their socioeconomic profile (educated, elite), and/or their status as professional speakers (e.g. newscasters); (2) the pronunciation described in reference books (grammars, dictionaries, textbooks) and whose origin is not clearly established (cf. Lyche 2010). While French phonology has traditionally largely relied on the second view (often not explicitly; cf. Morin 1987), recent corpus-based work has prompted a shift toward the first view, even though the definition of the targeted speakers tends to remain quite general (speakers from the northern half of France without a perceptible regional or sociolectal accent). This is the (admittedly unsatisfactory) notion of standard adopted here. In some cases, notably in the discussion of phoneme inventories, corpus-based descriptions differ from those found in reference books, more appropriately identified as “conventional”.

The chapter is divided into eight parts, moving from segments to higher prosodic units. Sections 2 and 3 are devoted to vowels and consonants: the respective inventories and a selection of processes that affect them. Latent segments, schwa and liaison consonants, are discussed in Section 4. The last sections focus on suprasegmental phonology: the syllable (Section 5), the word (Section 6), and prosody, especially stress and intonation (Section 7). Section 8 offers a brief conclusion.

2 Vowels

The vowel system varies considerably across varieties of French. The vowel inventory is first established on the basis of final syllables, which present the largest number of contrasts; the standard variety (2.1) serves as a reference point for the discussion of dialectal variation (2.2). The distribution of vowels in non-final syllables is addressed in 2.3 and processes involving close vowels are discussed in 2.4.

2.1 The standard vowel inventory

Defining a standard vowel inventory for French is a delicate task considering the varied interpretations of “standard”. Reference books such as dictionaries, grammars, and textbooks provide almost invariably the 16-vowel inventory shown in Table 21.1. It includes twelve oral and four nasal vowels, distinguishing three points of articulation – front unrounded, front rounded, and back – and four degrees of aperture. The vowel /ə/ is variably classified as central, according to its IPA value, or front rounded, corresponding to its normal realization, close to [œ] or [ø]. Its phonemic status being highly contentious, schwa is addressed separately in 4.1 and ignored in the remaining discussion of the vowel inventory.

Table 21.1: The conventional vowel inventory.

	Front unrounded	Front rounded	Back
Close	i	y	u
Close-mid	e	ø	o
Open-mid	ɛ ẽ	œ œẽ	ə ɔ̃
Open	a		ɑ ã

This conventional inventory, however, no longer clearly corresponds to that of a well-defined community, nor to an explicit model which native speakers aim at. Its value now essentially lies in its providing a stable point of comparison between varieties. If “standard” refers to a specific variety, perceived as neutral or unaccented and characteristic of the northern half of France, the inventory would be smaller and less stable than the one shown in Table 21.1. In actual usage, five vocalic contrasts among those in Table 21.1 are in a more or less advanced state of weakening (Lyche 2010; Hansen/Juillard 2011; Østby 2016 and references therein). They are listed in (1) with representative minimal pairs.

- (1) a. /ẽ/-/œ/ *brin* /bʁẽ/ ‘strand’ *brun* /bʁœ/ ‘brown_M’
 b. /a/-/ɑ/ *patte* /pat/ ‘leg, paw’ *pâte* /pat/ ‘paste’
 c. /e/-/ɛ/ *pré* /pʁe/ ‘meadow’ *près* /pʁɛ/ ‘close’
 d. /ø/-/œ/ *jeûne* /ʒœn/ ‘fast_{NOUN}’ *jeune* /ʒœn/ ‘young’
 e. /o/-/ɔ/ *saute* /sot/ ‘jump_{IMP}’ *sotte* /sɔt/ ‘silly_F’

The first two pairs have now been essentially neutralized and the consensus is that the standard inventory no longer includes /œ/ and /ɑ/ (the remaining open vowel /a/ taking on a more central quality). The pairs in (1c–e) concern the opposition between oral close-mid and open-mid vowels. This contrast is mainly active in one context: in final open syllables for /e/-/ɛ/, in final closed syllables for the rounded pairs /o/-/ɔ/ and /ø/-/œ/. And even in these contexts we observe ongoing weakening, especially for /ø/-/œ/. The point of exclusion has not been reached, however, and the standard vowel inventory in Table 21.2 can safely be established.

Table 21.2: The revised standard vowel inventory.

	Front unrounded	Front rounded	Back
Close	i	y	u
Close-mid	e	ø	o
Open-mid	ɛ ẽ	œ	ɔ ɔ̃
Open	a		ɑ

This inventory is never fully realized since the two series of mid vowels are always at least partly neutralized in any given context. Table 21.3 summarizes the distribution of mid vowels in final syllables, distinguishing the unrounded pair /e/-/ɛ/ and the two rounded pairs (cf. 2.3 for non-final syllables).

Table 21.3: The distribution of mid vowels across contexts in final syllables.

	/e/-/ɛ/	/ø/-/œ/, /o/-/ɔ/
Final open syllables	Contrast (cf. 1c) <i>pré</i> /pʁe/ <i>près</i> /pʁɛ/	Only /ø/, /o/ e.g. <i>sot</i> /so/ ‘silly _m ’
Final syllables closed by /z/	Only /ɛ/ e.g. <i>chaise</i> /ʃɛz/ ‘chair’	Only /ø/, /o/ e.g. <i>chose</i> /ʃoz/ ‘thing’
Final syllables closed by /ʁ/	Only /ɛ/, /œ/, /ɔ/ e.g. <i>guerre</i> /gɛʁ/ ‘war’, <i>peur</i> /pœʁ/ ‘fear’, <i>cor</i> /kɔʁ/ ‘horn’	
Other final closed syllables	Only /ɛ/ e.g. <i>sept</i> /sɛt/ ‘seven’	Contrast (cf. 1d–e) <i>jeûne</i> /ʒø̃n/ <i>jeune</i> /ʒœ̃n/ <i>saute</i> /sot/ <i>sothe</i> /sɔt/

In final open syllables, only the unrounded pair contrasts, while the rounded ones are neutralized toward /ø/, /o/. In final closed syllables, /e/ is banned in favor of /ɛ/, but the rounded pairs have a more complex distribution: only /ø/, /o/ before /z/, only /œ/, /ɔ/ before /ʁ/, and contrast before other consonants (with localized cases of neutralization, for instance only /ɔ/ before /g/, /ɲ/, as in *vogue* /vɔg/ ‘fashion’ and *cigogne* /sigɔɲ/ ‘stork’).

2.2 Dialectal variation in vowel inventories

Vowel inventories vary both in the number and quality of contrastive vowels. Varieties of French spoken as a first language may be grossly divided into two categories: (i) northern varieties are spoken in Europe in areas historically associated with *langue d’oïl* and *francoprovençal* (northern half of France, Belgium, Switzerland) and, outside Europe, in former colonies peopled by speakers of northern varieties in the 17th and 18th centuries; (ii) southern varieties are spoken in the *langue d’oc* area in the southern half of France. Three regional varieties are briefly described: Southern French, Swiss French, and Laurentian French (Canada). These varieties have undergone distinct historical developments and illustrate different tendencies away from the (northern) standard system presented in 2.1.

Southern French (Durand 2009; Courdès-Murphy 2018) has the simplest inventory, with seven vowels: /i y u E œ O a/. /E œ O/ represent mid vowels underspecified for aperture, the distinction between close-mid and open-mid vowels being completely

neutralized in most southern varieties. The quality of mid vowels is determined by syllable structure: open-mid in closed syllables, close-mid in open syllables.¹ For example, *pré* ‘meadow’ and *près* ‘close’ are both realized [pʁe]. Regarding nasal vowels, Southern French avoids the /ɛ̃/-/œ̃/ neutralization, but the phonemic status of nasal vowels is questionable, as several arguments suggest they be analyzed as underlying sequences of an oral vowel and a nasal consonant (Durand 2009; Courdès-Murphy 2018).

Swiss and Laurentian French, both northern varieties, stand at the opposite end of the spectrum in terms of the number of contrasting vowels. They have in common the conservative use of vowel length as a distinctive feature, which has been lost in the standard variety. But they differ in the relationship between length and quality and the contexts where length contrasts are realized.

Swiss varieties (Métral 1977; Racine/Andreassen 2012) mostly maintain the conventional contrasts in Table 21.1 (disregarding schwa), with the /a/-/a:/ contrast (1b) reinterpreted in some regions as one of length /a/-/a:/. In addition, the historical /ɛ/-/ɛ:/ contrast remains productive, as in *faites* /fɛt/ ‘do_{IMP.PL}’ vs. *fête* /fɛ:t/ ‘party’. But the most salient feature of the Swiss French system is the maintenance of length distinctions in final open syllables for the vowels /i y u e ø ɛ a/, as illustrated in (2).

- (2) a. *vit* /vi/ ‘live_{3SG}’ vs. *vie* /vi:/ ‘life’
 b. *bleu* /blø/ ‘blue_M’ vs. *bleue* /blø:/ ‘blue_F’
 c. *voix* /vwa/ ‘voice’ vs. *voie* /vwa:/ ‘track’

Many Swiss varieties also differ from the standard system in avoiding the neutralization between /o/ and /ɔ/ in final open syllable (cf. Table 21.3, first line), as in *saut* /so/ ‘jump’ vs. *sot* /sɔ/ ‘silly_M’. The system just sketched and summarized in Table 21.4 can be considered maximal, as certain contrasts may be absent in some regions or weakening among younger speakers.

Table 21.4: The Swiss French vowel inventory, adapted from Racine/Andreassen (2012).

	Front unrounded	Front rounded	Back
Close	i i:	y y:	u u:
Close-mid	e e:	ø ø:	o
Open-mid	ɛ ɛ: ẽ	œ œẽ	ɔ ɔ̃
Open	a a:		(a) ɑ̃

¹ This is the so-called *loi de position*, which applies with regularity in Southern French, but only in limited contexts in northern varieties. As a principled exception to this *loi* in southern varieties, open-mid vowels surface in open syllables when the following vowel is a schwa (cf. 4.1), as in *nette* [nɛ.tə] ‘clean_F’ and *netteté* [nɛ.tə.te] ‘cleanliness’ (cf. Eychenne 2014).

Laurentian French (Côté 2012) is also characterized by a strong distinction between short and long vowels, but one that is associated with concomitant differences in quality. All the contrasts in the conventional system in Table 21.1 are maintained without any sign of weakening. The distinction between close-mid and open-mid vowels is enhanced by length, as well as that between the two open vowels; the back open vowel (and its nasal counterpart) are also rounded. The historical /ɛ/-/ɛ:/ opposition still attested in Swiss French is also robust in Laurentian French, but the long vowel has taken a distinct quality, transcribed /ɜ:/ (Côté/Lancien 2019). The nasal vowels are long and different in quality: the standard /ẽ/ tends toward /ẽ:/ and /õ/ has a fronted variant [ã:]. More distinctively, a series of near-close vowels, originally allophonic, has developed in opposition to a close one, as in *bise* /bi:z/ ‘kiss’ vs. *Biz* /biz/ (proper name). This results in a symmetrical contrast between two degrees of height (or a tense-lax distinction) in both close and mid vowels. The complete system appears in Table 21.5.

Table 21.5: The Laurentian French vowel inventory, adapted from Côté (2012).

	Front unrounded	Front rounded	Back
Close	i:	y:	u:
Near-close	ɪ	ʏ	ʊ
Close-mid	e: ẽ:	ø:	o:
Open-mid	ɛ ɜ:	œ œ̃:	ɔ õ:
Open	a		ɒ ɔ̃:

This rich oral inventory includes eight vowel pairs distinguished by both length and quality (/ɛ/ is involved in two pairs): /i: ɪ/, /y: ʏ/, /u: ʊ/, /e: ɛ/, /ɜ: ɛ/, /ø: œ/, /o: ɔ/, and /ɒ: a/. It is fully realized in final closed syllables; in addition to the *bise-Biz* contrast above for close vowels, examples include *pâte* /pɔ:t/ vs. *patte* /pat/ ‘leg, paw’ for open vowels (compare with 1b) and *prête* /pʁɛt/ ‘ready_F’ vs. *prête* /pʁɜ:t/ ‘lend_{IMP}’ vs. *break* /bʁɛ:k/ ‘break’ for front unrounded mid vowels (/ɛ:/ in final closed syllables being found essentially in integrated loanwords). All vowel pairs are neutralized in two contexts, where length is no longer distinctive: before final /ʁ/ and in final open syllables. Neutralization, however, mixes length and quality and operates in two opposite directions: before /ʁ/, vowels are long but more open [i: y: u: ɜ: ɛ: ɔ: ɒ:] (e.g. *pire* [pi:ʁ] ‘worse’, *peur* [pœ:ʁ] ‘fear’), word-finally they are short but more close [ɪ ʏ ʊ ɛ ɜ ɔ] (e.g. *pis* [pi] ‘so’, *peu* [pø] ‘little’).² The only complication concerns the trio of front unrounded mid vowels /e: ɛ: ɛ:/ /e/ and /ɛ/ still contrast word-finally (as in 1c), but only /ɜ:/ surfaces before /ʁ/ (e.g. *père* /pɜ:ʁ/ ‘father’).

² In both contexts, the default open vowel is back; /a/ remains contrastive, but very marginally.

In both Laurentian and Swiss varieties, vowel length is enhanced by diphthongization. In Switzerland, diphthongization targets word-final vowels, especially /e:/ realized as [e̯i], e.g. *journee* /ʒuʁne:/ [ʒuʁne̯i] ‘day’. In Laurentian French, it applies most notably in final closed syllables. Diphthongs are closing and maintain the rounding, nasalization, and point of articulation of the underlying vowel. But they vary in the initial and final degrees of aperture: the initial degree is at least as open as the underlying vowel, the final degree at least as close. Representative examples are given in (3).

- (3) a. *père* ‘father’ /pɜ:ʁ/ [pɑ̃ʁ]~[pɑ̃eʁ]~[pɑ̃iʁ]~[pɛ̃eʁ]~[pɛ̃iʁ]
 b. *paume* ‘palm’ /po:m/ [pɔ̃m]~[pɔ̃um]~[pɔ̃ũm]
 c. *pente* ‘slope’ /põ:t/ [põ̃t]~[põ̃õt]~[põ̃ũt]

2.3 Vowels in non-final syllables

Vowel contrasts in non-final syllables are weaker than in final syllables. The opposition between close-mid and open-mid vowels in particular is largely obliterated (in varieties that maintain it in final syllables). The realization of mid vowels in non-final syllables is thus highly variable and conditioned by several factors, including:

- syllable structure: close-mid vowels are favored in open syllables and open-mid ones in closed syllables;
- analogy: forms derived by suffixation tend to retain the root vowel appearing in final syllables in the unsuffixed form;
- harmony: harmony favors vowels whose aperture is close to that of the vowel in final syllables: close-mid vowels before close(-mid) ones, open-mid vowels before open(-mid) ones (cf. Nguyen/Fagyal 2008);
- segmental constraints: open-mid vowels are favored in syllables closed by /ʁ/ and close-mid vowels before /z/, as in final syllables (Table 21.3);
- general preferences for specific vowels: Tranel (1987), for instance, considers /e/, /œ/, /ɔ/ as the default vowels in non-final syllables, Hansen/Juillard (2011) document a general closing tendency in Paris, and certain Swiss varieties show a strong preference for open-mid vowels;
- spelling: certain spellings tend to be associated with specific vowels, for instance <é> with /e/, <è>, <ê> with /ɛ/, <au> with /o/, <o> with /ɔ/.

These factors act and interact in different ways in varieties of French. They often make contradictory predictions, whose resolution depends on the relative weight of each factor. For instance, the word *aigri* ‘embitter’_{PST.PTCP} may be pronounced [ɛgʁi] or [egʁi]. The [ɛ] variant is favored by analogy with the base form *aigre* [ɛgʁ] ‘bitter’ and an association between <ai> and [ɛ]; the [e] variant ([e.gʁi]) is selected by syllable structure and vowel harmony.

Parisian and Southern French favor [egɐi]: Southern French has generalized the role of syllable structure; Parisian French offers a more complex picture, including a growing tendency toward close-mid vowels. In contrast, Laurentian and certain Swiss varieties opt for [ɛ], albeit for different reasons. The latter generally favor [ɛ] in non-final syllables, including in underived forms like *béton* [betɔ̃] ‘concrete’. In Laurentian French, analogy is the dominating factor, hence *aigri* [ɛgɐi]; cf. also *fêter* [fɛ:te] ‘celebrate_{INF}’ by analogy with *fête* [fɛ:t]³ ‘party’. In underived forms, vocalic contrasts are maintained more robustly than in other varieties, as in *maudite* /mo:dit/ ‘damned_F’ vs. *modique* /mɔdik/ ‘modest’ and *raison* /ʁɜ:zɔ̃/ ‘reason’ vs. *raisin* /ʁɛzɛ̃/ ‘grape’.

2.4 Close vowels

Close vowels undergo specific changes. They are subject to different processes – devoicing, laxing, syncope – in two opposite contexts: utterance-final and phrase-medial (2.4.1). They also alternate with glides in prevocalic position (2.4.2). These processes apply in different modalities across varieties.

2.4.1 Devoicing, laxing, syncope

Devoicing in European varieties applies in two different contexts. The better known one is exemplified by words like *oui* [wiç] ‘yes’ and *merci* [mɛʁsiç] ‘thanks’: the final [i] is devoiced, but also followed by a fricative-like noise (Smith 2003; Candea 2012; Dalola 2014; 2015 and references therein; ʔ11 Sociophonetics). This type of devoicing preferentially targets close vowels, in particular [i]; it mostly applies in utterance-final or pre-pausal position, hence its interpretation as a marker of finality.

Devoicing also applies phrase-medially, in a prosodic position that is opposite to the utterance-final one above (Torreira/Ernestus 2010). It targets close vowels in the context of voiceless consonants, such as the [i] of *ticket* [tɪkɛ] ‘ticket’ and the [y] of *supporter* [sɥpɔʁtɛʁ] ‘sports fan’. Over a third of phrase-medial close vowels preceded by a voiceless consonant are completely devoiced. Phrase-medial devoicing is a manifestation of vowel reduction in unstressed position; unlike its final counterpart, it does not appear to play any discursive role.

Dialectal variation in vowel devoicing remains to be investigated. But one variety that has been studied with respect to the realization of close vowels is Laurentian French (cf. Côté 2012 and references therein). Final devoicing is not observed, but word-medial close vowels reduce in various ways. Devoicing and syncope are very productive, as in *université* [yn(i)vɛʁs(ɪ)te] ‘university’. Close vowels in non-final syllables are also varia-

³ Typically realized with one of the diphthongized variants of [ɜ:]; cf. (3a) above.

bly laxed, as a result of two processes: harmony with a near-close/lax vowel in final syllables (e.g. *poutine* [putɪn] ‘poutine’) and closed-syllable laxing, which applies depending on the nature of the coda consonant (e.g. *Linda* [lm.dɔ], proper name).

2.4.2 Gliding

Close vowels are variably realized as glides when followed by another vowel. This is illustrated in (4, 5) morpheme-internally and in derived contexts, where a close vowel at the end of a verbal root alternates with the corresponding glide before a vowel-initial suffix.

- (4) a. /i/ *miette* [mi.ɛt]~[mjɛt] ‘crumb’
 b. /y/ *muette* [my.ɛt]~[mɥɛt] ‘dumb_F’
 c. /u/ *mouette* [mu.ɛt]~[mwɛt] ‘seagull’
- (5) a. /i/ *scie* [si] ‘saw_{IMP}’ *scier* [si.e]~[sje] ‘saw_{INF}’
 b. /y/ *sue* [sy] ‘sweat_{IMP}’ *suer* [sy.e]~[sqe] ‘sweat_{INF}’
 c. /u/ *joue* [zu] ‘play_{IMP}’ *jouer* [zu.e]~[zwe] ‘play_{INF}’

After obstruent+liquid (OL) clusters, gliding is blocked (6, 7), except morpheme-internally with the sequences [wa], [wɛ], [ɥi] (8). This is accounted for by a constraint against OLG (obstruent+liquid+glide) complex onsets. The special status of [wa], [wɛ], [ɥi] follows from their interpretation as diphthongs, syllabified in the nucleus, rather than as consonant+vowel sequences. When the close vowel is followed by a morpheme boundary, as in (6), the diphthongal analysis is excluded, giving rise to the contrast *troua* (6c) vs. *trois* (8a).

- (6) No gliding in derived contexts after OL clusters:
- a. /i/ *crier* [kʁi.e] * [kʁje] ‘shout_{INF}’
 b. /y/ *influer* [ɛfly.e] * [ɛflqe] ‘affect_{INF}’
 c. /u/ *troua* [tʁu.a] * [tʁwa] ‘hole_{3SG.PRET}’
- (7) No gliding morpheme-internally after OL clusters with sequences other than [wa], [wɛ], [ɥi]:
- a. /i/ *trio* [tʁi.o] * [tʁjo] ‘trio’
 b. /y/ *fluide* [fly.id] * [flɥid] ‘fluid’
 c. /u/ *brouette* [bʁu.ɛt] * [bʁwɛt] ‘wheelbarrow’
- (8) Gliding morpheme-internally after OL clusters with [wa], [wɛ], [ɥi]:
- a. /wa/ *trois* [tʁwa] ‘three’
 b. /wɛ/ *grosin* [gʁwɛ] ‘snout’
 c. /ɥi/ *truite* [tʁɥit] ‘trout’

In actual usage, the patterns in (6–8) are quite regular, although Southern French has been reported to allow gliding morpheme-internally with sequences other than [wa], [wɛ̃], [ɥi] (Durand/Lyche 1999). But gliding, or syneresis, is highly variable across contexts and varieties in the general case (4, 5). In the standard variety, it is presented as systematic, but more detailed descriptions show that this is not quite so; other varieties (Southern, Laurentian, Swiss) display a stronger preference for dieresis (Klein 1991; Kelly 2015; Côté 2018). Gliding is conditioned by several factors, including:

- the morphological context: syneresis is more frequent morpheme-internally (4) than in derived contexts (5);
- the identity of the vowel: syneresis follows the hierarchy /i/ > /u/ > /y/;
- the number of syllables: syneresis is favored in longer words;
- the nature of the preceding consonant: syneresis appears to be favored after voiceless consonants, although this effect remains to be more systematically investigated.

3 Consonants

The standard inventory and some points of variation are discussed in 3.1, a selection of consonantal processes subject to dialectal variation is presented in 3.2.

3.1 Inventory

The standard inventory is given in Table 21.6. It includes five modes of articulation (plosives, fricatives, nasals, liquids, glides). Plosives and nasals distinguish between labial, coronal, and dorsal consonants, while fricatives have two pairs of coronal segments. All obstruents display a voicing contrast. Liquids include a lateral approximant /l/ and a rhotic /ʀ/, whose mode of articulation varies between a fricative, a trill, and an approximant. Three glides /j/, /ɥ/, /w/ complete the inventory.

Table 21.6: The standard consonant inventory.

	Labial		Coronal				Dorsal		
	Bilabial	Labiodental	Alveolar	Postalveolar			Palatal	Velar	Uvular
Plosive	p	b		t	d			k	g
Fricative		f	v	s	z	ʃ	ʒ		
Nasal		m			n		(ɲ)	(ŋ)	
Liquid					l				ʀ
Approximant							j	ɥ	w

The main issue in this inventory concerns the dorsal nasals. On the one hand, the status of /ŋ/ is debated. The velar nasal is taken to have been borrowed with English words ending in *-ing* (e.g. *shopping* /ʃɔpiŋ/, *building* /bildiŋ/; ↗16 Loanword phonology in Romance) and it contrasts with /ɲ/, found in the native lexicon (e.g. *digne* /diɲ/ ‘worthy’). Sampson (1992), however, argues that the variability and distribution of [ŋ] do not justify granting it a phonemic status. On the other hand, the status of /ɲ/ itself is questionable, as it has merged with /nj/: *agneau* [anjo] ‘lamb’, *panier* [panje] ‘basket’ (cf. also Durand/Lyche 2019).

Dialectal variation with respect to the consonantal inventory is relatively limited. The rhotic is the most variable segment, in mode and point of articulation as well as voicing (cf. 3.2). Concerning point of articulation, some varieties have an apical [r], either as a conservative feature or as a contact phenomenon. In Europe, [r] can be found in rural areas among the oldest generation of speakers. In Canada, apical variants used to be dominant, but they have been giving way to dorsal ones since the 1950s. In Africa, the apical rhotic is frequent in contact with local languages that have a similar sound. With respect to glides, some varieties, notably in Belgium, have neutralized the /ɥ/-/w/ contrast in favor of /w/ (e.g. *juin* ‘June’ and *joint* ‘join_{3SG}’ both pronounced [ʒwɛ̃]) (Hambye/Simon 2012, 135).⁴

Additional consonantal phonemes that can be found in regional varieties are of two sorts: the maintenance of historical features or contact phenomena. The first case is illustrated by the preservation of the lateral /ʎ/ and the fricative /h/ by older speakers in the French Basque Country, as in *étriller* [etʁiʎe] ‘currycomb_{INF}’ ([etʁiʎe] in the standard variety) and *hasard* [hazaʁ] ‘chance’ (Durand 2009). The conservative use of /h/ is observed in many varieties, especially outside France, but this sound may also be acquired as a result of contact. For example, Swiss varieties have integrated a number of consonants through Germanisms, including /h/, a dorsal fricative /χ/ (distinct from the French rhotic), and affricates /tʃ dʒ ts dz kx/ (Racine/Andreasen 2012).

3.2 Processes

This section briefly describes some consonantal processes that display dialectal variation: obstruent voicing, variants of /ʁ/, plosive affrication, and the variable realization of word-final consonants.

The voicing contrast within obstruents may be neutralized as a result of assimilation or phrase-finally. First, we observe two variable patterns of voicing assimilation. On the one hand, assimilation normally applies regressively within obstruent clusters (9a) (Hallé/Adda-Decker 2011), but assimilation may be progressive if the obstruents

⁴ This does not prevent [ɥ] from surfacing as an allophone of /y/, as in *muette* [myet]~[mɥet] ‘dumb_F’.

are adjacent as a result of schwa omission morpheme-internally (cf. 4.1.1) (9b). On the other hand, obstruents variably voice before a sonorant. When the sequence is not word-initial (9c), voicing is variable but not restricted to a particular area. Word-initially (9d), voicing does not generally apply, except in southern varieties (Durand 2009).

Second, voiced obstruents are variably devoiced word- or phrase-finally (9e). While devoicing is occasionally observed across all varieties as a strict phonetic effect, it applies most characteristically in certain varieties, and as such serves as a dialectal marker. The areas concerned include southern France (Durand 2009) and both sides of the Belgian-French border, subject to adstratic (Flemish) and substratic (Walloon, Picard) influence (Hambye/Simon 2012; Pooley 1994).

The (de)voicing of obstruents brings us to that of /ʁ/: /ʁ/ devoices both after (9f) and before (9g) voiceless segments, as well as, variably, in initial (9h) and final (9i) position. The voicelessness of the rhotic is generalized toward [χ] in some varieties (e.g. in areas of Switzerland, Racine/Andreassen 2012). Beyond voicing, the rhotic may also weaken, vocalize, or delete in coda or word-final position (9i). Vocalization is pervasive in Laurentian French, deletion more characteristic of many varieties in Africa, the Indian Ocean, and the West Indies (Detey et al. 2010; Lyche/Meisenburg/Gess 2012).

(9) a.	<i>disgrâce</i>	[dizɣʁas]	‘disgrace’
	<i>discrédit</i>	[diskʁedi]	‘discredit’
b.	<i>cheveu</i>	[ʃəvø]~[ʃfø]	‘hair’
c.	<i>islamique</i>	[islamik]~[izlamik]	‘Islamic’
	<i>socialisme</i>	[sɔsʁjalism]~[sɔsʁjalizm]	‘socialism’
d.	<i>slip</i>	[slip] (general), [zlip] (Southern Fr.)	‘underwear’
e.	<i>malade</i>	[malad]~[malat]	‘sick’
f.	<i>patrie</i>	[patʁi]	‘homeland’
g.	<i>parti</i>	[paʁti]	‘gone’
h.	<i>riz</i>	[ʁi]~[χi]	‘rice’
i.	<i>port</i>	[pɔʁ]~[pɔχ]~[pɔʁ]~[pɔʁ]~[pɔ:]	‘port’

Two major types of plosive affrication are observed in different varieties. In France, we see a frequent, and possibly growing, tendency to affricate coronal, and to a lesser extent velar, plosives followed by close anterior vowels. *Tu* ‘you’ may thus be pronounced [tʲy] or, as a more salient variant, [tʃy] (Devilla/Trimaille 2010). This feature is observed across the country and appears to be rather associated with young speakers with an immigrant background, but the social meaning of this variable remains to be clarified (≈11 Sociophonetics).

Laurentian French is well-known for another type of affrication, whereby /t d/ are realized [tʰ dʰ] before close front vowels and glides, as in *tu* [tʰy] ‘you_{SG}’ and *dieu* [dʰjø] ‘god’. Affrication has been completely phonologized; it is systematic within words and variable across words, as in *sept idées* [setʰide] ‘seven ideas’ (Côté 2012).

Finally, a number of lexical items end in single consonants whose realization varies across geographical areas (rather than linguistic contexts). As shown by the words in (10) (Avanzi 2016; 2017 for 10a–c), the dialectal distribution of these variable consonants defies generalizations.

(10) a.	<i>vingt</i>	‘twenty’	[vɛ̃]	France (except East), Canada
			[vɛ̃t]	Belgium, Switzerland, East of France
b.	<i>moins</i>	‘less’	[mwɛ̃]	Everywhere
			[mwɛ̃s]	Southern France
c.	<i>persil</i>	‘parsley’	[pɛʁʁsi]	Large area around Paris, Canada
			[pɛʁʁsil]	Dominant form in France
d.	<i>but</i>	‘goal’	[by]	Canada, minority form in Europe
			[byt]	Majority form in Europe
e.	<i>bout</i>	‘end’	[bu]	Everywhere
			[but]	Canada

4 Latency phenomena

French is famous for its segmental latency phenomena, whereby a consonant (liaison) or a vowel (schwa) is realized or omitted, depending on a variety of linguistic and extralinguistic factors. These two cornerstones of the pronunciation of French are discussed here in more detail.

4.1 Schwa

The French schwa is as frequent in the language as it is complex, in addition to serving as a salient dialectal marker (↗4 From vowel weakening in Romance to French schwa). Its definition and the basic elements of its behavior are addressed in 4.1.1, contrasting northern and southern varieties; its distribution and the relevant conditioning factors are reviewed in 4.1.2.

4.1.1 Definition

The French schwa has been defined in the literature by the following elements.⁵

⁵ Another element is its unstressed prosodic status, with the possible exception of the post-verbal clitic *le*, whose vowel is stable and stressed, e.g. *dis-le* [dilø]~[dilœ] ‘say_{IMP} it’.

- (11) a. Its phonetic quality, usually taken to be close, but not necessarily identical, to [œ], [ø], or, in some contexts, [ə]; the traditional symbol [ə] is maintained here, without indicating a specific vowel quality;
 b. its alternation with Ø;
 c. its orthographic correspondence with <e>.

The proper interpretation of these elements, however, requires that we consider separately the two contexts where schwa appears – morpheme-finally and morpheme-internally – and two broad categories of varieties – northern and southern – which display contrastive patterns.

Morpheme-finally in northern varieties, any morpheme ending in a consonant may be followed by a vowel alternating with Ø; the context then determines how likely the vowel is to be realized (cf. 4.1.2). This is illustrated in (12) for *juste* ‘just’ and *aime* ‘like_{1/3SG}’ in a standard variety, as they are realized without a final schwa (12a), with a variable schwa (12b), or with a categorical schwa (12c), depending on the environment.

(12) a.	<i>juste ici</i>	[ʒystisi]	‘just here’
	<i>j’aime tout</i>	[ʒɛmtu]	‘I like _{1SG} everything’
b.	<i>juste là</i>	[ʒyst(ə)la]	‘just there’
	<i>j’aime rien</i>	[ʒɛm(ə)ʁjɛ̃]	‘I like _{1SG} nothing’
c.	<i>justement</i>	[ʒystəmã]	‘just _{ADV} ’
	<i>aimeriez</i>	[ɛmæʁje]	‘like _{2PL.COND} ’

Importantly, this alternation applies to morphemes with and without an orthographic <e>, so *golfe* and *golf* are both realized [gɔlf(ə)] (13a), *cette* and *sept* [sɛt(ə)] (13b; cf. 6.3 and Tranel (1981) regarding schwa before *h aspiré*). (11c) is therefore not a definitional element of schwa morpheme-finally. When realized, schwa corresponds to a front rounded vowel, although the quality of boundary schwa in northern varieties has not been systematically investigated.⁶

(13) a.	<i>golf/golfe russe</i>	[gɔlf(ə)ʁys]	‘Russian golf/gulf’
b.	<i>cette/sept housse(s)</i>	[sɛt(ə)us]	‘this _F /seven cover(s)’

Southern varieties, at least in their conservative form, pattern differently since a distinction is made between schwa-final and consonant-final forms (Eychenne 2014; Courdès-Murphy 2018). This distinction usually correlates with the presence of an orthographic

⁶ A vowel comparable to schwa, but much more variable in quality, frequently surfaces in prepausal position, as in *bonjour* [bɔ̃'ʒuʁə] ‘hi’ (Fagyal 2000). This process does not clearly fall under the same heading as schwa and is not discussed further here.

<e>, which itself reflects the history of the language. Schwa thus appears after *golfe* and *cette* but not *golf* and *sept*. This justifies lexical representations like *cette* /setə/ ‘this_F’ vs. *sept* /set/ ‘seven’ in Southern French, as opposed to /set/ for both words in northern varieties, where schwa is considered epenthetic. When realized, morpheme-final schwa in Southern French has a variable quality, including [ə ɔ̃ œ ɐ ɛ].

Morpheme-internally, southern and northern varieties again pattern in opposite ways. In northern varieties, two categories of schwa, corresponding to <e>, are traditionally distinguished (14).

- (14) a. Unstable vowels (#C_C(C)V): *genou* [ʒ(ə)nu] ‘knee’
 b. Stable vowels (OL_C): *brevet* [bʁəvɛ] ‘patent’
 c. Stable vowels (elsewhere): *requin* [ʁəkɛ̃] ‘shark’

Unstable vowels (14a) are found in initial syllables in the context #C_C(C)V. Stable vowels in initial syllables are of two types: the *brevet* type (14b), in which the stability of the vowel is required by the initial obstruent+liquid cluster, and the *requin* type (14c), in which this stability is not segmentally justified, as shown by words like *recours* [ʁ(ə)kʁɔ̃] ‘appeal’. Both types have been traditionally called “stable schwas”, a categorization that contradicts (11b) and presupposes a binary distinction between, on the one hand, stable and unstable schwas, and, on the other hand, stable schwas and /œ/ and/or /ø/. Both distinctions are questionable.

First, a contrast between stable schwas and /œ/ and/or /ø/ implies a distinct vowel quality for schwa. Marcoux (2018) highlights the fact that schwa does not appear in the same morphological and prosodic context as /œ/ and /ø/, preventing a direct comparison of their quality. For instance, the schwa of *genou* (14a) appears in an underived form, while the /œ/ and /ø/ (both spelled <eu>) of *jeunesse* [ʒœnɛs] ‘youth’ and *jeûner* [ʒœnɛ] ‘fast_{INF}’ are derived from *jeune* [ʒœn] ‘young’ and *jeûne* [ʒœn] ‘fast_{NOUN}’.⁷ For the Paris region, Marcoux concludes that schwa and /ø/ cannot be distinguished. In contrast, schwa in Laurentian French is identical to /œ/ (Séguin 2010).

Second, there is no clear contrast between unstable and stable vowels: Corresponding to graphical <e> in the context #C_C there rather is a continuum of “deletability” between vowels that delete most of the time (e.g. in *petit* ‘small_M’) and those that almost never delete (e.g. in *guenon* ‘female monkey’), with dialectal variations (Racine 2007; Marcoux 2018). Establishing a binary distinction between deletable and non-deletable schwas thus appears arbitrary.

The conclusion drawn from these observations is that morpheme-internal (unstable) schwa, as in *genou* and *recours* above, is not a distinct vowel category, but a characteristic of /ø/ or /œ/, which may delete under the right lexical, morphological, segmental, and prosodic context (cf. 4.1.2 and Côté 2008). As a consequence of schwa

⁷ Only a few words have /ø/ in the context #C_CV, like *jeudi* [ʒødi] ‘Thursday’.

merging with /œ/ and/or /ø/ (possibly both, given the weakness of the /œ/-/ø/ contrast, cf. 2.1), historical /œ/ or /ø/ may be subject to deletion, as in *peut-être* [p(œ)tɛtʁ] ‘maybe’ and *déjeuner* [dez(œ)ne] ‘lunch’.

In Southern French, there is no morpheme-internal vowel- $\emptyset$ alternation⁸ and only stable /ø/ appears, as in *genou* [ʒønu] (compare with 14a). Schwa in this variety is essentially morpheme-final, therefore corresponding to a boundary phenomenon.

In conclusion, schwa in northern varieties corresponds to two distinct phenomena: (i) the variable realization of a vowel following a morpheme-final consonant; (ii) the variable, lexically-specific, deletability of morpheme-internal /ø/ and/or /œ/. In contrast, southern varieties display a contrast between schwa-final and consonant-final morphemes, and no morpheme-internal V~ $\emptyset$ alternations.

4.1.2 The distribution of schwa

In northern varieties, the realization of schwa is intimately related to Grammont’s (1914/1961) *loi des trois consonnes* ‘law of the three consonants’. Schwa is absent next to a vowel (cf. also 6.3) and it is preferentially realized if it prevents sequences of three or more consonants, essentially in the environment CC_C, as opposed to VC_C.⁹ Morpheme-finally, the likelihood of schwa realization depends on the type of boundary, the consonantal and prosodic context, and the variety. Six boundary types can be distinguished, as shown in Table 21.7, where “_” indicates the position of schwa. For instance, “clitic_” refers to the boundary between a clitic and the host it attaches to, clitics being of the [C(ə)] form (i.e., in alphabetical order, *ce*, *de*, *je*, *le*, *me*, *ne*, *que*, *se*, *te*). Each boundary type is associated with examples in CC_C and VC_C contexts, including two types of pre-schwa clusters in CC_C: obstruent+liquid and C+obstruent. In each example schwa is taken to be regularly absent, present, or variable, in the standard pronunciation. Although the behavior of schwa is in reality not quite as systematic, the following generalizations emerge.

- Schwa is more likely to surface after two consonants than one: schwa is always at least variable in CC_C, but normally absent in VC_C, except after [C(ə)] clitics (grey cell in Table 21.7).
- In CC_C, schwa is influenced by the nature of the consonants, obstruent+liquid clusters favoring the realization of schwa (provided they have not already simplified, cf. 5.2).

⁸ Some exceptional words like *petit* ‘small_M’ may display a V~ $\emptyset$ alternation, but Courdès-Murphy (2018, 287) argues that they involve suppletion rather than schwa deletion.

⁹ VC_CC normally patterns with VC_C in disfavoring the presence of schwa (cf. rightmost column in Table 21.7). When CC corresponds to liquid+glide, however, schwa tends to be pronounced, as in *gôûteriez* [gutæɾjez] ‘taste_{2PL.COND}’. The presence of schwa is also favored in phrase-initial syllables after a single consonant, a context left aside here.

- In CC_C, schwa is most likely to surface before derivational suffixes and least likely at word boundaries. In the former context, schwa is always realized; in the latter, it is always variable. In the other contexts, schwa appears more sensitive to cluster type.
- In CC_C, schwa is more likely to be realized before monosyllables than polysyllables. This effect is most apparent in compounds, as illustrated by the contrast between *garde-boue* ‘mudguard’ and *garde-malade* ‘(home) nurse’, the latter also contrasting with *ouvre-bouteille* ‘bottle-opener’ with respect to cluster type.

Morpheme-internally, deletable vowels are subject to similar constraints as those applying to schwa in clitics.

Table 21.7: Distribution of morpheme-final schwa at different boundaries, in CC_C and VC_C.

	CC_C	VC_C
_derivational suffix	<i>doublement</i> [dubləmā] ‘double _{ADV} ’ <i>garderie</i> [gɑʁdəʁi] ‘kindergarden’	<i>follement</i> [fɔlmā] ‘mad _{ADV} ’
_inflectional suffix	<i>doublerai</i> [dublæʁe] ‘double _{1SG.FUT} ’ <i>garderez</i> [gɑʁd(ə)ʁe] ‘keep _{2PL.FUT} ’	<i>goûterez</i> [gutʁe] ‘taste _{2PL.FUT} ’
prefix_	<i>entrevoir</i> [ɑ̃tʁəvwɑʁ] ‘glimpse _{INF} ’ <i>ex-femme</i> [eks(ə)fam] ‘ex-wife’	<i>vice-doyen</i> [visdwajɛ] ‘vice-dean’
between two elements of a compound	<i>ouvre-bouteille</i> [uvʁəbutej] ‘bottle opener’ <i>garde-boue</i> [gɑʁdəbu] ‘mudguard’ <i>garde-malade</i> [gɑʁd(ə)malad] ‘nurse’	<i>lance-pierres</i> [lɑ̃spjɛʁ] ‘catapult’
clitic_	<i>avec le pot</i> [avɛkləpɔ] ‘with the _M pot’ <i>avec ce pot</i> [avɛks(ə)pɔ] ‘with that _M pot’	<i>dans le pot</i> [dɑ̃l(ə)pɔ] ‘in the _M pot’
word_	<i>l’oncle rit</i> [lɔ̃kl(ə)ʁi] ‘the uncle laughs’ <i>l’orque rit</i> [lɔʁk(ə)ʁi] ‘the orca laughs’	<i>l’homme rit</i> [lɔ̃mɛi] ‘the man laughs’

These generalizations may be modulated across varieties and speech styles, schwa being more frequently realized in formal situations. In the northern domain, some varieties admit the absence of schwa in CC_C even before a derivational suffix, as in *garderie* [gɑʁdəʁi] ‘kindergarten’ (Morin 1983 for Saint-Etienne; Racine 2007 for Switzerland). In Laurentian French (Côté 2012), schwa is exceptional at word boundaries, except after a handful of words; word-final clusters are instead regularly simplified (cf. 5.2). The reduction of obstruent+liquid clusters may also apply before inflectional suffixes, as in *doublerai* [dublɛ] ‘double_{1SG.FUT}’.

In conservative Southern French, lexical morpheme-final schwas are realized in all contexts except prevocally, including VC_C (e.g. *cette idée* [setide] ‘this_F idea’ vs. *cette fois* [setəfwɑ] ‘this_F time’, which would normally be realized without schwa in the north). This conservative southern system is however under pressure from the

northern one and subject to change. The most notable evolution concerns the deletion of schwa at the end of non-clitic words in preconsonantal or prepausal position (Eychenne 2019). The sentence in (15) would thus have three typical pronunciations.

- (15) *tu le jettes là* [tylʒɛtla] (Northern)
 you_{SG} it_M throw_{2SG} there [tylʒɛtəla] (Southern conservative)
 ‘you throw it there’ [tylʒɛtla] (Southern innovative)

The French schwa has given rise to a host of theoretical analyses in all major phonological frameworks, including classical generative phonology (Dell 1985), syllable-based non-linear phonology (e.g. Noske 1993), and constraint-based approaches (from Côté 2000 to Smith/Pater 2020). The formal challenge lies in the interaction between morphological, segmental, and prosodic factors and in the modeling of variation, which has been the focus of recent research.

4.2 Liaison

French liaison stands among the most celebrated sound processes in languages of the world. It is typically described as the realization of a final orthographic consonant in so-called liaison contexts. For example, *gros* ‘big_M’ alternates between [gʁo] in non-liaison contexts and [gʁoz] in liaison contexts. A linguistically informed definition, however, should avoid referring to spelling, as liaison consonants (LC) do not always correspond to orthographic consonants and are not necessarily interpreted as word-final. Liaison is therefore defined here as the realization of a consonant at certain word boundaries, as in (16a), as opposed to (16b–d), where *gros* appears in utterance-final position (16b), before a consonant-initial word (16c), or in a syntactic configuration that excludes liaison (16d). In liaison contexts, the preceding and following words are referred to as W1 and W2 (e.g. *gros* and *outil* in 16a).

- (16) a. *gros outil* [gʁozuti] ‘big_M tool’
 b. *l’outil est gros* [lutieɛgʁo] ‘the tool is big_M’
 c. *gros marteau* [gʁomaxto] ‘big_M hammer’
 d. *le gros est derrière* [ləgʁoɛdɛʁjɛʁ] ‘the_M big one is behind’

LCs are essentially [n], [z], [t], which account for more than 99% of all LCs observed in speech (Mallet 2008). Liaison may apply categorically or variably, depending on the context. The basic segmental condition for the realization of LCs is the presence of a following vowel or glide (cf. 6.3 for exceptions); the more complex lexical, syntactic, and prosodic constraints are taken up in 4.2.1.

When realized, LCs normally attach to the following vowel; the example in (16a) would thus be syllabified [gʁo.zu.ti]. In formal speech styles, LCs may also appear

in the coda of the preceding word, a process called liaison without *enchaînement* (Encrevé 1988; Laks 2014), which is virtually absent in conversational French (Durand/Lyche 2008; Durand et al. 2011).

Historically, LCs were stable final consonants, which ceased to be pronounced in a growing set of environments between the 12th and the 16th centuries. They remained only in some prevocalic contexts, giving rise to what is known now as liaison. Do LCs still belong to the preceding word, as traditionally accepted, or have they been diachronically reanalyzed? The lexical and phonological status of LCs, a key analytical issue raised by liaison, is addressed in 4.2.2.

Liaison has been the topic of much recent research, which has complemented the phonological perspective with insights from related areas, including phonetics, acquisition, psycholinguistics, and corpus linguistics (cf. Côté 2011; Durand et al. 2011; Soum-Favaro/Coquillon/Chevrot 2014; Barreca 2015; Eychenne/Laks 2017; Smolensky/Rosen/Goldrick 2020 for surveys and new research directions).

4.2.1 Contexts and factors

Liaison applies categorically in the contexts in (17), limited to nominal and verbal clitics: determiner+noun/adjective (17a), within the proclitic+verb group (17b), and within the verb+enclitic group (17c) (Durand/Lyche 2008; Mallet 2008; Barreca 2015). In each context, the first example, with liaison before a vowel-initial word, contrasts with an example without liaison before a consonant. Liaison also applies categorically in a closed set of compounds and fixed expressions, like *accent aigu* [aksátɛgy] ‘acute accent’ and *moins en moins* [mwẽzãmɥẽ] ‘less and less’, which may be considered lexicalized.

(17)	a.	<i>un ami</i>	[ẽnami]	‘a _M friend’
		<i>un mari</i>	[ẽmari]	‘a _M husband’
	b.	<i>vous avez</i>	[vuzave]	‘you _{PL} have _{2PL} ’
		<i>vous pouvez</i>	[vupuve]	‘you _{PL} can _{2PL} ’
	c.	<i>parlez-en</i>	[pablɛzã]	‘speak _{IMP,2PL} of it’
		<i>parlez-lui</i>	[pablɛlɥi]	‘speak _{IMP,2PL} to him/her’

Variable liaison is found in a wider variety of contexts, which involve three categories of triggers: closed lexical categories (18), the plural (19), and verbs (20). Closed categories include prepositions (18a), conjunctions (18b), the relative pronoun *dont* (18c), adverbs (18d), and masculine singular prenominal adjectives (18e). The plural category involves prenominal adjectives (19a) and nouns followed by adjectives (19b); liaison is regular in the first case (19a), but rare in conversational speech after plural nouns (19b). Verbs (20) include different forms, finite and non-finite, but productive liaison is largely limited to auxiliary forms of *être* ‘be_{INF}’ (20b) and, to a much lesser extent, *avoir* ‘have_{INF}’.

- (18) a. *dans une année* [dã(z)ynane] 'in a_F year'
 b. *mais elle a réussi* [mɛ(z)ɛlaʁɛysi] 'but she has succeeded'
 c. *dont il parle* [dɔ̃(t)ilpaʁl] 'of which he speaks'
 d. *très utile* [tʁɛ(z)ytil] 'very useful'
 e. *grand ami* [gʁã(t)ami] 'big_{M,SG} friend'
- (19) a. *nouvelles idées* [nuvɛl(z)ide] 'new_{F,PL} ideas'
 b. *maisons isolées* [mɛzɔ̃(z)izɔ̃le] 'house_{PL} isolated'
- (20) a. *elle allait à Paris* [ɛlalɛ(t)apaʁi] 'she went to Paris'
 b. *Luc est ici* [lykɛ(t)isi] 'Luc is here'

Adverbs (18d) do not strictly speaking form a closed lexical class, but they involve a finite number of elements: a small set of specific forms (e.g. *très* 'very') and the suffix *-ment* '-ly', which serves to derive all other adverbs. Prenominal adjectives can be considered to belong to a semi-closed set, as adjectives appear by default post-nominally in French and prenominal ones are lexically marked. In the plural (19a), any adjective used prenominally is likely to trigger liaison; in the singular, liaison is possible with only a small number of masculine forms (18e).

The grammatical configurations in (17–20) define the range of possible liaison contexts. Elsewhere liaison is normally excluded, for example after a singular noun (e.g. *plat italien* [pla(*t)italjɛ̃] 'meal Italian_M') or between a noun and a verb (e.g. *les garçons arrivent* [legaxsɔ̃(*z)aʁiv] 'the_{PL} boy_{PL} arrive_{3PL}') (Durand/Lyche 2008, 46). But within a given configuration, the frequency of liaison realization may vary considerably depending on the lexical item. For example, it is almost categorical after *très* 'very' but very rare after *pas* 'not' (adverbs, 18d), more frequent after *petit* 'small_{M,SG}' than after *grand* 'tall_{M,SG}' (adjectives, 18e) (Mallet 2008; Barreca 2015). This fact challenges strictly structural accounts of liaison, in which liaison is activated in specific syntactic or prosodic contexts (cf. Côté 2011 for a review). Other explanatory factors include frequency (Bybee 2005) and transitional probability (Côté 2013): liaison realization is correlated with the frequency of W1 (e.g. liaison is more likely after *est* 'be_{3SG}' than *sont* 'be_{3PL}'), the frequency of cooccurrence of W1 and W2 (e.g. liaison is categorical in highly frequent combinations like *determiner*+*noun*), and transitional probability between W1 and the category of W2 (e.g. liaison is productive after *très* 'very', which almost systematically precedes an adjective, but not after *pas* 'not', which appears in a variety of syntactic configurations). The length of W1 is also relevant, as liaison is significantly more frequent after monosyllables than polysyllables (e.g. more likely after *sont* 'be_{3PL}' than *était* 'be_{3SG,IMPF}', even though the latter is twice as frequent; Durand et al. 2011). The likelihood of liaison in any given context is thus conditioned by a variety of factors and a global predictive account has remained elusive.

Like schwa, liaison is sensitive to speech style and is more frequent in formal settings. Liaison is not traditionally considered a salient dialectal feature, but the PFC project has

revealed important regional characteristics outside Europe (Côté 2017), like the absence of variable liaison in Louisiana French and its reduced general frequency in African varieties. But it is Laurentian French that displays the widest range of specific features, including variable liaison in [l] after *ça* ‘this’ (e.g. *ça arrive* [sa(l)ʁiv] ‘it happens’), the generalization of liaison [t] with all forms of *être* ‘be_{INF}’ in the present tense (e.g. *tu es ici* [t(y)e(t)isi] ‘you_{SG} are here’), and the absence of liaison after *ils* ‘they’ (e.g. *ils arrivent* [ʁiv] ‘they arrive’, as opposed to the standard form [i(l)ʁiv]).

4.2.2 The lexical status of liaison consonants

Independently from the contextual factors that condition the realization of liaison, the status of LCs, in particular with respect to the preceding and following words, has been hotly debated. LCs systematically appear between two words and their lexical affiliation is contentious due to contradictory evidence that links them to W1, W2, or neither of these.

LCs are related to W1 in that it is W1 that establishes which LC, if any, is allowed. For instance, the prepositions *dans* [dɑ̃] ‘in’, *en* [ɑ̃] ‘in’, and *moyennant* [mwajənɑ̃] ‘by means of’, all ending in [ɑ̃], respectively trigger liaison in [z], [n], and [t]. Singular prenominal adjectives also highlight the correspondence between liaison and morphological derivation, which typically involves the same consonant (note, however, that most liaison-triggering words are not involved in derivation). For example [t] appears in liaison and derivation with *petit* [p(ə)ti] ‘small_{M.SG}’: *petit ours* [p(ə)tituʁs] ‘small_{M.SG} bear’, *petitesse* [p(ə)tites] ‘smallness’. But this correspondence is not necessary, as different (non-standard) LCs are attested, as in *gros enfant* [gʁotɑ̃fɑ̃] ‘big_{M.SG} child’ with liaison in [t] (Morin 2003). Derivation, however, remains untouched, as in *gros-seur* [gʁosœʁ] ‘size’ with [s].

LCs are linked to W2 phonetically and prosodically. This conclusion relies on a comparison between LCs, stable final consonants, and initial consonants in the same environment, as illustrated in (21) with [t]. LCs normally syllabify with the following vowel; they are very similar to initial consonants but clearly distinguishable from stable final consonants, notably in the duration of the consonant and the preceding vowel (e.g. Delattre 1940; Nguyen et al. 2007). In addition, when a strong prosodic boundary intervenes between W1 and W2, final consonants systematically precede it, but LCs tend to follow it. This can be observed in parentheticals (22a–b) or with hesitations (22c–d).¹⁰

¹⁰ The example in (22c) comes from the PFC-Québec corpus (Côté 2014). A survey of potential LCs with *euh* in this corpus shows that LCs may also be left unrealized or appear before the hesitation vowel, but only exceptionally in this case. By contrast, final consonants like in (22d) cannot follow the hesitation vowel.

- (21) a. LC: *maudit ami* [moditami] ‘damned_{M.SG} friend’
 b. Final C: *maudite amie* [moditami] ‘damned_{F.SG} friend’
 c. Initial C: *maudit amis* [moditami] ‘damned_{M.SG} sieve’
- (22) a. *un pauvre, mais grand, abri* [ɛ̃povʁ|mɛɡʁɑ̃|tabʁi]
 ‘a_M poor, but large_{M.SG}, shelter’
 b. *une pauvre, mais grande, église* [ynpovʁ|mɛɡʁɑ̃d|egliz]
 ‘a_F poor, but large_{F.SG}, church’
 c. *ton petit euh, exercice* [tɔ̃ptiœ:|tɛgzɛksis]
 ‘your_{M.SG} small_{M.SG} hmm, exercise’
 d. *ta petite euh, excursion* [taptiœ:|ɛkskyʁsjɔ̃]
 ‘your_{F.SG} small_{F.SG} hmm, excursion’

The link between LCs and W2 is reflected in acquisitional data (Chevrot/Dugua/Fayol 2009): children appear to initially interpret LCs as word-initial and later go through a stage of possible confusion between LCs and initial consonants. The initial [z] of *zèbre* [zɛbʁ] ‘zebra’ can thus be treated as a LC, but no comparable confusion emerges between LCs and final consonants.

LCs may also become semantically autonomous from W1 and W2, in particular in the case of liaison [z] in plural constructions. The LC may thus acquire an independent morphemic status. The use of this new plural morpheme can then generalize beyond liaison contexts, as in (23), from Côté (2011, 2695).

- (23) a. *c’est quoi comme arbres ?* [sekwakɔ̃mzɑ̃bʁ]
 ‘it is what as trees?’
 b. *ces parents si incompréhensibles* [sepɑ̃ɑ̃sizɛ̃kɔ̃pʁɛɑ̃sibl]
 ‘those parents so incomprehensible’

These contradictory arguments, which link LCs to W1 or W2, or make them autonomous from both W1 and W2, have naturally led to competing analyses of their lexical status: word-final, word-initial, morphemic, or part of larger constructions (cf. Côté 2011 for a review and Smolensky/Rosen/Goldrick 2020 for a new proposal). The traditional account considers LCs to be word-final, in line with their historical origins. This raises the question of how to distinguish LCs, which only surface in some prevocalic contexts, from stable final consonants, e.g. *très* ‘very’, pronounced [tʁɛz] in liaison contexts and [tʁɛ] otherwise, vs. *treize* ‘thirteen’, always pronounced [tʁɛz]. Answers to this question, and to the larger issue of the status of LCs, depend in part on one’s conception of the lexicon, the representation of segments, the role of the syllable, and even what is considered valid evidence.

5 The syllable

The syllable in French is relatively complex, given the large number of syllable types and consonant clusters attested in various positions (5.1). Final clusters are, however, frequently simplified, a process subject to dialectal variation (5.2). The syllabification of intervocalic clusters is addressed in 5.3.

5.1 Syllable types

Codas and onsets may be empty, simple, or complex and only vowels are admitted as nuclei. Table 21.8 shows the proportion of different syllable types.¹¹ French displays a strong preference for open syllables (73% of syllables have null codas) and simple onsets (85%).

Table 21.8: Proportions of different syllable types in French (Rousset 2004, 116).

	Null onset	Simple onset	Complex onset
Null coda	V: 8%	CV: 54%	(C)CCV: 11%
Simple coda	VC: 2%	CVC: 18%	(C)CCVC: 3%
Complex coda	VCC(C): 0.5%	CVCC(C)(C): 3%	(C)CCVCC(C): 0.5%

All consonants (disregarding glides) are allowed in simple onsets and codas, with the exception of word-initial /ɲ/ in some varieties (Dell 1995). Clusters display elements of both symmetry and asymmetry between onsets and codas. In both positions, the most frequent types of consonant clusters are obstruent+liquid (OL) (24a), possibly preceded by /s/ (24b), and /s/+plosive (24c). While OL clusters are expected in onset position, their frequency in coda position, which results from the historical deletion of final vowels, is typologically exceptional. In onsets, only sequences of non-falling sonority are otherwise attested, considering the following sonority hierarchy: obstruents < nasals < liquids (25). All liquid- and nasal-initial sequences are thus excluded. Codas are more permissive and allow all binary combinations of a liquid, a nasal, a fricative, and a plosive (Dell 1995; Côté 2004); the more frequent ones are exemplified in (26).¹² Codas also display more variability than onsets in clusters of more than two consonants: whereas only /s/ can appear as the initial segment of three-consonant

¹¹ Those proportions, based on a syllabified lexicon, would vary slightly in continuous speech, due to a number of sandhi processes affecting syllabification (cf. 6.3). A few word-internal consonant clusters are also compatible with different syllabic segmentations.

¹² However, sequences of a coronal fricative followed by a non-plosive are more restricted in coda than in onset: /sf/, /sn/, /sl/, /sʁ/ are attested only in onset, e.g. *sphère* (25c).

onsets (24b), three-consonant codas may also start with a liquid or a plosive (27). One four-consonant coda is attested: /kstɛ/ in *ambidextre* /ãbidɛkstɛ/ 'ambidextrous'.

- (24) a. OL: plosive+liquid (except /tɫ/, /dɫ/) and /f/, /v/+liquid:
 onset: *vrai* /vʁɛ/ 'true' *oubli* /u.bli/ 'oversight'
 coda: *souffle* /sufl/ 'breath' *entre* /ãtʁ/ 'between'
 b. /s/OL: onset: *strie* /stʁi/ 'streak' coda: *astre* /astʁ/ 'star'
 c. /s/+plosive: onset: *sport* /spɔʁ/ 'sport' coda: *vaste* /vast/ 'vast'
- (25) Other onsets:
 a. plosive+nasal: *pneu* /pnø/ 'tire'
 b. plosive+fricative: *psychologie* /psikɔlɔʒi/ 'psychology'
 c. fricative+fricative: *sphère* /sfɛʁ/ 'sphere'
- (26) Other CC codas:
 a. plosive+plosive: *apte* /apt/ 'apt'
 b. obstruent+nasal: *prisme* /pʁism/ 'prism'
 c. plosive+fricative: *taxe* /taks/ 'tax'
 d. liquid+C: *corne* /kɔʁn/ 'horn'
- (27) Other CCC codas:
 a. *arbre* /aʁbʁ/ 'tree'
 b. *verste* /vɛʁst/ 'verst'
 c. *spectre* /spektʁ/ 'specter'

5.1.1 Final cluster simplification

The complexity of word-final clusters leads to their regular simplification, especially in informal speech. But the relative frequency of simplification, its contexts of application, and the set of clusters involved differ across varieties. Considering only the last two consonants and with the exception of a few marginal cases, final clusters can be divided into three groups with respect to simplification (28).

- (28) a. OL (24a) *table* [tab(l)] 'table'
 b. Obstruent+nasal or plosive (24c, 26a, b) *liste* [lis(t)] 'list'
 c. Other clusters (especially 26c, d) *taxe* [taks] 'tax', *corne* [kɔʁn] 'horn'

OL clusters (28a) are the most frequent and the most susceptible to simplification, by deletion of the final liquid. Final deletion in clusters of the second group (28b) is possible, but less regular and restricted to some varieties. The last group (28c) comprises

clusters that are essentially stable. Reduction is most frequent in preconsonantal position, but also well attested prepausally and prevocally.

To illustrate the diversity of configurations with respect to cluster simplification, Table 21.9 indicates the rates of cluster reduction in four areas, distinguishing the three groups in (28) in prevocalic and preconsonantal position. These numbers are based on codings from the PFC corpus¹³ (www.projet-pfc.net; Durand/Laks/Lyche 2002), which indicate the occurrence of final cluster reduction; only the conversations were considered and each region is represented by two PFC survey points: northern France (Brécey, Puteaux-Courbevoie), Switzerland (Neuchâtel, Nyon), Québec (Saguenay, Trois-Rivières), southern France (Aix-Marseille, Lacaune).

Southern France, due to the regularity of word-final schwa (cf. 4.1.2), largely escapes cluster reduction, exceptions targeting in particular some preconsonantal OL clusters. The other (all northern) varieties display productive liquid deletion in preconsonantal OL clusters, ranging from 62% in Switzerland to 99% in Québec. They otherwise differ with respect to prevocalic deletion and the simplification of the clusters in (28b). In northern France, liquid deletion is well established prevocally (38%), but clusters in the (28b) group never simplify. Switzerland allows the reduction of plosive-final clusters (28b) preconsonantly (28%), but excludes prevocalic deletion even for OL clusters. Québec displays by far the highest rates of simplification, for both types of reducible clusters and in prevocalic as well as preconsonantal position (cf. Côté 2004) (29).

- (29) a. (28a), _C: *quatre filles* [katʁij] ‘four girls’
 b. (28a), _V: *quatre ou cinq* [katusœk] ‘four or five’
 c. (28b), _C: *juste mes trucs* [ʒysmetʁyk] ‘only my_{PL} things’
 d. (28b), _V: *juste un niveau* [ʒysœnivo] ‘only a_M level’

Table 21.9: Percentages of final consonant deletion in four areas, before consonants and vowels.

		Northern France	Switzerland	Québec	Southern France
_C	(28c)	0% (N = 46)	0% (N = 98)	0% (N = 80)	0% (N = 45)
	(28b)	0% (N = 23) ¹⁴	28% (N = 61)	84% (N = 49)	0% (N = 19)
	(28a)	74% (N = 103)	62% (N = 266)	99% (N = 214)	11% (N = 82)
_V	(28c)	0% (N = 13)	0% (N = 34)	0% (N = 29)	0% (N = 27)
	(28b)	0% (N = 15)	0% (N = 24)	70% (N = 10)	6% (N = 34)
	(28a)	38% (N = 48)	6% (N = 79)	85% (N = 73)	

¹³ The word *parce que* [paʁsk(ə)] ‘because’ was excluded due to its specific behavior.

¹⁴ This count excludes two occurrences of [t] coded as deleted before another coronal plosive.

5.2 The syllabification of internal clusters

Issues arise with respect to the syllabification of word-internal consonant sequences between codas and onsets. Two principles apply systematically (30) and variability in syllabification is observed in the cases in (31).

- (30) a. Prevocalic single consonants and OL clusters (24a) are onsets:
épée [e.pe] ‘sword’ *écran* [e.kʁɑ̃] ‘screen’
 b. Post-vocalic sonorants (liquids, nasals) are codas preconsonantly:
Hamlet [am.let] (proper name) *poltron* [pɔl.tʁɔ̃] ‘coward’
- (31) a. Obstruent+sonorant sequences other than those in (24a):
athlète [at.let]~[a.tlet] ‘athlete’ *apnée* [ap.ne]~[a.pne] ‘apnea’
 b. (Liquid+obstruent(+[s])+obstruent(+liquid)):
accès [ak.se]~[a.kse] ‘access’ *esprit* [ɛs.pʁi]~[ɛ.spʁi] ‘spirit’
obstacle [ɔps.takl]~[ɔp.stakl] ‘obstacle’

Dell (1995) suggests, on the basis of distributional regularities within consonant sequences, that post-vocalic consonants are always syllabified as codas if no conflict arises with respect to (30) and codas are limited to one consonant. The words in (31) would thus all be syllabified with one coda consonant. But this rule appears too strict. Laeuffer’s (1991) auditory and spectrographic analysis of experimental results indicates variability in syllabification for the sequences in (31), with more onset consonants in fast speech than in slow speech. Likewise, Azra/Cheneau (1994) and Plénat (1995) suggest that obstruent+obstruent sequences may be syllabified as complex onsets in words like *accès* and *esprit* (31b). Their argument rests on data from *verlan*, a language game in which words are created by inverting syllables in the original French form (hence *verlan* [vɛʁlɑ̃], from *l’envers* [lɑ̃vɛʁ] ‘the reverse’). Words like *mystique* [mistik] ‘mystic’ tend to be transposed as [stik.mi], indicating a syllabification with a complex onset and no coda [mi.stik]. The factors involved in the variable syllabification of the clusters in (31) include sonority sequencing, phonotactic restrictions at word edges, and speech rate (Laeuffer 1991), but they remain to be clarified.

6 The word

The word is considered here from two points of view. Sections 6.1 and 6.2 first discuss segmental and prosodic aspects involved in word formation: morphophonological alternations in derivation and prosodic morphology. Sandhi processes applying at word boundaries, and exceptions to them, are reviewed in 6.3.

6.1 Morphophonological alternations

Morphological inflection and derivation in French involve a large number of segmental alternations, which are involved in four contexts: masculine-feminine and singular-plural distinctions in the nominal and adjectival domain, verbal conjugations, and derivational morphology. The alternations fall into three main types: consonantal (C~Ø), nasal (VN~V̄), and vocalic (V₁~V₂). A number of other alternations are grouped in the “other” category. Table 21.10 provides examples of each combination of context and type.

These alternations are analyzable in different ways, from the most abstract to the most concrete, depending on the productivity and regularity of each alternation and one’s theoretical model. One issue is whether the alternations are phonological, morphological, or lexical in nature. Abstract derivational proposals have been applied in particular to the consonantal and nasal types, which are also related to liaison (cf. 4.2). One form of each alternation is obtained from the other by the application of phonological rules. For instance, *bon* [bɔ̃] ‘good_M’ may be derived from /bɔn/ through processes of vowel nasalization before a coda nasal and final consonant deletion (in that order), which do not apply in derived forms like *bonnement* ‘good_{ADV}’; cf. Ayres-Bennett/Carruthers (2001) for a review of nasal alternations and the problems raised by this type of approach, including the underlying or derived status of nasal vowels. Other, less abstract options include the use of suppletive forms (e.g. *bon-* [bɔ̃], [bɔn]) and more general morphological correspondences between nasal vowels and corresponding VN sequences.

Table 21.10: Morphophonological alternations in derivation.

	Masc-fem	Singular-plural	Verbs	Derivation
C~Ø	<i>grand~grande</i> [gʁɑ̃]~[gʁɑd] ‘big _{M-F} ’	<i>œuf~œufs</i> [œf]~[ø] ‘egg _{SG-PL} ’	<i>dit~disent</i> [di]~[diz] ‘say _{3SG-3PL} ’	<i>grand~grandir</i> [gʁɑ̃]~[gʁɑdiʁ] ‘big _M ~grow _{INF} ’
VN~V̄	<i>bon~bonne</i> [bɔ̃]~[bɔn] ‘good _{M-F} ’	---	<i>vient~viennent</i> [vjɛ̃]~[vjɛn] ‘come _{3SG-3PL} ’	<i>bon~bonnement</i> [bɔ̃]~[bɔnmɑ̃] ‘good _M ~good _{ADV} ’
V ₁ ~V ₂	<i>mon~ma</i> [mɔ̃]~[ma] ‘my _{M-F} ’	<i>monsieur~messieurs</i> [m(ə)sjø]~[mesjø] ‘sir _{SG-PL} ’	<i>peut~pu</i> [pø]~[py] ‘can _{3SG-PST,PTCP} ’	<i>sel~saler</i> [sɛl]~[sale] ‘salt~salt _{INF} ’
Other	<i>neuf~neuve</i> [nœf]~[nœv] ‘new _{M-F} ’	<i>ciel~cieux</i> [sjɛl]~[sjø] ‘sky _{SG-PL} ’	<i>faut~faill</i> [fo]~[faj] ‘must _{3SG-3SG.SUBJ} ’	<i>école~scolaire</i> [ekɔl]~[skɔlɛʁ] ‘school~school _{ADJ} ’

6.2 Prosodic morphology

Prosodic morphology is concerned with word formation processes that are governed by specific prosodic constraints. These include reduplication, truncation, and acronyms (Scullen 1993). Reduplicated forms obey strict conditions: they are disyllabic and the first syllable is consonant-initial and open.¹⁵ If the base word corresponds to a single open syllable, that syllable is simply reduplicated (32a). If the syllable is closed, only its CV part is copied to the left (32b). If the base word is polysyllabic, either the first or the last syllable may be reduplicated (compare 32c and 32d); the latter option is systematic with vowel-initial words (32e). Vowel quality may be adapted to conform to distributional restrictions, as in (32c).

- (32)
- | | | | | | |
|----|----------------|-----------------------|----------|---|-----------------|
| a. | <i>fou</i> | ‘crazy _M ’ | [fu] | → | [fufu] |
| b. | <i>folle</i> | ‘crazy _F ’ | [fɔl] | → | [fɔfɔl] |
| c. | <i>joli</i> | ‘nice’ | [ʒɔli] | → | [ʒoʒo] |
| d. | <i>biscuit</i> | ‘cookie’ | [biskɥi] | → | [kɥikɥi] |
| e. | <i>Annette</i> | (proper name) | [anet] | → | [nɛnɛt]~[nenet] |

Truncated forms are of two types: simple (33a, b) and suffixal (33c, d).

- (33)
- | | | | | | |
|----|-------------------|---------------|-------------|---|---------|
| a. | <i>cinéma</i> | ‘cinema’ | [sinema] | → | [sine] |
| b. | <i>conférence</i> | ‘conference’ | [kɔ̃fɛʁɑ̃s] | → | [kɔ̃f] |
| c. | <i>colonie</i> | ‘summer camp’ | [kɔlɔni] | → | [kɔlɔ] |
| d. | <i>apéritif</i> | ‘aperitif’ | [apɛʁitɪf] | → | [apɛʁɔ] |

Suffixal truncation most often involves a final [o] (cf. Scullen 1993 for other suffixes), which can be interpreted either as a suffix, as in [apɛʁɔ] (33d), or as a segment from the base word, as in *colonie* (33c). Excluding [o], truncated forms display a limited set of syllabic patterns – CVC, CV(C).CV(C), CV.CV.CV – with a strong preference for mono- or disyllabic forms and the constraint that monosyllables end in a consonant, as in (33b).¹⁶ Two conditions seem to be at work: a minimal word condition, whereby a word contains at least two moras¹⁷ (which excludes CV forms), and an optimal word condition, according to which a word contains one binary foot (defined by moras or syllables).

Acronyms (Scullen 1993; Plénat 1993; 1998) may be read letter by letter or as words, depending on a complex interplay of segmental and prosodic factors. In order to be read as a word an acronym must be “pronounceable”. This requires at

¹⁵ The last constraint is exceptionally violated, as in *cache-cache* [kaʃkaʃ] ‘hide-and-seek’.

¹⁶ Rare exceptions involve a complex onset: *psychologue* [psikɔlɔg] → [psi] ‘psychologist’.

¹⁷ A mora is a unit of syllabic weight, which has no apparent role in French outside of prosodic morphology.

least a vowel, so acronyms containing only consonants are spelled out (34a). The main tendencies otherwise appear to follow from three general principles. (i) The optimal word is disyllabic. As a result, two-letter acronyms are spelled (34b). The proportion of read acronyms then rises with the number of letters, spelling deviating more and more from the optimal disyllable. (ii) The optimal syllable has an onset. This principle applies more strictly to read acronyms and explains the greater tendency for vowel-initial acronyms (34c) and those containing vowel sequences (34d) to be spelled. (iii) Complex onsets follow the markedness hierarchy OL<[sC]<other (cf. 24, 25). In three-letter acronyms, all OL sequences may be read (34e), [sC] is variably spelled (34f) or read (34g), and more marked onsets are spelled (34h), but may only be read in longer acronyms (34i).

- (34) a. CGT [sezete] (Confédération Générale du Travail)
 b. SA [esa] (Société Anonyme)
 c. OPA [opea] (Offre Publique d'Achat)
 d. RAU [ɛʁay] (République Arabe Unie)
 e. CLA [kla] (Centre de Linguistique Appliquée)
 f. SPA [ɛspea] (Société Protectrice des Animaux)
 g. SCO [sko] (Sporting Club Olympique)
 h. CNU [seɛny] (Conseil National des Universités)
 i. CNIT [knit] (Conseil des Nouvelles Industries et Technologies)

The interest of prosodic morphology lies in its revealing hidden preferences in the phonology of French: (i) a minimal word constraint, which prevents CV truncations and acronyms; (ii) an optimal word condition, which favors disyllables in both of these processes as well as reduplication; (iii) a preference for onsetful syllables, which bans vowel-initial reduplicative forms and disfavors the reading of acronyms with initial vowels or vowel sequences. Analyses of these processes also highlight the role of binarity, at the level of moras, syllables, or feet.

6.3 Boundaries and disjunction

The status of the word in French has been notoriously contentious. It is commonly claimed that the (grammatical) word has no phonetic identity, as word boundaries tend to be blurred by a number of processes. These processes create alternations of consonants and vowels at word boundaries, by selecting vowel-final variants before consonant-initial words and consonant-final variants before vowel-initial words. They apply most systematically between clitics and their nominal or verbal host, but also between non-clitic words. Table 21.11 provides a summary.

Table 21.11: Sandhi processes distinguishing vowel-initial and consonant-initial words.

	Before consonant-initial words	Before vowel-initial words
a. V~Ø (clitics)	<i>la fille</i> [lafij] ‘the _F girl’ <i>le mot</i> [l(ə)mɔ] ‘the _M word’ <i>tu dors</i> [tydɔʁ] ‘you _{SG} sleep’	<i>l'idée</i> [lide] ‘the idea’ <i>l'ours</i> [lurs] ‘the bear’ <i>tu as</i> [t(y)a] ‘you _{SG} have’
b. [l]~Ø (clitics)	<i>il va</i> [i(l)va] ‘he goes’ <i>elle va</i> [ɛ(l)va] ‘she goes’	<i>il arrive</i> [ilaviv] ‘he arrives’ <i>elle arrive</i> [ɛlaviv] ‘she arrives’
c. Schwa (non-clitics)	<i>reste là</i> [ʁɛst(ə)la] ‘stay there’ <i>arrête là</i> [aʁɛtla] ‘stop there’	<i>reste ici</i> [ʁɛstisi] ‘stay here’ <i>arrête ici</i> [aʁɛtisi] ‘stop here’
d. Liaison	<i>les mots</i> [lemɔ] ‘the _{PL} words’ <i>gros chien</i> [ɡʁɔʃjɛ] ‘big _M dog’	<i>les hôtes</i> [lezot] ‘the _{PL} guests’ <i>gros ours</i> [ɡʁɔ(z)urs] ‘big _M bear’
e. Suppletion	<i>ma peau</i> [mapɔ] ‘my _F skin’ <i>vieux mot</i> [vjɔmɔ] ‘old _M word’	<i>mon eau</i> [mɔno] ‘my water’ <i>vieil hôte</i> [vjɛjot] ‘old guest’
f. <i>Enchaînement</i>	<i>quel mot</i> [kɛl.mo] ‘which word’	<i>quel hôte</i> [kɛ.lot] ‘which guest’

Clitics are subject to V~Ø and C~Ø alternations (Table 21.11, examples a, b). Vowel elision refers to the omission of the vowel in CV clitics followed by vowel-initial words: it is categorical in /Cə/ clitics and in *la* ‘the_F/her’, and variable (in informal speech) in *tu* ‘you_{SG}’. Unlike /a/ and /y/, however, the presence of schwa before a consonant is not systematic. In the clitics *il* ‘he’ and *elle* ‘she’, /l/ is variably omitted before consonants. At the end of non-clitic words (Table 21.11, examples c), schwa is also absent before vowel-initial words, but its presence before a consonant is more restricted than in clitics. Liaison (Table 21.11, examples d; cf. 4.2) is systematic after clitics (e.g. *les* ‘the_{PL}/them’) but variable after non-clitic categories (e.g. *gros* ‘big_M’). Suppletion (Table 21.11, examples e) applies to both clitics and non-clitic words, which have a consonant-final (or liaison-triggering) variant before vowels and a vowel-final variant before consonants. Finally, *enchaînement* (Table 21.11, example f)) refers to the resyllabification of word-final consonants in the onset of a following vowel-initial word, as in *quel hôte* ‘which guest’ /kɛl#ot/ [kɛ.lot]. This process disrupts the correspondence between syllable and word boundaries in C#V contexts.

Despite the processes in Table 21.11, Durand/Eychenne (2014) argue that there remain several segmental and prosodic cues to word boundaries. For example, *des blocages* ‘some blockings’ and *déblocage* ‘unblocking’ are both pronounced [deblokaʒ], but with a different prosodic pattern: the [e] of the determiner in *des blocages* is articulated with less intensity and a lower F0 and is thus less prominent than the [e] of *déblocage*. With respect to resyllabification, Fougeron (2007) also shows that it is far from systematic and there is no neutralization between final (resyllabified) consonants and initial consonants. In other words, the sequence [ita] in *petite amie* /pətit#ami/ ‘little_F friend_F’ remains different from that in *petit tamis* /pəti#tami/

‘small_M sieve’ – although both are usually transcribed [pə.ti.ta.mi] – due to durational and spectral differences between the two consonants and their surrounding vowels.

The sandhi processes in Table 21.11 can however be blocked before vowels, a phenomenon known as disjunction. Disjunction may apply before any vowel-initial word in specific contexts, notably in autonymic uses (e.g. *le “ami” dans ce texte* [ləamidās(ə)tɛkst] ‘the_M “friend” in this_M text’). But it is regular with a specific class of words, called *h aspiré*, which begin phonetically with a vowel but do not pattern with regular vowel-initial words with respect to the processes in Table 21.11, as shown in (35). For example, liaison applies as expected in *les eaux* [lezo] ‘the_{PL} waters’, but not in *les hauts* ‘the_{PL} tops’ (35c). Historically, these words, borrowed from medieval Germanic dialects, were pronounced with a consonantal [h]. This consonant later ceased to be realized in most varieties of French (cf. 3.1), but the words have retained their consonantal behavior. The phenomenon has since evolved in two directions: some *h aspiré* words have tended to regularize to normal vowel-initial words, but the class has also attracted new lexical categories that were not historically [h]-initial, notably letters,¹⁸ numbers, and proper names.

In most respects, *h aspiré* words pattern with consonant-initial ones, but two differences emerge. First, schwa is more often realized before *h aspiré* than before consonants. In clitics schwa is variably omitted before consonants (e.g. *dans le mot* [dāl(ə)mo] ‘in the_M word’), but generally not before *h aspiré* (e.g. *dans le haut* [dāləo] ‘in the_M top’). At the end of non-clitic words, schwa in northern varieties is usually not realized after one consonant (e.g. *douze mots* [duzmo] ‘twelve words’), but a following *h aspiré* word allows the retention of schwa (35b). Second, while *enchaînement* never applies before consonants, it is variable before *h aspiré* (35e). When *enchaînement* does not occur, a glottal plosive tends to be inserted.

(35) a. Vowel elision:	<i>la hausse</i>	[laos]	‘the _F rise’
	<i>le haut</i>	[ləo]	‘the _M top’
	<i>tu harcèles</i>	[tyaʁsɛl]	‘you _{SG} harass’
b. Schwa:	<i>douze hauts</i>	[duz(ə)o]	‘twelve tops’
c. Liaison:	<i>les hauts</i>	[leo]	‘the _{PL} tops’
d. Suppletion:	<i>ma hausse</i>	[maos]	‘my _F rise’
	<i>vieux haut</i>	[vjøo]	‘old _M top’
e. <i>Enchaînement</i> :	<i>quel haut</i>	[kɛl.(?)o]	‘which top’
	<i>quel héros</i>	[kɛ.le.ʁo]	‘which hero’

¹⁸ Interestingly, while all individual letters with a vowel-initial name involve disjunction (e.g. *le O et le S* [ləoeləs] ‘the O and the S’), only consonant letters remain disjunctive as the initial letter of acronyms that are spelled out, as in *la RAU* [laʁay] (34d) (cf. also 34b, f). Spelled acronyms with an initial vowel letter do not normally behave as *h aspiré* words, e.g. *l’OPA* [lopea] (not *la OPA*) (34c).

While the above summarizes the main empirical generalizations pertaining to *h aspiré*, corpus studies reveal more variability. Vowel elision is indeed systematically blocked before *h aspiré* words, but liaison is occasionally realized (e.g. *un handicap* [ɛ̃nādikap] ‘a_m handicap’) and *enchaînement* is in fact the norm, as it applies in 92% of potential cases (Göhring 2017). As to the representation of *h aspiré* words, it has led to multiple proposals, based on lexical diacritics, some initial consonant that eventually deletes, or an empty syllabic onset; cf. Gabriel/Meisenburg (2009) for a review and a proposal that incorporates the observed variability in the realization of *h aspiré* words.

7 Prosody

This section briefly deals with aspects of prosody, namely stress, intonation, and phrasing, which are more highly interdependent in French than in other Romance languages (cf. Delais-Roussarie et al. 2015; Avanzi/Simon/Post 2016; Di Cristo 2016; Féry 2017 for recent reviews; ↗9 Intonation).¹⁹

Stress in French has no contrastive function, unlike in English or Spanish, and it is determined at the post-lexical level. This leads to a high degree of syncretism between stress and intonation (Delais-Roussarie et al. 2015). Consequently, Féry (2017) classified French as a *phrase language*, as opposed to lexical stress, pitch accent, and tone languages. Certain regional varieties, however, may partially deviate from this categorization (cf. Simon 2012 for a synthesis of regional prosodic variation). African varieties may display tonal features as a result of contact with local languages. For instance, the variety of French spoken in Bangui, in Central African Republic, has developed a tonal system in which most words are associated with a tonal pattern that is stable across positions in the utterance (Bordal 2012). This system has been adapted from Sango, the *lingua franca* in the country; its lexical and tonal nature contrasts with the post-lexical and stress-based system of other varieties. Conservative Southern French has also maintained lexical stress, in contact with Occitan, itself a lexical stress language like other Romance languages (Sichel-Bazin 2016).

¹⁹ In terms of rhythm, another aspect of prosody, French joins other major Romance languages in being considered a so-called syllable-timed language, as opposed to stress-timed languages like English (↗8 Comparing and deconstructing speech rhythm across Romance languages). I follow Nespor/Shukla/Mehler (2011), who consider that this rhythmic distinction is not defined by isochrony between syllables and interstress intervals, but essentially derived from other aspects of the phonological system, particularly syllable structure. Syllable-timed languages are characterized by a higher proportion of open syllables and a (relatively) more restricted inventory of syllable types (cf. Table 21.8) than stress-timed languages. This results in a higher proportion of vocalic portions in the signal and a reduced variability of consonantal intervals. Additionally, French, like other Romance syllable-timed languages, is characterized by a limited amount of vowel reduction in unstressed syllables.

Two broad types of stress can be distinguished: rhythmic/demarcative and emphatic. They target the edges of the stress domain, which has received a variety of labels in the literature; it is referred to here as the accentual phrase (AP). The AP contains at least one content word, and its accompanying clitics if any; additional words may also be included, depending on the number of syllables, the syntactic configuration, and speech rate.

Main rhythmic stress regularly falls on the last syllable; in other words, stress is word-final, but its realization depends on the larger context. Two examples from Jun/Fougeron (2000, 215) are given in (36); APs are delimited with braces, content words bolded and syllables bearing main rhythmic stress underlined. (36b) illustrates that adjective+noun sequences are likely to form a single AP (*mauvais garçon*) and that monosyllabic words tend not to form an AP of their own (*ment*). On average, APs in Parisian French contain 2.3–2.6 words (1.2 content words) and 3.5–3.9 syllables (Jun/Fougeron 2000). In southern varieties, monosyllables being less frequent due to the realization of word-final schwas (cf. 4.1.2), each content word tends to project its own AP (Sichel-Bazin/Buthke/Meisenburg 2012).

- (36) a. {**Européen**} {est un **mot**} {**utilisé**} {par les **Français**}
 ‘European is a word used by the French’
 b. {Le **mauvais garçon**} {**ment** à sa **mère**}
 ‘The bad boy lies to his mother’

APs are grouped into larger prosodic constituents. The minimal model contains one type of higher unit, called the intonational phrase (IP), among other terms. The IP carries higher-level intonational features (sentence type, illocutionary force, modality), which are also realized at the right edge of the phrase through a tonal rise or fall.²⁰ Significant differences in duration are also observed between IP-final syllables, AP-final (non-IP-final) syllables, and AP-medial (unstressed) syllables, IP-final syllables being about twice as long as AP-medial ones (Jun/Fougeron 2000, 221).

IP-final syllables thus combine both AP-level information (stress) and IP-level intonation. IP-final stress may however shift to the penultimate syllable as a result of the occurrence of a prepausal schwa-like vowel (cf. 4.1.1, fn. 6). For example, *sa mère* in (36b) may be pronounced [sa'mɛʁ], with final stress, or [sa'mɛʁə], with penultimate stress. In the latter case, stress and intonation can be carried by different syllables. AP-final prominence may also be distributed over the last two syllables. Penultimate

²⁰ An intermediate level may be adopted, as the intermediate phrase (ip) in Delais-Roussarie et al. (2015). The occurrence of an ip, which combines several APs, is strongly related to the syntactic complexity and length of the sentence (e.g. long branching NPs, peripheral syntactic elements such as clefts etc.). In other models of French intonation, the absence of intermediate constituents is compensated for by restructuring mechanisms between APs and IPs (e.g. Post 2000). Intermediate levels are not considered here.

marking is particularly frequent and salient in certain regional varieties, notably in Belgium (Bardiaux/Simon/Goldman 2012) and Switzerland (Avanzi et al. 2012), where penultimate syllables are lengthened and/or associated with a tonal rise. In Laurentian French, penultimate syllables are not specifically lengthened, but those containing underlyingly long vowels (cf. 2.2) may be perceived as stressed (Paradis/Deshaies 1990).

The beginning of APs may also attract stress: either a secondary rhythmic stress or an emphatic stress. Emphatic stress itself serves different functions, notably emphasis *per se* – affective (37a) or argumentative (37b) – and listing (37c). It is particularly frequent in certain speech styles, such as public speech, and it has been argued that its increasing frequency has favored the development of the rhythmic optional initial stress. The position of initial stress is variable. It falls most often on the initial syllable of lexical words (37b, c), but possibly on the peninitial one in vowel-initial words (37a). Clitics or weak words may also be accented (Jun/Fougeron 2000, 212; Delais-Roussarie et al. 2015, 67). Initial stressed syllables are marked by higher intensity and pitch; their onset consonant can be lengthened.

- (37) a. *extraordinaire* ! [ˈɛkstʁ(a)ʁdinɛʁ]~[ɛks'tʁ(a)ʁdinɛʁ]
 'extraordinary'
 b. *un droit fondamental* [ɛ̃dʁwa'fɔ̃damɑ̃tal] 'a_M right fundamental'
 c. *une personne souriante, généreuse, travailleuse*
 [ynpʁɛʁsɔn'suʁjɑ̃t|'ʒenɛʁøz|'tʁavajøz]
 'a_F person smiling, generous, hardworking'

Delais-Roussarie et al. (2015) characterize the intonational structure of French in terms of tonal targets. The right edge of all prosodic constituents is associated with a rising (H) or falling (L) tonal event: a pitch accent in APs (noted with *), boundary tones in IPs (noted with %). The direction of the F0 movement depends on sentence type and interaction with neighboring constituents. The AP-final pitch accent is contrastively H* or L* in IP-final position, but it is by default H* in non-IP-final APs. The IP-final position thus displays distinctive combinations of pitch accents and boundary tones, associated with different sentence types and modalities (without any one-to-one correspondence between tonal configuration and function). For instance, statements tend to be characterized by a L*L% configuration, as opposed to H*H% or H*L% for imperatives and H*H% or L*H% for information-seeking yes/no questions (cf. Delais-Roussarie et al. 2015, 98–99 for a synthesis of tonal configurations associated with different sentence types). Only three tonal combinations are frequent – L*L%, H*H%, H*L% – and this limitation distinguishes French from other Romance languages. It appears that French appeals more often to other linguistic means (lexical markers, syntactic constructions, other prosodic features) to convey contrasts that are expressed by tonal patterns in other languages.

In addition to their final pitch accent, APs may contain an initial F0 rise, labeled Hi. Each H tone may be preceded by a L target, depending on the precise location of the H accent and the availability of segmental material. Jun/Fougeron (2000, 216) thus established the following default tonal pattern for APs: /LHiLH*/ (cf. also Delais-Roussarie et al. 2015, 70).

8 Conclusion

This chapter has presented an overview of the sound system of French, or rather Frenches, considering the emphasis put on dialectal variation. Inevitably, all topics and all varieties could not be covered with the same level of attention. The more detailed treatment devoted to schwa, liaison and the vowel inventory may be considered proportional to their privileged status in the phonological literature and the recent debates they have generated. Likewise, the description of the standard variety remains central, but the support of recent corpus data has strengthened its empirical basis, while putting it in the wider perspective of French as spoken around the world. Dialectal variation could not be addressed for all topics, however (e.g. word-level processes in Section 6), and much work remains to be done to complete the coverage of French varieties. While the chapter mostly provides a synthesis of available studies, it also takes approaches that may be considered unconventional (e.g. concerning the (non-)phonemic status of schwa) and offers new data (e.g. on word-final cluster reduction and liaison with hesitation vowels).

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22 Occitan

Abstract: This chapter details the phonological system of southern Gallo-Romance, or Occitan, a language traditionally spoken throughout the south of France and in parts of Spain and Italy. It begins by outlining the external history of the language, its principal dialects and sub-dialects, the glottonyms used to refer to the language, and its representation in written form; supra-dialectal groupings are also proposed. The historical linguistic developments that characterize the major dialects and supra-dialectal groupings are then presented, before a detailed discussion of the modern consonantal, vocalic, and glide/diphthong inventories. Within the discussion of the modern phonological system, extensive information is provided on the phonetic realization of phonemes across geographical space. Finally, the suprasegmental phonology of Occitan is presented, including stress placement, prosodic organization, nuclear configurations and applications, and contact-induced prosodic change.

Keywords: Occitan, southern Gallo-Romance, phonological variation, phonetic variation, standardization.

1 Introduction

Occitan is the name commonly given to the varieties of southern Gallo-Romance traditionally spoken in the south of France, but also in parts of Italy and Spain. The language had its heyday in the Middle Ages, most notably in the lyric of the Troubadours and a considerable body of scientific literature. However, most of the Occitan-speaking territories were successively absorbed into France starting in the 13th century, and as a consequence French progressively became the dominant language relegating Occitan to private use (Boyer/Gardy 2001). Over the course of the 20th century, Occitan has found itself in an increasing state of language obsolescence, resulting in domain restriction, a reduction in speaker numbers, and the transfer of linguistic features from French. It is extremely difficult to estimate speaker numbers for Occitan but recent work has cautiously suggested that there are around 500,000 native speakers in total (Martel 2007), with the vast majority of these speakers being over the age of seventy and rural dwellers. Active competence among younger generations is rare, but since the 1980s, some public schools and private *Calandretas* (immersion-education schools) have been offering bilingual Occitan-French education, mainly at the primary school level.

This chapter details the phonetics and phonology of Occitan and its varieties, focusing both on the commonalities between phonological systems over geographical space and the high levels of observable variation. It begins with an external overview

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of the history of Occitan and its dialects (Section 2), followed by a historical phonological justification of the major dialectal and sub-dialectal divisions within this language sub-family (Section 3). The consonantal and vocalic inventories are discussed in detail (Section 4), with cross-dialectal comparisons included in each section, followed by a discussion of the prosodic organization of the language (Section 5).

2 Contextual background

By the 10th century, the varieties descended from the Vulgar Latin spoken in Gaul had become strongly diversified along regional lines, leading to the development of three broad dialect areas for Gallo-Romance. The most significant division within Gallo-Romance is between the *langue d'oc* (commonly referred to as Occitan) in the south, and the *langue d'oïl*, in the north (≈21 French). The third, eastern area, *francoprovençal*, shares features of both northern and southern dialects, as well as independent developments which distinguish it from both. Within the Occitan area, many dialectal and sub-dialect divisions have been proposed, as well as supra-dialectal classifications that group and re-group Occitan varieties, to which we will now turn.

2.1 Dialectal divisions and sub-divisions

The modern *langue d'oc* area is commonly divided into six main dialects (cf. Figure 22.1): Gascon in the southwest; central Lengadocian; Lemosin and Auvernhât in the north of the *Oc* region; Provençal in the southeast; Vivaro-Alpin or *provençal alpin*, above the Provençal region. Additional principal dialects have been proposed, e.g. Aquitanian (Ford 1921, 1; Coustenoble 1945, 11), but this would be included within the Gascon dialect area by most other classificatory systems.

The six main Occitan dialects have been shown, to a certain extent, to have a common structural base (cf. Section 3), but they are frequently grouped together on the basis of common phonological developments. Bec (1963, 37) proposes regrouping Occitan into three supra-dialectal divisions: *nord-occitan*, including Lemosin, Auvernhât, and Vivaro-Alpin; *occitan moyen*, including Lengadocian and Provençal; Gascon stands alone. Oliviéri/Sauzet (2016, 319) mirror this classification, making a distinction between northern Occitan, southern Occitan, and Gascon. Sampson (1999, 139) proposes four supra-dialectal groupings, separating Lengadocian, Provençal, and Gascon, but maintaining a *nord-occitan* group on the basis that Lemosin, Auvernhât, and Vivaro-Alpin “form something of a linguistic continuum with a good deal of overlapping of linguistic features”. Wheeler (1988, 246), on the other hand, proposes a bipartite supra-dialectal division between northeastern Occitan, including Lemosin, Auvernhât, Vivaro-Alpin, and Provençal, and southwestern Occitan, including Len-



Figure 22.1: The Southern Gallo-Romance dialect areas (Harris/Vincent 1988, 482).

gadocian and Gascon. Nonetheless, within each dialectal area, many sub-dialectal divisions and classifications have been proposed.

For the three northern varieties, *nord-occitan*, various sub-dialects can be identified. Following Ford (1921, 1) Lemosin is comprised of *bas-limousin*, *haut-limousin*, and *marchois* as well as sub-dialects in the Périgord; Auvergnat comprises *cantalien*, *limagnien*, *velaunien*, and *forézien* sub-dialects; Vivaro-Alpin includes *briançonnais*, *diois*, *valentinois*, and *vivaraïs*. There is substantial variation regarding these sub-dialectal divisions, both in terms of their geographical limits and, indeed, in terms of the names that the sub-dialects are given. Many further sub-divisions have also been proposed; for example, Quint (1999, 1–2), working on the variety of Vivaro-Alpin that he calls *albonnais*, provides the following classification framework: Occitan (language) > Vivaro-Alpin (dialect) > *vivaro-dauphinois* (sub-dialect) > *vivaro-vellave* (group of local vernaculars) > *boutiérot* (sub-group of local vernaculars) > *albonnais* (local vernacular). The northern limits of the *nord-occitan* area constitute a transition zone, often referred to as the *croissant*, between *langue d'oc* and *langue d'oïl*, where intermediate linguistic forms are commonly found (Bec 1963, 13; cf. 3.1).

Bec (1963, 45) proposes four sub-dialectal groupings within Lengadocian: *languedocien méridional* (central, toulousain, fuxéen, donésanais, narbonnais); *languedocien septentrional* (rouergat, gévaudanais, aurillacois), which constitutes a transition zone into the *nord-occitan* area; *languedocien occidental* (agenais, quercinois, albigeois); *languedocien oriental* (biterrois, montpelliérain, cévanol), which transitions into Provençal. Provençal is commonly divided into four sub-dialects: *rhodanien*, spoken in the west of the province; *maritime*, spoken in the central part of the province; *bas-alpin* or *gavot*, spoken in the lower Alps; *nissart* spoken in and around Nice. Bec (1963, 47) makes a distinction between (*provençal*) *maritime* (spoken along the coast) and *central*, bordered by *maritime* to the south, *rhodanien* to the west, and *bas-alpin* to the east. Equally, the variety of Provençal traditionally spoken in Marseille is sometimes singled out as an autonomous sub-dialect (Ford 1921, 1). *Rhodanien* was the native dialect of Frédéric Mistral, the renowned Provençal poet, who in the mid-19th century became the central figure of an Occitan cultural and literary movement. It is therefore on the basis of *rhodanien* that Mistral compiled his *Trésor dóu Félibrige*, a comprehensive Occitan-French bilingual dictionary published between 1878 and 1886, which acted as a reference point for many works on Occitan (e.g. Ford 1921; Coustenoble 1945).

One commonality in all taxonomies is that Gascon is considered as separate from other Occitan dialects, primarily because it is the most divergent in terms of its phonological and morphosyntactic structure (Rohlf 1935/1977; cf. also Massoure 2012; Walter 1988, 153). From as early as the 14th century, Gascon has been referred to as *lengatge estranh* ('strange language') by Guilhem Moliniér in the grammatical treatise *Las Leys d'Amors* (1356) (Anglade 1919/1971, 164), but the explanation as to why Gascon contains such highly divergent linguistic features has been much debated (cf. 3.3). Lodge (1993, 68) notes that numerous factors seem to be at play: the pre-Latin

Aquitainian (rather than Gaulish) substratum; the post-Latin Basque superstratum resulting from the Basque invasion of the area between the Garonne and the Pyrenees from the 6th to the 9th centuries; close communication networks with Romance-speaking populations south of the Pyrenees. Many sub-dialects of Gascon can also be identified, such as Bortalés, traditionally spoken in the Bordeaux area, *lo parlar negre* ('the black dialect'), spoken primarily in the western part of the *Landes* department, and Biarnés, the principal surviving dialect of Gascon, spoken in the region of Béarn.

Outside of France, Occitan dialects are also spoken in about 16 valleys in the provinces of Cuneo and Turin in Italy (Olivieri/Sauzet 2016, 319), in the Val d'Aran in Catalonia, Spain, and in Guardia Piemontese (La Garda) in Calabria, southern Italy (Bec 1963, 13; Olivieri/Sauzet 2016, 319).

2.2 Occitano-Romance

In 2.1, we noted that Bec (1963) proposed three supra-dialectal groupings for Occitan: *nord-occitan*, *occitan moyen*, and Gascon; in fact, Bec (1963) also includes Catalan (723 Catalan) in his taxonomy. Although the classification of Occitan as Gallo-Romance and Catalan as Ibero-Romance is common, some scholars criticize the justification for this decision as superficial. Posner (1996, 24) is not alone in maintaining that "the end-result looks suspiciously like areal grouping", and Judge (2007) defends the notion that Catalan and Occitan should in fact form their own separate sub-branch of Romance. Many studies, including Bec (1963) and Sumien (2006), have emphasized the common diachronic developments in, and strikingly similar synchronic structures of, Occitan and Catalan: "whereas a 'Proto-Occitan-Catalan' is a quite plausible concept, a 'Proto-Occitan-French' (excluding Catalan) certainly is not" (Harris 1988, 16). On this basis, "Occitano-Romance" has been proposed as a sub-language family in its own right, distinct from Gallo- and Ibero-Romance, or, in some cases, as a sub-grouping within Gallo-Romance. Bec (1963, 55–58) takes this argument further, proposing two supra-dialectal areas within Occitano-Romance, on the basis of common phonological developments in each area: *alverno-méditerranéen* (later *arverno-méditerranéen*; Bec 1973, 18–19), including *nord-occitan* and Provençal, and *aquitano-pyrénéen*, with (Pyrenean) Lengadocian, Gascon, and Catalan. This division is mirrored, to some extent, by the northeastern-southwestern supra-dialectal areas proposed by Wheeler (1988; cf. 2.1). Within the *aquitano-pyrénéen* grouping, which is said to have Gascon at its centre (Bec 1973, 18), geographically restricted Pyrenean Lengadocian is identified as a transition or "bridge" variety between Gascon and Catalan (Bec 1973, 19), but the rest of the Lengadocian dialect is singled out as particularly conservative, emphasising the structural parallels between the Gascon dialect and Catalan.

2.3 Glottonyms and orthographical conventions

A wide variety of glottonyms are used to refer to southern Gallo-Romance, with native speakers often attesting simply that they speak *patois* or, sometimes, they will refer to the name of the local variety, e.g. *le béarnais* or *le montpelliérain* (cf. 2.1). The term “Provençal” was widely used in the medieval period and was revived by Romanists in the 19th century; this term is still sometimes used in English today, to designate the entire *langue d’oc* continuum (Harris 1988, 16). In modern usage, this term only refers to the main Provençal dialect area. Equally, the term “Gascon” has previously been used, in the 17th and 18th centuries, to refer to the *langue d’oc* continuum as a whole. The modern use of the term “Occitan” was born of the Occitanist movement which began largely with the establishment of the *Institut d’Estudis Occitans* after the Second World War. The term “Occitan” is the modern reflex of the Latin word *OCCITANUS*, attested as early as 1286 in the Testament of Lancelot d’Orgemont (“more patriae occitanae”, literally ‘following the custom of our Occitan country’), referring to the “lingua de hoc” (*langue d’oc*; cf. Sauzet 2012). The Occitanist movement considers “Occitan”, the unifying name used to designate all *langue d’oc* dialects, as referring to a single language. The standardization of modern Occitan began in the early 20th century, and the orthographical standard is based on medieval representations of central *langue d’oc* dialects together with some modern Lengadocian: today the classical orthography, as defined by Loïs Alibèrt, is most widely used (Alibèrt 1935/1976; Alibert 1966; Lafont 1971; cf. also Kremnitz 1974 for a historical perspective on Occitan writing systems; Oliuéri/Sauzet 2016, 319). The term “Occitan” and the orthographical standard are frequently a source of ideological conflict between Occitanist organizations and grass-roots movements in the regions that focus on individual varieties, often considering them to be languages in their own right, e.g. The *Institut Béarnais et Gascon* in Béarn or The *Unioun Provençalo*. Nonetheless, we will use the term “Occitan” and the standard “classical” orthographical system here, without their associated ideological implications, as they are the most commonly employed in the academic sphere.

3 Phonological history of Occitan

Occitan displays many historical developments in its linguistic evolution that distinguish it in phonological terms from the other Romance languages and, in particular, from Catalan and French. This section will serve to summarize these developments and, in 3.1–3.4, to outline the major phonological developments, from a historical perspective, within the main supra-dialectal areas.

Occitan exhibits the following characteristics in its phonological structure when compared with the other Romance languages (adapted from Bec 1963, 24; cf. Ronjat 1930–1937):

- The rounded mid-vowels /ø/, /œ/, and /o/, and the low vowel /ɑ/, are largely absent from the phonological inventory;
- Palatalization of stressed long Latin ū has resulted in a close front rounded vowel phoneme /y/, common to other varieties of Gallo-Romance, e.g. DURU(M) > *dur* /dyr/ ‘hard’;
- Latin vowel+nasal sequences are largely maintained as a partially nasalized oral vowel with a following consonantal segment, e.g. TEMPUS > *temps* /tens/ ‘time’;
- Diphthongization, during the Middle Ages, of stressed Latin ě and ǫ in specific environments (primarily before palatal consonants and less commonly before velar consonants ([w] or [k]), e.g. VETULU(M) > *vielh* /bjeʎ/ ‘old_{M.SG}’; LECTU(M) > *lieit* /ʎejt/ ‘bed’;
- No diphthongization of Vulgar Latin /e/ and /o/, e.g. DEBERE > *déver* /‘debe/ ‘have_{INF} to’; FLORE > *flor* /flu/ ‘flower’;
- Vulgar Latin /o/ closes to [u], e.g. DOLORE(M) > *dolor* /du‘lu/ ‘pain’;
- Latin stressed A is maintained, e.g. PRATU(M) > *prat* /prat/ ‘meadow’; CAPRA(M) > *cabra* /‘kabrɔ/ ‘goat’;
- Retention of Latin final unstressed -A (lost in standard French), most frequently as labialized /-ɔ/, e.g. PORTA(M) > *pòrta* /‘pɔrtɔ/ ‘door’;
- No syncope in phrase-internal or phrase-final syllables (cf. French), e.g. Oc. *una petita femna sus la finèstra* [y.nɔ.pe‘ti.tɔ‘fɛn.nɔ.sys.la.fi’nɛs.trɔ] ‘a little women in the window’ (12 syllables); Fr. *une petite femme sur la fenêtre* [yn.ptit.fam.syr.la.fnɛtʁ] (6 syllables);
- No proparoxytons (words stressed on the antipenultimate syllable); stress usually on the penultimate syllable (cf. 5.1). In this aspect Occitan is essentially opposed to Spanish and Italian (Bec 1963, 28), e.g. Oc. *pagina* /pa‘dʒinɔ/, It. *pagina* /‘padʒina/ ‘page’;
- /ɔ/ closes to [u] in pre-tonic position, e.g. *pòrc* /‘pɔrk/ ‘pig’ vs. Gasc. *porqueria* /purke‘rijɔ/ ‘mess’ or ‘pig shed’.

In addition to these eleven phonetic/phonological traits that characterize Occitan, Bec (1963, 24–30) also details five morphological, one syntactic, and two lexical features (as described by Ronjat 1930–1937). While Occitan is commonly grouped with French as a Gallo-Romance variety, it is clear that, in some ways, it shares more linguistic affinity with the other Romance languages (cf. 2.2).

3.1 Northern Occitan

This section describes the key historical phonological developments in the northern Occitan supra-dialectal grouping, or what Bec (1963) has called *nord-occitan*, including Lemosin, Auvernhât, and Vivaro-Alpin. These three dialects exhibit common features that justify their supra-dialectal classification (adapted from Bec 1963, 37):

- Palatalization of Latin CA and GA sequences to /tʃa/ and /dʒa/ respectively, e.g. CANTAT > *canta* [tʃantɔ] ‘sing_{3SG}’; GALLINA(M) > *galina* [dʒaˈlinɔ] ‘chicken’;
- Deletion of Latin intervocalic -D- (via [z]) in Vivaro-Alpin, e.g. CREDEMUS > *credem* [kreˈjem] ‘believe_{1PL}’; VIDEMUS > *vedem* [veˈjem] ‘see_{1PL}’, with subsequent epenthesis of [j] to avoid hiatus. This development also affects past participles with intervocalic [d] < -T-, e.g. *cantada* [tʃanˈtajɔ] ‘sing_{PST.PTCP. F.SG}’;
- Retention of /v/ as a contrastive phoneme, distinct from /b/, except in southern Auvergne, e.g. LAVARE > *lavar* [laˈva] ‘wash_{INF}’, not *[laˈba];
- Noun pluralization not marked or marked by vowel length and/or quality rather than by /-s/ morpheme, expect in Vivaro-Alpin, e.g. Lim. *vacha* [ˈvatʃɔ] ‘cow_{SG}’; *vachas* [ˈvatʃaː] ‘cow_{PL}’, not *[ˈvatʃɔs].
- /l/ vocalization in final position, which also occurs in Provençal and Gascon, e.g. SALE(M) > *sal* [saw] ‘salt’; intervocalic /l/ may be realized as [r], [ɣ], or [w], e.g. PALA(M) > *pala* [ˈpaɾɔ], [ˈpaɣɔ], or [ˈpawɔ] ‘blade’;
- /s/ is deleted in pre-tonic syllables when followed by the voiceless plosives /p t k/, e.g. CASTELLU(M) > *chastèl* [tʃaˈtɛw] ‘castle’; SPIARE > *espiar* [eˈpja] ‘look_{INF}’; SCHOLA(M) > *escòla* [eˈkɔlɔ] ‘school’;
- First person singular inflectional morpheme /-i/ is realized as [-e] in Lemosin and Auvergnat, e.g. *chante* [tʃante] ‘sing_{1SG}’, and as [-u] in Vivaro-Alpin, e.g. *chantu* [tʃantu].

In *bas-limousin*, the Latin CT > /tʃ/ change, e.g. FACTU(M) > /fatʃ/ ‘do_{PST.PTCP.M}’, has largely taken place, with /tʃ/ commonly realized as [ts], e.g. *fach* [fatʃ]. In *marchois*, however, in the extreme north of the Lemosin area, /tʃ/ is realized as [jt] (Bec 1963, 41; cf. 3.3). Lemosin also maintains plural marking, especially for feminine nouns, with /-ɔs/ realized as [-aː], involving a change in vowel quality and compensatory lengthening due to the loss of final /-s/, e.g. *jalina* [dʒaˈlinɔ] ‘hen_{F.SG}’; *jalinas* [dʒaˈlinaː] ‘hen_{F.PL}’. In some varieties, plural marking involves a change in the stressed syllable, e.g. *galinas* [dʒaliˈnaː] ‘chicken_{PL}’.

Auvergnat is said to be less conservative than Lemosin (Bec 1963, 42), primarily due to palatalization of /s z t d l n k g/ before /i/ and /y/ and the palatalization of /p b f v/ before /i/, e.g. *libre* [ˈljibre] ‘book’; *dire* [ˈdjire] ‘say_{INF}’. In *bas-auvergnat*, diphthongs are reduced, e.g. *paire* [ˈpere] ‘father’; *aiga* [ˈigɔ] ‘water’, and fully nasalized vowels from Latin vowel+nasal sequences are common (cf. 4.2.4). In *haut-auvergnat* varieties, /s/ is maintained in medial pre-tonic codas before the voiceless plosives, e.g. CASTELLU(M) > *chastèl* [tsasˈtɛ(r)] ‘castle’.

Finally, Vivaro-Alpin varieties distinguish themselves from other *nord-occitan* dialects by exhibiting some Francoprovençal features (e.g. deletion of intervocalic -T-) and the realization of /l/ as [r] or [r̥] before labial consonants and intervocalically (Bec 1963, 43), e.g. *balma* [ˈbarmɔ] ‘cave’. Final consonants are frequently maintained and /s/ is variable in pre-tonic syllable codas before /p t k/. Extremely rare in the Occitan

domain is the retention of final [-r] in verbal infinitives, e.g. *cantar* [tʃan'tar] 'sing_{INF}', making Vivaro-Alpin, in this respect, one of the most conservative Occitan dialects vis-à-vis Latin.

3.2 Southern Occitan

Southern Occitan, or *occitan moyen*, includes the Lengadocian and Provençal dialects. This supra-dialectal area is noted to include the most conservative varieties (Bec 1963, 44), and is characterized by the following phonological developments (adapted from Bec 1963, 44):

- Latin CA and GA sequences are not palatalized, e.g. CAPRA(M) > *cabra* ['kabrɔ] 'goat'; GALLU(M) > *gal* [gal] 'rooster';
- /s/ is maintained in clusters with /p t k/, with some realizations as [h] in the north of the Lengadocian domain;
- Pre-tonic A maintains its quality as [a], with some velarization to [ɔ] in the north of the domain, e.g. *castèl* [kas'tɛl] 'castle', but [kɔs'tɛl] in Rouergue;
- No consonantal palatalization, including /s/, except in the Périgord;
- Diphthongs and triphthongs are often maintained, e.g. *paire* ['pajre] 'father'; *puei* [puej] 'then' (cf. *puei* [pej] in Toulouse);
- Intervocalic /l/ is maintained, e.g. *bèla* ['belɔ] 'beautiful_{F.SG}'.

These examples demonstrate that the features that characterize southern Occitan involve primarily the maintenance of traditional phonological forms, making this supra-dialectal area one of the most conservative from a structural perspective. Bec (1963, 44) notes that the Lengadocian dialect is most conservative and labels this dialect "l'occitan moyen par excellence". The following examples illustrate the primary differences between Lengadocian and Provençal from a historical phonological perspective (adapted from Bec 1963, 45–47):

- Retention of final /-s/ as the noun pluralization morpheme in Lengadocian, e.g. *pòrtas* ['pɔrtɔs] 'door_{PL}', but loss in Provençal, e.g. ['pɔrtɔ];
- Final /-n/ < Latin intervocalic -N- is frequently deleted in Lengadocian, e.g. *pan* [pa] 'bread', but is maintained in Provençal, e.g. [pän];
- Final /-l/ is not vocalized, e.g. *ostal* [us'tal] 'house', which distinguishes Lengadocian from Gascon and Provençal, e.g. [us'taw];
- Labio-dental /v/ has merged with /b/ in Lengadocian, e.g. *lavar* [la'βa] 'wash_{INF}', but is maintained in Provençal, e.g. [la'va];
- Final consonants are largely realized in Lengadocian, e.g. *vengut* [ben'gyt] 'come_{PST.PTCP.M.SG}', but dropped in Provençal, e.g. [ven'gy].
- Definite articles are *los* [lus] 'the_{M.PL}' and *las* [las] 'the_{F.PL}' in Lengadocian, but polyvalent *lei* [li] or [lej] in Provençal.

3.3 Gascon

Gascon is the most divergent of the Occitan dialects; it exhibits a wide range of phonological and morphosyntactic developments that distinguish it from the rest of southern Gallo-Romance. The key phonological developments (adapted from Bec 1963, 48) will be dealt with in this section, with more detailed information on sub-dialectal variation in Gascon reserved for Section 4:

- Latin F became a fully aspirated glottal fricative, [h], in Gascon, word-initially before a vowel and in intervocalic position, where it remained [f] in other dialects, e.g. FARINA(M) > *haria* [ha'rijɔ] 'flour'; CALEFACERE > *cauhar* [kaw'ha] 'heat_{INF}';
- Intervocalic -N- in (primarily) late-closed syllables is lost in Gascon, e.g. FENESTRA(M) > *hièstra* ['hjestrɔ] 'window';
- -LL- becomes an apical tap or trill [r] in Gascon feminine nouns where it becomes [l] in other dialects (Molyneux 2002, 26), e.g. PULLA(M) > *pora* ['purɔ] 'chicken'; in masculine nouns, -LL- becomes a palatalized affricate [tʃ] when it occurs in coda position as a result of apocope (Grosclaude 1986, 9), e.g. CASTELLU(M) > *castèth* [kas'tetʃ] 'castle'; in most modern varieties of Gascon, this has further simplified to [t], e.g. [kas'tet], with more conservative varieties using [tʃ], e.g. [kas'tetʃ] in Couserans and Comminges, or [tj], e.g. [kas'tetj] in Béarn.
- -MB- and -ND- sequences became [m] and [n] respectively in Gascon while they remained [mb] and [nd] in the rest of the Occitan dialects, e.g. CUMBA(M) > *coma* ['kumɔ] 'valley'; RETUNDA(M) > *arredona* [ar'e'dunɔ] 'round';
- For R- in word-initial position, the syllable onset is strengthened in Gascon to a trill prefixed by [a-], which does not occur in other varieties of Occitan, e.g. REGE(M) > *arrei* [a'rej] 'king'. This is suspected to be due to contact with Basque, e.g. *errege* 'king', and is also comparable to Spanish, where a word-initial rhotic is always realized as a trill [r], not a tap [r̄].
- Final /-l/ is vocalized, e.g. *ostal* [us'taw] 'house';
- Latin QU- sequences are maintained as /kw/ and do not evolve to simplex /k/, e.g. QUATTUOR > *quatre* ['kwate] 'four'; note also that /r/ is frequently elided in final post-tonic clusters when it precedes the unstressed vowel /e/, e.g. ALTERU(M) > *autre* ['awte] 'other_{SG}'.

3.4 Occitano-Romance supra-dialects

The two major supra-dialectal groupings within Occitano-Romance, proposed by Bec (1963; 1973), *alverno-méditerranéen*, including northern Occitan, Provençal, and parts of Lengadocian, and *aquitano-pyrénéen*, including Pyrenean Lengadocian, Gascon, and Catalan are characterized primarily in terms of their differing phonological developments (adapted from Bec 1973, 18–19):

- Latin -CT- evolved to [jt] in *aquitano-pyrénéen*, e.g. FACTU > *fait* [fajt] ‘do_{PST.PTCP.M.SG}’ or [hejt], but palatalized to [tʃ] in *alverno-méditerranéen*, e.g. *fach* [fatʃ];
- The Occitan diphthong /aj/ is realized as [ɛj] in the majority of *aquitano-pyrénéen* dialects, e.g. *qu’ei* [kej] ‘have_{1SG}’ in Gascon;
- The *alverno-méditerranéen* (and standard Occitan) phoneme /d͡ʒ/ is realized variably as [ʒ] or [j] in *aquitano-pyrénéen*, e.g. *getar* /d͡ʒe'ta/ ‘throw_{INF}’ is pronounced [ʒe'ta] or [je'ta];
- The phonemes /b/ and /v/ have merged (to /b/) in *aquitano-pyrénéen*, e.g. *vaca* ['bak] ‘cow’, but remain distinct in much of *alverno-méditerranéen*, e.g. ['vak];
- Stable word-final and intervocalic consonants in *aquitano-pyrénéen*, e.g. *cantat* [kan'tat] ‘sing_{PST.PTCP.M.SG}’ in Gascon, but [kan'ta] in Provençal; *cantada* [kan'taðɔ] ‘sing_{PST.PTCP.F.SG}’ in Gascon, but [tʃan'tajɔ] in Vivaro-Alpin;
- Palatalization intervocalically of /s/ to [ʃ] in words such as *paréisser* /pa'rejse/ ‘appear_{INF}’, e.g. *paréisher* [pa'reʃe] in Gascon; *parèixer* [pə'reʃə] in Catalan; some varieties of Lengadocian palatalize the fricative but maintain the preceding glide which triggered the palatalization, e.g. [pa'rejʃe].
- First person singular inflection morpheme is /-i/ in *aquitano-pyrénéen*, e.g. *canti* ['kanti] ‘sing_{1SG}’, but /-e/ is more common in *alverno-méditerranéen*, e.g. ['kante], with the exception of *provençal maritime*, e.g. ['kanti], and Vivaro-Alpin, e.g. ['tʃantu].

The Lengadocian dialect has the unique quality of containing a mix of *alverno-méditerranéen* features (e.g. /tʃ/ and /d͡ʒ/, /-e/_{1SG} in northeastern area) and *aquitano-pyrénéen* forms (e.g. loss of /v/, stable final consonants, /-i/_{1SG} in southwestern area). In fact, the only feature that it does not share with another dialect area is the final /-l/ which is not vocalized to [w] in Lengadocian, e.g. *sal* [sal] ‘salt’, not *[saw].

4 Modern phonological inventory

Lengadocian is often considered to be the most conservative dialect (Wheeler 1988, 246), the center of the Occitan-Romance area – a lowest common denominator of sorts. It was regarded the most authoritative reference variety (Bec 1973, 20) and it is for this reason that it was selected as the basis for the standard. The Occitan orthographical system, known commonly as the *grafia classica*, is based on the principle of a phonological diasystem. A diasystem is essentially an abstract, standardized phonological reference point against which we can compare variation observed in the dialects. The aim of the diasystem – and the resultant orthography – is to at once represent all of the dialects and none of the dialects in particular (Bec 1973, 24). As we have seen, there are problematic ideological constructs associated with this diasystemic approach (cf. 2.3) but, nonetheless, the phonological analysis presented in this overview will use the diasystem and its standard orthography throughout as a means of facilitating detailed comparison between and across dialectal areas.

4.1 Consonants

The Occitan diasystem contains 20 distinct consonantal phonemes (cf. Table 22.1), including /v/, which is only found in some varieties of *alverno-méditerranéen*, and excluding the glide phonemes, /j/, /w/, and /ɥ/, which are discussed below (cf. 4.3). There is some debate over the phonemic status of /t͡s/, /ʃ/, /ɲ/, and /ɸ/ (Wheeler 1988, 248), which will be dealt with in the discussion below.

Table 22.1: The consonantal phonemes of Occitan.

	Bilabial		Labio-dental		Alveolar		Post-alveolar		Palatal	Velar	
Plosive	p	b			t	d				k	g
Affricate					t͡s		t͡ʃ	d͡ʒ			
Fricative			f	(v)	s	z	(ʃ)				
Nasal		m				n			ɲ		
Trill						r					
Tap						ɾ					
Lateral						l			ʎ		

Bec (1973, 51) considers the inventory in Table 22.1 to represent the maximum consonantal diasystem, while also proposing a minimum diasystem of 15 phonemes that results from the following common phonological mergers in some major dialect varieties: /ʃ/ ~ /t͡ʃ/ > /ʃ/ or /t͡ʃ/; /t͡ʃ/ ~ /d͡ʒ/ > /t͡s/; /ʎ/ ~ /j/ > /j/; /r/ ~ /ɾ/ > /ɾ/; /v/ ~ /b/ > /b/. Bec (1973, 51) also makes reference to the voiceless alveolar affricate /t͡s/ which merges with /s/ in dialects with a reduced phonological inventory.

4.1.1 Plosives

The Occitan voiceless plosives /p t k/ derive from Latin voiceless plosives in word-initial position and in syllable-initial position word-medially when following a consonant, e.g. CAMPU(M) > *camp* ‘field’. They also derive from geminate voiceless plosives in intervocalic position, e.g. CUPPA(M) > *copa* /'kupa/ ‘champagne glass’. The voiced plosives /b d g/ have evolved from intervocalic Latin voiceless (or from voiced geminate) plosives, e.g. LUPA(M) > *loba* /'luba/ ‘wolf_{F.SG}’ (Olivieri/Sauzet 2016, 325). Voiced plosives originally occurred word-finally, e.g. CAPUT > *cab* /kab/ ‘head’, but final devoicing became established from the 12th century onwards, e.g. *cap* [kap] (Olivieri/Sauzet 2016, 325). Latin CA and GA sequences gave rise to /k/ and /g/ respectively, but these phonemes vary in their phonetic realization over geographical space. In northern Occitan dialects, /k/ is palatalized to [t͡ʃ], e.g. *chabra* [t͡ʃabɾa]; the affricate /d͡ʒ/

occurs initially, e.g. *jalina* [dʒa'linɔ] 'hen', and after a consonant, e.g. *longa* [l'lundʒɔ] 'long_{F.SG}', but is realized as [j] after a vowel, e.g. *païar* [pa'ja] 'pay_{INF}' (Wheeler 1988, 250–251). In Vivaro-Alpin, and more specifically in the *albonnais* sub-dialect, these initial palatalized forms are alveolar, rather than post-alveolar, e.g. CANTARE > *chantar* [tsɔn'te] 'sing_{INF}'; GALLU(M) > *gal* [dʒar] 'rooster' (Quint 1999, 14). In fact, Vivaro-Alpin displays a system of palatalization that results in the neutralization of phonemic contrast between some plosive pairs. The /t/ ~ /k/ contrast is neutralized to [c] before /i/ and /y/, e.g. *qui* [ci] 'who'; *tu* [cy] 'you_{2SG}'; the /d/ ~ /g/ contrast is neutralized to [j] in the same phonological context, e.g. *dina* [ʒinɔ] 'dine_{3SG}'; *guida* [ʒidɔ] 'guide' (Quint 1999, 8). Coustenoble (1945, 76) notes that [j] also occurs as an allophone of /g/ before [i e je jɛ] in *rhodanien* Provençal, e.g. *seguida* [se'jidɔ] 'follow_{PST.PTCP.F.SG}'. In Gascon, /b d g/ have contextually conditioned approximant allophones [β ɸ ɣ] when they occur intervocalically, alone or in a cluster with [r r l z], e.g. *saba* [saβɔ] 'know_{3SG}'; *marga* [maɣɔ] 'sleeve' (Olivieri/Sauzet 2016, 325). This also occurs across word boundaries, e.g. *lo buòu* [lu'βjɔw] 'the ox'. In western Gascon, the /b/ phoneme, realized as [b], derives from B and v and intervocalic p. In Eastern and Central Gascon, initial B and v also converge to [b] (alternating allophonically with [β] after a vowel) but intervocalic -p- yields [β], e.g. SAPERE > *saber* [sa'βe] 'know_{INF}'. Intervocalic /b/ that derives from B or v, however, yields [w], e.g. LAVABAT > *lavava* [la'wawɔ] 'wash_{3SG.IMPF}'. In some Pyrenean valley varieties, these contextually conditioned allophonic variants of intervocalic /b d g/ are replaced by their corresponding voiceless plosives [p t k] when they occur before [a ɔ y u] (Moreux/Puyau 2002, 25), e.g. *craba* ['kraβɔ] 'goat' is pronounced ['krapɔ]. There is also considerable variation in southwestern varieties between voiced and voiceless plosive pairs, [p b], [t d], [k g], when following nasal consonants [m] and [n], e.g. *cramba* ['krampɔ] or ['krambɔ] 'bedroom'.

4.1.2 Affricates

The Occitan diasystem has two postalveolar affricates, /tʃ/ and /dʒ/, e.g. *chicar* /tʃi'ka/ 'chew_{INF} tobacco', *jamai* /dʒa'maj/ 'never', which vary widely across dialects both in terms of their phonetic realization and their phonemic status. In northern varieties, especially Lemosin, Auvernhât, and northern Lengadocian, /tʃ/ and /dʒ/ are depalatalized to [ts] and [dʒ]; in the northernmost part of the Occitan area, the affricates are realized as [s] or [θ] and [z] or [ð], respectively (Wheeler 1988, 248; Olivieri/Sauzet 2016, 325). In areas where /tʃ/ is realized as [s] and /dʒ/ as [z], /s/ and /z/ are palatalized to [ʃ] and [ʒ] (Wheeler 1988, 248), e.g. Lim. *cerchar* /ser'tʃa/ [ʃer'sa] 'look_{INF} for'. In varieties that preserve both phonemes, such as Provençal, /tʃ/ may be realized at [tʃ] or [ts] and /dʒ/ as [dʒ] or [dʒ] (Coustenoble 1945, 86; Bec 1973, 44); in *rhodanien*, Coustenoble (1945, 86) notes that the affricates are depalatalized to [ts] and [dʒ]. In much of the Lengadocian dialect, the affricates are merged to [ts] (Bec 1973, 44), e.g. *chicar* [tsi'ka] 'chew_{INF} tobacco', *dotze* [dʊtse] 'twelve'. Olivieri/Sauzet (2016, 326) note con-

siderable variation within Lengadocian: in Béziers, for example, /tʃ/ and /dʒ/ merge in terms of voicing, but do not depalatalize. The phonemic status of /tʃ/, as distinct from /t/ + /s/ or from /tʃ/, is marginal (Wheeler 1988, 248); [tʃ] is primarily involved in a morphophonological alternation with [z], e.g. *crotz* [kruʃ] ‘cross’ ~ *crosar* [kruʒa] ‘cross_{INF}’. In western Lengadocian varieties, /dʒ/ may be realized as [ʒ] (Field 1978, 80; Wheeler 1988, 248); this is due to the fact that Gascon realizes /dʒ/ as [ʒ] or [j], e.g. *jamai* [ʒa'mɛj], [ja'mɛj] ‘never’. Latin -CT- became /tʃ/ in most of the Occitan area, but is realized as /jt/ in Gascon, western Lengadocian, Auvergnat, and Vivaro-Alpin (Wheeler 1988, 251; Quint 1999, 17) (cf. 3.4). Some varieties of Gascon, such as *béarnais*, have two palatalized affricate phonemes: voiceless /tʃ/ and voiced /dʒ/. In masculine nouns, root-final -LL- became voiceless /tʃ/ when it occurred in coda position as a result of apocope (Grosclaude 1986, 9), e.g. CASTELLU(M) > *castèl* [kas'tɛtʃ] ‘castle’; within Gascony, [t] and [tʃ] are common as variants of /tʃ/ (Mooney 2014, 348). Castet (1895, 16) notes that palatalized [tʃ] may occur as a variant of /t/ in past participles in the mountain dialect of Couserans, e.g. *cantat* [kan'tatʃ] ‘sing_{PST.PTCP.M.SG}’, perhaps by analogy. -TC- sequences, on the other hand, which occurred as result of elision, developed into /dʒ/ in Gascon, e.g. VILLATICUM > *vilatge* [bi'ladʒe] ‘village’. Finally, in loanwords from French, /ʃ/ is often rendered as an affricate in Occitan, e.g. *cheval* > *chabal* [tʃa'bal] ‘horse’ in Lengadocian; *chivau* [tʃi'vaw] in Provençal, but as /ʃ/ in Gascon (Olivieri/Sauzet 2016, 325), e.g. *chivau* [ʃi'βaw], perhaps due to the phonemic status of /ʃ/ in Gascon.

4.1.3 Fricatives

Latin F remained /f/, realized as a labiodental fricative [f] throughout the Occitan area, e.g. FERRUM > *fèr(re)* [ˈfɛr(e)] ‘iron’, with the exception of Gascony, where it is realized as a fully aspirated voiceless glottal fricative [h], e.g. *hèr* [her]. When [f] occurs in Gascon, it is due to borrowing from French, e.g. *fresa* [ˈfrɛzɔ] < Fr. *fraise* ‘strawberry’. When the F > [h] change occurs in an onset cluster with a rhotic consonant, the [h] is deleted, giving the sequence F > [h] > Ø (Wheeler 1988, 250), e.g. FORMATICU(M) > Oc. *formatge* [for'madʒe] ‘cheese’, Gasc. *hromatge* [ru'madʒe]; in fact, /h/ in initial position is also subject to (variable) deletion (Field 1978, 83). In some Occitan varieties, the Latin B ~ v contrast is maintained, e.g. *vin bon* /vin bun/ ‘wine good_{M.SG}’, but in many others, these phonemes have merged to /b/, a process called betacism: “today, the betacizing area covers all of Gascony, almost all of Languedoc, and a large portion of Auvergne” (Olivieri/Sauzet 2016, 325). The /v/ phoneme is more common in varieties of *alverno-méditerranéen* (Bec 1973, 37) and is attested in *rhodanien* Provençal (Ford 1921, 55–56), *albonnais* (Quint 1999, 13), Chiomonte (Sibille 2012, 2235) Vivaro-Alpin, and in Lemosin (Olivieri/Sauzet 2016, 325). Ford (1921, 79) also notes that in *rhodanien*, words beginning with [u] or [ʉe] have a tendency to develop an initial [v], e.g. *onze* /ˈundʒe/ [ˈvundʒe] ‘eleven’. In Gascon generally, /b/ is the

modern reflex of Latin initial *B-* and *v-*, and intervocalic *-P-*, *-B-*, and *-v-* (Olivieri/Sauzet 2016, 325), e.g. *que trobava lo vin bon* [ketru'βaβɔlu'βi'βũ] 'he found the wine good'. In some varieties of Gascon, intervocalic *-P-* evolved to /b/ and intervocalic *-B-* and *-v-* evolved to /w/, leading to an opposition between /b/ and /w/ between vowels, with the latter corresponding to *alverno-méditerranéen* /v/ (Olivieri/Sauzet 2016, 325), e.g. [ketru'βawɔlu'βi'βũ]. The spread of betacism from Gascon means that Lengadocian is now predominately betacizing as well.

The fricatives /s/ and /z/ are usually apico-alveolar in Occitan; the contrast is neutralized in preconsonantal position, with [s] before voiceless consonants and pauses and [z] or [ʒ] before voiced consonants (Bec 1973, 42; Field 1978, 82), e.g. *mesclar* [mes'kla] 'mix_{INF}'; *esdracar* [ezdra'ka] 'wring out_{INF}'. /s/ and /z/ may be postalveolar in *nord-occitan* varieties (Wheeler 1988, 248), e.g. *saison* /se'zun/ [ʃe'zũ] 'season', where, additionally, pre-consonantal /s/ is subject to weakening and is frequently realized as [x], [h], [j], vowel lengthening, or Ø, with [j] as the majority variant (Wheeler 1988, 251), e.g. *escòla* [eh'kɔlə] 'school', [ej'kɔlə], [e'kɔlə] etc. In Vivaro-Alpin, and more specifically in the sub-dialect of *albonmais*, /s/ is realized as [ʃ] in word- and syllable-initial position, as well as intervocalically, e.g. *sopa* [ʃupɔ] 'soup'; *perseguièr* [per'ʃje] 'peach tree'; *caçaire* [ʃso'ʃajre] 'hunter', and as [h] pre-consonantly and pre-pausally, e.g. *chasque* [ʃsahke] 'every'; *cantas* [ʃsɔntɛh] 'sing_{ZSG}'. In word-final position, /s/ is realized as [ʒ] before a vowel, e.g. *los arbres* [lu'ʒarbreh] 'the tree_{PL}', as [h] before /p t ts k/, e.g. *los chals* [luh'ʃsɔwh] 'the cabbage_{PL}', and as [j] before other consonants, e.g. *los libres* [luj'libreh] 'the book_{PL}'. In Lengadocian, word-final /s/ is realized as [j] before consonants other than voiceless plosives (Field 1978, 101; Wheeler 1988, 252), e.g. *las claus* [las'klaws] 'the key_{PL}'; *las femnas* [laɣ'fennɔs] 'the woman_{PL}'; before voiceless plosives, word-final /s/ may be realized as [h], e.g. [lah'klaws]. The phonemic status of /ʃ/ is not established for the majority of Occitan dialects; as we have seen, [ʃ] primarily occurs as a geographical and/or allophonic variant of /s/. Equally, [ʒ] is attested as a variant of /z/ but the sound is not contrastive. [ʒ] in Gascon can correspond to an affricate, e.g. Oc. *jamès* /dʒa'mɛs/ 'never' and Gasc. [ʒa'mɛs]. In southwestern Lengadocian (i.e. *aquitano-pyrénéen*), [ʃ] appears as a contextually conditioned allophone of /s/ following /j/, e.g. *peis* /pejs/ [pejʃ] 'fish' (Olivieri/Sauzet 2016, 325). In Gascon, however, /ʃ/ is a phoneme; *peis* is realized as [pejʃ], without contextual conditioning, and minimal pairs can be found to establish the /ʃ/ ~ /s/ contrast, e.g. *peis* /pejʃ/ 'fish' ~ *pes* /pes/ 'weight'. [ʃ] also occurs as an allophone of /s/ in Gascon, following palatal consonants (Field 1978, 90), e.g. *uelhs* /weʎs/ [weʎʃ] 'eye_{PL}'. The voiced fricative /z/ only occurs in intervocalic position in standard Occitan, and derives from intervocalic *-D-*, *-C-*, and *-S-* (Wheeler 1988, 251), e.g. AUDIRE > *ausir* /aw'zi/ 'hear_{INF}'; RACEMU(M) > *rasim* /ra'zim/ 'grape'; CAUSA(M) > *causa* /'kawzɔ/ 'thing'. Some dialects, such as Gascon, maintain [d] for Occitan /z/ < *-D-*, e.g. *ausir* [aw'di], and sometimes for /z/ < *-C-*, *rasim* [ara'zim]. Intervocalic /z/ has largely been lost in Provençal, CAMISIA(M) > *camisa* /ka'mizɔ/ [ka'mjɔ] 'shirt', with glide formation of the stressed vowel and stress shift to the final vowel.

4.1.4 Nasal consonants

The Occitan diasystem has three nasal consonant phonemes: /m/, /n/, and /ɲ/, e.g. *lama* ['lamɔ] 'blade'; *lana* ['lanɔ] 'wool'; *lanha* ['laɲɔ] 'grief' (Olivieri/Sauzet 2016, 326). The velar [ŋ] and labiodental [ɱ] nasals exist as allophones of the other nasals when followed by a velar or labiodental consonant respectively (Coustenoble 1945, 82), e.g. *longa* ['luŋɔ] 'long_{F.SG}'; *comfortable* [kum'fɜr'tablɛ] 'comfortable'. In word-final position, the dialects show considerable variability (Wheeler 1988, 249; Olivieri/Sauzet 2016, 326): word-final /m n ɲ/ are realized as [n] in Lengadocian (Salvat 1973, 7; Sampson 1999, 149), e.g. *fum* [fyn] 'smoke', but as [ɲ] in Provençal (Ford 1921, 31; Coustenoble 1945, 1), e.g. *banh* [baɲ] 'bath'. Provençal [ɲ] is long in stressed syllables when it is preceded by [e ɛ ø], e.g. *novembre* [nu'veɲbre] 'November', but short elsewhere, e.g. *camin* [ka'miɲ] 'pathway' (Coustenoble 1945, 67). In Lengadocian, *nord-occitan*, and some varieties of Gascon (e.g. Biarnés and Bigordan), word-final /n/ is frequently deleted, e.g. *vin* [bi] 'wine' and, in *nord-occitan*, this often leads to the development of nasal vowels (cf. 4.2.4). Some, but not all, Vivaro-Alpin dialects, e.g. *albonnais* (Quint 1999, 18), also delete /n/ word-finally, e.g. *camin* [tsɔ'mi] 'pathway'. In Gascon, /m/, /n/, and /ɲ/ can all occur word-finally, e.g. *fum* [hym] 'smoke', but the reflex of Latin intervocalic -N- is lost, e.g. LUNA > *luna* [lyɔ] 'moon'; this deletion also frequently involves the development of nasal vowels (cf. 4.2.4) and has also occurred in Galician-Portuguese, Alpine dialects of south-eastern France and north-western Italy, dialects of Sardinian and Corsican, and early Romanian (Sampson 1999, 145). Sampson (1999, 153) notes that the Gascon varieties spoken in the *Landes* department have the maximum number of nasal consonants that may appear in word-final position: [-m -n -ɲ -ŋ]. In these dialects, intervocalic N yields [ɲ] (after apocope) whereas final [n] derives from -ND and -NT clusters which have become final, e.g. VENIT > *ven* [beɲ] 'come_{3SG}' vs. VENTUM > *vent* [beɲ] 'wind'.

4.1.5 Liquid consonants

The trill /r/ and the tap /ɾ/ are in contrastive distribution in intervocalic positions, e.g. *poret* /pu'ret/ 'chicken' ~ *porret* /pu'ret/ 'leek', but not contrastive in other contexts such that "an archiphoneme could be set up for all other positions" (Cardaillac Kelly 1973, 32). Some analyses choose to treat this contrast as a single coronal rhotic phoneme with a long-short length contrast (Olivieri/Sauzet 2016, 326). The apical rhotics are not, however, in strictly complementary distribution in non-intervocalic contexts: the distribution of [r] and [ɾ] is somewhat constrained by their position within the syllable and with respect to word boundaries with a tendency for [r] to occur word-initially and as an onset after [n], and [ɾ] to occur in onset clusters and in the syllable coda, but this distribution is by no means categorical (Cardaillac Kelly 1973, 32; Mooney 2014, 345). It is most prevalent in "the conservative west" (Wheeler

1988, 250), or in *aquitano-pyrénéen* Occitan; in other varieties, such as Provençal and its sub-dialects, both /r/ and /r̥/ are traditionally realized as [ʁ] or [r̥], neutralizing contrasts in intervocalic positions (Bec 1973, 48). In some sub-dialects, however, such as *rhodanien*, only the trill is replaced by a uvular consonant and the intervocalic contrast is maintained (Coustenoble 1945, 93), e.g. *pòre* ['pɔre] 'pore' ~ *pòrre* ['pɔʁe] 'leek'. The uvular realization of the rhotic consonant has been attested in Provençal varieties since at least the eighteenth century (Stéfanini 1969, 167, cited in Oliuéri/Sauzet 2016, 326) and as such it is unlikely that this feature is the result of transfer from French since at this time the apical rhotic most likely constituted the French norm. In other varieties, such as Gascon, however, there is evidence to suggest that apical rhotics are being replaced by uvular rhotics as a result of contact with French (Mooney 2018), with various constraints on transfer such as phonological environment, position in the syllable, and the speakers' place of origin within Gascony. Finally, Proto-Occitan word-final [r] is systematically deleted in infinitives (and some suffixes such as *-ièr* < -ARIUS), e.g. *cantar* /kan'ta/ 'sing_{INF}', though this is often retained in Vivaro-Alpin, e.g. [tʃan'tar].

Occitan /l/ is a dental lateral approximant, which may be velarized in coda position (Bec 1973, 46), where it commonly vocalizes to [w] in dialects other than conservative Lengadocian, e.g. CALET > Leng. *cal* [kal] 'be_{3SG} necessary'; Gasc. *que cau* [ke'kaw]. Within Lengadocian, however, some sub-dialects show the /l/ > [w] change in codas before dentals, while others exhibit the change before consonants other than dentals (Wheeler 1988, 249). There is also evidence for contextual conditioning in other dialects. For example, in the *rhodanien* dialect of Provençal, vocalization occurs in all contexts except after /u/ and /y/, e.g. *lo sol* [lu'sul] 'the sun' (with the suffixed form *solèu* also occurring); note, however, that *lo só* [lu'su] occurs in other dialects, including Gascon. In the *albonnais* sub-dialect of Vivaro-Alpin, /l/ is preserved in singular nouns, but vocalized in plurals, e.g. *castèl* [tsɔh'tɛr] 'castle'; *castèls* [tsɔh'tɛw] 'castle_{PL}'; these examples also demonstrate the common realization of /l/ as [r] or [r̥] in Vivaro-Alpin (Wheeler 1988, 253). In Auvernhat, intervocalic, syllable-initial /l/ may vocalize, e.g. *pala* ['pawɔ] 'shovel', or be realized as a velar [g] or labiodental [v], e.g. ['pagɔ], ['pavɔ], and in Gascon final /l/ < -LL- is realized as [tʃ], [tʃ̥], or [t], e.g. *castèl* [kas'tɛtʃ] 'castle'. Gascon /tʃ̥/ in masculine nouns alternates morphophonologically with [r] in feminine nouns, e.g. *bèth* [bɛtʃ̥] 'beautiful_{M.SG}'; *bèra* [bɛrɔ] 'beautiful_{F.SG}' (Field 1978, 79).

Finally, the palatal lateral may occur word-initially, intervocalically, and word-finally in the Occitan diasystem, but not medially in coda position and is subject to a variety of constraints in the dialects themselves. Gascon traditionally preserves /ʎ/ in all positions, e.g. *lhevar* [ʎe'βa] 'raise_{INF}'; *tribalhar* [triβa'ʎa] 'work_{INF}'; *uelh* [weʎ] 'eye'. There are relatively high rates of retention in intervocalic position across dialects (with the exception of Provençal), but the palatal approximant [j] frequently emerges as an allophone of /ʎ/ in intervocalic position, e.g. *tribalhar* [triba'ja]. In final position, /ʎ/ is realized as [l] in Lengadocian (Field 1978, 102) and as [j] or [w] in Provençal,

e.g. *genolh* > Leng. [dʒe'nul] 'knee', Prov. [dʒe'nuij]; *filh* > Leng. [fil] 'son', Prov. [fjɛw] (Wheeler 1988, 249). The [w] variant in Provençal is the result of first depalatalization to [l] and then vocalization to [w] (Ford 1921, 20). In Vivaro-Alpin, the [ʎ] variant is preserved with high rates intervocally, and palatal laterals may arise from the palatalization of /l/ in initial /gl/ and /kl/ clusters, e.g. *la glèisa* [la'gʎɛjzɔ] 'the church'; *la clau* [la'kʎaw] 'the key'.

4.1.6 Syllable- and word-final consonants

In standard Occitan, based on Lengadocian, only sonorants and /s/ are permitted in non-final syllable codas (Olivieri/Sauzet 2016, 326), e.g. *factor* [fa(t)'tu] < Fr. *facteur* /fak'tœʁ/ 'postman', where /k/ assimilates in place or is omitted. In word-final position, /j/, /w/, /r/, /N/, /s/ and, sometimes, /f/ are permitted in codas; there is a strong tendency in *nord-occitan* and Provençal to delete word-final obstruents (Wheeler 1988, 252–253). In Lemosin, /s/ in coda position is deleted with compensatory lengthening or it debuccalizes to [h], /l/ vocalizes to [w], and nasal consonants are deleted, with only [j] and [r] permitted in coda position (Olivieri/Sauzet 2016, 326); similarly, Vivaro-Alpin only allows five consonants, [h ʁ n j w] (Quint 1999, 8). In word-final codas, Bec's (1963; 1973) distinction between *alverno-méditerranéen* and *aquitano-pyrénéen* Occitan best accounts for the distribution of final consonants (cf. 2.2; 3.4). In *aquitano-pyrénéen* dialects, words can end in obstruents and in clusters, e.g. *lo còp* [lu'kɔp] 'the time', *la sèrp* [la'sɛrp] 'the snake'; in *alverno-méditerranéen* dialects, final obstruents are deleted and deleted from clusters, e.g. *lo còp* [lu'kɔ], *la sèrp* [la'sɛr]. Eastern Lengadocian allows final obstruents, e.g. [lu'kɔp], but not final clusters, e.g. [la'sɛr], except in nominal plurals with the morpheme /-s/, e.g. *las sèrps* [las'sɛrs] 'the snake_{PL}' (Olivieri/Sauzet 2016, 327); some Gascon varieties allow triple consonant clusters with plural /-s/, e.g. [las'sɛrps]. Some Provençal dialects, such as *nissart*, permit diasystemic consonant clusters by moving the obstruent into the onset of a syllable whose nucleus is a paragogical vowel (Olivieri/Sauzet 2016, 327), e.g. *la sèrp* [la'sɛrpe].

Where they are retained, final voiced plosives /b d g/ are devoiced to [p t k] (Field 1978, 80), e.g. *saber* /sa'be/ 'know_{INF}', *sap* /sap/ 'know_{3SG}'; *amic* /a'mik/ 'friend_M', *amiga* /a'migɔ/ 'friend_F'. Before vowels, final fricatives are voiced, e.g. *los arbres* [lu'zɛrbres] 'the tree_{PL}'; /tʃ/ can be voiced or voiceless, while /v/ is commonly vocalized in final position, e.g. *nòu* [nɔw] 'new_M', *nòva* [nɔβɔ] 'new_F' (Bec 1973, 36, 40; Field 1978, 115; Wheeler 1988, 252). Only Gascon maintains full contrast between the laterals /l/ and /ʎ/ and the nasals /m n ɲ/ in final position, with Lengadocian and Provençal neutralizing these contrasts to [l] and [n], and [w] and [ɲ], respectively (Coustenoble 1945, 1; Bec 1973, 45; Wheeler 1988, 252). Quint (1999, 8) notes that final /m/ does occur in verbal paradigms in Vivaro-Alpin, e.g. *avèm* [ɔ'vɛm] 'have_{1PL}', but that it is increasingly replaced by [n], e.g. *aurem* [ɔw'βɛn] 'have_{1PL,FUT}', and that there is therefore no /m/ ~ /n/ contrast in final position. Place contrasts for coda obstruents /p t tʃ/

k/ are maintained, especially in Lengadocian and Vivaro-Alpin (Wheeler 1988, 252), before vowels, but before consonants these contrasts are generally neutralized, e.g. *còps* [kɔts] ‘time_{PL}’, *occitan* [utsi'ta] ‘Occitan’, except for the contrast between /s/ and /f/ (Wheeler 1988, 252). In dialects with /t͡s/, it is common for [t͡s] to simplify to [s]; since [t͡s] can arise in coda position from /t+/s/, /p+/s/, and /k+/s/, this results in an abundance of forms with syllable-final [s]. Final plosives also assimilate in manner to following consonants, e.g. *ròc mòl* [rɔm'mɔl] ‘soft rock’, triggering a geminate, and consonants between consonants are frequently deleted (Wheeler 1988, 252), e.g. *bèls miralhs* [ˈbɛlmi'rals] ‘beautiful_{M,PL} mirror_{PL}’.

4.2 Vowels

The full Occitan vowel system is presented in Table 22.2 and contains seven phonemic oral vowels in stressed syllables: /i y e ε a ɔ u/, preserving the common Western-Romance vowel system (Sampson 1999, 140). This vowel system has arisen from two unconditioned changes, /u/ > /y/ and /o/ > /u/, which have occurred in all dialects (Wheeler 1988, 247), e.g. *comun* /ku'myn/ < COMMŪNE(M).

Table 22.2: Stressed oral vowels in Occitan.

Oral	Front		Back
	Unrounded	Rounded	Rounded
Close	i	y	u
Close-mid	e		
Open-mid	ε		ɔ
Open	a		

In pre-tonic syllables, this system is reduced to /i y e a u/ and, in post-tonic syllables, to /i e ɔ u/. Some analyses consider stressed /ɔ/, e.g. *sòl* /sɔl/ ‘ground’, as distinct from post-tonic word-final /-ɔ/, e.g. *sòla* /'sɔlə/ ‘sole’, preferring to use the symbol /o/ (Coustenoble 1945, 4; Wheeler 1988, 247; Quint 1999, 5) or /ə/ (Bec 1973, 35) for the latter; the analysis presented here will not consider them to represent independent phonemes but the variability in each context is treated in detail in 4.2.1 and 4.2.3 respectively. For *rhodanien*, Coustenoble (1945, 4) replaces /y/ with /ø/ (cf. 4.2.1) and adds /œ/ to the inventory; for Vivaro-Alpin, Quint (1999) also includes /œ/, both giving an eight-term vocalic inventory.

In most Occitan varieties, the tonic syllable of lexical words may be final or penultimate, though proparoxytons are permitted in *nissart* Provençal, e.g. *dimenge* /di'mendʒe/ ‘Sunday’ vs. Nissart [di'meneʒ]. The position of tonic stress on the final or penultimate syllable is subject to interdialectal variation (cf. 5.1), though the

general pattern can be described as follows (Mooney 2014, 347–348): (i) stress is lexically defined for any word ending in a vowel other than /a/; (ii) words ending in /a/ are always oxytonous, e.g. *cantar* /kan'ta/ 'sing_{INF}'; (iii) words ending in post-tonic /-ɔ/ are paroxytonous, e.g. *cambra* /'kambɾɔ/ 'bedroom'. Words ending in a consonant are oxytonous, with the following exceptions: (a) verb conjugations ending in 3rd person plural /-n/ are paroxytonous, e.g. *cantan* /'kantɔn/ 'sing_{3PL}'; (b) verb conjugations ending in 2nd person singular /-s/ are paroxytonous in the majority of tenses, e.g. *venes* /'benes/ 'come_{2SG}'; (c) for nouns and adjectives, the plural morpheme /-s/ does not modify the stress pattern found in the singular form, e.g. Gasc. *la gojata* /lagu'jatɔ/ 'the young girl_{SG}'; *las gojatas* /lazgu'jatɔs/ 'the young girl_{PL}'.

4.2.1 Stressed oral vowels

The /i/ phoneme remains relatively stable across dialects; /y/, however, demonstrates some variability. The /y/ phoneme evolved from Latin tonic long ū, but the date of change from /u/ to /y/ is not known (Coustenoble 1945, 14). This development occurred throughout Gallo-Romance, including French, but did not take place in Catalan. The /y/ vowel is known to be involved in free variation with /i/ and /e/, and to replace /ø/ in phonologically integrated loanwords from French (Müller/Martin Mota 2012, 158). The acoustic quality of /y/ is said to be highly variable, showing some lowering and centralization (Müller/Martin Mota 2012, 158). Indeed, the most frequent variant of this phoneme is [ø], e.g. *muscle* /'myskle/ ['møskle] 'mussel': "This system is found from Arles to an area on the edge of Catalan-speaking domains which has neither [y] nor [ø]" (Olivieri/Sauzet 2016, 322). Coustenoble (1945), working on the *rhodanien* Provençal dialect of Arles, chooses to use the symbol /ø/ for the phoneme, noting that /y/ can be realized as [e] before a nasal consonant, e.g. *un* /yn/ [eŋ] 'one', demonstrating both opening (to [ø]) and unrounding (to [e]) in this context. As mentioned above, Coustenoble (1945) also cites /œ/ as a phoneme of *rhodanien*; this corresponds to /ʉε/, e.g. *vuèja* /'vʉεdʒɔ/ ['vœ:dʒɔ] 'empty_{F.SG}'. When /y/ finds itself in a stressed syllable closed by /j/ or /ɾ/, it is realized as [œ] in Auvernhat (Field 1978, 119), e.g. *durmir* [dyr'mi] 'sleep_{INF}', *duerm* [dœr] 'sleep_{3SG}'. The third high vowel /u/ is relatively stable in stressed position. There are some Occitan varieties, however, where all close vowels diphthongize to falling diphthongs such as in Saint-Agnès, near the Italian border (Olivieri/Sauzet 2016, 323), e.g. *fil* [føj] 'thread'.

The /e/ ~ /ɛ/ contrast is largely maintained in final closed syllables, e.g. *set* /set/ 'thirst' ~ *sèt* /sɛt/ 'seven', and in non-final syllables, e.g. *crema* /'kremɔ/ 'burn_{3SG}' ~ *crèma* /'krɛmɔ/ 'cream' (Olivieri/Sauzet 2016, 322). Bec (1973, 57) notes that maintenance of this contrast is more robust in *aquitano-pyrénéen* varieties, weak in *alverno-méditerranéen*, and near absent in Provençal. In *nord-occitan*, the /e/ ~ /ɛ/ contrast is largely dephonologized, with [e] and [ɛ] functioning as contextually conditioned allophones of the same phoneme (Bec 1973, 57; Wheeler 1988, 247; cf. 4.2.3), with [e] in

open syllables and [ɛ] in closed syllables. In *rhodanien*, stressed /e/ may be rounded to [ø] before nasal consonants, e.g. *femna* [fø:mɔ] ‘woman’ (Coustenoble 1945, 22); this may involve neutralization of the diasystem’s /e/ ~ /y/ contrast, e.g. *fen* /fen/ [føŋ] ‘hay’ ~ *fum* /fym/ [føŋ] ‘smoke’. In the so-called *parlar negre* of Gascon, in the *Landes* department, stressed /e/ is realized as [œ], such that the /e/ ~ /ɛ/ contrast is maintained by rounding rather than by vowel aperture, e.g. *set* [sœt] ~ *sèt* [set] (Olivieri/Sauzet 2016, 322). In Auvernhat, /e/ may be closed to [i], e.g. *cercle* [ˈsirkle] ‘circle’.

Stressed /a/ is frequently labialized to [ɔ] before nasals in *nord-occitan* and northern Lengadocian dialects (Field 1978, 114; Quint 1999, 9; Olivieri/Sauzet 2016, 322), e.g. *chanta* [ˈtʃɔntɔ] ‘sing_{3SG}’. There are some lexicalized exceptions to this in Vivaro-Alpin (Quint 1999, 9), in particular the words for multiples of ten in the numeral system, e.g. *cinquanta* [ʃiŋˈkantɔ] ‘fifty’. Word-final stressed /a/ is also routinely realized as [ɛ] in the *albonnais* sub-dialect of Vivaro-Alpin, e.g. *donar* [duˈne] ‘give_{INF}’; this feature is systematic in *albonnais* but also frequently found in the variety of Lemosin spoken around the town of Nontron and in *briançonnais*, but only in verbal infinitives (Quint 1999, 10). In *rhodanien* Provençal, /a/ is realized as [æ] in final open syllables, e.g. *cofar* [kwiˈfæ] ‘style_{INF} hair’; in non-final stressed syllables, the realization is frequently [a:] (Coustenoble 1945, 27–30), *cofada* [kwiˈfa:dɔ] ‘style_{PST.PTCP.F.SG} hair’. The /ɔ/ shows little variability in stressed syllables, though it is usually longer in monosyllabic words (Müller/Martin Mota 2012, 157), e.g. *còp* [kɔ:p] ‘time’, and, in Provençal and Rouergat, is diphthongized in closed syllables, e.g. *pòrc* [pɔrk] ‘pig’, [pɔrk], [pɔrk] (Olivieri/Sauzet 2016, 322); in Vivaro-Alpin, /ɔ/ is also frequently diphthongized to [wɔ] (Quint 1999, 10; Müller/Martin Mota 2012, 157).

4.2.2 Vowel length

In Lemosin and Auvernhat, phonemic vowel length has developed as a result of the loss of the plural /-s/ morpheme (Olivieri/Sauzet 2016, 323); the deletion of /-s/ for plural nouns has resulted in compensatory vowel lengthening, such that singular and plural nouns are distinguished by vowel length, e.g. *pè* [pe] ‘foot_{SG}’ ~ *pès* [pe:] ‘foot_{PL}’. Vowel length also serves to distinguish second and third person singular in verbal paradigms, e.g. *cantas* [ˈsãtɔ:] ‘sing_{2SG}’ ~ *canta* [ˈsãtɔ] ‘sing_{3SG}’; this may be accompanied by stress reassignment, e.g. *cantas* [sãˈta:] ~ *canta* [ˈsãtɔ] (Olivieri/Sauzet 2016, 323; cf. also Meinschaefer 2020). In *rhodanien* Provençal, vowel length is phonetically conditioned, not contrastive (Coustenoble 1945, 98–100): in final open syllables, stressed and unstressed vowels are short, e.g. *dormir* [duʁˈmi] ‘sleep_{INF}’; in medial syllables (open and closed), stressed vowels are long and unstressed vowels are short, e.g. *divina* [diˈvi:nɔ] ‘divine_{F.SG}’; in final closed syllables, vowels are short before [-ŋ] and long before /-s/ and /-r/, e.g. *partirès* [partiˈbe:s] ‘leave_{2SG.COND}’, *mar* [ma:ʁ] ‘sea’, particularly in verbal inflection morphemes for person and in oral narratives. In the Vivaro-Alpin dialect of Chiomonte, Italy, when the stressed vowel in the sequence

'VCV is long, the following consonant is singleton; when the stressed vowel is short, the consonant is geminate (Sibille 2012, 2234–2235), e.g. *pasta* ['pa:tɔ] 'pastry', *pata* ['pat:ɔ] 'paw'.

4.2.3 Unstressed oral vowels

Post-tonic /i/ occurs primarily in 1st person singular verbal morphology (Wheeler 1988, 247), e.g. *canti* /'kanti/ 'sing_{1SG}'; it is frequently realized as [-e] in *alverno-méditerranéen* dialects and as [-u] in Vivaro-Alpin. Post-tonic /i/ also occurs in a large number of learned words, borrowed from Latin (Ford 1921, 66), e.g. *memòri* /me'mɔri/ 'collective memory'. In unstressed syllables, both pre- and post-tonic, the phonemic contrast between /e/ and /ɛ/ is neutralized to /e/ (Bec 1973, 31), e.g. *pèl* /pɛl/ 'skin', *pèlar* /pe'la/ 'skin_{INF}'. In Vivaro-Alpin, pre-tonic /e/ is realized as [ə] (Sibille 2012, 2235) or [œ] (Field 1978, 126), frequently leading to syncope in the dialect of Chiomonte, Italy, e.g. *semana* [sə'manɔ] 'week' > [s'manɔ]. In *albonnais* Vivaro-Alpin, [ɛ] occurs in post-tonic syllables as an allophone of /e/ before [h] < /s/ (Quint 1999, 6), e.g. *ères* [ɛrɛh] 'be_{2SG.IMPF}'. In *rhodanien* Provençal, post-tonic /e/ is often realized as [ə], particularly in the Vaucluse sub-dialect (Coustenoble 1945, 24); in the same dialect, final /e/ is deleted when followed by a vowel (Coustenoble 1945, 122), e.g. *un brave ome* [øŋbʁa:vɔ:mə] 'a courageous_{M.SG} man'. In the *parlar negre* of Gascon, post-tonic /e/ is realized [œ] (Mooney 2014, 348), e.g. *càser* ['kaðœ] 'fall_{INF}' (cf. 4.2.1). Post-tonic /u/ has a relatively restricted distribution, occurring primarily in third person plural verb forms (Wheeler 1988, 247), e.g. *lièjon* /'ljɛdʒun/ 'read_{3PL}'.

Pre-tonic /a/ has the majority variant [a], but in dialects including Lemosin, northern Lengadocian and Vivaro-Alpin, this is frequently realized as [ɔ] (Quint 1999, 9; Olivieri/Sauzet 2016, 324) (cf. 3.2), e.g. *parlam* [pɔr'lan] 'speak_{1PL}'. The post-tonic /a/ phoneme of Old Occitan has, in the modern language, evolved to /ɔ/; note that some analyses choose to treat final post-tonic /ɔ/ as distinct from stressed /ɔ/, preferring the notation [a] (Olivieri/Sauzet 2016, 324), [o] (Coustenoble 1945, 33), or [ə] (Bec 1973, 35), because of the high level of variability in the phonetic realization of the post-tonic vowel, though there is no phonological basis (e.g. the existence of minimal pairs) to do so (Coustenoble 1945, 33). [ɔ] cannot occur in pre-tonic syllables, where it alternates with [u], e.g. *pòrc* [pɔrk] 'pig', Gasc. *porqueria* [purke'rijɔ] 'mess' or 'pig shed', though it does occur in some borrowings from French (Bec 1973, 33), e.g. *auto* [ɔ'tɔ] 'car'. The realization of post-tonic /ɔ/ varies geographically, with the following variants: [ɔ] is found in the majority of Occitan dialects, e.g. *pòrta* [pɔrtɔ] 'door'; [a] or [ɑ] is found in *lodévois* and *montpelliérain* Lengadocian (Bec 1973, 34), *nissart* Provençal (Olivieri/Sauzet 2016, 324), and in the Gascon of Pontacq, Asson (Bouzet 1928, 9) and the Biros valley (Castet 1895, 15), e.g. [pɔrta]; [u] is found in Couserans Gascon (Castet 1895, 15) and in some sub-dialects of the Médoc and the Ariège, as well as in *vaudois* and the variety spoken in the southern Alpilles (Bec

1973, 34), e.g. [ˈpɔrtu]; [ə] is found in *rhodanien* Provençal (Ford 1921, 24; Coustenoble 1945, 34) e.g. [ˈpɔrtə]; [œ] is found in *parlar negre* Gascon (Mooney 2014, 348), e.g. [ˈpɔrtœ]. In the *parlar negre*, therefore, the contrast between word-final post-tonic /-e/ and /-ɔ/ is neutralized as both are realized as [-œ], e.g. *càser* [ˈkaðœ] ‘fall_{INF}’ ~ *cada* [ˈkaðœ] ‘every’. Other dialects present a more complex array of variants in final position. In Lemosin, [ɔ] occurs in singular feminine nouns and 3rd person singular verbal morphology, while [a:] occurs in plurals and 2nd person singular verbal endings (Bec 1973, 35), e.g. *filha* [ˈfijɔ] ‘daughter_{SG}’, *filhas* [ˈfija:] ‘daughter_{PL}’; *canta* [ˈtʃantɔ] ‘sing_{SG}’, *cantas* [ˈtʃanta:] ‘sing_{2SG}’. The same pattern can be observed in Vivaro-Alpin but, additionally, stressed /a/ can also be realized as [ɔ] in singular nouns when it finds itself in an open syllable as a result of word-final consonant deletion (Field 1978, 123), e.g. *prat* [prɔ] ‘meadow’; this [ɔ] alternates with [a:], which marks plurality, as in Lemosin, e.g. *prats* [pra:] ‘meadow_{PL}’. In Lunel Lengadocian, post-tonic /ɔ/ is realized as [ɔ] after phrasal stress and otherwise as [a] (Olivieri/Sauzet 2016, 324), e.g. *la taula lònga* [laˌtawlaˈlɔŋɔ] ‘the long_{F.SG} table’, but *la lònga taula* [laˌlɔŋgaˈtawla]. In Bessan Lengadocian, post-tonic /ɔ/ is realized as [ɔ] in closed syllables and as [a] in open syllables (Roque-Ferrier 1878, cited in Olivieri/Sauzet 2016, 324), e.g. *las taulas lòngas* [lasˌtawlasˈlɔŋɔs] ‘the long_{F.PL} table_{PL}’, but *la taula lònga* [laˌtawlaˈlɔŋga] ‘the long_{F.SG} table_{SG}’.

4.2.4 Vowel nasalization

Standard Occitan does not have any phonemic nasal vowels; Latin vowel+nasal sequences are generally preserved as a phonemic oral vowel followed by a nasal consonant, e.g. *FŪMU(M)* > *fum* /fym/ ‘smoke’. In southern Occitan, there are no phonological nasal vowels (Olivieri/Sauzet 2016, 326), with Lengadocian being particularly conservative in this respect (Sampson 1999, 147). Phonemic oral vowels do, however, have nasalized allophonic variants when they appear before nasal consonants (Sampson 1999, 139; 76 Nasals and nasalization). The degree of nasalization of vowels in this context is attested to be at most partial and “only really perceptible in the latter part of the vowel” (Sampson 1999, 147; Olivieri/Sauzet 2016, 326). In Provençal, both Coustenoble (1945, 66) and Ford (1921, 22) note that nasalization is only allophonic, but there is more evidence for the weakening of nasal consonant codas than in Lengadocian, particularly following /a/, leaving behind an unconditioned nasal vowel, [ã] (Sampson 1999, 150), e.g. *grand* /gran/ [grã] ‘big_{M.SG}’. In fact, in southern Occitan, final /-n/ frequently drops, but typically leaves an oral vowel in an open syllable (Field 1978, 101; Sampson 1999, 151), e.g. *PANEM* > /pan/, Leng. [pa] ‘bread’.

In some dialects of *nord-occitan*, such as Lemosin, phonemically nasal vowels have developed in open syllables as a result of the weakening and loss of nasal consonant codas (Sampson 1999, 147; Olivieri/Sauzet 2016, 326); this is frequently accompanied by vowel opening such that /iN yN uN/ are realized as [ẽ œ õ] respectively

(Sampson 1999, 151). In Lemosin, nasal vowels are “systematically long” and the absence or presence of nasality is involved in morphophonological alternations, e.g. *chantan* [ˈsã:tã:] ‘sing_{3PL}’, *chanta* [ˈsã:tɔ] ‘sing_{3SG}’ (Olivieri/Sauzet 2016, 323). In Auvergnat, Sampson (1999, 152) notes that non-open vowels are more resistant to nasalization than open vowels. In Vivaro-Alpin, retention of nasal consonant codas is the norm (Sampson 1999, 150; Quint 1999, 6) and as such there are no phonemically nasal vowels in this variety. In the Vivaro-Alpin sub-dialect of Chiomonte, Italy, nasality is preserved in post-tonic position in words with a Latin etymon ending in -INE(M), -ENE(M), -INU(M) (Sibille 2012, 2235), e.g. HOMINE(M) > *ome* [ˈɔmã] ‘man’; IUENE(M) > *jove* [ˈʒuvã] ‘young_{M.SG}’; FRASSINU(M) > *fraisie* [ˈfrejsã] ‘ash tree’.

In Gascon, the dropping of Latin intervocalic -N- has led to the existence of a phonemic nasal vowel system, /ĩ ỹ ũ ã ã/, in some sub-dialects, such as *béarnais* (Mooney 2014, 346), e.g. VINUM > *vin* /bĩ/ ‘wine’; CATA-UNUM > *cadun* /kaˈdũ/ ‘everyone_{M.SG}’; MASIONE(M) > *maison* /ˈmajzũ/ ‘house’, PLENUM > *plen* /plẽ/ ‘full_{M.SG}’; PANE(M) > *pan* /pã/ ‘bread’ (Sampson 1999, 154). In other varieties of Gascon, however, these vowels have denasalized, e.g. *vin* [bi], while in still others, there has been restructuring as an oral vowel + [ŋ] (Sampson 1999, 154), e.g. *vin* [bin].

4.3 Glides and diphthongs

Standard Occitan has three glide phonemes, /j w ɥ/. Minimal pairs that show /j/ to be in contrast with /i/ are readily available (Wheeler 1988, 250), e.g. *trairà* /trajˈra/ ‘pull out_{3SG.FUT}’ vs. *traïra* /traiˈra/ ‘betray_{3SG.FUT}’. In the Gascon of west-central Bearn and the Pyrenean valleys and, to a lesser extent, the central Pau region, /j/ is replaced by [ʒ] in all positions (word-initially, intervocalically and postconsonantly), e.g. *jo* [ʒu] ‘me’. The phonemic status of /w/ is not as clear (Wheeler 1988, 250); in the Occitan diasystem, it occurs rarely in syllable onsets, and when it appears in codas, it is usually the result of vocalization of /l/, /ʎ/, or /v/. In Gascon, initial /kw/ and /gw/ are retained, whereas these are simplified to /k/ and /g/ in other dialects, e.g. *quatre* /katre/ ‘four’ vs. Gasc. [ˈkwate]. The /ɥ/ phoneme is absent in Gascon; in other dialects, it never occurs in coda position (Bec 1973, 49). Wheeler (1988, 250) notes that the phonemic status of /ɥ/ is ‘very dubious’ and the sequences such as /yj/ and /ɥi/ are not consistently distinguished. In some varieties, such as Rouergat Lengadocian and Vellave Auvergnat (Field 1978, 108, 116–117), glides in stressed syllables alternate with corresponding vowels when stress is shifted in inflected forms, e.g. *dona* [ˈdwɔɔɔ] ‘give_{3SG}’, *donar* [duˈna] ‘give_{INF}’, *dobrir* [durˈbi] ‘open_{INF}’, *duèrb* [dɥɛr] ‘open_{3SG}’. In Vivaro-Alpin, final glides in singular nouns, e.g. *pomièr* [pumɛj] ‘apple tree’, often alternate morphologically with rhotics to mark pluralization, e.g. *pomièrs* [pumer] ‘apple tree_{PL}’ (Field 1978, 123).

In the diasystem, rising and falling diphthongs are formed with a vowel preceded by /j/, /w/, or /ɥ/, or with a vowel followed by /j/ or /w/. The following rising diph-

thongs are possible: /je/, e.g. *sobrietat* /subrje'tat/ 'sobriety'; /jɛ/, e.g. *ièr* /jɛ/ 'yes-terday'; /ja/, e.g. *embestiar* /embes'tja/ 'annoy_{INF}'; /ju/, e.g. *violon* /vju'lun/ 'violin'; /jɔ/, e.g. *iòga* /'jɔga/ 'yoga'; /ji/, e.g. *saunegi* /saw'neji/ 'dream_{1SG}'; /jy/, e.g. *jumpar* /jym'pa/ 'rock, swing_{INF}'; /ɥe/, e.g. *cuer* /kɥer/ 'leather'; /ɥi/, e.g. *adiure* /a'diure/ 'bring_{INF}'; /ɥɔ/, e.g. *fuòc* /fɥɔk/ 'fire'; /ɥu/, e.g. *cuol* /kɥul/ 'arse'. The diphthong /jɛ/ is used in the standard Occitan suffixes *-ièr/-ièra* [-jɛ]/[-jɛrɔ] which may be realized as [-ɛ]/[-ɛrɔ] in Gascon and Auvernhat or as [-ɛj]/[-ɛjrɔ] in northern sub-dialects of Gascon (Olivieri/Sauzet 2016, 323); in Auvergne, this /jɛ/ > [ɛ] realization is also attested in stems, e.g. *mièlhs* [mɛj] 'better'. /jy/ is realized as [jə] in *rhodanien* Provençal (Coustenoble 1945, 58). Even in dialects that retain /ɥ/, Bec (1973, 54–55) notes that the majority of realizations of /ɥɔ/ and /ɥu/ are as [jɔ] and [ju] respectively, across dialects, e.g. *fuòc* [fjɔk] 'fire'; *cuol* [kjul] 'arse', but Quint (1999, 10) documents *fùoc* [fɥo] 'fire' in Vivaro-Alpin. In dialects such as Gascon, where /ɥ/ is absent, the following rising diphthongs are attested: /we/, e.g. *uelh* [weɫ] 'eye'; /wɛ/, e.g. *cuèlher* ['kwɛɛɫ] 'fetch_{INF}'; /wa/, e.g. *quatre* ['kwatɛ] 'four', /wi/, e.g. *guidar* [gwi'da] 'guide_{INF}'. The diphthongs [wɔ], [wa], and [wɛ] can also arise from the diphthongization of /ɔ/, e.g. *pòrta* ['pwɔrta] 'door'.

Possible falling diphthongs are (Bec 1973, 54–55): /ej/, e.g. *veire* /'vejre/ 'see_{INF}'; /ɛj/, e.g. *pèira* /'pejra/ 'stone'; /aj/, e.g. *maire* /'majre/ 'mother'; /uj/, e.g. *coire* /'kujre/ 'copper'; /ɔj/, e.g. *còire* /'kɔjre/ 'cook_{INF}'; /ew/, e.g. *beu* /bew/ 'drink_{3SG}'; /ɛw/, e.g. *nèu* /nɛw/ 'snow'; /aw/, e.g. Gasc. *nau* /naw/ 'nine'; /iw/, e.g. *viu* /biw/ 'lively_{M.SG}'; /ɔw/, *nòu* /nɔw/ 'new_{M.SG}'. In *rhodanien* Provençal, /ɛj/ is variably realized as [i] (Coustenoble 1945, 44), e.g. *èime* ['i:me] 'spirit', /ɛw/ is variably realized as [ɛw] (Coustenoble 1945, 37), e.g. *solèlh* [sulew] 'sun', /aw/ as [aw] or [ɔw] in stressed syllables and as [ow] or [u] in unstressed syllables (Coustenoble 1945, 50), e.g. *faudau* [fu'daw] 'apron', and /ɔw/ is variably realized as [ɔw], [ow], or [u] (Coustenoble 1945, 43, 50). However, Coustenoble also posits phonemic /ow/ for *rhodanien*, which contrasts with /ɔw/ and /u/, e.g. *pòutra* ['pɔwtrɔ] 'young female donkey' ~ *pautra* ['pɔwtrɔ] 'burgundy'; *sosleu* [sou'leu] 'raising' ~ *solèu* [su'leu] 'sun'. The /aj/ diphthong is frequently realized as [ɛj] in *aquitano-pyrénéen* dialects; [ɛj] is attested in Vivaro-Alpin (Quint 1999, 12). /aw/ preserves the same falling Latin diphthong (Wheeler 1988, 247), but can also arise from vocalization, e.g. *sal* [saw] 'salt'; /aw/ is variably realized as [ow] or [ɔw] in unstressed position in Vivaro-Alpin (Quint 1999, 12), e.g. *se pausar* [ʃepow'ze] 'stop oneself_{INF}'. /ɔw/ is realized variably as [ɛw] in Auvernhat (Field 1978, 118), e.g. *nòu* [nɛw], and as [aw] in Gascon, e.g. [naw]. To the series of falling diphthongs with /w/, Bec (1973, 54) adds /yw/ for Gascon, e.g. *cuol* [kyw] 'arse'.

Triphthongs are formed with both a pre- and post-vocalic glide. The following combinations are possible (Bec 1973, 54–55): /ɥɔw/, e.g. *uòu* /ɥɔw/ 'egg'; /ɥej/, e.g. *nueit* /nɥejt/ 'night'; /ɥɔj/, e.g. *cuòissa* /'kɥɔjsɔ/ 'thigh'; /jej/, e.g. *fieira* /fiejra/ 'fair'; /jaw/, e.g. *mial* [mjaw] 'honey' in *nord-occitan*. Bec (1973, 55) also notes that [jɔw] occurs as a variant of /ɥɔw/. For dialects such as Gascon, without /ɥ/, /ɥ/ is substituted by [w] or sometimes [j]. Additionally, for *rhodanien* Provençal, Coustenoble (1945, 62) posits /jew/

and /jɛw/ as additional phonemes, e.g. *lo sieu* /lu'sjɛw/ 'yours_{M.SG}', *lo fièu* /lu'fjɛw/ 'the fief', [jɔw] as a variant of /ɥɔw/, and [jei] or [jøj] as variants of /ɥej/.

5 Suprasegmental phonology

5.1 Stress

The basic stress system of Occitan is outlined in 4.2. In short, if a lexical word ends in a heavy syllable (i.e. one with a diphthong or a final consonant), stress is final; otherwise, stress is penultimate. Therefore, closed syllables (i.e. words ending in consonants) attract primary stress, but many dialects of Occitan have a strong tendency to drop word-final consonants (cf. 4.1.1). This has led to a number of words ending in stressed monophthongal vowels (Wheeler 1988, 251; Olivieri/Sauzet 2016, 328), e.g. *donar* /du'na/ 'give_{INF}', Prov. *qualitat* [kali'ta] 'quality'. Synchronically, therefore, the general rule is that words ending in an underlying consonant are stressed on the final syllable (cf. Bec 1973, 56). Lexical exceptions to the general stress pattern include words like *aquò* /a'kɔ/ 'that' and *aicì* /aj'si/ 'here' (Olivieri/Sauzet 2016, 328), loanwords such as *velò* [ve'lɔ] 'bicycle', and some words ending in *-ol* /-ul/ (Salvat 1973, 16), e.g. *apòstol* /a'pɔstul/ 'apostle'. Additionally, inflection morphemes do not alter the stress pattern of words to which they are affixed, e.g. *canta* /'kantɔ/ 'sing_{3SG}', *cantas* /'kantɔs/ 'sing_{2SG}'. In central Lemosin, however, stress is systematically re-assigned to the final long or closed syllable, even for inflectional morphemes (Olivieri/Sauzet 2016, 328), e.g. *cantas* [tʃan'ta:] 'sing_{2SG}' or [san'ta:]. While *nissart* Provençal allows antipenultimate stress in general, e.g. *pèrsegue* ['pɛsege] 'peach', Aranese Gascon only allows it in learned words (Olivieri/Sauzet 2016, 328), e.g. *musica* ['myzikɔ] 'music'. In some dialects, such as *albonnais* Vivaro-Alpin, stress alone distinguishes grammatical person (Quint 1999, 5), e.g. *fenisse* [fe'niʃe] 'finish_{1SG}' ~ *fenissètz* [feni'ʃe] 'finish_{2PL}'.

5.2 Prosodic organization

Sichel-Bazin/Buthke/Meisenburg (2012a, 351) define prosody as a "set of phenomena involving variations in pitch, temporal organization and intensity during the speech act". Full empirical studies of Occitan are in short supply; Sichel-Bazin (2011) cites three reference studies of Occitan prosodic organization, each of which uses a different prosodic transcription system and theoretical framework: Hualde (2003) on Lengadocian; Lai (2005) on Vivaro-Alpin; Dourdet (2006) on Lemosin. It is also worth noting Coustenoble's (1945) study of Provençal, which is somewhat pioneering

in the investigation of intonational patterns in Occitan. In order to address these disparities, both in terms of geographical breadth and analytical focus, the *Atlas interactiu de l'intonacion de l'occitan* (Prieto/Sichel-Bazin/Meisenburg 2007–2014) was created to survey all six main dialects, and several other databases were compiled. Within these activities, participants were asked to take part in a map task, a sociolinguistic interview, and a Discourse Completion Task (DCT; Prieto 2001; cf. Vanrell/Feldhausen/Astruc 2018). The latter had been developed to document 47 semi-spontaneous utterance types with different sociopragmatic functions including assertions, yes-no questions, wh-questions, imperatives, and vocatives (Sichel-Bazin 2011; 2015; Sichel-Bazin/Buthke/Meisenburg 2012a; Sichel-Bazin/Meisenburg 2014; Sichel-Bazin/Meisenburg/Prieto 2015).

Recent studies of Occitan prosody were done within the framework of Autosegmental-Metrical phonology (AM). This approach considers high (H) and low (L) tones (auto-segments) to be the basic units of intonational structure. These tones (or combinations thereof) can have phonemic value when they occur as pitch accents on metrically strong (stressed) syllables, which act as anchor points for these pitch accents. The theory distinguishes between prominent syllables, which bear pitch accents (indicated by *), and phrasal (or constituent) boundaries, which act as anchor points for boundary tones (indicated by %); both pitch accents and boundary tones can be simple, e.g. L*, H*, L%, H%, or complex, e.g. L+H*, L*+H, H+L*, LH% (Pierrehumbert 1980). In articulatory terms, prominent syllables are usually marked by clearer segmental articulation and an increase in fundamental frequency (F0), duration and/or intensity (Ladd 1996, 46–51). Boundaries, on the other hand, are signaled by pre-boundary lengthening and/or tonal marking.

The intonational phrase (IP) is the highest constituent of prosodic structure in Occitan. The head of the IP is its most prominent or nuclear accent, usually the last one; final lengthening and a boundary tone (T%) mark its right edge, which is usually followed by a pause (Sichel-Bazin/Buthke/Meisenburg 2012a, 359). The IP is made up of one or more accentual phrases (AP), which may contain more than one lexical item plus clitics (Beckman/Pierrehumbert 1986). The AP is an important prosodic constituent that Occitan shares with French (↗21 French). Essentially, it is APs that bear a pitch accent, not just lexically stressed syllables; indeed, not all lexically stressed syllables bear a pitch accent (Sichel-Bazin/Meisenburg/Prieto 2015, 232). In both Occitan and French, an optional initial rise (Hi) can occur on syllables that do not bear lexical stress (Sichel-Bazin/Meisenburg/Prieto 2015, 200). The right edge of the AP is marked by a pitch accent on its last stressed syllable (either the final syllable or the penultimate one); the left edge is marked by an optional low boundary tone (aL) and/or an initial rise (Hi). The tonal structure of the AP is thus /(aL)(Hi)T*/, where T* is the (low or high) pitch accent (Sichel-Bazin/Meisenburg/Prieto 2015, 232).

5.3 Nuclear configurations and applications

Sichel-Bazin/Meisenburg/Prieto (2015, 229) report that six types of pitch accent have been found in Occitan: L^* , H^* , $L+H^*$, $L+<H^*$, $H+L^*$, and $H+H^*$ which may combine with boundary tones ($L\%$ or $H\%$) in various ways to form specific nuclear configurations with associated sociopragmatic values. The following summary of these nuclear configurations draws on Sichel-Bazin/Meisenburg/Prieto (2015, 229–232), which should be consulted for full discussion and exemplification of the issues and variability involved; this analysis compares Occitan spoken in France (Oc-F) with the Occitan subdialects Aranese (A) (in contact with Catalan and Spanish) and Cisalpine (C) (in contact with Piedmontese and Italian); phrasal examples for each configuration can be consulted in the methodology section of the *Atlas interactiu de l'intonacion de l'occitan* site (Prieto/Sichel-Bazin/Meisenburg 2007–2014). Three examples of Occitan information-seeking questions are reproduced here for illustration (cf. also Sichel-Bazin 2015).

A progressive fall to the end of the utterance ($L^* L\%$) is used to indicate finality in broad (Oc-F, A) and narrow (Oc-F) focus statements, in postfocal sequences, in information-seeking yes-no questions headed by *es que* (Oc-F) (cf. Figure 22.2), in information-seeking wh-questions, and in gentle commands. A rise in the nuclear syllable followed by a fall ($L+H^* L\%$) is used for narrow focus statements, exclamations, confirmation-seeking yes-no questions, emphatic wh-questions, and echo statements with positive bias. A peak in the nuclear vowel followed by a fall ($H^* L\%$)

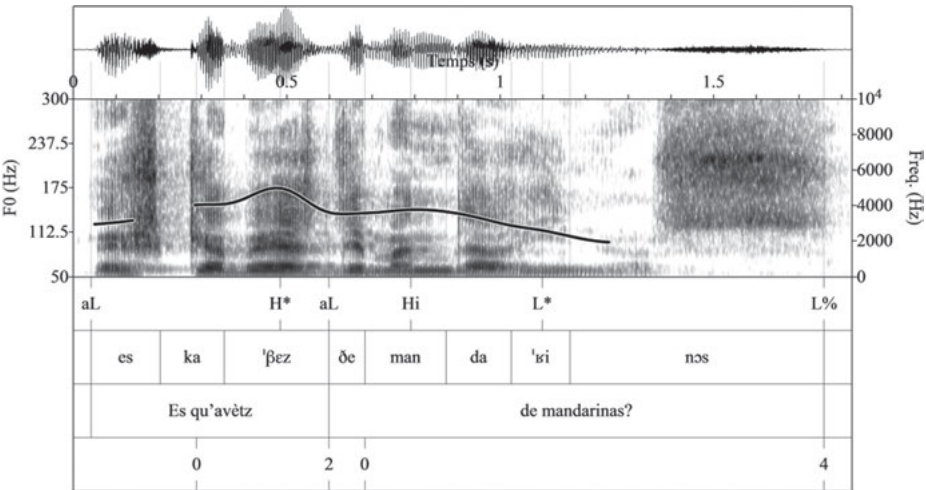


Figure 22.2: Waveform, spectrogram and F0 contour of the information-seeking yes-no question *Es qu'avètz de mandarinas?* 'Do you have tangerines?' produced by a Lengadocian speaker from Gabian (Sichel-Bazin/Meisenburg/Prieto 2015, 215).

is used for one-word commands, urgent commands, and vocatives. A rise, or a high plateau, in the preaccentual syllable and a fall in the nuclear syllable (H+L* L%) are used for categorical statements (Oc-F), exclamations (Oc-F), broad focus statements in Cisalpine, and confirmation-seeking yes-no questions in Aranese. A rise in the preaccentual syllable to a peak in the nuclear syllable, followed by a fall (H+H* L%) is used in the Occitan spoken in France for statements of the obvious, exclamations, confirmation-seeking yes-no questions, and requests.

A rise in the nuclear syllable that continues until the end of the utterance (L+H* H%) is used in all varieties for continuation, information-seeking yes-no questions (cf. Figure 22.3), and echo questions with negative bias. A low pitch in the nuclear syllable followed by a rise (L* H%) is used for information-seeking yes-no questions (mainly in Aranese) (cf. Figure 22.4) and for contrastive topic in incredulity echo yes-no questions (mainly in Oc-F). A fall in the nuclear syllable followed by a rise (H+L* H%) is used in Aranese for incredulity echo yes-no questions, and a rise in the nuclear syllable followed by a sustained mid-level plateau (L+H* !H%) is used for vocative chants in Aranese and Cisalpine, and for continuation in Cisalpine. Finally, a low pitch in the nuclear syllable followed by a rising-falling movement (L*HL%) is used for requests in Aranese.

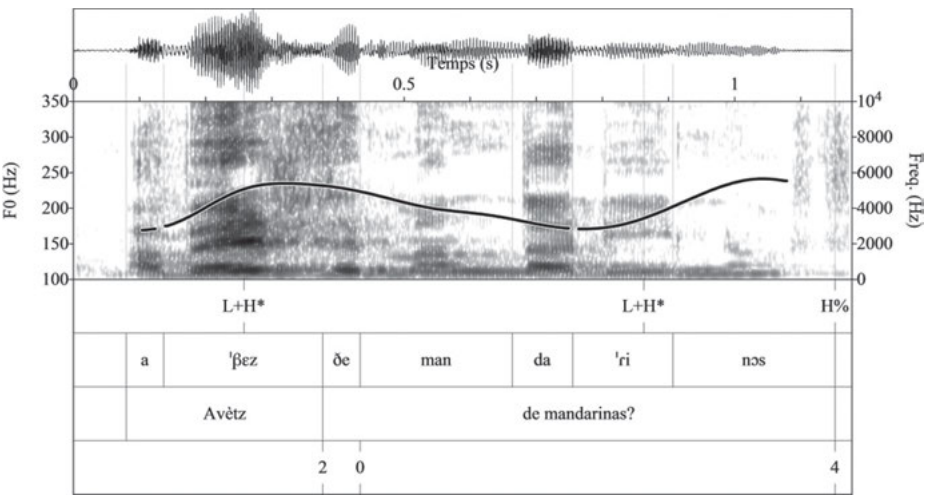


Figure 22.3: Waveform, spectrogram and F0 contour of the information-seeking yes-no question *Avètz de mandarinas?* ‘Do you have tangerines?’ produced by a Lengadocian speaker from La Cauna (Sichel-Bazin/Meisenburg/Prieto 2015, 214).

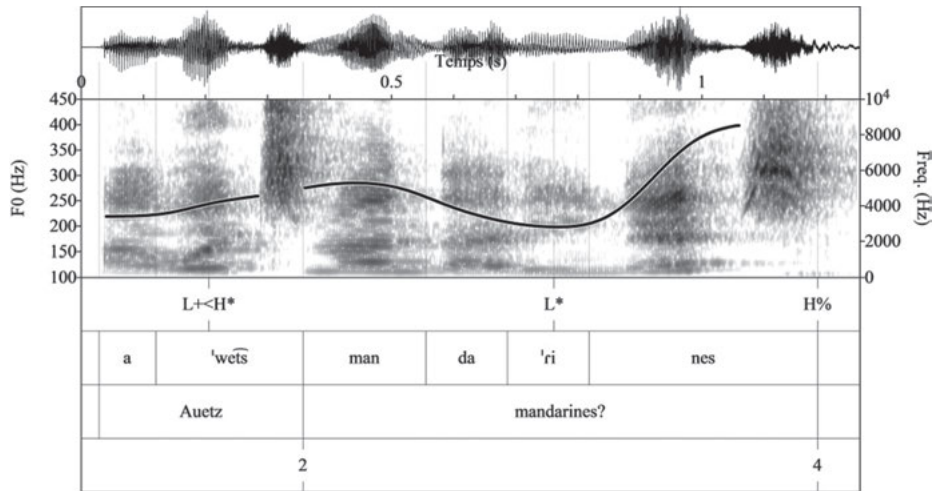


Figure 22.4: Waveform, spectrogram and F0 contour of the information-seeking yes-no question *Auetz mandarines?* ‘Do you have tangerines?’ produced by a Gascon (Aranese) speaker from Les (Sichel-Bazin/Meisenburg/Prieto 2015, 214).

5.4 Contact-induced prosodic change

Occitan finds itself in a situation of language contact with French in France, with Catalan and Spanish in Spain, and with Italian and other Italo-Romance dialects in Italy; it is therefore no surprise that there is evidence of contact-induced prosodic transfer in Occitan from these more dominant languages. Sichel-Bazin/Buthke/Meisenburg (2012a; b; 2015) and Sichel-Bazin (2015) have studied in depth the bilateral prosodic influence between these languages. In contrast to Occitan, French is traditionally described as employing phrasal stress (as opposed to lexical stress), where the primary metrical structure is the rhythmic group, the final syllable of which bears stress (↗21 French):

- (1) a. Oc. Qu’ei un mossur francés qui’v atend
ENC be_{3SG} a man French_{M.SG} who-for-you_{SG} wait_{3SG}
entà’v demandar un renshament.
to-you_{sg} ask-for_{I_{INF}} an information.
‘There is a French man who is waiting for you to ask you for information.’
/ke.jỹ.mu’sy.fran’ses | ki.pa’ten |
den’tap.de.man’dà | ÿ.ren.se.ɲa’men //
- b. Fr. C’est un monsieur français qui vous attend pour vous demander un
renseignement.
/sɛ.tœ.mə.sjø.fʁɑ̃’sɛ | ki.vu.za’tɑ̃ |
puʁ.vu.dmɑ̃’dɛ | œ̃.fʁɑ̃.sɛjɛn’mɑ̃ //

Despite the differences between the stress systems of Occitan and French, the nuclear configurations outlined in 5.3 are rather similar in both languages, except for statements of the obvious and vocatives (Sichel-Bazin/Buthke/Meisenburg 2012c; Sichel-Bazin 2015). Sichel-Bazin/Buthke/Meisenburg (2015) and Sichel-Bazin (2015) have demonstrated, however, that southern regional French displays features of traditional Occitan prosodic structure, notably lexical stress, while Occitan, in turn, appears to have adopted the rhythmic group from French. The rhythmic group corresponds, in the autosegmental-metrical framework, to the AP (cf. 5.2) such that, in both languages, the final (or penultimate) syllable – the head – of the AP is marked (by F0, intensity, duration). Occitan also displays initial rises (Hi), characteristic of French prosody (Sichel-Bazin/Buthke/Meisenburg 2012a, 356–357); these rises, however, align with the left edge of the first content word of the AP in French, but with the left edge of the whole AP in Occitan (Sichel-Bazin/Buthke/Meisenburg 2012a, 357). The outcome of Occitan adopting the AP from French is the (at least partial) deaccentuation of lexically stressed syllables and the concomitant accentuation of group-final syllables (cf. 5.2):

- (2) /ke.jỹ.mu.sy.fran'ses | ki.pa'ten |
 en.tap.de.man'da | ỹ.ren.se.na'men ||/

While lexical stress has been shown to weaken in Occitan due to contact with French, it is not completely lost; Sichel-Bazin/Buthke/Meisenburg (2012a, 361) found slight prominences on traditionally lexically stressed syllables within the AP and these prominences were also found for southern regional French speakers, demonstrating transfer from Occitan to French as well. Outside of France, Sichel-Bazin/Meisenburg/Prieto (2015, 229–230) found that Aranese had adopted its default pre-nuclear accent – rising with a delayed peak (L+<H*) – and a bitonal boundary tone (HL%) from its contact languages, Catalan and Spanish.

6 Concluding remarks

In this chapter, detailed phonetic and phonological characteristics of Occitan and its varieties have been presented, with focus placed both on the similarities between phonological systems diatopically and on the wealth of observable variation in this language. Despite its endangered status, a wealth of literature exists on Occitan and researchers in the modern day continue to examine its linguistic structure using frameworks and methodological toolkits from disciplines such as variationist sociolinguistics, acoustic phonetics, and laboratory phonology. Indeed, as we have seen, the specific contact situation in which Occitan finds itself makes it a prime candidate for future research of this kind.

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23 Catalan

Abstract: This chapter presents a general overview of the phonetics and phonology of Catalan, with an updated state-of-the-art report of the most recent investigations in this area. Though the report concentrates on Central (Eastern) Catalan, we also highlight the rich dialectal variation that affects both segmental and prosodic properties. After a brief introduction to the dialectal distribution of the language, the first part of the chapter is devoted to segmental phonology, taking into consideration syllable structure. In this part, we first present the basic segmental inventories of Catalan, as well as syllable structure types; we then describe the phonological processes that affect both vowels and consonants. The second part of the chapter covers the main prosodic characteristics of the language, followed by a description of the intonational variation found for a variety of sentence types.

Keywords: Catalan, vowel system, consonant system, prosodic system, phonological processes

1 Introduction

Catalan is a medium-sized European language with around 5.6 million native speakers. This number rises to 10.5 million for people claiming to speak and read Catalan and to 13 million for people who report understanding it (Vila 2020). The Catalan language is traditionally divided into two main dialect groups, depending on the vowel reduction systems they present in unstressed position: Eastern Catalan, with full vowel reduction, and Western Catalan, with partial vowel reduction (cf. 3.1). The Eastern group includes Central Catalan (in the northern and eastern areas of Catalonia), Balearic, Northern Catalan (in the Roussillon region of southern France), and Algherese (in the city of Alghero in Sardinia). The Western group includes Northwestern Catalan (in the western and southern areas of Catalonia, eastern Aragon, and Andorra) and Valencian.

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Figure 23.1: Geographical distribution of the dialects of Catalan.

The present chapter focuses on the characteristics of Central (Eastern) Catalan, though we will also provide some information about the more distinctive features of other dialects. Hence, unless otherwise indicated, the transcriptions correspond to Central Catalan. The description is based on the general surveys of the phonology of Catalan depicted in Mascaró (1978), Wheeler (1979; 2005a), Recasens (1991; 1993), Bonet/Lloret (1998), Prieto (2004), Lloret (2011), and the chapters on phonetics and phonology in the *Gramàtica del català contemporani* (Solà et al. 2002, 35–462) and

the *Gramàtica de la llengua catalana* (IEC 2016, 1–115). Additional data for Balearic Catalan are taken from Bibiloni (1983; 2016), Dols (1993a; 2000), and Pons-Moll (2007a), and for Valencian, from Colomina (1985a) and Jiménez (1999). Further references will be given in the text for more specialized issues. Recasens (2017) provides an up-to-date review of the phonetic evolution of Catalan.

Our chapter is organized as follows. Section 2 presents the basic segmental inventories and syllable structure. Sections 3 and 4 are devoted to the main phonological processes that affect vowels and consonants respectively. Section 5 deals with the prosodic properties. Section 6 addresses some final remarks.

2 The organization of sounds in Catalan

2.1 Vowel and consonant inventories

The vowel system of Catalan is shown in Table 23.1. There are several points to be noted about this inventory. First, /ə/ in stressed position only appears in parts of the Balearic variety. Second, /ə/ in unstressed position only appears in the Eastern varieties (with the exception of Algerhese). Third, the contrast between close-mid and open-mid vowels only appears in stressed position (with the exception of Northern Catalan, which has a single mid front vowel and a single mid back vowel, shown in parentheses in the table). The difference in the number and distribution of the vowels is mainly due to the different vowel reduction processes they undergo in unstressed position, which will be examined in 3.1. Another important dialectal difference is the incidence of vowels in stressed position: broadly speaking, words that show /ə/ in Balearic have /ɛ/ in Central Catalan and /e/ in Western Catalan (*ceba* ‘onion’: [ˈsəβə] in Balearic, [ˈseβə] in Central Catalan, and [ˈseβa] in Western Catalan). The peculiar distribution of mid front vowels is due to some distinctive vowel changes that Catalan underwent: basically, old Catalan stressed [e] was maintained as [e] in Western Catalan and Algerhese, but evolved to [ə] in all other Eastern dialects; later

Table 23.1: Vowel system of Catalan.

	Front	Central	Back
Close	i		u
Close-mid	e		o
Mid	(e)	ə	(o)
Open-mid	ɛ		ɔ
Open		a	

on, [ə] changed to [ɛ] in Central and Northern Catalan, while it remained unchanged in Balearic, and, finally, Northern Catalan merged close-mid and open-mid vowels.

Pre-stressing suffixes (e.g. *-i*, *-ic*, *-im*) impose the opening of the preceding mid vowel (*c[ɪ]e[nt]* ‘hundred’ – *c[ɪ]ɛ[ntim]* ‘penny’; *carb[ɔ]* ‘carbon’ – *carb[ɔ]nic* ‘carbonic’) and may reveal the underlying character of the unstressed vowel of the stem (e.g. *púr[p]u[ra]* ‘purple’ – *purp[ɪ]ri* ‘of purple quality’, derived from /u/; but *àt[u]m* ‘atom’ – *at[ɔ]mic* ‘atomic’, derived from /o/ or from an underspecified mid back vowel /O/) (Mascaró 1984a).

The consonant system of Catalan is shown in Table 23.2 (parentheses indicate segments which occur only in some varieties or in loans). Some comments are in order. First, /v/ occurs only in Balearic, Algerese, and some Valencian varieties (though [v] may arise due to voicing processes in all varieties; cf. 4.2.1). Second, most Valencian varieties do not contrast /z/ and /dʒ/, but only have /dʒ/. Third, Catalan /l/ is notably velarized in all contexts ([ɫ]), though to a higher degree in coda position and after back vowels; in this chapter we adopt the common practice of using the unmodified symbol [l]. Fourth, the lexical incidence of /j/ and /ʎ/ varies dialectally. Words that in late Latin contained a group of an alveolar lateral and [j] (or vice versa) changed to [j] in Balearic and part of Central Catalan but turned into [ʎ] elsewhere (PALEA(M) > late Lat. [ˈpalja] > [ˈpajə] or [ˈpaʎə] ‘straw’). There is also a recent urban non-standard tendency to replace all instances of /ʎ/ with /j/, probably due to the influence of Spanish. Additionally, part of the Balearic variety of Majorca has the palatal plosives /c/ and /ɟ/ in singleton onsets (except before back vowels) and word-final position, where other varieties show the velar plosives /k/ and /g/ (*cuc* [ˈkuc] ‘worm’, *gas* [ˈʎas] ‘gas’). Northwestern areas near Aragon have /θ/, derived from old Catalan [ʃ], which in turn evolved from the Latin sequences *ɾ[j]*, *c[j]*, and *ce,i* (with the result of [s] in all other dialects) (CAPTIARE > *caçar* [kaˈθa] ‘hunt_{INF}’). /θ/ and /x/ also appear in loan adaptations, e.g. *thriller* [ˈθrilɐr], *la Rioja* [riˈoxə] (Sp. toponym). Some Valencian and Northwestern varieties devoice the sibilants, but this pronunciation does not belong to formal registers.

Table 23.2: Consonant system of Catalan.

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Palatal	Velar
Plosive	p	b	t	d		(c) (ɟ)	k g
Affricate				ts	dʒ	tʃ	dʒ
Fricative		f (v)	(θ)	s z	ʃ ʒ		(x)
Nasal	m			n		ɲ	
Lateral				l		ʎ	
Trill				r			
Tap				ɾ			
Approximant						j	w

The phonemic status of the affricates, the trill, and the glide approximants is controversial. The debate on the phonemic status of the affricates and the trill arises from their defective distribution. The question of the monophonemic or biphonemic interpretation of affricates has been discussed at length (cf., among others, Lloret 1992; Recasens 1993, 160–161; Jiménez 1996; Wheeler 2005a, 11–22; Bonet/Lloret 2018). In favor of the biphonemic interpretation it is argued that [t͡s] and [d͡z] do not occur word-initially (learned words and loans are pronounced with a fricative: *tsar* ['sar] 'tsar', *tsunami* [su'nami]), and [t͡s] rarely occurs in lexical intervocalic position (*lletsó* [lə't͡so] 'dandelion', *tutsi* ['tuʔsi] 'Tutsi'). Moreover, in Eastern Catalan (except in the Tarragona region of Central Catalan, where affricates are favored), [d͡z] does not occur word-initially (*joc* ['ʒok] 'game') and, unlike other unit phonemes, none of the affricates occur after a consonant (*panxa* ['panʃə] 'belly', though in the area of Barcelona they can appear as free variants of their fricative counterparts: ['panʃə] ~ ['panʃ͡ə]). In favor of the monophonemic interpretation, the following arguments are given: the voiced postalveolar fricative does not contrast with the postalveolar affricate word-finally, where only the affricate occurs (devoiced as [t͡ʃ] due to word-final devoicing, as in *fuig* ['fuʃ] 'flee_{3SG}' – *fugia* [fu'ʒiə] 'flee_{3SG.IMPF}'; cf. 4.2.1); [t͡ʃ] and [d͡ʒ] appear word-initially and in postconsonantal position in Western Catalan (*joc* ['d͡ʒok], *panxa* ['panʃ͡ə]) where other varieties show their fricative counterparts; additionally, /ʒ/ is totally absent from most of Valencian, for which the affricate counterpart is found (*fugia* [fu'd͡ʒiə]). All in all, since postalveolar fricatives and affricates do not contrast in word-initial or postconsonantal position in any variety, the data seem to reflect dialectal differences on the phonological status of affricates.

The phonemic status of the two rhotic sounds is subject to ongoing debates because they only contrast in intervocalic position. In pregenerative accounts the existence of minimal pairs such as *cera* ['sɛrə] 'wax' and *serra* ['sɛrə] 'saw' was taken as sufficient evidence to posit two phonemes: the tap /ɾ/ and the trill /r/. Within the generative tradition, most authors derive them from one phoneme (whether specified as a tap /ɾ/ or as an underspecified rhotic segment /R/), usually drawing the intervocalic contrast from the presence of a single or a geminate rhotic. The main advantage of the geminate view is that the distribution of the two rhotics arises straightforwardly from syllabification: strengthening (i.e. the trill) occurs obligatorily word-initially (*ram* ['ram] 'bouquet'), in heterosyllabic postconsonantal onsets (*honrat* [un'rat] 'honest'), and with variation in preconsonantal codas (*carn* ['karn] ~ ['karn] 'meat') and in phrase-final position (*És el* ['mar] ~ ['mar] 'It's the sea'); the tap appears in complex onsets (*tren* ['trɛn] 'train') and when word-final /ɾ/ resyllabifies with a vowel-initial word (*Ma[r] Egeu* 'Aegean Sea'). Alternatively, some authors attempted to explain the distribution of rhotics in non-contrastive contexts from sonority considerations (Bonet/Mascaró 1997; Padgett 2009; Pons-Moll 2011b). Under this view, [ɾ] is considered to be less sonorous than [r], and hence the trill is preferred as a singleton onset while the tap is preferred in codas and in the second position of a complex onset; the contrastive intervocalic tap is lexically marked.

Wheeler (2005a, 27–29) points out several advantages of the geminate approach, based on three facts: first, stress restrictions (unlike most consonants, the trill does not appear after the stressed syllable of a proparoxytone word, plausibly revealing its geminate character due the restriction against the presence of codas in the penultimate syllable of proparoxytones that operates in Catalan: *còlera* ‘cholera’, **còlerra*); second, word-final consonant restrictions (like other geminate sonorants, the presence of a final geminate rhotic requires the presence of a final vowel: *cor* ‘heart’ vs. *corre* ‘run_{3SG}’, cf. *ball* [‘baʎ] ‘dance’ vs. *batlle* [‘baʎʎə] ‘mayor’), and, third, the similar distribution of [r] and its strengthened counterpart [r̥] and that of [ʒ] and its strengthened counterpart [dʒ̥] (in both sets, the contrast may only arise in intervocalic position: *cera* [‘serə] vs. *serra* [‘serə], *assajar* [əsəʔʒa] ‘rehearse_{INF}’ vs. *assetjar* [əsəʔdʒa] ‘besiege_{INF}’).

As for the phonemic status of the glides, [j] and [w] are often derivable from /i/ and /u/ through default syllabification and additional metrical requirements governing their realization; but there are lexical exceptions for which underlying glides or the syllabic nuclear status of the vowels have to be marked (cf. 3.2).

2.2 Syllable structure and (re)syllabification

In Catalan, syllables obligatorily contain a vowel; onsets and codas are optional. Onsets contain a maximum of two segments; codas have a maximum of two segments word internally and three word finally. Hence, the maximum permitted syllable is CCVCCC, as in *frescs* [‘fresks] ‘fresh_{M.PL}’. Nuclei are considered to be singleton in Catalan due to phonotactic considerations; for example, words ending in a glide tend to be oxytones, as words ending in a consonant do: *jersei* [ʒər’sɛj] ‘jersey’, *abric* [əʔβrik] ‘coat’. The only exception to this generalization is [j] derived from palatal nasal splitting in Majorcan Balearic: in this variety, a maximum of two consonants, including glides, appear in word-final codas and a maximum of one consonant, including glides, appear in word-internal codas (*all* [‘aj] ‘garlic’, *alls* [‘ajs] ‘garlic_{PL}’, *alls petits* [aj.pəʔtɪfs] ‘small garlic_{PL}’) (cf. 4.2.3); however, when [j] derives from palatal nasal splitting one more segment is allowed, presumably due to the nuclear position [j] occupies in this context (*any* [‘aɲ] ‘year’, *anys* [‘ajns] ‘year_{PL}’, *any passat* [ajm.pəʔsat] ‘last year’) (cf. 4.2.4). In the present chapter, any combination of glide and vowel is considered to be a diphthong, regardless of the syllabic position the glide occupies. Any consonant or glide can be a singleton onset or a singleton coda. Complex onsets consist of a plosive or /f/ followed by a liquid /l/, /r/ or a glide (*clau* [‘klaw] ‘key’, *braç* [‘bras] ‘arm’, *flor* [‘flo] ‘flower’, *quan* [‘kwan] ‘when’), except for the non-existing combinations */tɫ/, */dɫ/. Though glides do not usually occur after a biconsonantal onset, these sequences arise in oral speech as a result of diphthongization (*bíblia* [‘biβliə] ~ [‘biβljə] ‘bible’; cf. 3.2). In a small area of Northwestern Catalan, clusters with a lateral present /ʎ/ instead of /l/ ([‘kʎaw],

[ˈfʎo]). Algherese has changed /l/ into /r/ in all complex onsets ([ˈkraw], [ˈfrɔ]), and also in intervocalic singleton onsets (*meló* [maˈro] ‘melon’) (cf. 4.1.2). All onset clusters, thus, respect the sonority sequencing principle since sonority increases from the onset margin towards the nucleus.

Complex codas in word-internal position consist of either the labial-velar glide followed by a velar plosive (*auxili* [əwkˈsi.li] ‘help’, *augment* [əwgˈmen] ‘augmentation’), or /w/, /n/ or plosive plus alveolar fricative (/s/, /z/ or an underspecified segment /S/) (*auscultar* [əws.kulˈta] ‘auscultate_{INF}’, *transmetre* [trənzˈmɛ.trə] ‘transmit_{INF}’, *extrem* [əksˈtrem] ‘extreme_{M.SG}’); they tend to simplify in less formal pronunciations, by deleting the plosive in the first context ([əwˈsi.li]), reducing the diphthong in /Vws/ combinations ([us.kulˈta]), and deleting the nasal or the plosive in the other combinations ([trəzˈmɛ.trə], [əsˈtrem]). Plosive plus alveolar fricative clusters do not comply with the sonority sequencing principle, since sonority rises from the plosive towards the fricative. In word-final position, biconsonantal codas present more combinations, which can be divided into two groups. First, except for sibilants, an alveolar fricative can be added to all existing simple codas (*dijous* [diˈɟows] ‘Thursday’, *dolç* [ˈdols] ‘sweet_{M.SG}’), to the extent of breaking the sonority fall (*bíceps* [ˈbi.səps] ‘biceps’); in most cases the alveolar fricative stands for the plural morph (*ou-s* [ˈɔws] ‘egg_{PL}’, *pal-s* [ˈpals] ‘stick_{PL}’) or the second person singular verbal morph (*beu-s* [ˈbɛws] ‘drink_{2SG}’, *sap-s* [ˈsaps] ‘know_{2SG}’). Additionally, the following clusters are found: glide plus consonant (*caic* [ˈkajk] ‘fall_{1SG}’, *caut* [ˈkawt] ‘cautious_{M.SG}’), though combinations with another sonorant used to be banned (*gasoil* [gəˈzɔj], traditionally pronounced as [gəˈzɔj] or [gəˈzɔʎ], but see recent loans such as *e-mail* [iˈmɛj] or *clown* [ˈklawn]); liquid plus consonant (*dorm* [ˈdɔrm] ‘sleep_{3SG}’, *turc* [ˈturk] ‘Turkish_{M.SG}’, *golf* [ˈgɔlf] ‘gulf’); nasal plus consonant (*triomf* [triˈomf] ‘triumph’, *ponx* [ˈpoŋx] ‘punch’), and s plus plosive (*bosc* [ˈbɔsk] ‘forest’). Triconsonantal word-final codas end in the morph *s* (*triomf-s* [triˈomfs] ‘triumph_{PL}’, *dorm-s* [ˈdɔrms] ‘sleep_{2SG}’); hence, *s* appears after all existing biconsonantal final codas and may violate falling sonority (*turc-s* [ˈturks], *bosc-s* [ˈbɔsk]). There are also a few words with the final combinations /-wst/ (*faust* [ˈfawst] ‘fortunate_{M.SG}’) and /-kst/ (with a sonority break: *text* [ˈtekst]), which may show plural forms ending in [-wst̪s], [-kst̪s] (*faust-s*, *text-s*).

Unlike other varieties of Catalan, Balearic and Algherese do not show any overt inflectional affix in the first person singular present indicative forms (*mat* [ˈmat] ‘kill_{1SG}’). Stems with final clusters that do not comply with the sonority sequencing principle are tolerated in this context (*obr* [ˈɔpr] ‘open_{1SG}’, *filtr* [ˈfɪltr] ‘filter_{1SG}’, *umpl* [ˈumpl] ‘fill_{1SG}’ in Balearic), whereas elsewhere they appear with a final vowel (*batre* ‘beat_{INF}’, *filre* ‘filter’; cf. 3.3 for discussion on the epenthetic nature of such vowels). Algherese further shows the nominal forms *alegr* [aˈlekr] ‘cheerful_{M.SG}’, *alegr-s* [aˈlefs] ‘cheerful_{M.PL}’, *llestr* [ˈʎestr] ‘clever_{M.SG}’, *llestr-os* [ˈʎestrus] ‘clever_{M.PL}’. Prior accounts alleged that these endings occur in onset position; hence they do not violate the sonority sequencing but are licensed by a special ‘zero’ inflectional morph (Dols 1993b;

Serra 1996). The main problem with the onset approach is that the endings behave as codas with respect to other phonological processes (e.g. they undergo word-final devoicing; cf. 4.2.1). Alternatively, Dols/Wheeler (1995) analyze all final consonants as onsets that are specially licensed at the end of the phonological phrase. This view is incompatible with the epenthetic interpretation of the final vowel ([ə], [e] or [a] depending on the vowel reduction system of the dialect) as a means to repair syllable structure. Recent accounts treat these problematic endings as true codas and relate the underapplication of epenthesis in this context to paradigmatic effects (Lloret 2004; Pons-Moll 2007b).

Resyllabification occurs between words to provide onsets to vowel-initial words (*mal any* [ma'laj] 'bad year', *dorm ara* [dɔr'ma.rə] 'sleep_{3SG} now'; in Balearic and Algherese, *n'obr un* [nɔ'prun] 'open_{1SG} one of them'). Resyllabification can be interpreted as a reflex of the same universal tendency that triggers syllabification of onsets prior to syllabification of codas within words, to its maximal extension at the word level in Catalan but to the minimal extension at the phrase level; for example, in a word like *suplim* 'supply_{1PL}' syllabification at the word level yields [su'plim] while across words the same sequence in *cap límit* 'no limit', [kab'li.mit], does not alter the initial word syllabification (*cap* ['kap], *límit* ['li.mit]) (on voice regressive assimilation, cf. 4.2.1).

3 Phonological processes affecting vowels

3.1 Vowel reduction

In all dialects of Catalan, the vowel system reduces in unstressed position (cf. Table 23.3). Dialects with full vowel reduction (Central Catalan, part of Balearic, Northern Catalan, and Algherese) simplify to three elements. Dialects with partial vowel reduction simplify to four (part of Balearic) or five (Western Catalan) elements. Lexical words may display vowel reduction effects in morphologically related words due to a change in the position of word stress (e.g. Central Cat. *gas* ['gas] 'gas' – *gasós* [gə'zos] 'gaseous', *beus* ['bɛws] 'drink_{2SG}' – *beuràs* [bəw'ras] 'drink_{2SG,FUT}', *dent* ['den] 'tooth' – *dental* [dəɲ'tal] 'dental', *mor* ['mɔr] 'die_{3SG}' – *morim* [mu'rim] 'die_{1PL}', *gos* ['gos] 'dog' – *gossera* [gu'serə] 'kennel'). Unstressed syllables that do not alternate with a corresponding stressed syllable in morphologically related words, as well as functional words that are unstressed, contain a vowel of the unstressed series (e.g. Central Cat. *c[ə]mell* 'camel', *b[u]txaca* 'pocket'; *en* [ən] 'in', *nos* [nus] 'we_{ACC/DAT}').

Table 23.3: Vowel reduction patterns.

		Stressed position	Unstressed position	Vowel reduction
Eastern Catalan	Central Catalan and part of Balearic (Minorca and Eivissa)	i e ε a ɔ u	i ə u	e ε a → ə ɔ o → u
	Northern Catalan	i e a ɔ u	i ə u	e a → ə ɔ → u
	Algherese	i e ε a ɔ u	i a u	e ε → a ɔ o → u
	Part of Balearic (Majorca)	i e ε ə a ɔ u	i ə u	e ε a → ə ɔ → o
	Western Catalan	i e ε a ɔ u	i e a ɔ u	ε → e ɔ → o

In a small area of Western Catalan, word-final unstressed /a/ is realized as [ɛ] (especially in the central part of Northwestern Catalan) or [ɔ] (e.g., in the Pyrenees region of Northwestern Catalan and in parts of Valencia), as in *copa* ['kɔpɛ], ['kopɔ] 'cup'.

In most varieties of Eastern Catalan (including Central Catalan), there are lexical and contextual exceptions to mid vowel reduction. Lexical exceptionality is a variable (idiolectal and inter-dialectal) phenomenon that may affect mid vowels of learned words, old and recent loans, proper names, and acronyms. In many of these words, unstressed mid vowels appear as [e] and [o] variably coexisting with fully reduced [ə] and [u], respectively. Most cases involve word-final syllables (*bas*[e] 'base', *dolm*[e]*n* 'dolmen', *UNESC*[o], *espòns*[o]*r* 'sponsor'), though there are also instances in post-tonic non-final position (*òp*[e]*ra* 'opera', *catàstr*[o]*fe* 'catastrophe') and pretonic position ([e]*v*[e]*rest* 'Everest', *d*[o]*ssier* 'dossier'). In the morphologically derived environments, full reduction applies straightforwardly (*op*[ə]*ristic* 'operatic', *espons*[u]-*ritzar* 'sponsor_{INF}') (Mascaró 1978, 73–75).

Contextual exceptionality affects mid front vowels in contact with mid and low vowels. In the sequences /ea/ and /εa/ there is no reduction of the mid vowel to [ə] when it appears in unstressed position, but instead it is realized as [e] in the following contexts: when the second vowel is [a] (*ideal* [iðe'a] 'ideal' – *idea* [i'ðeə] or [i'ðeə] 'idea', *real* [re'a] 'real') or an unstressed [ə] in morphophonemic alternations with /'a/ (*id*[ə]*lisme* 'idealism', *r*[ə]*lisme* 'realism'), or when the second vowel is a non-alternating [ə] derived from the unstressed sequence /ea/ (*àrea* [a'ɛə] 'area', *Beatriu* [bea'triw] 'Beatrice'). Exceptionality cannot be attributed to a surface dissimilatory restriction prohibiting [əə] or [ə'a] sequences, because there exist such strings in a few words (*n*[əə]*rlandès* 'Dutch', *Abr*[ə'a]*m* 'Abraham', also pronounced simplified as *n*[ə]*rlandès*, *Abr*[a]*m*). For the same reason, the second vowel of the unstressed sequence /ea/ is considered to be /a/ (and not /ə/), though it is always realized as

[ə] (Bonet/Lloret 1998, 46–49). In the reverse sequences /æ/ and /æ/, most cases show variation (*p[əe]lleta* ~ *p[əə]lleta* ‘pan_{DIM}’, cf. *p[ə'e]lla* ‘pan’; *isr[əe]lita* ~ *isr[əə]lita* ‘Israelite’, cf. *Isr[ə'e]l*), but a few words show categorical exceptionality (*M[əe]s-trat* (toponym), *tetr[ʼae]dre* ‘tetrahedron’). In sequences of adjacent mid front and mid back vowels (i.e. /eo/ and /eo/), there also exists variation in the realization of the front vowel in unstressed position, with variable unstressed [e] cases (*peó* [p'e'o] ~ [pə'o] ‘paw’n’) together with categorical [ə] cases (*lleó* [ʼlə'o] ‘lion’, though with variation in the proper name *Lleó* [ʼlə'o] ~ [ʼle'o]). The few words that contain the reverse sequences /oe/ and /œ/ also show variation, with cases of variable unstressed [e] (*bòer* [b'œr] ~ [b'œr] ‘Boer’) and cases of categorical [e] (*Cloe* [k'lo'e] ‘Chloe’, *oct[ʼœ]dre* ‘octohedron’).

The Balearic variety of Majorca shows additional exceptions to [e]-reduction (Bibiloni 1998; Pons-Moll 2011a). To a large extent, underapplication of reduction affects the initial syllable of stems in the three following contexts. First, words paradigmatically related to [ʼe] or [ʼɛ] through productive derivation (*peix* [ʼpeʃ] ‘fish’ – *p[e]ixet* ‘fish_{DIM}’, but *p[ə]ixater* ‘fish seller’; *cel* [ʼsɛl] ‘sky’ – *c[e]let* ‘sky_{DIM}’, but *c[ə]lestial* ‘celestial’ vs. *pap[ʼe]r* ‘paper’ – *pap[ə]ret* ‘paper_{DIM}’). Second, words paradigmatically related to [ʼe] through inflection (*crem* [ʼkrem] ‘burn_{1SG}’ – *cr[e]mam* ‘burn_{1PL}’ vs. *xerr* [ʼʃɛr] ‘talk_{1SG}’ – *x[ə]rram* ‘talk_{1PL}’, *cont[e]st* ‘answer_{1SG}’ – *cont[ə]stam* ‘answer_{1PL}’). Third, learned words and loans in which the vowel is generally preceded by a labial consonant (*b[e]cari* ‘grant holder’ vs. the traditional word *b[ə]tum* ‘shoe polish’). Additionally, the posttonic word ending [-ek] is systematically maintained with an unreduced vowel (*màn[e]c* ‘handle’).

All in all, lexical, contextual, and paradigmatic exceptions broaden the unstressed system of the Eastern varieties to [i e ə o u]; but [ɛ ɔ] never appear in unstressed position, except word-finally in the Western areas aforementioned or unless they result from vowel harmony (cf. 3.3).

3.2 Vowel contact

Vowel contacts lead to the emergence of a diphthong (if a close vowel is involved), hiatus maintenance or vowel loss. At the word level, close vowels after another vowel result in a falling diphthong (*pau* [ʼpaw] ‘peace’, *noi* [ʼnoj] ‘boy’, *neu* [ʼnew] ‘snow’, *cauré* [kəw're] ‘fall_{1SG.FUT}’, *vuitè* [buj'tɛ] ‘eighth’), though paradigmatic relations, prosodic requirements, and lexical exceptions compel hiatus as the only solution. For close back vowels, there are words that superficially contrast in the presence of a diphthong or a hiatus in the same phonetic context (*esquiú* [əs'kiw] ‘elusive_{M.SG}’ vs. *esquio* [əs'kiu] ‘ski_{1SG}’), which is attributed to different underlying representations: either the former contains an underlying diphthong and the latter an underlying vowel sequence where close vowels are protected from gliding due to prosodic effects or lexical marking (/skiw/ ‘elusive_{M.SG}’ vs. /ski-u/ ‘ski_{1SG}’), or the former is derived

from a close vowel, which in the right context becomes a glide, and the latter from an underlying close-mid vowel, which can only reduce to [u] (/skiu/ vs. /ski-o/). Paradigmatic hiatus occurs in verbal inflection due to syllabic-uniformity effects with the stem (*cre-ï* ['krei] 'create_{3SG.SBJV}', as well as *esqui-o* [əs'kiu] 'ski_{1SG}') and in nominal derivation due to syllabic-uniformity effects with the suffix when the stress is one or two syllables away from the stem (*flu-ïd-esa* [flui'ðezə] 'fluidity' vs. *flu-id* ['flujt] 'fluid_{M.SG}'). There are also uniformity effects between a vowel-final prefix and a vowel-initial stem (*re-incidir* [rəinsi'ði] 'relapse_{INF}') and between a pretonic vowel of a stem and the correspondent stressed vowel in a morphologically derived word (*v[əi]natge* 'neighborhood', *v[ə'i]* 'neighbor'), though diphthongs are also common in more frequent words (*v[əj]natge*). Additionally, falling diphthongs can be blocked in specific lexical items (*p[əu]nasme* 'pleonasm', *n[ii]lisme* 'nihilism').

Rising diphthongs at the word level are more variable. The contact of a close vowel and another vowel is resolved as a rising diphthong, where the close segment emerges as a glide, both word-initially and between vowels (*iot* ['jɔt] 'yacht', *cauen* ['kawən] 'fall_{3PL}'). However, in word-initial position some words maintain the hiatus, whether categorically (*ió* ['i'o] 'ion') or in variation with a diphthong (*UAB* ['wap] ~ [u'ap] 'acronym for *Universitat Autònoma de Barcelona*'), presumably favored by the tendency to avoid monosyllabic words. Close back vowels followed by another vowel and preceded by a velar consonant are also pronounced as a glide in most words (*quota* ['kwɔtə] 'quota', *aigua* ['ajɣwə] 'water'), though there are cases of hiatus, generally due to the aforementioned paradigmatic syllabic-uniformity effects (*cu-a* ['kuə] 'tail_F', *cu-ota* [ku'ɔtə] 'tail_{AUG.F}', but also ['kwɔtə] in less formal pronunciations); invariant [kw] cases are represented orthographically by *qu* (or *qü*) while the other cases are represented by *cu*. In all other postconsonantal contexts, close vowels followed by another vowel were traditionally pronounced with hiatus, but there has long been a strong tendency to produce diphthongs in posttonic position (*famí*[ljə] 'family', *v[ə]wə* 'widow') and in the ending *-ió* (*condi*['sjɔ] 'condition') (Fabra 1982, 15–16); Northern Catalan and Majorcan Balearic avoid the proparoxytone pattern of words ending in *-ia* by deleting the final vowel (*família* [fə'mili]). Cabré/Prieto (2004) point out several morphological and prosodic conditions that constrain the emergence of rising diphthongs, such as the fact that gliding tends to be blocked in word-initial position (e.g. *p[i'a]no* 'piano', *d[iə]lecte* 'dialect') or that gliding tends to increase when the distance of the target high vowels from the stressed syllable (underlined in the following examples) is greater (*d[iə]lecte* 'dialect' vs. *d[jə]lectologia* 'dialectology').

Across words, vowels that are stressed at the word level are always maintained, even if they are identical (*tindrà ànims* [a'a] 'have_{3SG.FUT} encouragement', *violí íntim* [i'i] 'intimate violin'). Vowel contacts involving identical unstressed vowels mostly come out as a single vowel (*casa antiga* 'old house' [a] in Western Catalan and Algerese, [ə] elsewhere; *diari idoni* [i] 'eligible diary'). Vowel contacts implicating identical vowels in which one of the vowels is stressed and the other unstressed are typically solved with the loss of the unstressed vowel (*violí idoni* [i] ~ [ii] 'eligible violin'; *tindrà amics* [a] ~ [aa] 'have_{3SG.FUT}

friends' in Western Catalan and Algherese), though deletion is less frequent when the first vowel is not [a] and the second vowel is stressed (*diari íntim* [i'i] ~ [i] 'intimate diary'; *puma àgil* [a'a] ~ [a] 'agile puma' in Western Catalan and Algherese). Contacts involving an unstressed close vowel preceded by a close vowel give rise to falling diphthongs (*porta ulleres* 'wear_{3SG} glasses' [aw] in Western Catalan and Algherese, [əw] elsewhere). Contacts involving an unstressed close vowel followed by another vowel give rise to hiatus (*diari antic* 'old diary' [ia] in Western Cat. and Algherese, [iə] elsewhere); yet a rising diphthong may appear if the adjacent vowels are far from phrasal stress (*diari antiquíssim* 'very old diary' [ja] ~ [ia], [jə] ~ [iə]). In the dialects with [ə] like Central Catalan, the contact of [ə] with a following unstressed vowel more frequently results in [ə]-loss (*adorable Everest* [ə] 'lovely Everest'), or, as said, with a diphthong if a close vowel is involved (*porta ulleres* [u] ~ [əw]); the contact of [ə] with a following stressed vowel more typically results in its maintenance (*puma àgil* [ə'a] ~ [a]). In Western dialects, the contact of unstressed [a] or [e] with another vowel is realized with hiatus (*compra elefants* [ae] 'buy_{3SG} elephants'), though, as said, a diphthong emerges if an unstressed close vowel is involved and loss of the unstressed vowel is possible if they are identical. Cases of reduction of two identical vowels to one can be interpreted as an instance of vowel fusion.

3.3 Other phenomena

Other important phenomena affecting vowels include epenthesis, the opening of mid vowels, and vowel harmony. Lexical vowel epenthesis has often been invoked to explain the presence of the default vowel [ə], [e], or [a], according to the vowel reduction pattern of each dialect (represented always by *e*) when its absence would entail the occurrence of a structure defying syllable well-formedness. There is conclusive evidence for vowel epenthesis in word-internal position, because there are fully transparent morphophonemic alternations between 'zero' and *e*, both within word paradigms and with respect to parallel inflected forms of words that belong to the same class but whose forms do not give rise to potential syllabic problems. The contexts for word-internal epenthesis include the three following situations. First, sibilant contacts: *vences* /bɛns-z/: [ˈbɛnsəs] 'defeat_{2SG}' (cf. *venç* /bɛns/: [ˈbɛns] 'defeat_{3SG}', *bats* /bat-z/: [ˈbats] 'beat_{2SG}'); *felices* /fəlis-z/: [fəˈlisəs] 'happy_{F.PL}' (cf. *feliç* /fəlis/: [fəˈlis] 'happy_{M/F.SG}', *pals* /pal-z/: [ˈpals] 'stick_{PL}'). Second, verbal forms of conjugations II and III that do not conform with respect to admissible coda clusters: *obres* /ɔbr-z/: [ˈɔβrəs] 'open_{2SG}' (cf. *obrim* /ɔbr-im/: [uˈβrim] 'open_{1PL}', *dorms* /dɔrm-z/: [ˈdɔrms] 'sleep_{2SG}'). And finally, verbal forms of conjugation II to avoid a bad syllable contact between a stem ending in nasal, lateral, or sibilant, and an /r/-initial morph: *venceré* /bɛns-re/: [bɛnsə're] 'defeat_{1SG.FUT}' (cf. *batré* /bat-re/ [ba'tre] 'beat_{1SG.FUT}').

In contrast, the arguments that support word-edge epenthesis are weaker, especially word-finally. In word-initial position, there are no surface words beginning with [sC-]; both historically and synchronically such structures are avoided through the

addition of an initial *e*–: [ə]sperar ‘expect_{INF}’, and recent loans like [ə]Skype. The only morphophonemic alternations that surface involve words whose synchronic morphological complexity is doubtful ([ə]sperar ‘expect_{INF}’ – prosperar ‘prosper_{INF}’), which contrast with more recent constructs that retain the vowel (in[ə]sperat ‘unexpected’, [ə]spai ‘space’ – ciber[ə]spai ‘cyberspace’). Replicating Harris’s (1979) argument for Spanish, Wheeler (2005a, 287) points out that the oxytonic stress pattern of the verb *estar* ‘stay_{INF}’ in the second and third person singular and third person plural present indicative forms (i.e. [əs’tas], [əs’ta], and [əs’tan] respectively) supports the epenthetic nature of the initial vowel, because the unstressed character of the inflectional suffixes of these forms regularly causes the stem to bear the stress (e.g. [e̞n̪tɾə], from /entr-a/ ‘enter_{3SG}’), but not in *estar* ([əs’ta], from /st-a/ ‘stay_{3SG}’). Lloret/Pons-Moll (2016) provide further evidence drawn from Majorcan Catalan: as said above, underapplication of mid vowel reduction applies to the initial syllable of stems; however, underapplication applies to the second syllable of words with the shape [əsCe–] ([ə]sp[e]rar ‘wait_{INF}’, [ə]st[e]ve ‘Steve’), plausibly revealing the epenthetic nature of the initial vowel. In word-final position, the arguments for the epenthetic nature of *-e* (in words such as *filtre* ‘filter’, *corre* ‘run_{3SG}’, *obres* ‘open_{2SG}’, *batre* ‘beat_{INF}’) fade, especially in nominal forms ending in the inflectional nominal desinence *-e* not required by syllabification (*cotx-e* [ˈkoʃtə] ‘car’ vs. *despatx* [dəspatʃ] ‘office’; *mar-e* [ˈmarə] ‘mother’ vs. *mar* [ˈmar] ‘sea’; cf. *cotx-às* ‘car_{AUG.M.SG}’, *mar-ona* ‘mother_{AUG.F.SG}’). The same argumentation holds for the corresponding plural forms (*filtre-s* ‘filter_{PL}’). In verbs, the epenthetic nature of *-e* satisfactorily avoids allomorphy, since, in forms without syllabification problems, the second and third person singular present indicative forms do not show *e* in conjugations II and III verbs (*corre-s* ‘run_{2SG}’, *obre* ‘open_{3SG}’ vs. *tem-s* ‘fear_{2SG}’, *dorm* ‘sleep_{3SG}’), and the infinitive morph appears as /ɾ/ elsewhere (cf. *bat-re* ‘beat_{INF}’ vs. *entra-r* ‘enter_{INF}’, *dormi-r* ‘sleep_{INF}’). (On special cases of epenthesis in the clitic group, see Bonet/Lloret 2002; 2005.)

Algherese additionally shows [i] vowel insertion across words to avoid internal complex codas (*cent voltes* [ˌsɛntiˈvɔltas] ‘a hundred times’, cf. *cent* [ˈsɛnt] ‘hundred’; *compr molt* [ˌkɒmpriˈmoɫt] ‘buy_{1SG} a lot’, cf. *compr* [ˈkɒmpr] ‘buy_{1SG}’), except for glide plus [s] or [z] sequences (*cous bé* [kɔwzˈbe] ‘cook_{2SG} well’) and glide plus nasal sequences (*diun coses* [diwɲˈkɔzas] ‘say_{3PL} things’). The vowel [i] is also inserted to avoid [f], plosives, and affricates as internal singleton codas (*viv bé* [ˌviʋiˈbe] ‘live_{1SG} well’, cf. *viv* [ˈviʋ] ‘live_{1SG}’; *bec whisky* [ˌbekiˈwiski] ‘drink_{1SG} whiskey’, cf. *bec* [ˈbek] ‘drink_{1SG}’; *desig feo* [daˌziˈtʃiˈfɛu] ‘bad desire’, cf. *desig* [daˌziˈtʃi]) (Loporcaro 1997). Epenthesis does not occur when the first word ends in any other single consonant, whatever the resulting sonority profile (*És tot* [esˈtot] ‘It’s all’, *És whisky* [ezˈwiski] ‘It’s whiskey’). Hence, epenthesis across words is not triggered by syllable-contact sonority considerations, but is exclusively related to the nature of the consonants that appear in coda position. Lloret/Jiménez (2008; 2010) point out that less perceptible codas (i.e. complex codas without a glide and singleton codas with non-sibilant obstruents) are accepted in the

prominent phrase-final position (as in [ˈbekl]) but avoided in the least prominent position (i.e. preconsonantal codas, as in [ˌbekiˈwiski]).

In most Western varieties, the initial vowel of words beginning with *em-*, *en-*, *es-*, and *eix-* generally opens to [a] when the vowel appears in a closed syllable: [a]mbolic ‘mess’, [a]ncant ‘charm’, [a]sperar ‘expect_{INF}’, [a]xam ‘swarm’ (though with a close-mid vowel in: [e]mpresa ‘company’, [e]ntrar ‘enter_{INF}’, [e]spanyol ‘Spanish’, [e]xida ‘way out’). Sporadically, the opening affects open initial syllables ([a]legant ‘elegant’) and internal syllables (cal[a]ndari ‘calendar’, forr[a]llat ‘bolt’). (Lloret/Jiménez 2008 offer an analysis of such openings in terms of prominence relations.)

Valencian Catalan displays a vowel harmony process that affects final unstressed /-a/, which harmonizes with the previous adjacent /ɛ/ and /ɔ/: terra [ˈtɛɾɛ] ‘land’, cosa [ˈkɔzɔ] ‘thing’ (vs. pècora [ˈpɛkɔɾa] ‘sheep’). In some varieties, harmony can affect the whole word: afecta [ɛˈfɛktɛ] ‘affect_{3SG}’, tovallola [tɔvɔˈɫɔɫɔ] ‘towel’ in Southern Valencian, but [aˈfɛktɛ], [tovaˈɫɔɫɔ] in other Valencian varieties (Colomina 1985b; Jiménez 1998). In Central Catalan, learned and loan words with stressed mid vowels tend to be adapted with an open-mid vowel (Badia i Margarit 1970; Pi-Mallarach 1997). In this context, final unstressed mid vowels generally undergo full reduction (euro [ˈɛwru]); but if they present a stressed close-mid vowel, final unstressed mid vowels harmonize in degree of aperture with the stressed vowel ([ˈewro]) (Cabré 2009; Pons-Moll 2012).

4 Phonological processes affecting consonants

4.1 Onset position

Segments in onset position remain quite stable, due to the relative strength of CV cues (versus the weaker cues that VC sequences present). They show two weakening effects (spirantization and rhotacism) and a strengthening process (gemination).

4.1.1 Spirantization and gemination

Spirantization applies to voiced plosives, both word-internally and across words: /b/, /d/, /g/ (/ɟ/ in Majorcan Balearic) become spirant approximants [β], [ð], [ɣ] ([j] in Majorcan Balearic) in onset position when the preceding sound does not interrupt the air flow in the oral cavity, i.e. after a vowel, a glide, a liquid, a fricative, or an affricate (cada ceba groga [ˌkaðəˌsɛβəˈɣrɔɣə] ‘every yellow onion’, cor[ð]a ‘rope’, es[β]rinar ‘find out_{INF}’, migdia [miðʒˈðiə] ‘noon’). There is no spirantization in the groups [ɫd], [ɫd], and [vb] (caldo [ˈkaɫdu] ‘broth’, pell dura [peɫˈdura] ‘hard skin’, puf baix [puvˈbaɟ] ‘low pouf’), presumably due to the homorganicity of the segments involved (Mascaró 1991).

Varieties with /v/ tend to maintain the plosive realization of /b/ (*ce[b]a*), plausibly to maximize the contrast between /v/ and /b/ (Recasens 1991, 196). Spirantization does not apply after a nasal consonant or in absolute word-initial position (*desembre* [də'zembrə] 'December'), and neither does it in coda position (*abduir* [əbdu'i] 'abduct_{INF}', *puc ballar* [pugbə'la] 'I can dance').

In Eastern Catalan (except in Algherese), the postvocalic clusters /bl/ and /gl/ geminate after an adjacent stressed syllable (*poble* ['pɔbblə] 'village', *regla* ['regglə] 'rule' vs. *problema* [pru'βləmə] 'problem', *aglà* [ə'ɣlə] 'acorn'), as well as in words morphologically derived from the previous context (*població* [pubblə'sjo] 'population', *reglament* [rəgglə'men] 'regulation') (Mascaró 1987; Wheeler 2005a, 265–268; Torres-Tamarit/Pons-Moll 2012). In Central Catalan these groups tend to further devoice ([ˈpɔpplə], [ˈrekklə]), without gemination in some areas ([ˈpɔplə], [ˈreklə]). The very few exceptions are all learned words (*bíblia* ['biβliə] 'bible', *sigla* ['siɣlə] 'initial'). Except in Valencian (excluding the southern area), part of Balearic (Eivissa), and Algherese, there is also a general tendency to geminate intervocalic affricates after an adjacent stressed syllable (*tutsi* ['tuffsi] 'Tutsi', *dotze* ['dodðzə] 'twelve', *cotxe* ['kɔfʃə] 'car', *metge* ['medðzə] 'doctor'); gemination applies across words too (*set sabates* [ˌsɛfʃə'βatəs] 'seven shoes'). In Central Catalan, gemination after a stressed syllable is quite systematic in the case of voiceless affricates and regularly spreads to all intervocalic positions in the case of voiced monomorphemic affricates: *dotzena* [dud'ðzənə] 'dozen', *metgessa* [məð'ðzəsə] 'doctor_F' (vs. *cotxet* [ku'ʃɛt] 'car_{DIM}', *compra't cireres* [ˌkomprə'ʃi'rɛrəs] 'buy yourself some cherries') (cf. Mascaró 1984b; Lloret 1992; Bonet/Lloret 2018 for more details). In Valencian, intervocalic alveolar affricates appear as geminates straightforwardly while postalveolar affricates do not, presumably revealing the biphonemic character of /ts/ and /dz/ but the monophonemic character of /tʃ/ and /dʒ/ (Jiménez 1996).

4.1.2 Rhotacism

Algherese shows the peculiarity of changing /d/ and /l/ into [r] in singleton onsets between vowels (*vida* ['vira] 'life', *enfadar* [əmfə'ra] 'anger_{INF}'; *meló* [mə'ro] 'melon', *tremolam* [tramu'ram] 'tremble_{1PL}'). The fact that first person singular present indicative forms, with no overt inflectional marker (cf. 2.2), do not rhotacize stem final /-d/ and /-l/ but show morphophonemic alternations (*enfa*[t] 'anger_{1SG}', *tremo*[l] 'tremble_{1SG}') is taken as evidence of its surface coda status, especially in the case of the plosive, which appears as voiceless due to word-final devoicing (cf. 4.2.1) (Lloret 2004). The lateral has further historically changed into /r/ in all complex onsets (*clau* ['kraw] 'key', *flor* ['fro] 'flower') and in first person singular present indicative forms of stems ending in such clusters. In these cases the rhotic is strengthened as is usually the case in word-final position in Algherese (*umpl* ['umpr] 'fill_{1SG}' – *um*[pr]im 'fill_{1PL}').

4.2 Coda position

Segments in coda position are more prone to change and to neutralize, due to the less prominent margin-syllabic position in which they occur, especially preconsonantly. The main general processes involve voice neutralization, place and manner assimilations, and cluster reduction.

4.2.1 Voicing processes and [t̪] – [ʒ] alternation

There are three processes that affect the voicing of obstruents. First, obstruents devoice in word-final position: /b/ *sa[p]* ‘know_{3SG}’ – *sa[β]em* ‘know_{1PL}’ (cf. /p/ *escu[p]* ‘spit_{3SG}’ – *escu[p]im* ‘spit_{1PL}’); /d/ *po[t]* ‘can_{3SG}’ – *po[ð]em* ‘can_{1PL}’ (cf. /t/ *po[t]* ‘pot’ – *po[t]et* ‘pot_{DIM}’); /g/ *amar[k]* ‘bitter_{M.SG}’ – *amar[χ]a* ‘sour_{F.SG}’ (cf. *tur[k]* ‘Turkish_{M.SG}’ – *tur[k]a* ‘Turkish_{F.SG}’); /z/ *pe[s]* ‘weight’ – *pe[z]ar* ‘weigh_{INF}’ (cf. /s/ *pa[s]* ‘step’ – *pa[s]ar* ‘pass_{INF}’); /d̪/ *enu[t̪]* ‘annoyance’ – *enu[d̪]os* ‘annoyance_{PL}’ (cf. /t̪/ *despa[t̪]* ‘office’ – *despa[t̪]os* ‘office_{PL}’), and /v/ in dialects with such phoneme *ser[f]* ‘servant_M’ – *ser[v]a* ‘servant_F’ (cf. *amor[f]* ‘amorphous_{M.SG}’ – *amor[f]a* ‘amorphous_{F.SG}’). In Central Catalan, some lexical items morphophonemically alternate word-final [t̪] with intervocalic [ʒ]: *bo[t̪]* ‘fool_{M.SG}’ – *bo[ʒ]a* ‘fool_{F.SG}’ (vs. /f/ *ba[f]* ‘low_{M.SG}’ – *ba[f]a* ‘low_{F.SG}’, /t̪/ *despa[t̪]* – *despa[t̪]os*, /d̪/ *enu[t̪]* – *enu[d̪]os*). In the classical generative view, the [t̪] – [ʒ] alternation was seen as a strengthening process affecting /ʒ/ in word-final position, followed by word-final devoicing of obstruents (i.e. /-ʒ/ turning to /-d̪/ and later to [-t̪]). However, it seems more plausible to interpret it as a weakening process affecting /d̪/ intervocalically, which thus adds to the onset weakening phenomena. In this interpretation, instances of affricate /d̪ʒ/ contrast with cases of biphonemic plosive plus fricative sequences (/d̪ʒ/ and, for coherence, /t̪f/) when no such alternation is found (as in *enu[t̪]* – *enu[d̪]os*); the weakening interpretation is in line with the diachronic development of Catalan and with other intervocalic spirantization processes found in Catalan (cf. 4.1.1) and other Romance varieties (cf. Bonet/Lloret 2018 for more details).

Second, coda obstruents assimilate in voice to the following consonant, both word-internally and across words: *re[p]te* ‘challenge’, *sú[b]dit* ‘subject’; *sa[ps] cantar* ‘you know how to sing’, *sa[bz] dir* ‘you know how to say’; *despa[t̪] petit* ‘small office’, *despa[d̪] gran* ‘big office’.

Third, sibilants undergo voicing across words in prevocalic position: *pe[z]* *elevat* ‘high weight’, *pa[z]* *elevat* ‘high step’; *enu[d̪]* *anterior* ‘former annoyance’, *despa[d̪]* *anterior* ‘former office’; *Bai[ʒ]* *Empordà* (toponym), *bo[d̪]* *i estúpid* ‘fool and dumb’; *po[d̪]* *ajudar* ‘you can help’, *po[d̪]* *hermètics* ‘airtight pots’. Voicing also occurs between a prefix and the stem (*e[g.z]amant* ‘ex-lover’). There is variable voicing of prevocalic /f/ across words, especially when it occurs far from the accents: *fotògraf alemany* [fu.t̪o.ʝrə.və.ləˈmaɲ] ‘German photographer’ vs. *xef indi* [ʃeˈfiɲ.di] ‘Indian

chef’. Only voicing across words presents some dialectal differences: in the southern areas of Valencian, voicing extends to all obstruents, as in *po[ð]* *ajudar* ‘can_{3SG} help’ (*po[t]* *ajudar* elsewhere). Llach (1998, 65), replicating Lipski’s (1989) argument for Ecuadorian Spanish, suggests that voicing across words may be due to morphological reasons, i.e. to facilitate word recognition. Alternatively, Jiménez (1999, 165–185) and Jiménez/Lloret (2008; 2014) suggest that similarity in the degree of sonority of the segments involved is the factor that favors voicing assimilation, with prominence and paradigmatic relations controlling the spread.

Table 23.4 summarizes the basic results of processes affecting voice according to the contexts in which obstruents occur, without taking into account the aforementioned dialectal differences. (More detailed information on voicing processes and their distribution in Catalan and other Romance languages can be found in Jiménez/Lloret 2014.)

Table 23.4: Distribution of voiced and voiceless obstruents. (‘C’ and ‘V’ stand for consonants and vowels respectively; ‘O’ stands for obstruents; ‘S’ stands for sibilants; ‘T’ stands for plosives; ‘#’ indicates word boundaries.)

Within words			Across words		
Onset	Coda		Onset		Coda
Contrast	Neutralization		Contrast	Neutralization	
.O	O.C	O.#	#.O	.S#V (variably .f#V)	.T#V O#.C
	Voice assimilation	Voiceless		Voiced	Voiceless Voice assimilation

4.2.2 Place and manner processes

In word-internal position, the nasals /m n ɲ/ and the laterals /l λ/ appear in onset-initial and intervocalic position ([m]ora ‘Moorish_{F.SG}’, [n]ora ‘daughter in law’, [ɲ]ora ‘chili’; ca[m]a ‘leg’, ca[n]a ‘white hair’, ca[ɲ]a ‘cane’; [l]ama ‘lama’, [λ]ama ‘llama’, ca[l]a ‘creek’, ca[λ]a ‘shut up_{3SG}’). They also appear word-finally (ha[m] ‘fish hook’, ha[n] ‘have_{3PL.AUX}’, a[ɲ] ‘year’; fi[l] ‘thread’, fi[λ] ‘son’), except in Algherese, where the palatals centralize to [n] and [l], respectively (any [ˈan], anys [ˈans] – a[ɲ]ada ‘vintage’; fill [ˈfiɫ], fills [ˈfiɫs] – fi[λ]a ‘daughter’, and in the first person singular present indicative forms, as a reflex of their coda status: ba[n] ‘bathe_{1SG}’ – ba[ɲ]ar ‘bathe_{INF}’, ba[l] ‘dance_{1SG}’ – ba[λ]ar ‘dance_{INF}’). In preconsonantal word-internal position, /ɲ/ and /λ/ do not occur in Catalan; in this context, /m/, /n/ (or an underspecified segment /N/) always agree in place with the following consonant (ð[ɲf]ora ‘amphora’, to[mb]ar ‘turn over_{INF}’, de[n̩t]al ‘dental’, si[ns]er ‘sincere_{M.SG}’, pa[n̩]a ‘belly’, sa[n̩]gada

‘bleeding’), and /l/ agrees with a following dental/alveolar/postalveolar consonant (*sa*[t̪]*ar* ‘jump_{INF}’, *ca*[l̪z]*e* ‘chalice’, *à*[l̪z]*ebra* ‘algebra’). Across word boundaries, /n/ also generally assimilates to the place of articulation of the following consonant (*són* [ˈson] ‘be_{3PL}’ – *só*[m̪f]*eliços* ‘they are happy’, *só*[m̪p]*etits* ‘they are little’, *só*[ns]*incers* ‘they are sincere’, *só*[n̪]*ais* ‘they are lambs’, *só*[n̪]*ores* ‘they are chilies’, *só*[ŋg]*rans* ‘they are big’); but /m/ only assimilates within the labial series (*so*[m] ‘be_{1PL}’ – *so*[m̪f]*eliços* ‘we are happy’ vs. *so*[m̪g]*rans* ‘we are big’). Some dialects (e.g. part of Balearic; cf. below) extend the assimilatory context to /m/ (*so*[ŋg]*rans* ‘we are big’). In the same context, /l/ assimilates to the place of articulation of a following dental/alveolar/postalveolar/palatal consonant (there are no labial or velar allophones) (*el* [əl] ‘the_{M.SG}’ – *e*[ld]*ia* ‘the day’, *e*[ln]*en* ‘the boy’, *e*[lj]*ai* ‘the lamb’, *e*[lɰ]*aç* ‘the loop’). In preconsonantal word-final position, /n/ and /l/ do not dentalize in the dialects that delete the final plosive (*dent* [ˈden] ‘tooth’, *salt* [ˈsal] ‘jump’; cf. 4.2.2). According to the data, nasal and lateral place assimilation is traditionally split into two processes: major place assimilation, which changes /n/ and /l/ to [m n ɲ ŋ] and [l ʎ] respectively, and minor place assimilation, which introduces the bilabial–labiodental distinction, within the labial series ([m]–[m̪]); the dental–alveolar distinction, within the dento-alveolar series ([n̪]–[n], [l̪]–[l]), and the postalveolar–palatal distinction, within the palatal series ([ɲ]–[ɲ], [l̪]–[ʎ]). Broadly following Recasens (1993, 194–196) and Recasens/Pallars (2001), minor place assimilation adds a coarticulatory gesture while major assimilation implies the loss of a characteristic gesture (these authors further distinguish gestural blending, leading to assimilation or coarticulation; cf. Wheeler 2005a, 186–206, for a full discussion of minor place assimilations in line with Recasens et al.’s studies). Other minor place assimilations affect the sibilants, e.g. in the context of /ɲ/ and /ʎ/ followed by an alveolar fricative, which is a case of progressive assimilation (*anys* [ˈaɲ] ~ [ˈaɲs] ‘year_{PL}’), or a postalveolar sibilant followed by an alveolar fricative, which is an instance of mutual assimilation or gestural blending (*mateix so* [m̪t̪eɪs̪o] ‘same sound’, with further optional reduction to a single sibilant: [m̪t̪eɪs̪o]; cf. 4.2.4). Additionally, /t d/ followed by an alveolar sonorant also assimilate place (*set nois* [s̪ɛt̪n̪ɔjs] ‘seven boys’), and may undergo manner assimilation as well, as we will see next.

The dental plosives /t/ and /d/ assimilate to the articulatory place of a following plosive (*set pomes* [s̪ɛp̪oməs] ‘seven apples’, *set cases* [s̪ɛk̪kazəs] ‘seven houses’). Some dialects (e.g. part of Balearic; cf. below) are more permissive and extend the assimilatory context to all plosives in preconsonantal position (*sap cantar* [ˌsakk̪ən̪ˈta] ‘s/he knows how to sing’, *puc passar* [ˌpupp̪əˈsa] ‘I can pass’).

Manner assimilation mainly affects plosives followed by a nasal or a lateral consonant. The assimilation systematically applies to /t/ and /d/ within words (*setmana* [s̪əmˈman̪ə] ‘week’, *ètnic* [ˈɛnn̪ik] ‘ethnic_{M.SG}’, *atles* [ˈall̪əs] ‘atlas’, *batlle* [ˈbaʎʎə] ‘mayor’), and is optional across words (*set nois* [s̪ɛt̪n̪ɔjs] ~ [s̪ɛn̪n̪ɔjs]). Within words, /kn/ and /gn/ may also assimilate nasality, but they maintain the velar character of the original plosive (*cognom* [kug̪n̪ɔm] ~ [kug̪n̪ɔm] ‘last name’). Manner assimila-

tion of /p/ and /b/ is limited to a following /m/; this context only appears in prefixed words and compounds, where the assimilation is quite systematic (*submarí* [summə'ri] 'submarine'), and across words, where the assimilation is optional (*cap mare* [kab'marə] ~ [kam'marə] 'no mother'). The previous data show that nasal and lateral assimilations are constrained by homorganicity, either underlying or derived from place assimilation. Some dialects (e.g. part of Balearic; cf. below) extend the manner assimilation context to non-homorganic contacts (*poc net* [pɔn'nət] 'not much clean', *cap límit* [cal'limit] 'no limit'). Additionally, sibilants tend to assimilate to the rhotic character of a following [r], typically resulting in an approximant (*Israel* [izrə'el] ~ [iʁə'el], *mateix riu* [mäteʒ'riw] ~ [mäter'riw] 'same river'); these groups may reduce to [r] too (cf. 4.2.4).

As mentioned above, in the Balearic variety of Majorca (and to a lesser extent in Minorca), assimilation is more radical. Plosives assimilate to the articulatory place of a following sibilant, resulting in an affricate (*rics* ['rits] 'rich_{M.PL}', *cap ceba* [cat'tsəβə] 'no onion', *puc jugar* [puddʒu'ja] 'I can play'). All other non-sibilant obstruents assimilate place and manner of a following onset consonant, giving rise to geminates (*cap dia* [cad'diə] 'no day', *cap flor* [ca'flo] 'no flower', *cap límit* [cal'limit] 'no limit'; *agaf coses* [əjak'kɔzes] 'I take things', *agaf mores* [əjam'mores] 'I collect blackberries'). Just like /n/, /m/ assimilates place in all preconsonantal positions too (*so[m]* 'we are' – *so[ŋg]rans* 'we are big'); /m/ as well as /n/ optionally assimilate manner when they are followed by a lateral consonant (*so[m]* 'we are' – *só[nl]egals* ~ *só[ll]egals* 'we are legal'; *só[n]* 'they are' – *só[nl]iures* ~ *só[ll]iures* 'they are free'). (For an analysis of manner assimilation understood as a strategy to improve the sonority profile of syllable contacts, cf. Pons-Moll 2011b. More phonetic details on place and manner assimilations can be found in Recasens 2018.)

4.2.3 Word-final cluster reduction

In Central Catalan, Northern Catalan, the Balearic variety of Eivissa, Northwestern Catalan, and part of Valencian, nasals and laterals followed by homorganic plosives delete the plosive, i.e. major place assimilation applies prior to deletion (cf. 4.2.2): *camp* ['kam] 'field' – *ca[mp]erol* 'peasant', *tomb* ['tom] 'overturn' – *to[mb]ar* 'turn over_{INF}'; *dent* ['den] 'tooth' – *de[nt]al* 'dental', *profund* [pru'fun] 'deep_{M.SG}' – *profu[nd]a* 'deep_{F.SG}'; *banc* ['ban] 'bank' – *ba[nk]a* 'banking', *sang* ['san] 'blood' – *sa[ŋg]ada* 'bleeding'; *salt* ['sal] 'jump' – *sa[l̩t]ar* 'jump_{INF}', *herald* [ə'ral] 'herald' – *herà[l̩d]ic* 'heraldic'. Nasal cluster reduction is categorical except for velar groups, which can retain the plosive in phrase-final and prevocalic position (*Dona sa[ŋ(k)]* 'donate_{3SG} blood', *sa[ŋ(k)] i fetge* 'blood and liver'). Lateral cluster reduction is categorical, especially in words of high-frequency use, but presents variation when the plosive stands for the participial morph (*resol-t* [rə'zɔl(t)] 'solve_{PST.PTCP}'). Words ending in /-rt/, /-rd/, and /-st/ (there are no /-sd/ native words in Catalan) present variable deletion (deletion is more common

in less formal pronunciations, extending to prevocalic contexts): *cu[r(t)]* ‘short_{M.SG}’ – *cu[r(t)]issim* ‘very short_{M.SG}’, *pe[r(t)]* ‘lose_{3SG}’ – *pe[r(t)]ia* ‘lost_{3SG.IMPF}’, *robu[s(t)]* ‘robust_{M.SG}’ – *robu[s(t)]a* ‘robust_{F.SG}’. All other word-final clusters are maintained: *A[lp]* ‘toponym’, *bo[sk]* ‘forest’, *ca[rn]* ‘meat’. Therefore, clusters that show final consonant deletion share not only the major point of articulation (labial, dento-alveolar, or velar) but also the non-continuant character of the consonants involved (nasals, laterals, and plosives). In the Balearic varieties of Majorca and Minorca, Algerese, and most part of Valencian, the aforementioned clusters are retained in phrase-final position and prevocalically across words (*És una de[n̩t]* ‘It’s a tooth’, *de[n̩t] incisiva* ‘incisor tooth’); but the plosive is deleted in preconsonantal position (*de[m] molar* ‘molar tooth’) (cf. 3.3 for epenthesis across words in Algerese). In variable contexts in dialects with cluster reduction, speakers categorically delete the plosive in preconsonantal position (*pe[r] pes* ‘lose_{3SG} weight’ vs. *pe[r(t)]* ‘lose_{3SG}’, *pe[r(t)] un botó* ~ *pe[r] un botó* ‘lose_{3SG} a button’). (Discussion on cluster reduction as a result of deletion or coalescence appears in Wheeler 2005b and Pons-Moll 2006a.)

In preconsonantal position across words, other clusters may reduce, especially in less formal styles; deletion typically affects plosives and /f/ (*parcs temàtics* [par. tə'matiks] ‘theme park_{PL}’, *trionf global* [tri,omglu'βal] ‘global triumph’). In the Balearic variety of Majorca, internal complex codas, even when they contain a glide, end up reducing to a singleton coda (*parc temàtic* [par.tə'matik], *parcs temàtics* [par.tə.'matifs], *ou petit* [ɔw.pə'tit] ‘small egg’, *ous petits* [ɔw.pə'tifs] ‘small egg_{PL}’, *vuit nins* [vuj'nins] ‘eight boys’).

4.2.4. Other processes

Other general processes of Catalan include consonant epenthesis, simplification of sibilants and rhotics in contact, and irregular morphophonemic alternations. Catalan shows a few cases of consonant insertion to repair bad syllable contacts. The most general case involves [d] insertion between a verbal stem ending in nasal or lateral and an /r/-initial morph (*vend-re* ['bɛndrə] ‘sell_{INF}’ – *ven-ia* [bɛ'niə] ‘sell_{3SG.IMPF}’; *vold-ré* [buɫ'drɛ] ‘want_{1SG.FUT}’ – *vol-ia* [bu'liə] ‘want_{3SG.IMPF}’). Some varieties (Northern Catalan, northern areas of Northwestern Catalan, and in recession among younger generations in northern Central Catalan, Majorcan Balearic, and Algerese) tolerate these contacts by strengthening the rhotic (*ve[nr]e*, *vo[lr]é*).

Sibilant contacts are avoided word-internally. Morpheme-internally they reduce to a single segment (*piscina* [pi'sinə] ‘piscine’), but across morphemes they trigger vowel epenthesis (*felic-e-s* ‘happy_{F.PL}’, cf. *feliç* ‘happy_{M/F.SG}’; *fug-e-s* ‘flea_{2SG}’, cf. *dorm-s* ‘sleep_{3SG}’) (cf. 3.3). Across words, they also generally reduce (*les sis* [lə'sis] ‘six o’clock’, *més jove* [me'ʒoβə] ‘younger’). In Majorcan and Minorcan Balearic, though, dissimilation applies in the contexts where other varieties show reduction ([pit'ʃina], [lət'ʃis], [med'ʃɔvə]). Rhotic contacts tend to simplify (*Mar Roig* [ma'rɔʃ] ‘Red Sea’), as well as the assimilation

lated result of a sibilant plus rhotic sequence (*Israel* [irə'el], *mateix riu* [mə'te'riw]; cf. 4.2.2). (For an analysis of the different outcomes of sibilant contacts viewed as different strategies to comply with the Obligatory Contour Principle, cf. Palmada 1994a, 94–104; 1994b; Bonet/Lloret 2002; Pons-Moll 2004.)

Other patterns of morphophonemic alternations involve $\emptyset$ – [n], $\emptyset$ – [r], and [w] – [β] ([w] – [v] in certain dialects) alternations. The alternations with ‘zero’ occur in posttonic word-final position; there are, though, many exceptions and further constraints that regulate the outcomes. The $\emptyset$ – [n] alternation is limited to postvocalic word-final position (*mà* ['ma] ‘hand’ – *ma*[n]s ‘hand_{PL}’, *so* ['so] ‘sound’ – *so*[n]ar ‘sound_{INF}’, cf. *carn* ['karn] ‘meat’) and appears in nominals mainly (cf. *ven* ['bən] ‘sell_{3SG}’, *estan* [əs'tan] ‘be_{3PL}’); but even within nominals there are lexical exceptions (*nen* ['nən] ‘boy’, *son* ['sɔn] ‘sleep’). Northern Catalan has extended the ‘zero’ pattern to plurals (*mà* ['ma] – *mans* ['mas] – *ma*[n]eta ‘hand_{DIM}’). On the other hand, the $\emptyset$ – [r] alternation extends to plurals (*flor* ['flo] ‘flower’, *flors* ['flɔs] ‘flower_{PL}’ – *flo*[r]a ‘flora’; *dur* ['du] ‘hard_{M.SG}’, *durs* ['dus] ‘hard_{M.PL}’ – *du*[r]a ‘hard_{F.SG}’), but the phenomenon has many lexical exceptions too (*mar* ['mar] ‘sea’, *mars* ['mars] ‘sea_{PL}’, *car* ['kar] ‘expensive_{M.SG}’, *cars* ['kars] ‘expensive_{M.PL}’) and is subject to a large dialectal variation (e.g. Valencian does not generally delete final /-r/, while Majorcan Balearic almost systematically deletes it). The unpredictable extension of the two patterns suggests that they are better treated as instances of underlying allomorphy ($\emptyset$ – /n/ and $\emptyset$ – /r/ respectively), with the ‘zero’ allomorph limited to word-final position and, in the case of the rhotic, when it is followed by the plural morph as well (Wheeler 2005a, 327–328). As for the [w] – [β] ([w] – [v]) pattern, only dialects with /v/ can be treated as displaying a general phonological process of /v/ weakening to [w] in postvocalic word-final codas (*bla*[w] ‘blue_{M.SG}’ – *bla*[v]a ‘blue_{F.SG}’), which takes precedence over the general word-final devoicing process that affects obstruents (cf. 4.2.1) (cf. Jiménez/Lloret/Pons-Moll 2019 for a more detailed description and analysis of the [w] – [v] alternation in Majorcan). Dialects that have merged /v/ to /b/ show [w] – [β] alternations instead (*bla*[w] – *bla*[β]a), which coexist with [p] – [β] and [w] – [w] patterns in the same contexts (*sa*[p] ‘know_{3SG}’ – *sa*[β]em ‘know_{1PL}’; *garne*[w] ‘cunning_{M.SG}’ – *garne*[w]a ‘cunning_{F.SG}’). Coexisting patterns indicate that [w] – [β] alternations are also better treated as instances of underlying allomorphy, phonologically conditioned by the context: /w/ in codas, /b/ in onsets (Wheeler 2005a, 338–340).

Other peculiar dialectal processes worth mentioning involve gliding effects, rhotacism of the alveolar fricative, and /r/-lateralization. In Western Catalan, postalveolar fricatives give rise to a preceding [j] in intervocalic position (*caixa* ['kajʃa] ‘box’; *roja* ['rojʒa] ‘red_{F.SG}’, though ['rɔʒa] in many Valencian varieties; cf. 2.1); in the case of /ʃ/, gliding extends to word-final position (*mateix* [ma'tejʃ] ‘same_{M.SG}’). In Majorcan Balearic and Northern Catalan, postalveolar sibilants reduce to [j] in preconsontal position (*mateix* [mə'tej] – *mateix dia* [mə'tej'diə] ‘same day’, *raig* ['raɪ] ‘ray of a liquid’ – *raig seguit* [ˌrajsə'ɣit] ‘straight ray’); gliding also occurs in the contact of a stem and the plural morph (*mateix-s* [mə'tejs] ‘same_{M.PL}’, cf. *mateix-o-s* elsewhere)

and, to a lesser extent, in the contact of a stem and the second person singular morph in Majorcan Balearic (*fuig* ['fuɪ] 'flea_{3SG}' – *fug-s* ['fujs] 'flea_{2SG}', cf. *fug-e-s* elsewhere) (Palmada 1994a, 89–90; 1994b; Pons-Moll 2004). In Northern Catalan sibilant gliding extends to phrase-final position (*És el mate[j]* 'It's the same'). In the Balearic varieties of Majorca and Minorca, palatal nasals followed by a consonant split into [j] and a depalatalized nasal, which undergoes place assimilation (*any* ['aɲ] 'year' – *anys* ['ajns] 'year_{PL}' – *any passat* [ajmpə'sat] 'last year'; *banc* ['baɲc] 'bank' – *bancs* ['bajns] 'bank_{PL}' – *banc tancat* [bajntəɲ'cat] 'closed bank') (Mascaró 1986; Palmada 1994a, 91–92; 1996; Dols 1993a, 190–191; Pons-Moll 2006b). Majorcan Balearic tends to rhotacize the alveolar fricative before a voiced consonant (*bisbe* ['biɹbə] 'bishop'; *És meu* [əɹ'mew] 'It's mine' vs. *És teu* [əs'tew] 'It's yours') and in some localities also before /f/ (*es focs* [əɹ'fɔɪs] 'the fires') (cf. Pons-Moll 2011b for an analysis driven by sonority considerations in syllable contacts). Finally, at the word level Algerese has changed /ɾ/ into /l/ in preconsonantal position (*fort* ['fɔɪt] 'strong_{M.SG}', *forta* ['fɔɪta] 'strong_{F.SG}').

5 Prosody

5.1 Word prosody

While Catalan content words (nouns, verbs, adjectives) are typically stressed, function words (pronouns, determiners, auxiliary verbs, and prepositions) tend to be unstressed. Word stress (also called primary stress) can be lexically contrastive, differentiating words that are otherwise phonologically identical or similar: *fàbrica* 'factory' vs. *fabrica* 'produce_{3SG}' vs. *fabricà* 'produce_{3SG.PRET}'. Depending on their position within the word or the sentence, syllables carrying word stress are acoustically realized through changes in tone, duration, and intensity. Following a demarcative tendency for word prominence (as well as phrasal prominence) to mark the final edge of prosodic domains, word stress tends to fall on one of the last three syllables of the content word (enclitics excluded, such as in *dona-me-la* 'give it to me'; cf. the stress contrast outlined above). Regarding frequency, in contrast with other Romance languages, final stress can be considered the dominant pattern in Catalan (cf. Serra 1996 and Oliva/Serra 2002 for a review). A quantitative analysis on the most frequent metrical patterns found in this language reported that words with stress-final patterns (e.g. monosyllabic stressed words and bisyllabic iambs such as *sol* 'sun' or *sabó* 'soap') constituted 53% of the data and words with penultimate stress patterns (e.g. bisyllabic trochaic words such as *taula* 'table' and trisyllabic amphibrachs such as *pilota* 'ball') constituted 40% of the data, with antepenultimate stress being residual (cf. Prieto 2006 for more details). Importantly, a clear tendency is documented for final stress in words ending in a consonant, and for penultimate stress in words ending in a vowel.

Stress systems tend to show a tendency for alternation of prominences in sequences of lexically unstressed syllables, triggering patterns of secondary stresses. In contrast with word stress, secondary stresses in Catalan are not an inherent property of specific syllables. Even though some traditional work on Catalan has reported a systematic binary pattern of secondary stresses to the left of the primary stress (*marató* [ˌməɾəˈto] ‘marathon’, *fatalitat* [ˌfətəliˈtat] ‘fate’; Coromines 1983; Oliva 1992), experimental work has not found clear empirical evidence of the presence of binary secondary stress patterns in casually read speech (Prieto 2003). However, in public speech style (e.g. university lectures, radio and television speech etc.) speakers typically perform a rhetorical phenomenon which consists of assigning emphatic stresses to one of the syllables preceding the primary stress within the word. Regarding the distribution of these emphatic stresses, the most common pattern is the one occurring two syllables before the primary stress (cf. Nadeu/Hualde 2012 for more details).

With respect to speech rhythm, Catalan has been described as an “intermediate language” between syllable-timed languages like Italian or Spanish and stress-timed languages like English or Dutch (Nespor 1990; Ramus/Nespor/Mehler 1999). The main difference that lies between the two rhythmic classes consists in the perception and realization of rhythmic patterns, with more even durations between stressed and unstressed syllables in syllable-timed languages than in stress-timed languages. Even though Catalan displays phonological properties that are typically associated with stress-timed languages such as greater complexity of syllable structure and systematic vowel reduction phenomena (cf. 3.1), recent studies have shown that timing or durational patterns for Catalan are very similar to those reported for syllable-timed languages such as Spanish (Prieto et al. 2012). Thus, Catalan shows that the phonological properties of a language (e.g. systematic vowel reduction and more complex syllable structures) do not necessarily have a one-to-one correspondence with prosodic durational reductions leading to stress timing patterns.

5.2 Phrasal prosody: prosodic prominence, prosodic phrasing, and intonation

One of the fundamental pillars of phrasal prosodic structure is the realization of prosodic prominence above the level of the word. At the phrasal level, Catalan is a stress-accent language in which lexically stressed syllables generally serve as the main landing site for phrasal pitch accents. Pitch accents are phrase-level prominences that are typically realized through pitch changes in the corresponding stressed syllables. Pitch accents can be rising, falling, or have more complex pitch movements. Figure 23.2 (cf. 5.3.1 below) shows three examples of a rising pitch accent (L+H* and H*, associated with some stressed syllables of the sentence) and one example of a falling pitch accent L* (associated with the last stressed syllable). As we will see below, these pitch accents directly affect the intonational structure of the utterance. Given the demarcative prop-

erties of prominence, phrasal prominences strongly mark the ends of prosodic domains in Catalan. Typically, the last content word in the prosodic constituent receives a nuclear pitch accent (or main phrasal stress). This is the most perceptively salient stress within the constituent, and it is called the *nuclear pitch accent* (or main phrasal stress). Pitch accents which appear before the nuclear pitch accent are called *prenuclear pitch accents* and are not as salient as nuclear pitch accents. Catalan is not very flexible with regard to allowing focused constituents *in situ*; that is, it does not easily allow for a leftward shift of nuclear pitch accents within prosodic constituents, as other languages do in cases of prosodic focus (cf. 5.3.1). Even though pitch accents typically associate with stressed syllables, unstressed syllables can also receive emphatic stresses, which are typically realized through a rising pitch accent (Nadeu/Hualde 2012).

The second fundamental aspect of phrasal prosody is prosodic phrasing. The way a sequence of words is organized into constituents (or phrases) strongly affects the prosodic structure of the discourse. In Catalan, two intonationally defined prosodic constituents have been described, namely the intonational phrase (IP) and the intermediate phrase (ip) (Prieto 2014; Prieto et al. 2015). Both levels of prosodic constituency are characterized by at least two prosodic markers, e.g. duration and pitch. First, constituent-final syllables are lengthened (with stronger final lengthening at the IP level than at the ip level). Second, the IP and ip constituents are tonally marked through a nuclear pitch configuration which appears in phrase-final position. This configuration includes the nuclear pitch accent and a set of boundary tones which appear right at the edge of the prosodic boundary. The difference between the ip and IP tonal structures is that they are typically more reduced in the ip position. Figure 23.2 (cf. 5.3.1) illustrates the two types of prosodic phrases that are relevant to intonation in Catalan.

Intonational patterns can be described on the basis of prominence and phrasing patterns. The minimal intonational tune is circumscribed to a prosodic constituent and consists of at least one pitch accent plus a boundary tone or a set of boundary tones. Overall, intonational patterns can be described as sequences of prenuclear and nuclear pitch accents followed by phrase-final boundary tones. In the section below, we describe the tonal structure of the most common tunes found in Catalan.

5.3 Main intonational patterns in Catalan

This section describes the main intonational patterns used in Central Catalan, with some references to dialectal variation. For a more extensive description of intonational variation in Catalan, cf. Prieto (2014) and Prieto et al. (2015). The section has been organized according to sentence types (statements, yes-no questions, wh-questions, commands and requests, and vocatives), and within each section both biased and non-biased tunes are described.

5.3.1 Statements

Broad-focus statements in Catalan are characterized by a melodic pattern that ends in a falling nuclear accent followed by a low boundary tone. Phrase-internal stressed positions are realized through prenuclear rising pitch accents. Figure 23.2 shows the intonational pattern of the broad-focus statement ((*La nena de la Marina*)_{ip} (*vol amanida*)_{ip})_{ip} ‘Marina’s daughter wants some salad’ produced with two prosodic phrases. The first prosodic constituent is an intermediate phrase (ip) ending with a rising pitch accent and followed by a boundary tone, and the second prosodic constituent coincides with the sentence-final intonational phrase (IP).

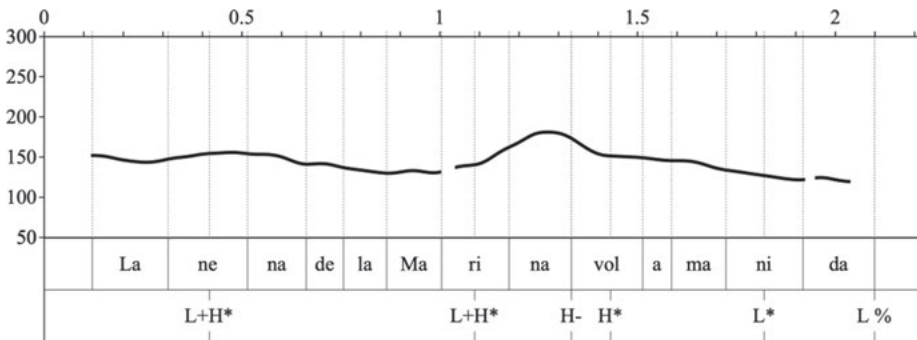


Figure 23.2: Intonational pitch contour of the broad focus statement ((*La nena de la Marina*)_{ip} (*vol amanida*)_{ip})_{ip} ‘Marina’s daughter wants some salad’, produced by a female speaker.

In narrow-focus statements (that is, statements which informationally highlight a given constituent), phrasing and prominence patterns can change substantially. Catalan is quite restrictive with respect to the location of nuclear prominence, which is systematically located in final position. Instead of allowing the shift of the nuclear accent to a non-final constituent, as many other languages do, Catalan tends to resort to syntactic strategies such as focus fronting, which triggers the right-dislocation of the non-focal material (e.g. *L’he posat [a dins l’armari]_F, el paquet* ‘I have put it [inside the wardrobe], the parcel’), clefting (e.g. *És [a dins l’armari]_F, que he posat el paquet* ‘It is [inside the wardrobe] where I put the parcel’). These syntactic strategies guarantee the location of the phrasal prominence at the end of the constituent. One specific type of narrow-focus statement is the so-called contrastive focus, which specifically refers to the highlighting of information that directly rejects the potential alternatives presupposed by the interlocutor (i.e. ‘It is B, and not A’). Figure 23.3 illustrates the intonation of the contrastively focused utterance [*La Marina*]_F *vol amanida* ‘It is Marina (and not Maria) who wants some salad’. The intonation contour is composed of two prosodic constituents. First, the focused constituent [*La Marina*]_F is produced with an emphatic rising pitch accent followed by

a low boundary tone. By contrast, the post-focal constituent displays a very compressed pitch range. For recent studies of the melodic realization of contrastive- and broad-focus sentences in Catalan, Spanish, and Italian, cf. Vanrell et al. (2013b) and Vanrell/Fernández-Soriano (2013).

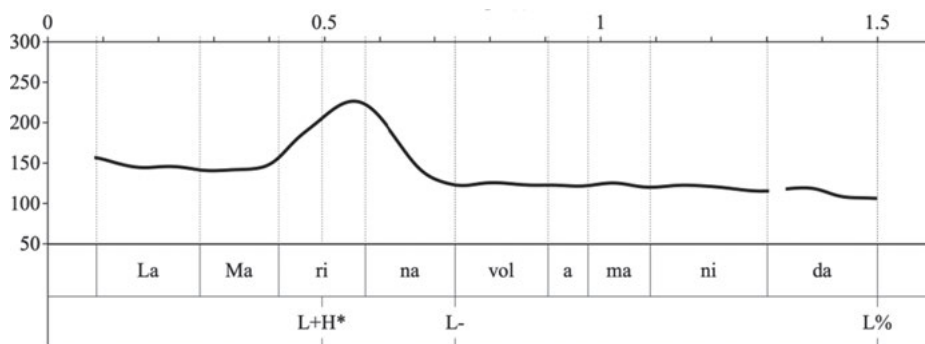


Figure 23.3: Intonational pitch contour of the contrastive focused utterance [La Marina]_r vol amanida ‘It is Marina (and not Maria) who wants some salad’, produced by a female speaker.

Statements can be epistemically biased and express a variety of belief states, such as the speaker’s degree of certainty and uncertainty with respect to the content of the utterance, as well as obviousness or contradiction. In Catalan, prosodic and intonational patterns strongly reflect specific epistemic biases. For example, uncertainty statements are characterized by lengthened syllables, and also by a suspended pitch movement at the end of the utterance. Similarly, statements of the obvious are characterized by a complex falling-rising-falling nuclear configuration (cf. Prieto et al. 2015 for a more detailed description of epistemically-biased statement intonation).

5.3.2 Yes-no questions

Non-biased yes-no questions are non-expectational or non-presuppositional queries. In Catalan, the intonation of non-biased questions is characterized by the use of two types of intonation patterns, namely the rising pitch contour and the falling pitch contour. While the rising pitch pattern is characterized by a falling-rising nuclear pitch configuration (and also a prenuclear falling-rising pattern), the falling pitch pattern is characterized by a falling nuclear pitch configuration preceded by a prenuclear high sustained pitch. The difference between the falling intonation pattern of the *que*-interrogatives and the falling pattern of the broad focus statements lies in the tonal specification of the prenuclear syllables, which is high throughout the sentence up until the last stressed syllable in the sentence. The upper panel of Figure 23.4

illustrates the yes-no question *Vols amanida?* ‘Do you want some salad?’ produced with a rising nuclear pitch configuration, while the bottom panel illustrates the yes-no question (*Que*) *vols amanida?* ‘Do you want some salad?’ produced with a falling pitch configuration (compare with the intonation pattern in Figure 23.2). The sentence-initial interrogative particle *que* ‘that’ is typically associated with the utterances displaying the falling pattern.

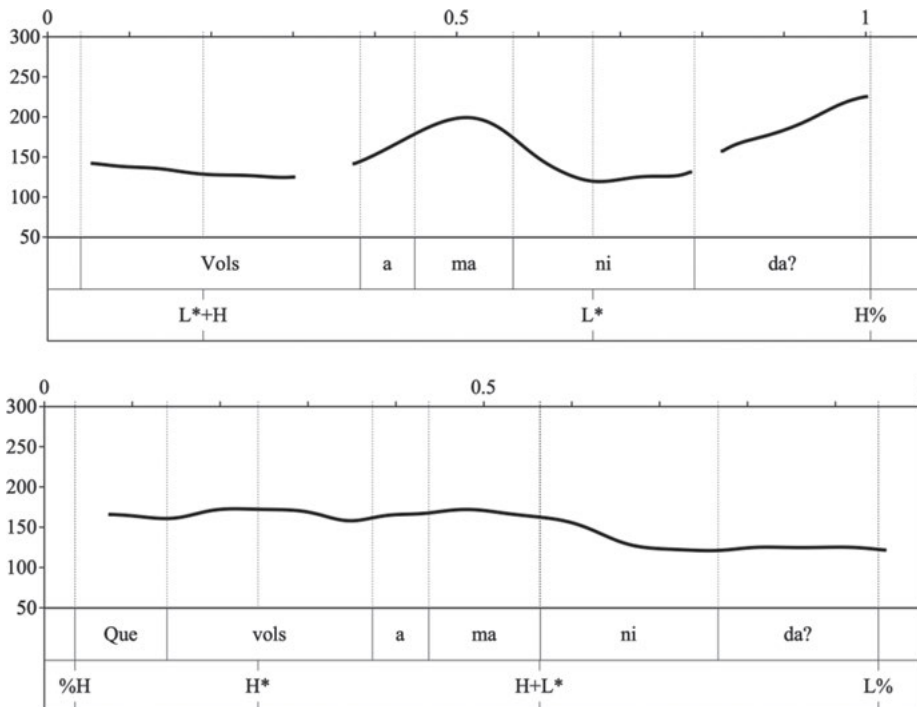


Figure 23.4: Intonational pitch contours of the yes-no question (*Que*) *vols amanida?* ‘Do you want some salad?’ produced with a rising intonation pattern (top panel) and a falling intonation pattern (bottom panel) by a female speaker.

The use of the falling or rising intonational patterns, as well as the use of the sentence-initial particle *que* ‘that’, depends greatly on the dialectal area. While in standard Central Catalan the two types of patterns coexist and both express information-seeking questions, the falling pattern is the predominant pattern in Balearic, Northwestern, and Algerese Catalan. By contrast, in Valencian and Northern Catalan there is a strong tendency to use the rising intonation pattern.

From an information standpoint, the focus of the question is typically placed at the end of the utterance and receives a nuclear accent. Yes-no questions with a narrow or contrastive focus on a non-final constituent (such as the subject) trigger changes

in phrasing and prominence patterns. For example, a sentence like [En Joan]_F *vol amanida?* ‘Is it John that wants some salad?’, with information focus on the subject, is produced with two prosodic phrases and two nuclear pitch accents.

As in the case of statements, Catalan questions can use specific intonation patterns to express belief states through epistemically-biased questions. In contrast with information-seeking questions, confirmation-seeking questions express the speaker's previous knowledge about the propositional content of the utterance. Catalan dialects display a great variety of confirmatory lexical markers such as *oi/no/eh* 'right', which can be placed both sentence-initially or sentence-finally (*Oi/No/Eh que vols amanida?* / *Vols amanida, oi/no/eh?* 'You want some salad, right?'). Confirmation-seeking questions can also be produced without the initial lexical marker and with an intonation pattern which is similar to the falling pitch contour illustrated in Figure 23.4 (bottom panel). The difference between the two intonational contours lies in the amplitude of the falling pitch movement of the nuclear pitch accent (cf. Vanrell et al. 2013a for Majorcan Catalan).

Echo questions typically express the failure to understand the previous move in a conversation. This is why these questions tend to repeat (or ‘echo’) the information just mentioned in the discourse (e.g. Speaker A: *Vull amanida* ‘I want some salad’; Speaker B: (*Dius que*) *vols amanida?* ‘(You say that) you want some salad?’). Figure 23.5 illustrates the prominent rising-falling nuclear pitch configuration that characterizes echo questions in Catalan.

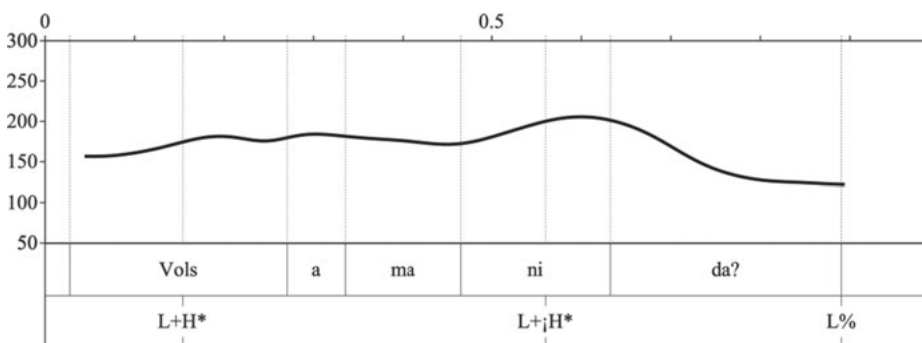


Figure 23.5: Intonational pitch contour of the echo question (*Dius que*) *vols amanida?* ‘(You say that) you want some salad?’, produced by a female speaker.

In conversation, echo questions can also encode some type of counter-expectational meaning, such as surprise, incredulity, disapproval, and even anger. In this case, intonational patterns can indicate the degree to which the situation contradicts the speaker's expectations (cf. Prieto et al. 2015 for a more detailed description of epistemically-biased interrogative intonation).

5.3.3 Wh-questions

Information-seeking wh-questions solicit about a specific piece of information from the hearer. In Catalan, wh-questions are headed by wh-words such as *què* ‘what’, or *qui* ‘who’. The most common intonation pattern of wh-questions in Catalan is characterized by a high-falling nuclear configuration. An example of this type of pitch contour is illustrated in Figure 23.6. This intonation pattern is commonly found in Central Catalan, Northwestern Catalan, Northern Catalan, and part of Balearic Catalan. In contrast, in Valencian, Algerese, and some parts of Balearic Catalan, a falling pattern is documented (cf. Prieto et al. 2015 for more details).

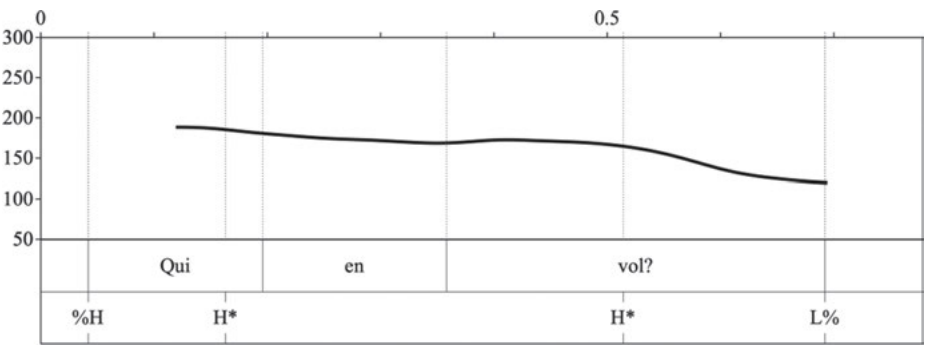


Figure 23.6: Intonational pitch contour of the echo question *Qui en vol?* ‘Who wants some?’, produced by a female speaker.

As in the case of yes-no questions, changes in the focus structure of the sentence lead to the reorganization of prosodic phrasing. Constituents that are not in focus are typically located pre-focally or post-focally (e.g. *Qui en vol, d’amanida?* or *D’amanida, qui en vol?* ‘Who wants some salad?’). Similarly, epistemic and volitional pragmatic effects can lead to melodic changes, such as the fact that imperative wh-questions are produced with an emphatic falling nuclear pitch accent.

5.3.4 Commands and requests

This section describes the intonation patterns of the main directive speech acts in Catalan: that is, speech acts that intend to persuade the hearer to perform the action described by the proposition. Depending on their illocutionary strength, directive speech acts range from strong and assertive commands to gentle requests. Prosodic patterns, as well as intonation, play an important role in the conveyance of the illocutionary force of imperative acts. On the one hand, assertive commands are characterized by a fast speech tempo and a substantial increase in intensity and pitch

range (with either higher or lower values than the ones normally used by the speaker). The most common intonation pattern found in commands has a rising falling melody. Figure 23.7 shows the intonation pattern of the command *Vine!* ‘Come here!’. From a melodic point of view, imperative intonation patterns are very similar to broad focus intonation, the main difference being the increased pitch range found in the former.

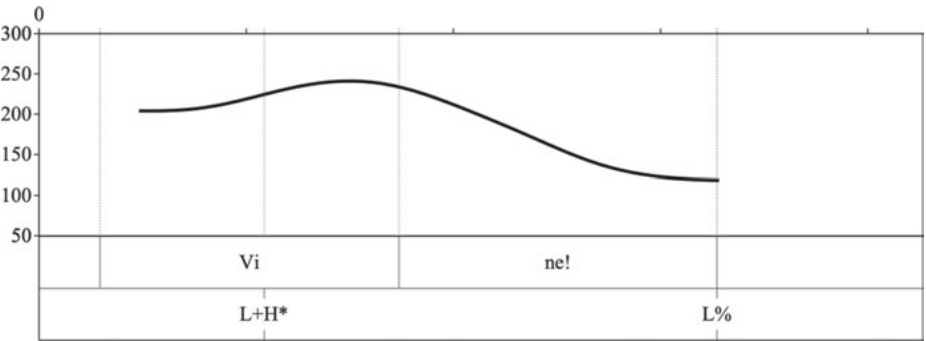


Figure 23.7: Intonational pitch contour of the strong command *Vine!* ‘Come here!’, produced by a female speaker.

From a prosodic point of view, gentle requests are characterized by a set of prosodic mitigation strategies (Hübscher/Borràs/Prieto 2017), such as low intensity, a softer voice quality, as well as slow tempo, and even extreme lengthening of the stressed and final syllables. An increase of these features tends to be linked to an increase of the pragmatic effect of persuasion. One of the most common intonation patterns found in soft requests is the one exemplified in Figure 23.8 by the request *Vine!* ‘Come here!’. It is characterized by a low tone aligned with the nuclear accented syllable followed by a complex rising-falling movement associated with the posttonic.

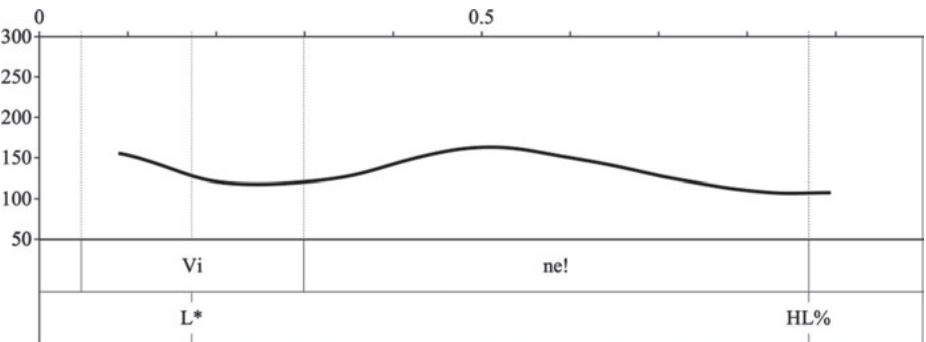


Figure 23.8: Intonational pitch contour of the soft request *Vine!* ‘Come here!’, produced by a female speaker.

5.3.5 Vocatives

Vocatives in Catalan can be produced with a set of intonational melodies that vary according to a set of sociopragmatic factors (cf. Borràs-Comes/Sichel-Bazin/Prieto 2015 for a phonetic and pragmatic analysis of vocative melodies in Central Catalan; for a summary, cf. Prieto et al. 2015). Three main intonational contours have been described. First, perhaps the most frequent first call in many Catalan dialects is the one exemplified in Figure 23.9 (left). It is produced with a rising pitch accent associated with the stressed syllable on the proper name followed by a long final syllable produced with a rising-falling boundary tone. This constitutes a non-insistent vocative. Second, the so-called *vocative chant* is typically used for insistent calls across dialects. This is a tune that is widely used in many Romance and Germanic languages. Figure 23.9 (middle) illustrates its melodic realization. It consists of a rising pitch accent associated with the stressed syllable followed by a long and sustained mid boundary tone. The third intonational pattern is the falling-rising melody, which is used when the interlocutor is not present and the speaker is wondering whether s/he can hear the call (cf. Figure 23.9, right).

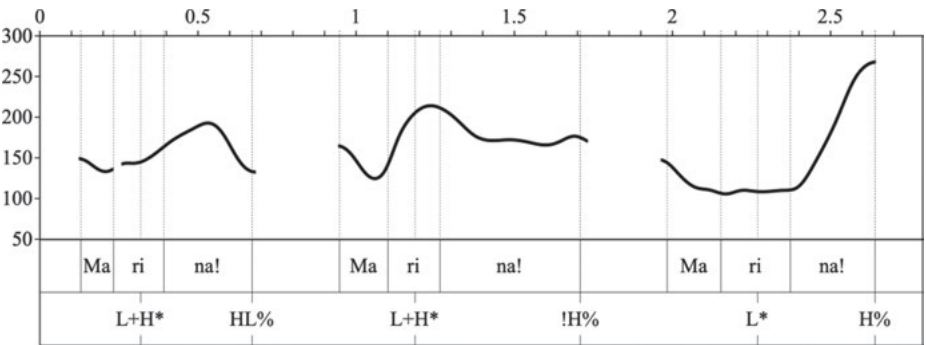


Figure 23.9: The proper name *Marina!* produced by a female speaker with the three most common intonational pitch contours used for vocatives, from left to right: non-insistent vocative, insistent vocative, question vocative.

Catalan also shows two interesting dialectal features in the expression of vocatives, namely the use of sentence particles and also some truncation phenomena (cf. Vanrell/Cabr  2011; Prieto et al. 2015). In Majorcan and Minorcan Catalan, emphatic vocatives (uttered only in case of second occurrence vocatives) are typically produced with the sentence-initial particle *o* (for example, *O Margalida!*) and pronounced with rising pitch accent over the vocative particle followed by a falling intonation. In Algerese Catalan, as in other Romance languages such as Sardinian, Corsican, and southern varieties of Italian, vocatives are typically truncated. The truncated pattern is obtained by deleting the segmental material after the stressed vowel of the proper

name (i.e. *Bàrbara* > *Bá*, *Teresa* > *Teré*, *Pasqual* > *Pasquá*). As for the intonation of truncated vocatives, two main patterns have been documented. While the non-insistent call is realized with a falling pitch accent on the stressed syllable, the emphatic call is realized with a pitch-accent shift to the first syllable of the truncated word. For example, the two possible melodic realizations of the vocative *Teré* (truncated form of *Teresa*) can be either [ta¹re], with a falling pitch accent over the last syllable of the word (non-insistent call) or ['ta.re], with a rising pitch accent over the first syllable of the word (emphatic call).

6 Summary and conclusions

This chapter has offered an overview of segmental and suprasegmental phenomena in Catalan. The presentation is based on the characteristics of the Central (Eastern) variety, though we have also included information about the more distinctive features of other dialects. The sections on vowels and consonants have shown the rich dialectal variation that Catalan displays, with common processes shared by many other Romance languages, such as resyllabification across words, vowel reduction, word-epenthesis, spirantization, voice neutralization, place and manner assimilations, and word-final cluster reduction. The rich dialectal variation of Catalan has also made it possible to identify more idiosyncratic processes, shared by fewer Romance varieties, such as vowel insertion across words, vowel harmony, sibilant voicing across words, rhotacism, /r/-lateralization, gliding effects, sibilant dissimilation, severe assimilations and cluster reductions, $\emptyset$ – /n/ and $\emptyset$ – /r/ alternations, as well as the unique [ʃ] – [ʒ] alternation and, in addition to the common exceptional syllabification of the alveolar fricative in clusters (limited to codas in Catalan), the tolerance of other word-final codas that do not comply with sonority requirements.

The section on prosody has offered a description of the main features of word prosody, phrasal prosody, rhythm, as well as the most common intonational patterns found in Catalan. We have seen that the Catalan prosodic system has many features in common with those of other Romance languages. Word stress is used to characterize the majority of words in this language, and is typically placed on one of the three last syllables of the word. Secondary stresses tend to be realized as emphatic prominences over certain unstressed syllables in specific speech styles, such as public speech. This strategy is shared by other Romance languages, but it differs from French or Occitan (cf. the discussion in Frota/Prieto 2015). The rhythmic pattern of Catalan is syllable-timed, like most other Romance languages (but unlike languages such as Friulian, and some dialects of Portuguese and Italian, which can be considered more stress-timed). Finally, Catalan uses a variety of post-lexical prominence patterns, as well as post-lexical intonational patterns, to mark phrasing structure and also to express modality and other pragmatic meanings, such as focus. From an intonational

point of view, Catalan can be regarded as a very rich language which uses intonation to express a wide variety of pragmatic meanings, such as epistemic positioning or informational focus in statements and questions.

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24 Spanish

Abstract: This chapter describes the sound system of Spanish, including consonants and vowels, stress, intonation and morphophonological processes. The main aspects of geographical variation in pronunciation are considered.

Keywords: Spanish, vowel sequences, spirantization, phonemic analysis, syllable-final neutralization, phonological variation

1 Introduction

Spanish pronunciation has been the object of considerable scholarly attention, with many studies of aspects of Spanish phonetics and phonology being published every year. Recent, more-or-less comprehensive, treatments of the sound system of Spanish, from different perspectives, are available at different levels of detail, chapter-size (e.g. Hualde 2010; Campos-Astorkiza 2012), book-size (e.g. Hualde 2005; Martínez Celdrán/Fernández Planas 2007; NGRAE 2011; Gabriel/Meisenburg/Selig 2013; Núñez Cedeño/Colina/Bradley 2014; Colina/Martínez-Gil 2020) and even multi-volume (e.g. Gil Fernández/Llisterri Boix to appear), as are treatments that focus on the phonetics and phonology of a single geographical dialect (cf. e.g. Martínez Celdrán/Fernández Planas/Carrera Sabaté's 2003 description of the Castilian Spanish sound system, Martín Butragueño's 2014 book on segmental variation in Mexican Spanish, Quesada Pacheco's 2010 edited book on Central American Spanish pronunciation, chapters 1–5 in Colantoni/Rodríguez Louro's 2013 edited book on Argentine Spanish etc.).

Perhaps the single work on Spanish pronunciation that has had the greatest influence in the field is Navarro Tomás's book *Manual de pronunciación española*, which has been reprinted many times since its initial publication in 1918. Navarro Tomás's *Manual* focuses on the standard pronunciation of Peninsular or Iberian Spanish in the first decades of the 20th century, with only occasional reference to other varieties of the language. Alarcos Llorach (1965) and Harris (1969) are classical theoretical treatments of Spanish phonology within the frameworks of European Structuralism (Prague School) and Generative Phonology, respectively. Harris (1969) concentrates on educated Spanish from Mexico City and Alarcos Llorach (1965) on Peninsular Spanish. Among early generative studies of Spanish varieties, Guitart's (1976) treatment of educated Havana Cuban Spanish is also worth mentioning. Quilis (1993) is another influential work that includes both phonetics and (structuralist)

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phonology, with reference to variation in pronunciation. There is also a large body of dialectological work that includes detailed information on pronunciation in different countries and regions (cf. e.g. Lipski 1994; Alvar 1996). Finally, good descriptions of Spanish phonetics and phonology can also be found in works with a pedagogical orientation intended for teachers and students of Spanish as a second language, including Dalbor (1969), Gil Fernández (2007), Morgan (2010) and Schwegler/Kempff/Ameal-Guerra (2009).

In this chapter, after reviewing the main aspects of geographical variation in Spanish, we consider the different phoneme classes of this language, noting some of the most important details of allophony. Word-stress, intonation and main morphological alternations are also briefly considered in separate sections.

2 Geographical varieties

2.1 Spain

The Romance variety known as Spanish or Castilian has its origin in the local evolution of the Latin language in the medieval kingdom of Castile, around the town of Burgos, from where it spread, first over a large area of the Iberian Peninsula – at the expense of Arabic and of other Romance varieties – and then to the Canary Islands and the Americas.

Old Castilian had Asturian-Leonese and Navarro-Aragonese as its closest relatives, to the west and east, respectively. Although most of the territory where these Romance languages were once spoken has been linguistically Castilianized, descendants of Old Asturian-Leonese are still spoken nowadays (by bilingual speakers), mostly in Asturias and in the Portuguese region of Miranda do Douro (where it is known as *Mirandês* and has official status). Aragonese varieties have a very small number of native speakers at present, in the central Pyrenees. Further afield, we find other Romance languages in the Iberian Peninsula, Galician-Portuguese (or, Galician and Portuguese, including perhaps as a third coordinated variety the *fala* of the Xálima/Jálama valley of Extremadura, ↗26 Portuguese, ↗27 Galician) and Catalan (in Catalonia, Andorra, Valencia, the Balearic Areas and a small area of Aragon, ↗23 Catalan). Within Spain, but on the northern side of the Pyrenees, a variety of the Gascon dialect of Occitan (↗22 Occitan) is spoken in Val d'Aran (where speakers tend to be trilingual in Gascon, Spanish and Catalan). In addition, a non-Romance, non-Indo-European language, Basque, is spoken in the Autonomous Community of the Basque Country and in Navarre).

Whereas the Spanish of bilingual areas presents special characteristics due to language contact, most isoglosses affecting Spanish pronunciation in the Iberian Peninsula separate a northern from a southern area. Spanish dialectologists typically

distinguish either two main dialects, northern-central vs. southern (Andalusian), or three dialects, northern, central or transitional, and southern.

Outside of the Iberian Peninsula, the Spanish of the Canary Islands, off the North African coast, shares many features of pronunciation with Andalusian Spanish and also with Caribbean Spanish, reflecting historical patterns of colonization and settlement. The Spanish of the North African Spanish enclaves of Ceuta and Melilla (where many speakers are bilingual in Moroccan Arabic or Berber) is also a continuation of Andalusian Spanish.

Nowadays the most important phonological difference between Iberian or Peninsular Spanish and Latin American Spanish as a whole is the presence of a phonemic contrast between the fricatives /s/ and /θ/. This contrast is part of Peninsular standard pronunciation but is not found in Latin American Spanish (so-called *seseo*, cf. 4.2). Although traditionally the Spanish of large areas of Andalusia also lacked this contrast, it is being introduced in the pronunciation of the younger generations in urban areas (cf. e.g. Melguizo Moreno 2007), through the influence of the mass media and the school system, so that this is increasingly becoming a consistent difference that serves to identify Iberian Spanish speakers from those hailing from Latin America.

Leaving aside the /s/ vs. /θ/ contrast, within Iberian Spanish, the most salient feature of pronunciation subject to geographical variation is the weakening of syllable-final and word-final fricatives and liquids, a phenomenon that has great intensity in southern areas, less intensity in central areas, and is uncommon in northern speech. Another important dialectal phenomenon is the realization of word-final /n/ as velar in eastern and southern areas. Among Spanish-speakers, however, there is very little awareness of nasal velarization.

Southern varieties have a laryngeal /h/ (which is often voiced intervocally) instead of the velar or postvelar (uvular) /x/ of more northerly areas of the peninsula. The incidence of these three phenomena, /s/ weakening, /n/ velarization, and /x/ aspiration is also subject to geographical variation within Latin American Spanish, as we will see in the next section. Traditionally the presence vs. absence of a phonological contrast between /j/ and /χ/ (as in *cayó* ‘fall_{3SG.PRET}’ vs. *calló* ‘become silent_{3SG.PRET}’) was another important dialectal trait, but the neutralization of the contrast or *yeísmo* (cf. 4.4) has become almost completely general in recent decades, starting from large towns and spreading to rural areas (Rost Bagudanch 2014; Molina Martos 2013).

2.2 Latin America

Spanish is an official language in 19 Latin American countries (Cuba, Dominican Republic, Puerto Rico, Mexico, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile, Paraguay, Argentina and Uruguay). It is also widely spoken in the USA, which is in fact the second country,

after Mexico, by number of Spanish speakers, even though there it has the status of a minority language.

Although the Spanish language started spreading in Latin America over five hundred years ago, phonological differences among geographical varieties are smaller than this timeline would suggest, since during the colonial period innovations continued to be transmitted across areas after the initial settlement. A clear example is the diffusion of the retraction of the old prepalatal fricatives to /x/ (or /h/), as in *ojo* ‘eye’, *bajo* ‘low’, a sound change that took place perhaps during the 17th century, well after initial Spanish settlement in many areas (cf. e.g. Penny 2002, 101). Whereas Judeo-Spanish preserves the Old Castilian phonemes, e.g. /'oʒo/ ‘eye’, /'baʒo/ ‘low’ (↗25 Judeo-Spanish), such older pronunciations are not found anywhere in Latin American Spanish, as the innovation spread everywhere.

Many phonological isoglosses in Latin America reflect variation also found in the Iberian Peninsula. These include, without being exhaustive, (a) aspiration or maintenance of /s/, (b) aspiration or velar articulation of /x/ (realization of the back fricative as laryngeal or as velar) (c) pronunciation of final /n/ as coronal or as velar, (d) preservation of the opposition between /j/ and /ʎ/, (e) variation in the degree of constriction of /j/, (f) neutralization of liquids and rhotics in the coda and (g) weakening of /tʃ/ to /ʃ/. In general, Latin American Spanish pronunciation shows more affinity with Western Andalusian speech than with other Peninsular varieties. Two other phonological phenomena of Western Andalusian (and Extremaduran) Spanish that are also found in some Latin American areas are the neutralization of coda liquids, e.g. *alma* ‘soul’ = *arma* ‘weapon’ (widespread in Caribbean Spanish) and the retention of aspiration from Latin /f/, as in e.g. *harina* /ha'rina/ ‘flour’ (in some areas of Colombia, among other places). In this respect, it should be noted that the generalization of /s/ aspiration in Andalusian Spanish probably has a relatively late chronology, for which reason it affected the pronunciation of mostly coastal areas of Latin America, which were in more continuous contact with recent immigration from Spain.

Some other aspects of variation, however, have resulted from local phonological developments in specific areas of Latin America and are not found in Spain. Among these we find (a) the evolution of /j/ (and /ʎ/) to a voiceless postalveolar fricative /ʃ/ in Argentina and Uruguay (i.e. /j/ > /ʒ/ > /ʃ/) and (b) several distinct realizations of the historical alveolar trill, as an apical assibilated ([s]-like) fricative (variably in Andean Spanish), a retroflex approximant (variably in Costa Rica) and a preaspirated apical trill (variably in Caribbean Spanish). Whereas all over the Spanish-speaking world one finds individual speakers who produce a dorsal (velar or uvular) trill instead of an apical trill, this phenomenon appears to have acquired sociolinguistic significance only in Puerto Rico (Vaquero/Quilis 1989).

An interesting phenomenon because of its geographical distribution is the realization of word-final nasals as labial /m/, e.g. *pan* [pam] ‘bread’. This pronunciation has been documented in three different areas that are very far away from each other: the Yucatán Peninsula in Mexico (Alvar 1969; Yager 1989; Michnowicz 2008),

the Cauca Valley of Colombia (Montes 1979) and Tucumán, in Argentina (Rojas 1969). Sporadic labialization of final nasals has also been documented in Paraguay (De Granda 1982, 174). There does not appear to be any particular historical connection between these labializing areas. For Yucatán Spanish the phenomenon may be due to language contact, but this explanation would not extend to other regions.

In addition, as explained below, there is a great variety of intonational patterns in Latin American Spanish that do not have a counterpart in Peninsular Spanish (cf. 7.3 for examples). Some of these patterns may have been transferred from other languages in contact and some others may reflect language-internal evolution.

It has long been claimed that some of the variation found in Latin American Spanish pronunciation, in intonation, rhythm and aspects of the realization of vowels and consonants, may be due to present or past contact with other languages. Besides pronunciations perhaps originally due to language contact that have been established in the speech of a certain area, bilingual speakers may of course also display distinctive pronunciation variants. In most Spanish-speaking Latin American countries, indigenous Amerindian languages are spoken by a larger or smaller percentage of the population. The only countries where pre-Columbian languages are no longer spoken are Uruguay and the Caribbean island nations of Puerto Rico, Cuba and the Dominican Republic. To mention but a few of the most important contact situations involving Amerindian languages, in Paraguay most citizens speak Guaraní; Quechua is widely spoken in Bolivia, Peru and Ecuador (where it is known as Quichua); Aymara is also spoken by large numbers of people in Bolivia and Peru; in Mexico, besides Nahuatl, many other languages belonging to several families are found, including Otomí, Zapotec, and Mixtec, among others; and a number of Mayan languages are widely used in Guatemala and in the Mexican region of Yucatán.

Regarding bilingualism with non-indigenous languages, contact with English is of course prevalent in the US, but also, with less intensity, in the US possession of Puerto Rico; and English-lexified creoles are spoken in areas of several Central American countries. In the Dominican Republic, which shares the island of Hispaniola with Haiti, there is also a presence of (French-based) Haitian Creole. In northern Uruguay, (Brazilian) Portuguese is also spoken. Past contact with Italian, in the 19th and first decades of the 20th century, may be responsible for some of the particular intonational contours of Buenos Aires Spanish (Colantoni/Gurlekian 2004; Gabriel et al. 2010; Pešková et al. 2012; Gabriel/Kireva 2014).

2.3 Other parts of the world

On the southern tip of the Iberian Peninsula, we find the British colony of Gibraltar, where most inhabitants are bilingual in Spanish and English. The Spanish of Gibraltar is essentially the same Andalusian variety spoken in adjacent areas of Spain, with some traits attributable to contact with English.

Spanish is one of the official languages of Equatorial Guinea, which was a former colony of Spain. Virtually all Spanish-speakers in Equatorial Guinea are multilingual and most of them are native speakers of one of several Bantu languages. Pidgin English is also widely spoken in the country. Some features of Equatorial Guinea Spanish pronunciation that have been noted in the literature, such as a tendency to neutralize the contrast between the rhotic tap and trill, and distinctive intonational patterns explainable from a tonal substrate, may in fact be features of second-language pronunciation (Lipski 1985; 2010; 2016).

The Philippines were part of the Spanish Empire and have an Academy of the Spanish Language in association with the Royal Spanish Academy, like all Latin American countries and the USA; however, there is now only a very small number of Spanish speakers in the Philippines. Zamboangueno Chavacano (or Chabacano), a Spanish-based creole language spoken in Zamboanga City, has much greater vitality (cf. Steinkrüger 2013 and ↗28 Romance-lexifier creoles). A different case is that of Judeo-Spanish (↗25 Judeo-Spanish). We turn now to the description of the phonological system of the Spanish language.

3 Vowels

3.1 Vowel inventory: Articulatory and acoustic characteristics

Spanish has a cross-linguistically common, symmetrical five-vowel system /i e a o u/. Differences in vowel quality between stressed and unstressed syllables are relatively small and inconsistent (Nadeu 2014). This simple vowel system diachronically derives from a more complex one with the same five vowels in unstressed syllables but seven vowels /i e ε a ɔ o u/ in stressed syllables, as we find in some other Romance languages. The subsequent diphthongization of the stressed open-mid vowels /ε ɔ/ to /ie ue/ brought about numerous morphophonological alternations that permeate the Spanish lexicon, e.g. *pierdo* ‘lose_{1SG}’, *perdemos* ‘lose_{1PL}’; *tierra* ‘land’, *terreno* ‘terrain’; *cuento* ‘count_{1SG}’, *contamos* ‘count_{1PL}’; *puerta* ‘door’, *portal* ‘doorway’ etc. In word-final unstressed syllables, high vowels have very low frequency, but are not excluded (e.g. *bici* ‘bike’, *tribu* ‘tribe’).

There is no phonological contrast between short and long vowels, but sequences of two identical vowels may occur within words, as in e.g. *loor* /lo'or/ ‘praise’, *loo* /'loo/ ‘praise_{1SG}’, *dehesa* /de'esa/ ‘prairie’, *lee* /'lee/ ‘read_{3SG}’.

The only Spanish dialect that appears to substantially deviate in its vocalic phonology from the rest is Eastern Andalusian, including the variety spoken in the adjacent region of Murcia. In this dialectal area, the complete loss of final /s/ (and other consonants) arguably has been accompanied by the phonologization of differences in vowel quality in final unstressed syllables, where mid vowels are

more open and the low vowel is more fronted and higher before an etymological final consonant (Navarro Tomás 1939; Hernández-Campoy/Trudgill 2002); e.g. *libre* ['liβre] 'free_{SG}' vs. *libres* ['liβre] 'free_{PL}'; *libro* ['liβro] 'book_{SG}' vs. *libros* ['liβro] 'book_{PL}', *libra* ['liβra] 'pound_{SG}' vs. *libras* ['liβrae] 'pound_{PL}'. Although word-medial stressed mid vowels may harmonize with the final vowel (e.g. *mono* ['mono] 'monkey_{SG}' vs. *monos* ['mono] 'monkey_{PL}'), the phonological contrast is borne by the latter vowel. This thus results in a typologically unusual situation with a larger underlying phonological vowel inventory in unstressed than in stressed syllables.

Although in the transcriptions above we have used the symbols [-e], [-o] in the singular, it has been noted that these vowels tend to be somewhat closer in eastern Andalusia than in Castilian Spanish. A more extreme raising of unstressed final mid vowels is found in several other areas, including rural areas of Mexico (Parodi/Santa Ana 1997) and of western Spain (cf., among others, Cummins 1974 for Extremadura, Holmquist 1985 for Cantabria, as well as Gabriel/Grünke/Kireva 2020 for a recent study of Olivenza Spanish).

Bilingual speakers of Andean Spanish who are dominant in Quechua or Aymara sometimes show variation between high and mid vowels even in stressed position, e.g. ['misa] for ['mesa] 'table'. This is not a stable dialectal feature, but rather an L2 transfer phenomenon, due to the fact that those two languages have a three vowel system /i a u/ (in many varieties with mid vowels only as contextually conditioned allophones of high vowels, and not as distinct phonemes).

3.2 Vowel sequences: Diphthong and hiatus

In Spanish, any sequence of two qualitatively different vowels may be pronounced in a single syllable, as a diphthong, or in hiatus, in two syllables. Spanish diphthongs are different both from the diphthongizing vowels of English (as in *lay*, *go*) and from the diphthongs of this language (as in *lie*, *cow*, *boy*). Whereas English diphthongs, which form a reduced set, constitute single phonological units, Spanish diphthongs are better analyzed as tautosyllabic sequences of two vowel phonemes (cf. Roca 2016).

Whether a sequence of two vowels is lexically tautosyllabic or heterosyllabic is for the most part predictable from vowel aperture (or: height) and stress. A vowel sequence is lexically heterosyllabic if either:

- (a) both vowels are non-close (low or mid), regardless of the position of the stress; e.g.: *área* ['a.re.a] 'area', *teatro* [te'a.tro] 'theater', *creemos* [kre'e.mos] 'believe_{1PL}', *poeta* [po'e.ta] 'poet', *leona* [le'o.na] 'lioness', *Leonora* [le.o'no.ra] (proper name), or
- (b) one of the two vowels is close (or: high) and stressed; e.g. *manía* [ma'ni.a] 'mania', *reúne* [re'u.ne] 'gather_{3SG}'

Other sequences constitute lexical diphthongs (e.g. *varios* ['ba.ɾios] 'several', *fauna* [fa'u.na] 'fauna', *europeo* [eu.ro'pe.o] 'European').

Nevertheless, in Iberian Spanish and less commonly in some Latin American varieties, certain words containing sequences with an unstressed close vowel exceptionally admit a hiatus pronunciation. Thus, for some Iberian Spanish speakers, words like *piano* [pi'a.no] 'piano', *liana* [li'a.na] 'liana', *dueto* [du'e.to] 'duet', with a hiatus, are exceptions to the general pattern, according to the rules just given, observed in most other words with the same sequences and the same stress pattern like *viaje* ['bja.xe] 'trip', *italiana* [i.ta'lja.na] 'Italian_{F,SG}', *duelo* ['dɥe.lo] 'sorrow'. Some of these exceptional hiatuses can be explained by paradigm effects, where the close vowel receives the stress in related words, as in *dueto* [du'e.to] 'duet', related to *dúo* ['du.o] 'duo', where /u/ is stressed. Compare also, in verb paradigms, the regular diphthongization pattern observed in, e.g., *cambio* ['kam.bjo] 'change_{1SG}', *cambiamos* [kam'bja.mos] 'change_{1PL}' vs. the exceptional pattern of *envío* [em'bi.o] 'send_{1SG}', *enviamos* [em.bi'a.mos] 'send_{1PL}', where the hiatus in the word *enviamos*, with unstressed /i/, is explainable by the fact that this vowel is stressed in other forms of the paradigm. The presence of a morphological boundary between the two vowels may also induce an exceptional hiatus, as in *boquiancho* [bo.ki'an.tʃo] 'wide-mouthed'. Other exceptions to the general rules of syllabification have a limited distribution (cf. Hualde 2005, 81–86).

There are also lexical triphthongs, where a non-close vowel is both preceded and followed by a close vowel, as in the last syllable of *Paraguay* [pa.ra'gɥaj], *cambiáis* [kam'bjaɪs] 'change_{2PL}'.

3.3 Post-lexical contraction of vowel sequences

The syllabification rules for vowel sequences given above apply to words in citation form. In running speech, any sequence of two vowels can be reduced to a single syllable. Vowel-sequence reduction is more common when it implies the gliding of an unstressed mid vowel (e.g. *área* ['a.re.a] → ['a.rɛa] ~ ['a.rja], *teatro* [te'a.tro] → ['tɛa.tro] ~ ['tja.tro]) or the reduction of an exceptional hiatus (e.g. *enviamos* [em.bi'a.mos] → [em'bja.mos]) than when it involves stress displacement from a mid or high vowel (e.g. *maestro* [ma'es.tro] → ['maɪs.tro] 'teacher; bricklayer', *manía* [ma'ni.a] → [ma'nja]). However, in compounds with systematic deletion of the stress of the first member, reduction is regular, e.g. *María* [ma'ri.a] (proper name), but *María Rosa* [ma.rja'rosa] (proper name). Reduction of vowel sequences to a single syllable is also more common across certain word-boundaries (e.g. *la entrada* [la.en'tra.ða] 'the entrance' → [laɛn'tra.ða], *poco asado* ['po.ko.a'sa.ðo] 'little roasted' → ['po.kɔa'sa.ðo]; *poco usado* ['po.ko.u'sa.ðo] 'little used' → ['po.kou'sa.ðo]) than inside words (cf. Navarro Tomás 1918/1977, 148–149; Hualde 2020).

The raising of mid vowels to close glides (e.g. *paseando* [pa.se'an.do] 'walking' → [pa'sja.n.do]), produces neutralization with lexical diphthongs (e.g. *cambiando* [kam'bja.n.do] 'changing'). This phenomenon is more frequent in Latin American than

in Iberian Spanish and within Latin American Spanish its frequency also varies substantially among geographical dialects (cf. e.g. MacLeod 2007; Garrido 2008; 2013; Colantoni/Hualde 2016).

Sequences of three or more vowels that arise across word boundaries may also be reduced to a single syllable by post-lexical contraction, especially if unstressed, as long as they present a uniform sonority contour with only one sonority peak (e.g. *media Europa* ['me.ði.a.eu'ro.pa] 'half Europe' → ['me.ðjaeu'ro.pa] vs. *esta o aquella* ['es.ta.o.a'ke.ja] 'this one or that one' → ['es.taɔ.a'ke.ja] ~ ['es.ta.ɔa'ke.ja], but not *['es.taɔa'ke.ja], since that would result in a tautosyllabic sequence [aɔa] with two sonority peaks).

4 Consonants

4.1 Plosives

Spanish has a phonological contrast between two series of plosive (or: oral stop) consonants, voiceless /p t k/ and voiced /b d g/. In most positions /b d g/ are realized without complete occlusion, as approximants, which has led some phonologists to prefer a phonemization /β ð ɣ/. This is the analysis adopted, for instance, by Maddieson (2013) in the *World atlas of language structures online* (WALS), where Spanish is listed as a language without a contrast between voiced and voiceless plosives, since, in this alternative analysis, it would lack the voiced plosive phonemes /b d g/. Here we adopt the more traditional analysis with two series of plosives differing in voicing. Both series of plosives are subject to lenition in weak positions, especially between vowels, but not with the same systematicity. Whereas, in languages like French or English, /b d g/ may occasionally be produced with incomplete occlusion in casual speech, in Spanish, approximant realizations of /b d g/ in the intervocalic context and in some postconsonantal contexts are systematic in all styles, including careful speech. At least since Navarro Tomás (1918/1977), the observation is that in many Spanish varieties /b d g/ are typically realized as [β ð ɣ] in all contexts except after pause or a homorganic nasal or lateral (e.g. *cada* ['kaða] 'each', *anda* ['anda] 'walks', *caldo* ['kaldo] 'broth'). An exception is found in Central American Spanish and the highlands of Colombia, where plosive realizations are common and even preferred in all postconsonantal contexts and after glides, e.g. *calvo* ['kalbo] 'bald', *hay dos* ['aj'dos] 'there are two', cf. general Spanish ['kalβo], ['aj'ðos] (whereas intervocalically we find very open approximants) (cf. Canfield 1981; Carrasco/Hualde/Simonet 2012; Quesada Pacheco 2010).

In some Spanish dialects, intervocalic /p t k/ may also be variably realized as voiced approximants (Hualde/Simonet/Nadeu 2011; Torreira/Ernestus 2011), but this is a casual speech phenomenon that lacks the systematicity of the spirantization of /b

d g/ and is subject to considerable variation in its frequency among speakers. Eager (2017) finds a correlation between the degree of weakening of intervocalic /p t k/ and /b d g/ for different speakers and dialects.

Word-finally the only common plosive is /d/, e.g. *verdad* ‘truth’, *usted* ‘you (formal address)_{SG}’, *sed* ‘thirst’, *Madrid* (place name), *virtud* ‘virtue’. Besides its standard careful realization as [ð], this consonant is often deleted and it may also be realized as [θ] or [t] in some dialects, with different preferences for deletion or devoicing depending on the phrasal context, number of syllables, position of the stress and even the specific lexical item (Hualde/Eager 2016). The devoicing of word-final /d/ in the Peninsular dialect of Madrid or Valladolid results in alternations of the type *red* [‘reθ] ‘net’, *redes* [‘reðes] ‘net_{PL}’. Other word-final plosives are rare, but can be found in technical terms and borrowings, e.g. *club* ‘club’, *déficit* ‘deficit’, *bloc* ‘block’, *blog* ‘blog’. The pronunciation of these final consonants varies considerably depending on speaker, style and dialect.

The standard spelling suggests that all six plosives may appear in word-internal codas, even if with low frequency, e.g. *apto* ‘competent’, *obtener* ‘obtain_{INF}’, *étnico* ‘ethnic’, *admirar* ‘admire_{INF}’, *acto* ‘act’, *signo* ‘sign’. However, the contrast in voice tends to be neutralized, so that, e.g. *apto* and hypothetical *abto* could not be a reliably distinguished minimal pair (Alonso 1945). In addition, contrasts in place may also be neutralized in several dialect-specific ways, including the realization of all coda plosives as velar in Caribbean varieties (e.g. *obtener* [okteˈner]) and the pronunciation of orthographic coda <c> as [θ] (e.g. *dictado* [diθˈtaðo] ‘dictation’) in north-western Castilian areas (Hualde 2005, 146).

4.2 Voiceless fricatives and affricates

Unlike most other Romance languages, Spanish does not have a phonological contrast between voiced and voiceless fricatives. This does not represent a conservative trait from Latin, since the voice contrast was found in Old Spanish (as it still is in Judeo-Spanish, ↗25 Judeo-Spanish).

All present-day Spanish dialects have three voiceless fricative phonemes: a labiodental /f/, an alveolar /s/ and a velar /x/ (which may also be uvular [χ] or glottal [h]). In addition, most speakers from Spain have an interdental /θ/ in words where the standard spelling has <z> or <c(e,i)> (e.g. *caza* /ˈkaθa/ ‘hunt’, *cerca* /ˈθerka/ ‘near’), and in Buenos Aires Spanish a postalveolar phoneme /ʃ/ has recently developed from earlier /ʒ/, still used by some speakers, in words where the spelling has <y> or <ll> (e.g. *mayo* /ˈmajo/ > /ˈmaʒo/ > /ˈmaʃo/ ‘May’, *calle* /ˈkaʎe/ > /ˈkaʒe/ > /ˈkaʃe/ > /ˈkafe/ ‘street’).

Traditionally, the pronunciation of /s/ has been a major focus of Spanish dialectology. In most Spanish dialects, syllable-final /s/ may be weakened to [h] or deleted,

but the intensity of the phenomenon varies. The most extreme weakening is found in the Caribbean, Canary Islands, Chile and southern Spain. As mentioned in 2.1, in eastern Andalusia and Murcia, but apparently only in this area, the loss of /s/ is compensated by the opening of mid vowels and the raising and fronting of the low vowel, as in, e.g., *pino* ['pino] 'pine' vs. *pinos* ['pino] 'pine_{PL}', *niña* ['niɲa] 'girl' vs. *niñas* ['niɲæ] 'girl_{PL}' (cf. Henriksen 2017 for a recent experimental study including both production and perception). On the other hand, the most conservative regions in this respect, with the highest indices of [s] retention are central Mexico, Guatemala, the Central Valley of Costa Rica, the Andean region of Peru and Bolivia, and northern Spain.

Before a voiced consonant, /s/ may be fully or partially voiced, *mismo* ['mizmo] 'same', *desde* ['dezðe] 'from'. A feature that distinguishes Ecuadorian Spanish is the systematic voicing of word-final /s/ before a vowel, e.g. *lo*[z] *Andes* 'the Andes' (Lipski 1989; Chappell 2011). A phenomenon that has started to receive scholarly attention more recently is the optional voicing of /s/ in intervocalic position, both word-internally (e.g. *paso* ['pazo] 'step') and across word boundaries (e.g. *más abajo* ['mazaβaxo] 'farther down') in several regions (Torreira/Ernestus 2012; Hualde/Prieto 2014).

Besides aspiration, two other traditional concerns of Spanish dialectology related to the phoneme /s/ are its phonological contrast with interdental /θ/ and its realization as apico-alveolar, lamino-alveolar or lamino-dental. In northern and central Spain, where it contrasts with /θ/, apico-alveolar realizations of /s/ tend or until very recently tended to predominate. In southern Spain and Latin America (with the exception of a small area of Colombia), on the other hand, /s/ is mostly lamino-alveolar. Another possible realization of /s/ is as lamino-dental. The phenomenon is traditionally known as *ceceo* in Spanish dialectology, since this realization is acoustically more similar to that of /θ/. In Spanish dialectology *ceceo* is opposed to the contrast (Sp. *distinción*) between /s/ and /θ/, and to *seseo* (only /s/). Whereas *ceceo* is or was found in a large area in southern Spain (see Ruiz Sánchez 2017, for a recent study), in Latin America it is an uncommon pronunciation, found mostly in rural areas of northern Central America (Lipski 1994, 254, 272, 280).

Spanish has a single affricated phoneme /tʃ/, written <ch>. This consonant is found only in prevocalic position, e.g. *charco* 'puddle', *bache* 'pothole'. Its weakening to [ʃ], systematically or variably, has been documented in several areas, including the southernmost region of Andalusia, northern Mexico, Panama and Chile. There is also variation in its place of articulation. Whereas the most common realization is postalveolar (prepalatal), a more retracted articulation [c] (known as 'ch *adherente*' in Spanish dialectology) is found in the Canary islands, and a fronted articulation [ts] is found variably in Chile and, in a very recent development, in some northern areas of the Iberian Peninsula, perhaps as a gender-related sociolinguistic variable (cf. Ciriza 2009, 115).

4.3 The palatal consonant /j/

One of the most controversial issues in Spanish phonology is that of the status of the consonant orthographically represented as <y> (e.g. *yeso* ‘gypsum’, *mayo* ‘May’), and in most varieties also as <ll> (e.g. *llave* ‘key’, *valle* ‘valley’) as well as word-initial prevocalic <hi-> and intervocalic <-i-> (e.g. *hielo* ‘ice’, *paranoia* ‘paranoia’). This consonant shows a wide range of pronunciations both across dialects and within a single dialect, including weak approximant or glide [j], constricted voiced approximant [j̞], (affricated) voiced plosive [j̟] and postalveolar fricative, voiced [ʒ] and voiceless [ç]. We will use [j̞] as a cover symbol since it perhaps reflects the most common pronunciation across dialects.

Whereas the seemingly most straightforward analysis would give phonological status to this consonant (i.e. for the examples in the paragraph above: /jeso/, /majo/, /jabe/, /baje/, /jelo/, /para'noja/) doubts arise for this phonemization because [j̞] alternates with allophones of the vowel /i/ in a phonologically predictable manner, as in, e.g. *saliendo* [sa'liendo] ‘go out_{PRS.PTCP}’ (cf. *salir*_{INF}) vs. *yendo* [j̞endo] ‘go_{PRS.PTCP}’ (ir_{INF}) and [kre'jendo] ‘believe_{PRS.PTCP}’ (*creer*_{INF}), so that [j̞] and [i] are for the most part in complementary distribution.

In one possible analysis (cf. Hualde 1997 and references therein), there is no phoneme /j̞/, but, rather, the vowel /i/ has a non-syllabic glide allophone [j̞] in the contexts specified in 3.2 and more constricted realizations [j̟] when it is syllable initial in the contexts #iV and ViV:

Syllabic and non-syllabic realizations of /i/ (analysis without phonemic /j̞/)

- (a) Not adjacent to another vowel
[i] *pino* /'pino/ [pi.no] ‘pine’, *miró* /mi'ro/ [mi.ro] ‘look_{3SG.PRET}’
- (b) Adjacent to another vowel and stressed
[i] *vía* /'bia/ [bi.a] ‘track’, *bahía* /ba'ia/ [ba'i.a] ‘bay’
- (c) Unstressed in CiV, Vi
[i] *viaje* /'biaxe/ [bi.a.xe] ‘trip’, *baile* /'baile/ [bai.le] ‘dance’
(exceptional hiatus: [i] *liana* /li'ana/ [li'a.na])
- (d) Unstressed in #iV, ViV
[j̞] *yoga* /'ioga/ [jo.ɣa] ‘yoga’¹, *mayo* /'maio/ [ma.jo] ‘May’, *vaya* /'baia/ [ba.ja] ‘go’
(exceptional hiatus: [i] *hiato* /i'ato/ [i'a.to] ‘hiatus’)
- (e) Exceptional syllabification in C.iV
[j̞] *cónyuge* /'kon.iuxe/ [kon̩.ju.xe] ‘spouse’

¹ In *yoga* the vowel /o/ is the phonologically stressed element, not the initial /i/, which becomes a consonant as it does not receive the stress on itself in this context, although the initial syllable is stressed. The lack of clarity introduced by the IPA convention of marking the stress at the beginning of the syllable in sequences like /io/ without a preceding consonant is the reason why in Hualde (2005) stress is indicated directly on the stressed vowel instead.

As noted in (c) and (d) above, this analysis has lexical exceptions in varieties with exceptional hiatus sequences. The exceptions in (c) are independent of whether or not /j/ is given phonemic status. In addition, in a phonological analysis where [j] is a conditioned allophone of /i/, the word *cónyuge* and others with more-or-less transparent prefixes (*adyacente* ‘adjacent’, *inyección* ‘injection’, *deshielo* ‘thaw’) require a syllabification with a syllable boundary before /i/ in C.iV.

The consonant represented as [j] has a wide range of realizations. In particular, in many varieties (including e.g. Mexico City and Madrid) it may be variably produced as an affricated plosive [j] phrase-initially (*yeso* [ˈjeso] ~ [ˈjeso]) and after a consonant.

This analysis does not easily extend to varieties such as Buenos Aires Spanish where the historical evolution of [j] has produced a strident postalveolar fricative [ʒ] or [ʃ], which is acoustically very different from a palatal glide. In Buenos Aires Spanish, in fact, an orthographically-induced phonemic split has taken place, and words with orthographic <i> are pronounced differently from those with <y> or <ll> in the spelling, e.g. *hielo* [ˈjelo] ‘ice’ vs. *yeso* [ˈjeso] ‘gypsum’, *lleno* [ˈfeno] ‘full_{M.SG}’; *paranoia* [paraˈnoja] vs. *tramoya* [traˈmoja] ‘stage’, *cebolla* [seˈβoja] ‘onion’ (cf. Colantoni 2013).

4.4 Liquids

The class of liquids includes the rhotic and lateral consonants. Spanish has a contrast between a rhotic tap /r/ and a trill /r/ limited to the intervocalic position. In word-internal intervocalic position (including the context between vowel and glide) the contrast is robust and there is a sizable number of minimal pairs, e.g. *varios barrios* /ˈbarios ˈbarios/ [ˈbarjos̺βarjos̺] ‘several neighborhoods’. An intervocalic context can also be found at word boundaries, but here there is no phonological contrast, because word-initial rhotics are always trills and word-final rhotics are produced as taps when they resyllabify with a following vowel in the next word; e.g. *ve rocas* [beˈrokas] ‘see_{3SG} rock_{PL}’ vs. *ver ocas* [beˈrokas] ‘see_{INF} goose_{PL}’. In other positions (i.e. after or before a consonant and before pause, e.g. *árbol* ‘tree’, *broma* ‘joke’, *ver bruma* ‘see_{INF} fog’, *ver* ‘see_{INF}’) the contrast is neutralized, with a preference for the tap in most varieties. For the phonological analysis of the Spanish rhotics both possible logical positions have been defended. In one view, there are two rhotic phonemes, and several rules of neutralization account for the lack of contrast between them in all positions except the word-internal intervocalic context. In the other view there is a single phoneme and an underlying geminate or some other abstract device is proposed to account for the surface contrast between tap and trill in the position where it is found (cf. e.g. Hualde 2004 for discussion).

The standard or canonical realization of both rhotics is as voiced apico-alveolar consonants, the tap being produced with a single contact and the rhotic with two or more. Nevertheless realizations without full occlusion are common. Preaspirated realizations of the trill have been described for Caribbean dialects (cf. Willis 2007).

Dorso-uvular realizations of the trill have become a sociolinguistic marker in Puerto Rican Spanish, although they are also found elsewhere as an idiolectal feature. In Costa Rican Spanish, a retroflex approximant realization acoustically very similar to English /r/ is variably found.

Regarding the laterals, Spanish used to have two lateral phonemes in its inventory, alveolar /l/, written <l>, and palatal /ʎ/, written <ll>. The contrast is only found syllable-initially. There are some morphophonological alternations like *aquel* ‘that_M’, *aquella* ‘that_F’ showing depalatalization in the coda.

As explained before, however, the palatal lateral has merged with /j/ (or consonantal /i/, depending on the analysis), almost everywhere, both in Spain and Latin America, although the contrast is still preserved in some areas, including Paraguay, the Andean region and isolated rural points in Spain.

Even though *yeísmo* is a relatively old phenomenon, its almost complete generalization has taken place only within the last century or so, both in Spain and in South America. In classical studies of Standard Peninsular Spanish pronunciation, such as Navarro Tomás (1918/1977), Alarcos Llorach (1965) and Quilis (1993), the consonant /ʎ/ is included in the phonemic inventory (also in Martínez Celdrán/Fernández Planas/Carrera Sabaté (2003), in spite of the fact that now very few speakers in Spain have a non-*yeísta* pronunciation).

Unlike in Portuguese and Catalan, Spanish /l/ is pronounced without dorsal retraction, both in the onset and in the coda (cf. Proctor 2011). An important dialectal phenomenon, which we have already mentioned, is liquid neutralization in the syllable coda. In addition, at least in Puerto Rican Spanish, there is an allophone of /r/ in coda position that to speakers from other varieties sounds like a realization of /l/, although native Puerto Rican speakers perceive it as clearly different from the lateral (Simonet/Rohena-Madrado/Paz 2008).

4.5 Nasals

Most Spanish varieties have three nasal phonemes: labial /m/, alveolar /n/ and palatal /ɲ/ <ñ>. A tendency to depalatalize the palatal nasal causing neutralization with /ni/ before a vowel in the same syllable has been noted in different regions, most notably in Buenos Aires and other parts of Argentina, so that for instance, pairs that are phonologically distinguished elsewhere such as *Begoña* (proper name) and *begonia* ‘begonia (flower)’ or *huraño* ‘antisocial’ and *uranio* ‘uranium’ do not contrast in these varieties and the spelling of words containing the letters <ñ> and <niV> has become problematic for children (Bongiovanni 2015a; 2015b). In most Spanish varieties, however, the palatal nasal /ɲ/ contrasts with alveolar /n/ followed by a palatal glide (e.g. *alimaña* ‘vermin’, *peña* ‘rock’, *otoño* ‘autumn’ vs. *Alemania* ‘Germany’, *venia* ‘consent’, *antimonio* ‘antimony’ (cf. Shosted/Hualde 2010 for Puerto Rican Spanish).

The three-way contrast among nasal phonemes only obtains syllable-initially. It is robust in intervocalic position, where it is possible to find minimal triplets (e.g. *cama* ‘bed’, *cana* ‘gray hair’, *caña* ‘rod, reed’). Word-initially, the contrast is also found, but there are very few words starting with /ɲ/, including only a handful of borrowings such as *ñandú* ‘South American ostrich’ and *ñu* ‘gnu’, and dialectal forms like *ñudo* ‘knot’ (for standard *nudo*). After a consonant, the palatal /ɲ/ is not found within word domains. There is, for instance, *arma* ‘weapon’, *palma* ‘palm’, *mismo* ‘same’, *carne* ‘meat’, *vulnerar* ‘to harm’, *asno* ‘donkey’, but there are no words with *<rn>, *<ln>, *<sn>.

Word-internal nasals in the coda of the syllable always assimilate in place to a following non-nasal consonant. There are, for instance, no sequences like */ms/ in native words and, in the colloquial pronunciation of loanwords with such sequences, there is a tendency to assimilate or delete the nasal, e.g. *hámster* [ˈxa(n)ster] ‘hamster’. Notice also the existence of alternations as in *presumir* ‘show_{INF} off; presume’ vs. *presuntuoso* ‘presumptuous’. The sequence /mn/ is, however, allowed, e.g. *alumno* ‘student’, *columna* ‘column’, *himno* ‘hymn, anthem’.

Word-finally, there are no contrasts in the place articulation of nasals. The only word-final nasal is /n/, if we leave aside a few words of variable pronunciation ending in orthographic <-m>, such as *álbum* and *referéndum* (cf. the biblical names *Adán* ‘Adam’, *Belén* ‘Bethlehem’, *Jerusalén* ‘Jerusalem’ and also *Ámsterdam* [ˈa(n)sterðan] ~ [-ŋ]). As for */-ɲ/, it has been noted that morpheme-final but word-medial /ɲ/ in words like *desdeñar* ‘disdain_{INF}’, *doña* ‘Mrs.’ alternates with /n/ in word-final position, as in *desdén* ‘disdain’, *don* ‘Mr.’ (Alonso 1945). Also, French *champagne* has been adapted as either *champán* or *champaña* (**champáñ* would be impossible).

Word-final nasals assimilate in place to following consonants (e.g. u[n] *animal* ‘an animal’, u[m] *perro* ‘a dog’, u[ŋ] *gato* ‘a cat’). The same assimilation rule can be observed across prefix boundaries (e.g. i[n] *adecuado* ‘inadequate’, i[m] *posible* ‘impossible’, i[ŋ] *grato* ‘ingrate, ungrateful’).

Before pause, word-final /-n/ is realized as alveolar [n] or velar [ŋ] depending on the dialect (or, in a few areas [m], as mentioned in 2.2 above). Velarization of nasals is found in western and southern Spain, the Canary Islands, the Caribbean and the Pacific coast of South America. Word-finally but before a vowel, /-n/ has an alveolar realization in some velarizing dialects, e.g. *es pa[n]* ‘it is bread’ vs. *el pa[n]* *es* ‘the bread is’ (Martínez García 2014), but some other velarizing dialects may keep velar [ŋ] in this context, so that *pa[n]es* ‘loaves of bread’ contrasts with *pa[ŋ] es* ‘bread is’, and *enojos* ‘anger_{PL}’ vs. *en ojos* ‘in eye_{PL}’ is also a minimal pair. This issue still requires experimental confirmation. Notice that in word-internal position, plural *panes* [ˈpanes], with an alveolar nasal, is found in both non-velarizing and velarizing dialects.

5 Syllable structure

5.1 Possible syllables

A syllable onset group may contain one or two phonemes. All consonant phonemes can appear as a syllable onset, except that the rhotic tap /r/ is excluded from word-initial position (e.g. *cara* /'ka.ra/ 'face' but */rata/, cf. *rata* /'ra.ta/ 'rat'). In addition, in one phonemic analysis, /i/ and /u/ may also constitute syllable onsets (undergoing consonantization in this position); e.g. *hielo* /'ielo/ [ʎe.lo] ~ [je.lo] 'ice', *hueso* /'ueso/ [we.so] ~ [gue.so] 'bone'.

Onset clusters consist of a plosive or /f/ and a liquid, with the exception of */dl/, which cannot form an onset cluster. Depending on the dialect /tl/ may be heterosyllabic or tautosyllabic. In Madrid Spanish, this group, which is only found word internally, is heterosyllabic, e.g. *atleta* [at'le.ta] 'athlete'. In Latin American Spanish, on the other hand, it is tautosyllabic, [a'tle.ta]. This appears to be the preferred syllabification in all Latin American varieties, as well as in western areas of the Iberian Peninsula. Mexican Spanish has, in addition, borrowed a sizeable number of words from Nahuatl with word-initial /tl/, e.g. *tlapalería* [tla.pa.le'ri.a] 'hardware store'.

Spanish does not allow syllable-initial sC clusters, which in word-initial position are systematically repaired in loanwords by vowel epenthesis, e.g. *estrés* 'stress'. Other word-initial clusters found in technical words are repaired by deletion of the initial consonant, a fact that is sometimes reflected in the standard spelling e.g. *neumático* 'car tire' (< Gr. PNEUMA), *psicología* ~ *sicología* 'psychology', *mnemónico* ~ *nemónico* 'mnemonic' and other times is not, e.g. *pterodáctilo* /tero'daktilo/ 'pterodactyl'.

The syllable nucleus may contain a vowel, a rising diphthong, a falling diphthong or a triphthong, e.g. *palo* [pa.lo] 'stick', *cuarto* [kʷar.to] 'room', *jaula* [xau.la] 'cage', *limpiáis* [lim'pjajs] 'clean_{2PL}'. Rising diphthongs may follow onset clusters, e.g. *prueba* [pɾue.βa] 'test', *pliegue* [plje.ɣe] 'fold_{1/3SG.SBJV}'. There are no syllabic consonants in Spanish.

Only a few consonants are frequent in syllable codas: /d/ *sed* 'thirst', /s/ *tos* 'cough' (/θ/ *coz* 'kick'), /n/ *pan* 'bread', /l/ *col* 'cabbage', /r/ *mar* 'sea'. Other consonants may occur in technical words and borrowings (see above for coda plosives). Coda clusters of two consonants are rare. The most common one is /ns/, found in words with the prefix *trans-*, e.g. *transporte* 'transportation'. A word-internal coda cluster /rs/ is only found in a couple of words, *perspectiva* [pers.pek'ti.βa] 'perspective', *perspicaz* [pers.pi'kas]. Word-finally, other clusters, always with /-s/ (or /θ/) as a second member, are found in a few borrowings and proper names, e.g. *vals* 'waltz'. In Mexican Spanish /tl/ may be word-final, e.g. *Popocatépetl* [po.po.ka'te.petl] (which in Iberian Spanish, where the cluster is not allowed, is usually pronounced [po.po.ka.te'pel]; notice also the shift of the stress).

5.2 Syllabification rules

In Spanish, a consonant is always syllabified with a following vowel in the same word. That is, VCV sequences are always syllabified as V.CV regardless of morphological structure, e.g. *desaloja* → [de.sa'lo.xa] 'eject_{3SG}'. This rule also applies across word-boundaries, if a pause is not inserted, e.g. *dan otras alas* → [da'no.tra'sa.las] 'they give other wings'. However, it has been noted that dialectal phenomena such as nasal velarization and fricative aspiration may apply to consonants in this context in some varieties. Even in the absence of such phonological processes, it appears that some word-final consonants before a vowel in the next word (e.g. Vs#V) are shorter or weaker than word-internal intervocalic consonants or word-initial consonants after pause (Hualde/Prieto 2014; Strycharczuk/Kohlberger 2016). These facts and experimental results can be interpreted as partial resyllabification or ambisyllability of word-final consonants.

Sequences of the type VCCV allow two possible syllabification patterns, depending on the CC cluster and also on morphology. In most morphological contexts, syllabification is V.CCV if the cluster is one of those that are allowable at the beginning of a word; i.e. a plosive or /f/ + liquid, except for /dl/ (and in some varieties /tl/); e.g. *otra* → ['o.tra] 'other_{F.SG}', *sopla* → ['so.pla] 'blow_{3SG}', *cofre* → ['ko.fre] 'box, chest'. Other clusters are heterosyllabic, e.g. *arte* → ['ar.te] 'art', *selva* → ['sel.βa] 'forest'. Otherwise allowable onset clusters are also heterosyllabic across word boundaries and also with productive prefixes, e.g. *sublingual* → [suβ.lin.'gual]. That is, whereas in C#V sequences typically there is resyllabification of the word-final consonant, there is no resyllabification in C#CV. This lack of resyllabification also applies to contexts where the second word starts with a non-syllabic allophone of /i u/; e.g. *las hierbas* /las 'ierbas/ [laɰ'jér.βas] 'the grasses', not *[la'sjier.βas], *con hueso* /kon 'ueso/ [kon'güe.so] 'with bone', not *[ko'nüe.so], cf. *con husos* /kon 'usos/ [ko'nu.sos] 'with spindles'.

6 Stress

6.1 Stress assignment rules

The most important generalization regarding Spanish stress is that stress must fall on one of the last three syllables of the word (verbs bearing enclitic pronouns are an apparent exception; e.g. *cantándomelo* 'singing it to me'). Other generalizations require making reference to word class and morphological structure.

- (a) **Nouns and adjectives.** The vast majority of all nouns and adjectives in their singular form are stressed on the final syllable if they end in a consonant (*universidad* 'university', *azul* 'blue'), and on the penultimate syllable if they end in a vowel (*estudiante* 'student', *amarillo* 'yellow'). In the marked case, stress is retracted one syllable with respect to the unmarked patterns; that is, we may find penultimate

stress in consonant-final words (*difícil* ‘difficult’) and antepenultimate stress in vowel-final words (*púrpura* ‘purple’). The other two patterns allowed by the three-syllable restriction are very weakly instantiated in the lexicon. Only a handful of consonant-final words have antepenultimate stress (*régimen* ‘regime; diet’, *déficit*) and there is a somewhat larger group of vowel-final words with final stress (*colibrí* ‘humming bird’). Generally, plural inflection does not affect the position of stress (e.g. *azul*, *azules* ‘blue_{SG/PL}’; *fácil*, *fáciles* ‘easy_{SG/PL}’). There is only one unmotivated exception with stress shift in the plural: *carácter*, *caracteres* ‘character_{SG/PL}’. The very few consonant-final nouns with antepenultimate stress all have irregular plurals, sometimes involving stress shift (e.g. *régimen*, *regímenes* ‘regime_{SG/PL}’).

There are two types of compounds regarding stress. Some preserve the stress of each member (e.g. *perro lobo* ‘wolf-dog’) and others keep only the stress of the last member (e.g. *lavaplatos* ‘dishwasher’, *limpiaparabrisas* ‘windshield wiper’).

- (b) **Verbs.** In verbal forms, we find different stress rules depending on the tense. In the present indicative and subjunctive the stress falls on the last syllable of the root, except in the forms for *nosotros* ‘we_{1PL}’, *vosotros* ‘you_{2PL} (Spain)’ and *vos* ‘you_{2SG} (Argentina and some other Latin American countries)’ where it falls on the following syllable, e.g. *yo edifico* ‘I build_{1SG}’, *tú edificas* ‘you build_{2SG}’ vs. *nosotros edificamos* ‘we build_{1PL}’, *vosotros edificáis* ‘you build_{2PL} (Spain)’ and *vos edificáis* ‘you build_{2SG} (Argentina)’.

All verbs have exactly the same accentual pattern in the present, with the only exception of the verb *estar* ‘be, stay_{INF}’, which has stress on the ending in all forms, e.g. *yo estoy* ‘be_{1SG}’, *tú estás* ‘be_{2SG}’ (due to the historically epenthetic nature of its initial vowel). In particular, antepenultimate stress is not allowed, which requires stress shift in verbs derived from nouns and adjectives (e.g. *fábrica* ‘factory’ → *fabrico* ‘manufacture_{1SG}’).

A complication is found in verbs with stems ending in a high vowel. These verbs may either have a diphthong or a hiatus, in a lexically determined manner, giving rise to a contrast in the position of the stress between two sets of verbs; e.g. *cambiar* ‘change_{INF}’, *cambio* ‘change_{1SG}’; *envidiar* ‘envy_{INF}’, *envidio* ‘envy_{1SG}’, *menguar* ‘diminish_{INF}’, *menguo* ‘diminish_{1SG}’ vs. *enviar* ‘send_{INF}’, *envío* ‘send_{1SG}’, *desafiar* ‘defy_{INF}’, *desafío* ‘defy_{1SG}’, *actuar* ‘act_{INF}’, *actúo* ‘act_{1SG}’.

In all other tenses, there is morphologically-conditioned stress, where a specific morpheme attracts the stress. In the future and conditional paradigms, stress falls on the syllable containing the tense marker *-r-*, whether it is the final syllable (e.g. *edificaré* ‘build_{1SG.FUT}’), the penultimate (*edificaremos* ‘build_{1PL.FUT}’, *edificarías* ‘build_{2SG.COND}’) or the antepenultimate (*edificaríamos* ‘build_{1PL.COND}’). In the past tenses, stress is also morphologically determined, but the syllable that receives the stress is the one immediately after the root, (containing the theme vowel or a portmanteau suffix), e.g. *edificábamos* /edifi'k-a-ba-mos/ ‘build_{1PL.IMPF}’, *edificáramos* ‘build_{1PL.IMPF.SUBJ}’, *edifiqué* /edifi'k-e/ ‘build_{1SG.PRET}’. Infinitives are stressed on the final syllable.

- (c) As for **adverbs**, they follow the same patterns as nouns and adjectives (but some very common vowel-final adverbs have final stress: *aquí* ‘here’, *así* ‘thus’). Manner adverbs in *-mente* are compounds with two accents: *rápidamente* ‘quickly’, *honestamente* ‘honestly’, *infelizmente* ‘unfortunately’.
- (d) Finally, **function words**, including determiners, conjunctions and prepositions may be either stressed or unstressed in a not totally predictable manner. For instance, the phrase *nuestro libro* ‘our book’ has a single stress because possessives are lexically unstressed, but the phrase *estos libros* ‘these books’ has two stresses, since demonstratives have lexical stress. To give another example, the causal conjunction *puesto que* ‘given that’ is unstressed (e.g. *puesto que lo sabes* ‘since you know it’), but the nearly synonymous expression *dado que* has stress (*dado que lo sabes*).

Some function words are stressed or unstressed depending on their grammatical function (and this is reflected in the standard spelling), e.g. *como/cómo* ‘how’ is unstressed in *lo haré como me digas* ‘I will do it the way you tell me’, where it functions as an adverbial subordinating conjunction, but stressed in *no sé cómo quieres que lo haga* ‘I do not know how you want me to do it’, where it introduces an indirect question.

6.2 Rhetorical stress

In Spanish, there is no secondary lexical stress. Nevertheless, sometimes a syllable other than the one with lexical stress may receive prominence. This phenomenon has the status of a rhetorical device, which may reach very high frequency in public speech, where an audience is being addressed. Rhetorical stress may be placed either on the initial syllable (e.g. *solidaridad*) or two syllables before the lexical stress (e.g. *solidaridad*). With less frequency, in highly emphatic speech, we may find alternating stresses (e.g. *solidaridad*) (Hualde/Nadeu 2014).

6.3 Acoustic correlates of stress

In citation form, the stressed syllable of the word anchors a pitch accent and is highlighted by higher pitch, greater duration and greater intensity. Pitch accents are, however, not lexical features but, rather, utterance-level intonational elements. In other contexts, a given word may not carry a pitch accent. In addition, as mentioned, in rhetorical style pitch accents may be linked to a lexically unstressed syllable. In the absence of pitch prominence, durational enhancement may still allow for the identification of the stressed syllable of the word. In the example in Figure 24.1, for instance, the word *posteriores* ‘subsequent_{PL}’ has been produced in rhetorical style with a high pitch accent on its initial syllable. The syllable with lexical stress is, however, the penultimate, whose vowel is lengthened.

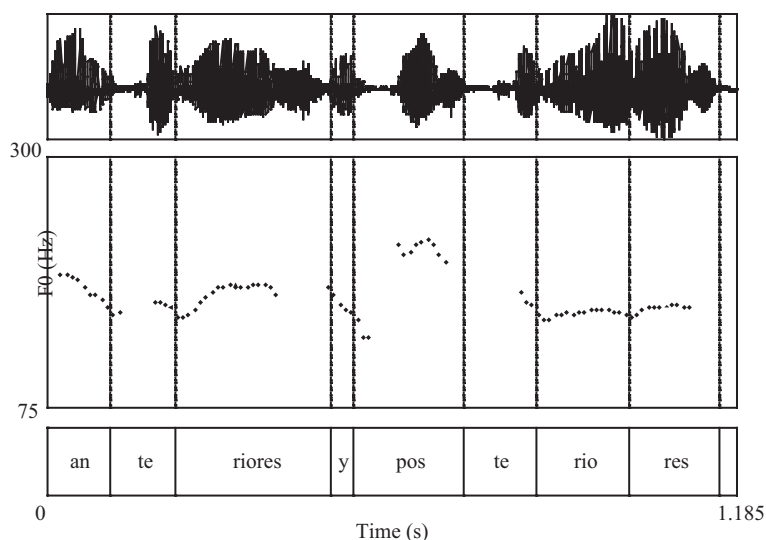


Figure 24.1: F0 contour and waveform of the example *anteriores y posteriores* ‘previous and subsequent’, produced with word-initial rhetorical accent on *posteriores*. Example taken from the radio news subcorpus of the *Glissando* corpus of Castilian Spanish (Garrido et al. 2013).

In words in phrase-final position the lengthening of the stressed syllable serves as a strong stress correlate, even in the absence of any significant pitch event associated with this syllable, as is often the case in neutral declarative sentences (Hualde/Prieto 2015). On the other hand, in phrase-medial contexts where the word is not given a pitch accent, the identification of the stressed syllable can be difficult, creating some ambiguity in the discrimination of minimal pairs. Thus, for instance, the sentences *¿Cómo corto el papel?* ‘How should I cut the paper?’ and *¿Cómo cortó el papel?* ‘How did s/he cut the paper?’ can be difficult to distinguish if pronounced without any internal pauses (Torreira/Simonet/Hualde 2014).

7 Intonation

7.1 Intonation and word order in the expression of discourse prominence

Intonation involves the systematic modulation of pitch, intensity and duration for pragmatic purposes. In a widespread view, two types of intonational elements are distinguished in the analysis of intonational contours: events that give prominence to certain words (accents) and events that indicate phrasing (boundary tones) (↗8 Comparing and deconstructing speech rhythm across Romance languages; ↗9 Intona-

tion). In Spanish, like in other Romance languages, the role of (pitch) accents to express phrasal prominence is very limited compared to English and other Germanic languages. As Bolinger (1954) noted, contrasts in information status that are conveyed in English by shifting the position of the main or nuclear accent of the phrase may be expressed in Spanish by changes in word order (e.g. *llegó el TREN* ‘the TRAIN arrived’ vs. *el tren lleGÓ* ‘the train arRIVED’).

Although it is possible to indicate contrastive focus on a non-final word by giving it prosodic prominence (e.g. *No, maRÍA trajo el libro, no tu hermano* ‘No, MArY brought the book, not your brother’), it is more common to place more important information at the end of the phrase (e.g. *No, el libro, lo trajo maRÍA*) (cf. Dufter/Gabriel 2016 for a recent overview).

7.2 Phrasing

In general, Spanish does not deaccent given information at the end of the phrase, so that learning the phrase-final deaccentuation rules of Germanic languages is a serious challenge for Spanish speakers (Zubizarreta/Nava 2011; van Maastricht/Krahmer/Swerts 2015).

Intonational phrasing may be used to indicate syntactic structure. For instance, the phrase *una casa con dos puertas y cuatro ventanas amarillas* may refer to ‘a house with two doors and four yellow windows’ or to ‘a house with two yellow doors and four yellow windows’, depending on whether an intonational break is introduced after *puertas* or after *ventanas* (cf. Nibert 2000). However, there is no one-to-one relationship between intonational and syntactic phrasing, since intonational phrasing may also express information structure. The division of an utterance in intonational phrases expressing information structure does not always coincide with syntactic phrasal structure. In particular a division in the sentence between given and new information may be expressed by placing a high boundary at the end of the given information, e.g. *el libro* H- *lo trajo María* (*el libro* is given information); *el libro lo trajo* H- *María* (where *el libro lo trajo* is given information; it may be an answer to ‘Who brought the book?’).

The possible mismatches between syntactic and informational structure have been illustrated with examples involving lexical homonymy, such as *la vieja lanza la amenaza*, which may mean either (a) ‘the old (woman) throws the threat’ or (b) ‘the old spear threatens her’. With an intonational break after *vieja*, the only possible interpretation is (a); that is *la vieja* is a complete noun phrase ‘the old woman’ which also has the status of given information and *lanza* is the verb ‘throw_{3SG}’. With an intonational break after *lanza*, on the other hand, the sentence is ambiguous (if uttered in isolation): it can have meaning (b), where *la vieja lanza* is the noun phrase ‘the old

spear', but it can also have meaning (a), with *la vieja lanza* 'the old woman throws' having the status of given information (Prieto 1997; Hualde 2003).

7.3 Main intonational contours and dialectal variation

In the last two decades or so, a substantial body of research has been produced on the shape and phonological structure of intonational contours in Spanish. In the work reported in Prieto/Roseano (2010), a similar questionnaire was used with speakers from ten different areas of the Spanish-speaking world in order to elicit intonational contours under different pragmatic conditions. The results of this investigation are accessible online (Prieto/Roseano 2009–2013), together with data more recently collected from other regional varieties, and have been integrated within the *Interactive atlas of Romance intonation* (Prieto/Borràs-Comes/Roseano 2010–2014). In Hualde/Prieto (2015), some of the main generalizations arising from this and related work are presented. Another pan-Romanic project using a somewhat different methodology is AMPER (*Atlas multimèdia de la prosòdia de l'espai romànic*), whose results for Spain and Latin America are gathered in Martínez Celdrán et al. (2003–2020). Among the findings from all this collective research, we may mention a high frequency (in many varieties) of prenuclear rising accents with a displaced peak on the posttonic syllable (lack of displacement indicating greater emphasis), and a frequent realization of words in phrase-final, nuclear, position with a very reduced F0 peak or with a pitch fall that continues to the end of the phrase, so that the stressed syllable of the word that receives nuclear accent is highlighted only or primarily by duration in many instances.

In Jun's (2014) classification, Spanish is classified as a head-prominence language (since word-prominence is born by stressed syllables) with a strong macro-rhythm, defined as alternation between high- and low-pitched syllables (since intonational phrases tend to have a relatively high density of pitch-accents and rising accents with a protracted peak are common). In Torreira/Grice (2018), Spanish intonation is reanalyzed in terms of melodic constructions, and the distinction between pitch accents and boundary tones is argued to be secondary.

Many Spanish varieties possess characteristic prosodic contours, readily identifiable to speakers of other dialects as different from their own. Some of these dialect-specific contours have also been described in recent work, including the Buenos Aires "long fall" (Kaisse 2001; Colantoni/Gurlekian 2004; Gabriel et al. 2010), the characteristic lengthening of the pretonic syllable in the speech of Córdoba, Argentina, known as "tonada cordobesa" (Lang-Rigal 2014; 2015; Lenardón 2017), the falling interrogative contours of Caribbean Spanish (Armstrong/Prieto 2015) and the nuclear circumflex accent of Mexico City Spanish (Martín Butragueño 2004), to mention but a few.

8 Main morphophonological alternations

8.1 Alternations involving vowels

The most important morphophonological alternation in Spanish involving vowel phonemes was mentioned in 3.1: It is the alternation between mid vowels and the diphthongs /ie ue/ in related words, e.g. *fiesta* ‘party’, *festivo* ‘festive’. In verb paradigms containing these diphthongs in the root, there is predictable monophthongization in unstressed syllables (with very few exceptions). In derivational morphology, on the other hand, there is less predictability, with different suffixes being more or less likely to trigger monophthongization (e.g. *diente* ‘tooth’, *dental*, with monophthongization, but *dientecito* ‘small tooth’ with preservation of the diphthong in an unstressed syllable, cf. Eddington 1996; Carlson/Gerfen 2011).

In a class of verbs (3rd conjugation) we find an alternation between high and mid root vowels. This alternation follows a dissimilatory pattern: the root has a high vowel /i/ or /u/ unless it is followed by a high monophthong /i/ in the next syllable; e.g. *pid-o* ‘ask_{1SG} for’, *pid-í-o* ‘ask_{3SG.PST} for’ (before a diphthong), but *ped-í* ‘ask_{1SG.PST} for’. Some 3rd conjugation verbs have a three-way phonologically-conditioned alternation /ie e i/ or /ue o u/; e.g. *siento* ‘feel_{1SG}’ (stressed), *sentí* ‘feel_{1SG.PST}’ (unstressed, before syllabic /i/), *sintió* ‘feel_{3SG.PST}’ (elsewhere).

There are almost no other alternations involving vowels that have any systematicity. The short high vowels of Latin regularly became mid vowels in Spanish (e.g. *pĭRA* > *pera* ‘pear’, *LŭPU(M)* > *lobo* ‘wolf’). We would thus expect to find alternations in cases where a basic word with one of these vowels that evolved regularly has been joined in its semantic family by derived learned words preserving the Latin vowels. In fact, the number of examples is very small. There is, for instance *pelo* ‘hair’, *piloso* ‘hairy’. In the specific context of stem-final /-en/ we do, however, find a regular pattern of alternation; e.g. *margen* ‘margin’, *marginal* ‘marginal’; *virgen* ‘virgin’, *virginal* ‘virginal’; *orden* ‘order’, *ordinal* ‘ordinal’; *examen* ‘examination’, *examinar* ‘examine_{INF}’ etc.

8.2 Alternations involving consonants

Like in other Romance languages, the palatalization of velars before front vowels in Late Latin has produced consonant alternations in stem-final position depending on whether the following vowel is back or front. In present-day Spanish, these alternations involve /g/ vs. /x/, e.g. *mago* /'mago/ ‘magician’, *magia* /'maxia/ ‘magic’ and /k/ vs. /s/ (Iberian Sp. /θ/), e.g. *opaco*, *opacidad*.

The regular Western Romance voicing of intervocalic consonants has created numerous alternations between directly transmitted words and related learned words; e.g. *vida* ‘life’, *vital* ‘vital’; *lago* ‘lake’, *lacustre* ‘lacustrine’; *saber* ‘know_{INF}’, *sapiencia* ‘knowledge’.

Another sound change that has resulted in alternations in semantically related words is the aspiration and loss of Lat. /f/; e.g. *hacer* ‘make_{INF}’, *manufacturar* ‘manufacture_{INF}’; *harina* ‘flour’, *farináceo* ‘flourlike’, cf. also *hogar* ‘fireplace’, but *fuego* ‘fire’, with preservation of /f/ before a labiovelar glide.

There are many other alternations with variable lexical incidence, both in verbal paradigms (e.g. *dig-o* ‘say_{1SG}’, *dic-es* ‘say_{2SG}’, *dij-e* ‘say_{1SG,PST}’) and between semantically related words (e.g. *ojo* ‘eye’, *oculista* ‘eye doctor’, *hijo* ‘son’, *filial* ‘filial’); cf. Pensado (1999) for a very complete presentation. The two morphophonological phenomena in Spanish that have attracted the greatest amount of attention are the alternation /-s, -es, -Ø/ in plural formation (e.g. *casa-s* ‘house_{SG/PL}’, *sol-es* ‘sun_{SG/PL}’, *lunes-Ø* ‘Monday_{SG/PL}’, cf. Colina 2009, 105–113 and references therein) and the alternation between the short and long forms of the diminutive suffixes (e.g. *roj-o* ‘red’, *roj-ito* ‘red_{DIM}’, vs. *verd-e* ‘green’, *verd-ecito* ‘green_{DIM}’ (cf. e.g. Colina 2009, 105–113 and 124–133 respectively for plural and diminutive formation, and references therein). Regarding diminutives, it should be noticed that there are important differences among geographical varieties regarding both the choice of allomorphs in some specific instances (e.g. *panecito* or *pancito* ‘bread_{DIM}’, *lechecita* or *lechita* ‘milk_{DIM}’) and the frequency with which diminutives are used.

To conclude, in this chapter we have examined the main facts of Spanish phonology, including segment inventory, syllable structure, prosodic features and morphophonological alternations. In every case, some of the main aspects of dialectal variation have been considered (without being exhaustive, given the great geographical extension of the Spanish language). As mentioned at the beginning of the chapter, the study of Spanish phonology and phonetics is an active field of research, with many empirical and theoretical papers presented at conferences and published in books and journals every year.

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Travis G. Bradley

25 Judeo-Spanish

Abstract: Judeo-Spanish refers to the varieties of Spanish spoken by the Sephardic Jews, who were expelled from Spain in 1492 and resettled around the Mediterranean, in North Africa and in areas of the Ottoman Empire. The language presents a mix of archaic features retained from medieval Ibero-Romance languages and innovative features arising from both internal change and contact with other languages. Despite its continued use for five centuries, Judeo-Spanish is at present severely endangered, which has prompted revitalization efforts and a renewed interest in the language from the perspectives of contemporary linguistic theory. This chapter presents a unified descriptive account of Judeo-Spanish phonology and phonetics. The account includes diachronic and synchronic comparisons across dialects and with other Ibero-Romance languages, as well as an examination of the phonological patterning of loanwords borrowed from co-territorial languages in the diaspora.

Keywords: Judeo-Spanish, Ladino, Judezmo, Haketia, Old Spanish

1 Introduction

Judeo-Spanish refers to the varieties of Spanish spoken by the descendants of the Sephardim, or Sephardic Jews, who were forced to leave Spain by the edict of expulsion of King Ferdinand and Queen Isabella in 1492. Those who eventually immigrated to North Africa, Turkey, Greece, and the Balkans retained many linguistic features from Old Spanish and other Ibero-Romance languages that they spoke before the expulsion. Judeo-Spanish also shows phonological innovations as the result of internal change and language contact, which has enriched the lexicon with loanwords and elements from various sources. These include the sacred languages of Judaism, i.e. Hebrew and Aramaic, as well as Arabic in North Africa and Israel, and French, Italian, and other co-territorial languages spoken in areas of the former Ottoman Empire, such as Turkish, Greek, Romanian, Serbian, and Bulgarian. While academics tend to use the label Judeo-Spanish, other common names for the language are Judezmo, Ladino, Spanyol, Djudyó/Djudjo/Djidió, and, in North Africa, Haketiya or Haketia. “Ladino” can also refer specifically to the calque language that was used to provide word-for-word translations of liturgical texts from Hebrew. According to Bunis (2011, 24–25, 34), the Jews of medieval Spain developed a Hebrew letter writing system called *letras djudías* ‘Jewish letters’ to transcribe their everyday language. This system formed the basis of the Rashi letter script, or *letras de Rashí*, developed by the Sephardim after the expulsion. Since the late 1920s, Judeo-Spanish has been mostly written in the Latin alphabet. In the inaugural issue of the Judeo-Spanish cultural magazine

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Aki Yerushalayim, Moshe Shaul (1979) proposed a standard romanized orthography, which is still used today in online publications and discussion groups.

The spoken Judeo-Spanish vernaculars that developed in the diaspora are commonly distinguished into two major groups, Western and Eastern. Western Judeo-Spanish denotes varieties spoken by the Sephardic Jews who migrated to Morocco. The influence of the Sephardim was strong in the large central cities of Rabat, Meknes, and Fes, where Judeo-Spanish survived for two centuries after 1492, but especially in and around the far northern cities of Tangiers, Tetuan, and Chaouen (cf. Heath 2002, 10–11). Contact with Peninsular Spanish beginning in the late 19th century soon led to dialect leveling, resulting in the present-day moribund status of Moroccan Judeo-Spanish.

Eastern Judeo-Spanish is spoken by descendants of Sephardic immigrants to the Ottoman Empire, where further geographical subdivisions can be established (for maps, cf. Quintana 2006, 358, 390):

- (a) northwestern: various localities throughout what is present-day Bosnia and Herzegovina (Banja Luka, Sarajevo, Travnik), Croatia (Dubrovnik, Split), North Macedonia (Bitola/Monastir), Serbia (Belgrade) and Greece (Kastoria)
- (b) northeastern: Romania (Bucharest, Craiova, Drobeta-Turnu Severin, Giurgiu, Ploiești), northwestern Bulgaria (Haskovo, Nikopol, Pleven, Plovdiv, Ruse, Shumen, Silistra, Sliven, Sofia, Vidin), Serbia (Niš), and Kosovo (Prishtina)
- (c) southeastern: Turkey (Ankara, Bursa, Çorlu, Dardanelles, Edirne/Adrianople, Gallipoli, Istanbul/Constantinople, Izmir, Mudanya, Tekirdağ), southeastern Bulgaria (Burgas, Dupnica, Karnobat, Kyustendil, Pazardzhik, Samokov, Varna, Yambol), Greece (Athens, Chios, Didymoteicho, Komotini, Rhodes, Serres, Thessaloniki/Salonika, Veria, Volos)
- (d) Israel (Jerusalem, Hebron)

The autonomy granted to the Sephardim living in the Ottoman territories favored the preservation of Judeo-Spanish for over four hundred years. Separated from the changes that would take place in Peninsular and Latin American Spanish, Judeo-Spanish developed independently into a pluricentric language, with linguistic innovations and norms propagating outward from several geographical centers of gravity, i.e. Salonika and Constantinople (Quintana 2010), as well as Sofia (Gabriel/Grünke 2018).

Transmission of the language to younger generations began to decrease by the mid-20th century, due to the rise of nationalism in the Balkans and to the end of the Ottoman Empire. Many Sephardim learned Turkish or French as their first language, while others emigrated to Israel and the U.S., where their children learned Hebrew or English. The Second World War and the ensuing Holocaust resulted in the death of many Sephardic Jews who had remained in the Balkans, although Bulgaria was an exception in this respect, since no deportations of Jewish citizens took place.

Finally, in a study of the Judeo-Spanish variety spoken by the Old *yīšuv* Sephardim, i.e. those who lived in *Eretz Yisrael* (Hebrew for ‘Land of Israel’) before

the establishment of the State of Israel, Bunis (1988) describes the language as a *koiné* which combines many of the features that are present in other Judeo-Spanish varieties spoken in the diaspora. One notable difference is that the Old *yišuv* Sephardim maintain the pharyngeal consonants /h/ and /ʕ/ from Hebrew, whereas more recent Sephardic immigrants from other former Ottoman regions realize these as /x/ and ʔ, respectively (cf. Section 2).

It is difficult to know the current total number of speakers worldwide, and estimates vary depending on how language proficiency is defined. The 22nd edition of the *Ethnologue. Languages of the World* puts the population of Judeo-Spanish speakers in Israel at 100,000 vs. 112,130 total users in all countries (Eberhard/Simons/Fennig 2019). Varon (2016) estimates that just over 100,000 can be said to have some knowledge of Judeo-Spanish, while the number of proficient speakers is much lower, in the 30,000–50,000 range. The emigration of 90% of the Jewish population of Bulgaria to Israel between 1946 and 1956 left only 2,500 Sephardic Jews, about 250–300 of whom are Bulgarian-dominant bilingual native speakers of Judezmo (Gabriel/Grünke 2018, 364). The Jewish community of present-day Thessaloniki is numbered at 1,000–1,500 persons; many of the elderly population are Greek-dominant bilinguals with varying degrees of proficiency in Judeo-Spanish, and there is little or no intergenerational transmission of the language (Christodouleas 2008, 18, 32–33). The Jewish community of Istanbul is estimated around 26,000 and is mostly Turkish-speaking, but the majority of members older than fifty are also fluent in Judeo-Spanish (Hualde/Saul 2011, 90).

Despite the language's preservation for over five hundred years, Judeo-Spanish has been in a state of general decline since the mid-20th century and is now classified as severely endangered (Moseley 2010). In the 21st century,

the thousands of Jews for whom Judezmo is still an important family language, one with which they strongly identify at the personal and group levels, have essentially lost the definable geographic space in which their language had once served as the primary Jewish communal tongue and in which their ancestors maintained their distinct Jewish lifestyle. Before the age of the Internet, Sephardim who wanted to communicate with others in Judezmo were limited to frameworks such as family interactions at home, occasional extended-family gatherings outside the home, meetings in community centers (e.g. homes for the aged and synagogues), correspondence with Sephardim at a greater distance by mail, and writing for and reading a small number of Judezmo periodicals, most of them published once in several months (Bunis 2016, 322–323).

The past two decades have seen a number of language revitalization and documentation efforts (cf. Romero 2015; Şarhon 2015). Founded in 1999 by Rachel Amado Bortnick, *Ladinokomunita* (Ladino Community) is an Internet forum for discussions written entirely in Judeo-Spanish using a standard romanized orthography, with over fourteen hundred members who reside in Israel, the United States, Turkey, Greece, France, Bulgaria, Spain, and thirty-five other countries (cf. Bunis 2016 for an analysis of members' discussions about the language, what they call it, how they perceive its relation to Mainstream Spanish, how they understand linguistic variation, and what

their future prognosis is for the language). As the 24th member of the Spanish Royal Academy's *Asociación de Academias de la Lengua Española*, the *Academia Nasionala del Ladino* was founded in 2018 with the goal of protecting and further promoting the language.

The remainder of this chapter gives a unified descriptive account of Judeo-Spanish phonology and phonetics, including diachronic and synchronic comparisons with Old Spanish, Mainstream Spanish, and other Ibero-Romance varieties. After an initial overview of the phoneme inventory, the remaining sections present a description of Judeo-Spanish consonantal and vocalic processes, followed by morphophonological alternations, and finally stress and intonation patterns. Particular attention is given to dialectal variation within Judeo-Spanish, including the phonological patterning of loanwords borrowed from co-territorial languages in the new diaspora countries.

2 Characterization of spoken Judeo-Spanish

There is a considerable body of descriptive and philological work documenting linguistic variation in modern Judeo-Spanish, including foundational fieldwork studies on the spoken vernaculars from the late-19th through the mid-20th centuries (cf. Agard 1950; Baruch 1930; Bénichou 1945; Benoliel 1926–1928/1977; Crews 1935; Crews/Vinay 1939; Kǎnčev 1974; 1975; Kovačec 1986; Kraus 1951; Lamouche 1907; Levy 1952; Luria 1930; Nehama 1977; Sala 1963; 1971; Subak 1906; Wagner 1914; 1930). Further data and descriptions can be found in the more recent literature (cf. Andreeva et al. 2017; 2019; Bunis 1985; 1988; 2003; 2008; 2011; 2016; Fischer/Gabriel/Kireva 2014; Gabriel/Grünke 2018; Gabriel/Kireva 2014; Hualde 2013; Hualde/Şaul 2011; Kirschen 2015; Minervini 2002; Penny 1992; 2000; Quintana 2001; 2006; 2014; 2015; Romero 2012; 2013; 2015; 2016; Schmid 2008; Varol Bornes 2008a; 2008b). The corpus of data and the descriptive generalizations presented in this chapter were assembled from the above studies (also on Moroccan Arabic, cf. Heath 2002; on Old Spanish and contemporary Spanish, cf. Holt 2004; Hualde 2014; Penny 2002; Torreblanca 1987), with examples standardized to the Latin alphabet and/or modern IPA as necessary. Another line of research, initiated by the present author over a decade ago, analyzes Judeo-Spanish phonology from the perspective of contemporary linguistic frameworks, such as Optimality Theory and Articulatory Phonology (cf. Bradley 2006; 2007a; 2007b; 2009; 2011; 2015; Bradley/Adams 2018; Bradley/Delforge 2006; Bradley/Smith 2011; for more extensive discussion and theoretical analyses of Judeo-Spanish phonology, cf. Bradley to appear). For a recent overview of sociolinguistic research on Judeo-Spanish, cf. Kirschen (2018).

Table 25.1 shows the consonant phonemes of Judeo-Spanish, organized by place and manner of articulation. Voiceless consonants appear to the left within each cell. Not all dialects possess the voiced labiodental fricative /v/ (cf. 3.1), the dental

affricates /t͡ʃ d͡ʒ/ (cf. 3.1), the alveolar rhotic trill /r/ (cf. 3.2), or the voiceless velar fricative /x/.

Table 25.1: Consonants in Judeo-Spanish.

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Velar
Plosive	p b		t d			k g
Affricate			t͡ʃ d͡ʒ		t͡ʃ d͡ʒ	
Fricative		f v	s z		ʃ ʒ	x
Nasal	m			n		
Lateral				l		
Rhotic				r r		

Table 25.2: Guttural consonants in loanwords from Semitic languages.

	Uvular	Pharyngeal	Glottal
Plosive	q		ʔ
Fricative	χ	ħ ʕ	h

In some dialects, words borrowed from the Semitic languages Hebrew, Aramaic, and Arabic have introduced guttural consonants, as summarized in Table 25.2. In the Old *yīšuv* Sephardim dialect of Israel, pharyngeals and glottals can be found in Semitic loanwords, e.g. [haku'ra] ‘vegetable garden’, [ʕud] ‘Middle Eastern lute’, [ʕuʔ] ‘market’, [harʕsi'jon] ‘Mount Zion’. Istanbul Judeo-Spanish lacks pharyngeals and glottals, and guttural fricatives from Hebrew and Turkish are adapted as /x/, e.g. [xa'ver] ‘business associate’ (< Heb. /ħ/), [xa'ber] ‘news’ (< Turk. /h/ *haber*). In some varieties of Turkish, Greek, and Bulgarian Judeo-Spanish, /x/ is realized phonetically as uvular [χ] but has shifted to glottal /h/ in the Judeo-Spanish of Bosnia, e.g. [ha'ver], [ha'ber]. In late 19th-century Moroccan Judeo-Spanish, glottal /h/ appears in Hispanic lexical items (cf. 3.1), and guttural consonants are maintained in Semitic loanwords, e.g. [ʕaʔar] ‘good will’, [hanuk'kwa] ‘consecration’, [hu'a] ‘air’, [ʔaʒ'mia] ‘Castilian/foreign language’, [qa'di] ‘judge’.

As shown in Table 25.3, Judeo-Spanish has the same five vowels as non-Sephardic Spanish varieties (↗24 Spanish). The close front and back vowels have palatal and labiovelar glide counterparts, which in some Judeo-Spanish dialects can be realized as secondary palatalization and labialization on certain consonants (cf. 3.4). Loanwords can contain other vowels borrowed from co-territorial languages, e.g. mid

Table 25.3: Vowels and glides in Judeo-Spanish.

	Front	Central	Back		Palatal	Labiovelar
Close	i		u	Close	j	w
Close-mid	e		o			
Open		a				

central /ə/ in Bulgarian JSp. /pən/ ‘log’ (< пѣн *pǎn*) vs. Hispanic-origin /pan/ ‘bread’. Non-Spanish vowels in loanwords can be substituted by similar Judeo-Spanish sounds, e.g. [kju'fe] ‘corner’ < Turk. *köşe*, [kju'pri] ‘bridge’ < Turk. *köprü*, [ka'di] ‘judge’ < Arab. *qāḍī*.

3 Consonantal and vocalic processes

3.1 Obstruents

Latin initial prevocalic F-underwent variable aspiration throughout Old Spanish and was ultimately replaced by glottal /h/, which was dropped in normative varieties of contemporary Spanish although still represented orthographically, e.g. FABULĀRE > OSp. *fablar* [fa'blar ~ ha'blar] > Sp. *hablar* [a'βlar] ‘speak_{INF}’. The development of etymological /f/ shows dialectal variation in Judeo-Spanish:

- (1) Moroccan JSp. Bosnian JSp. Istanbul JSp.
[ha'βlar] [fa'vlar] [a'vlar] ‘speak_{INF}’

Western Judeo-Spanish varieties of late 19th- and early 20th-century Morocco retain the outcome of OSp. /f/-aspiration, no doubt supported by the presence of Arab. /h/. Within Eastern Judeo-Spanish, etymological /f/ is retained in most Hispanic lexical items in northwestern dialects of Bosnia as the result of contact with other Romance languages that maintain initial /f/, e.g. Aragonese, Portuguese, and Italian. After a period of fluctuation between initial /f/, /h/, and ∅, the glottal fricative disappeared in northeastern and southeastern communities, and some dialects selected vowel-initial forms, e.g. Istanbul Judeo-Spanish.

The /b/-/v/ contrast that existed in southern Peninsular varieties of Old Spanish was neutralized to /b/ in northern Old Spanish, resulting in the allophonic distribution between [b] and spirant approximant [β] now found in contemporary Spanish (≈24 Spanish). Labiodental /v/ is absent from Moroccan Arabic. This may have facilitated the collapse of the /b/-/v/ contrast in Moroccan Judeo-Spanish to /b/, which

shows the same allophonic distribution as in Spanish, e.g. [ka'βoð] 'respect' vs. [aram'bam] 'Maimonides'. In Eastern Judeo-Spanish, the /b/-/v/ contrast is preserved but in fewer environments. OSp. <v> corresponds to Lat. -v- and -B- (2a) and v- (2d), while OSp. corresponds to -P- (2b) and B- (2c). Istanbul Judeo-Spanish has weakened the voiced bilabial plosive to /v/ word-medially after a vowel (2b) but maintains the contrast word-initially (2c, d):

(2)	Lat.	OSp.	Istanbul JSp.	Sp.		
a.	LAVĀRE	<i>lavar</i>	[la'var]	[la'βar]	<i>lavar</i>	'wash _{INF} '
	DEBĒRE	<i>dever</i>	[ðe'ver]	[ðe'βer]	<i>deber</i>	'owe _{INF} '
b.	SAPĒRE	<i>saber</i>	[sa'ver]	[sa'βer]	<i>saber</i>	'know _{INF} '
	POPULUS	<i>pueblo</i>	[pwevlo]	[pweβlo]	<i>pueblo</i>	'people'
c.	BUCCA	<i>boca</i>	['boka]	['boka]	<i>boca</i>	'mouth'
d.	VACCA	<i>vaca</i>	['vaka]	['baka]	<i>vaca</i>	'cow'

The contrast is also maintained in syllable-initial postconsonantal position, e.g. [ambe'zar] 'learn, teach_{INF}' vs. [im'vjerno] 'winter'. Syllable-final /v/ occurs in intervocalic consonant sequences, e.g. [šiv'ðəð] 'city', [ðevðə] 'debt', [ev'ropa] 'Europe' (cf. Sp. [θju'ðað] *ciudad*, [ðewðə] *deuda*, [ew'ropa] *Europa*). Intervocalic /b/ is maintained in words prefixed by /a-/ (3a) and after a vowel-final word (3b):

- (3) a. [aba'jar] * [ava'jar] 'lower_{INF}' cf. ['bafo] 'below'
 b. [la'boka] * [la'voka] 'the mouth' cf. ['boka] 'mouth'

The distribution of voiced obstruent allophones varies across Judeo-Spanish dialects. In late 19th-century Moroccan Judeo-Spanish, /b ð g/ surface as continuant allophones word-medially after a vowel and as plosives after a nasal, while only the velar continuant appears also word-initially, e.g. [ʔəto] 'cat', [ʔəto] 'drop', [ʔuzano] 'worm'. Within eastern dialects, there are three main areas of variation in the realization of /ð/ and /g/:

- (a) Varieties of Judeo-Spanish spoken in Bosnia, Serbia, Croatia, Romania, Bulgaria, and Israel lack the continuant allophones. Voiced plosives appear in all positions, even word-medially after a vowel, e.g. [ðeðu] 'finger', [ʃjegu] 'blind'. Continuant allophones were eliminated under contact with co-territorial languages that lack the analogous consonants: (i) Slavic languages, first in the northwestern Balkan varieties but later in the northeastern dialects, which remained under the linguistic influence of Salonika until the 19th century, and (ii) Arabic in Jerusalem and Hebron.
- (b) In the Judeo-Spanish of Greece, Macedonia, and Rhodes, /ð/ is realized as a plosive in word-initial position and as a spirant approximant [ð̤] word-medially between vowels. The patterning of /g/ has been influenced by language contact with Greek, in which plosive /g/ contrasts phonologically with fricative /ɣ/. In

Thessaloniki Judeo-Spanish, the velar continuant allophone (i) is not a spirant approximant but a true obstruent fricative, (ii) is generalized to all positions except after a nasal, e.g. [ʔaʔo] ‘cat’, [ʔʂjeʔo] ‘blind’, and (iii) is susceptible to devoicing, e.g. [aʔruxa] (< [aʔruʔa]) ‘wrinkle’, [xaʔʔiʔa] (< [ʔaʔʔiʔa]) ‘lizard’ (cf. Sp. [laʔarʔiʔa] *lagartija*).

- (c) In the Judeo-Spanish of Turkey, the spirant approximant allophones occur word-medially between vowels, with plosives favored in word-initial contexts, even postvocally.

Examples from Istanbul Judeo-Spanish illustrate pattern (c). Spirant approximant [ʔ] occurs word-medially between vowels (4a), but initial [dʔ] is generalized to words with the prefix /a-/ (4b) and to word-initial postvocalic contexts (4c):

- (4) a. [ʂefaraʔi] ‘Sephardic’
 b. [aʔuʔʂar] ‘sweeten_{INF}’ cf. [ʔuʔʂe] ‘sweet’
 c. [leʔdʔifo] ‘he told him’ cf. [ʔdʔifo] ‘told’

Word-medial intervocalic position favors the velar spirant approximant, e.g. [ʂiʔʔuro] ‘safe’, while the velar plosive tends to appear after a pause, albeit with some variation, e.g. [ʔgaʔo] ~ [ʔʔaʔo] ‘cat’ vs. [ʔgera] ‘war’.

Old Spanish had a single voiced postalveolar phoneme with two sibilant allophones in complementary distribution: affricate [dʒ] after a pause or nasal and fricative [ʒ] elsewhere. As Classical Arabic /dʒ/ had already weakened to /ʒ/ in Moroccan Arabic, language contact had the result of collapsing the two Old Spanish postalveolar allophones into /ʒ/ in Moroccan Judeo-Spanish, e.g. [ʒuʔjo] ‘Jew’, [ʒuʔaʔ] ‘reply’. Istanbul Judeo-Spanish maintains the fricative word-medially between vowels (5a) but has generalized the affricate to initial position, including after the prefix /a-/ (5b) and after a vowel-final word (5c):

- (5) a. [ʔozo] ‘eye’
 b. [aʔʒuʔʔar] ‘add, join_{INF}’ cf. [ʔʒuʔʔo] ‘together’
 c. [laʔʒeʔte] ‘the people’ cf. [ʔʒeʔte] ‘people’

As we saw in the discussion surrounding Table 25.2, language contact has enriched the Judeo-Spanish lexicon with loanwords from different sources. The voiced obstruents described above are also found in loanwords from co-territorial languages but with different distributions than in the Hispanic component of the Judeo-Spanish lexicon. While labiodental /v/ is absent from Hispanic words in Moroccan Judeo-Spanish, it does appear in Hebrew loanwords, e.g. [mizʔva] ‘religious precept’, [kavʔaʔna] ‘meditation’. Similarly, while we have seen that the continuant allophones of /b d g/ in Moroccan Judeo-Spanish surface between vowels, some Semitic loanwords do have word-medial intervocalic plosive [dʔ], giving rise to apparent phonemic contrasts,

e.g. Arabic-origin [fiðe'arse] 'boil over, spill_{INF}' vs. Hispanic-origin [fi'ðeo] 'noodle'. A similar contrast emerges word-initially between the velar plosive and continuant, e.g., Hebrew-origin [ˈger] 'proselyte' vs. Arabic-origin [ˈyer] 'only'. The presence of /ɣ/ in co-territorial languages is no doubt related to the generalization of continuant allophones of /g/ to word-initial position in Moroccan, Greek, and Turkish varieties of Judeo-Spanish. In Istanbul and Bucharest Judeo-Spanish, discrepancies in the distribution of voiced plosives and continuants are found in Turkish, Hebrew, and Romanian loanwords when compared to the expected behavior of voiced obstruents in the Hispanic lexicon. The labial plosive-fricative contrast is maintained word-medially between vowels (6a) (cf. the weakening to /v/ in 2a, b). Word-medial intervocalic /d̪/ is immune to weakening (6b) (cf. the example in 4a). The fricative-affricate distribution (6c) is opposite to that observed in Hispanic lexical items (cf. the examples in 5a–c).

- (6) a. [xa'ber] 'news' < Turk. *haber*
 [xa'ver] 'business associate' < Heb. *ḥaver*
 b. [bojaðe'ar] 'paint_{INF}' < Turk. *boyamak*
 [i'ðea] 'idea' < Fr. *idée*
 c. [kave'd̪ʒi] 'coffee-shop owner' < Turk. *kahveci*
 [ʒam'bon] 'ham' < Fr. *jambon*, Rm. *jambon*

Old Spanish had a contrast between voiced and voiceless sibilants in word-medial intervocalic position, which included pairs of dental affricates as well as apicoalveolar and postalveolar fricatives, shown in (7).

- (7) a. *deçir* [ðe'ʧir] 'descend_{INF}' *dezir* [ðe'd̪ʒir] 'say_{INF}'
 b. *osso* [ˈoʃo] 'bear' *oso* [ˈozo] 'dare_{1SG}'
 c. *fixo* [ˈfiʃo] 'fixed' *fijo* [ˈfiʒo] 'son'

Postalveolar /tʃ/, not shown here, remains unchanged from Old Spanish to Judeo-Spanish. The system in (7) underwent the following changes: (i) from the mid-13th through the 16th centuries, deaffrication of /ʧ/ > /ʃ/ and /d̪ʒ/ > /d̪/; (ii) by the late-16th century, devoicing of /ʒ/ > /s̺/, /z/ > /s̺/, and /ʒ/ > /s̺/, which neutralized the intervocalic voicing contrasts; and (iii) during the 16th and 17th centuries, shifts in place of articulation that produced two main outcomes: in northern central Peninsular Spanish, interdentalization of /s̺/ > /θ/ and velarization of /ʃ/ > /x/ (typically pronounced as a strident postvelar [χ]), and in southern Peninsular Spanish, merger of dental /s̺/ and apicoalveolar /s̺/ into a single laminal (dental or alveolar) sibilant fricative and retraction of /ʃ/ to glottal /h/ (ʔ24 Spanish).

Since the expulsion took place after deaffrication but before devoicing, the Judeo-Spanish sibilant system has lost the Old Spanish dental affricates but has kept the intervocalic contrast between voiceless and voiced sibilants. However, the apicoalveolar fricatives have merged with the dental fricatives (8a), which now contrast

with the postalveolars (8b). (For similar patterns of contrast deriving from medieval Western Romance, ↗23 Catalan; ↗26 Portuguese).

- (8) a. [al'ʃar] 'raise_{INF}' [ðe'z̥ir] 'say_{INF}'
 [paʃo] 'step' [kaʒa] 'house'
 b. [kaʃa] 'box' [mu'z̥er] 'woman'

Although Old Spanish dental affricates (7a) disappeared early, /t͡s/ and /d͡z/ have since reemerged in some Judeo-Spanish dialects. In the Balkans and Israel, dental affricates can be found in loanwords from Hebrew and other co-territorial languages, such as Romanian, Bulgarian, Serbo-Croatian, and German, e.g. [ʃiða'ka] < Heb. *tzedakah* 'charity', [maʃa] < Heb. *matsa* 'unleavened flatbread', [naʃjon] < Ger. *Nation* 'nation' etc. In the dialects of the northwest Balkans, an innovative process of post-nasal affrication has given rise to non-etymological [t͡s] and [d͡z], both in Hispanic words (9a) and in loanwords (9b):

- (9) a. [piŋ'd͡z̥el] 'paint brush' cf. Sp. [piŋ'θel] *pincel*
 [ðe'nunʃ̣ja] 'denounce_{3SG}' cf. Sp. [ðe'nunθja] *denuncia*
 b. [heŋ'd͡z̥ir] 'pig' < Turk. *hünzır*
 [maŋ'd͡z̥er] 'bastard' < Heb. *mamzer*

In these same Judeo-Spanish varieties, a few words within the Hispanic lexicon have intervocalic /d͡z/ where /z/ is otherwise expected. Numerals such as [d͡d͡z̥i] 'twelve', [t͡t͡d͡z̥i] 'thirteen' etc. were likely borrowed from Catalan before the expulsion (cf. *dotze, tretze*), while [oŋ'd͡z̥i] 'eleven' and [kiŋ'd͡z̥i] 'fifteen' can be explained in terms of innovative post-nasal affrication, as in (9). Words like [po'd͡z̥u] 'well', [t͡t͡d͡z̥u] 'frozen stiff' etc. are Italianisms. Innovative affrication is unattested in the Judeo-Spanish of Turkey, where dental affricates are absent from both Hispanic vocabulary and loanwords, e.g. [oŋze] 'eleven', [doze] 'twelve', [maʃa] 'unleavened flatbread', [mam'z̥er] 'bastard'. In Thessaloniki Judeo-Spanish, some inherited words show postalveolar /d͡ʒ/ where their Balkan Judeo-Spanish correspondents have dental /d͡z̥/, e.g. [d͡d͡ʒ̥i], [t͡t͡d͡ʒ̥i], [po'd͡ʒ̥u] etc. As in the case of loanwords (6c), these examples introduce [d͡ʒ] in word-medial intervocalic contexts, where only [z] appears in Hispanic lexical items (cf. the example in 5a).

In Judeo-Spanish both voiceless and voiced sibilants occur contrastively in word-medial syllable-initial position, as in (8). In Bucharest Judeo-Spanish, [z̥] and [z] are limited to intervocalic position in words inherited from Old Spanish, but intervocalic and initial [z̥] can be found in Hebrew and Turkish loanwords, as can initial and final [z] in words from French. In some words, Hebrew /ʃ/ has been regressively voiced before voiced consonants, e.g. [xeʒ'van] 'second month of the Hebrew calendar', [xeʒ'bon] 'account'. In Hispanic lexical items, the sibilant voicing contrast is neutralized in syllable- and word-final position. All Judeo-Spanish dialects show

regressive voicing assimilation before consonants and vowels. For example, in Istanbul Judeo-Spanish [ʃ] appears before voiceless consonants (10a, d) and a pause (10c), while [ʒ] appears before voiced consonants (10b, e) and word-finally before a vowel (10f):

- (10) a. [ʔeʃte] ‘this one’ d. [ɫdoʃka'veʃaʃ] ‘two heads’
 b. [ʔmizmo] ‘same’ e. [ɫdoʒ'gaʃoʃ] ‘two cats’
 c. [ʔdoʃ||] ‘two’ f. [ɫdo'ziʒoʃ] ‘two sons’

Word-final prevocalic sibilant voicing (10f) is a variable process conditioned by the strength of the intervening prosodic boundary. For example, voicing applies more consistently within the prosodic word, e.g. (laʒ(a'miʃaʃ))_{PW} ‘the friends’, than across two prosodic words (ʔdijaz)_{PW}(i(ʃe'manaʃ))_{PW} ‘days and weeks’.

In Eastern Judeo-Spanish, the coalescence of /jʃ/ sequences has resulted in post-alveolar /ʃ/ in word-final position, e.g. [kan'taʃ] ‘sing_{2PL}’, [ʃeʃ] ‘six’ vs. Sp. [kan'taʃs], *cantáis* [ʃeʃs] *seis* (also cf. Section 4). Word-final /ʃ/ shows the same voicing alternation as /ʒ/, with [ʃ] before a pause (11a) and voiceless consonants (11b) and [ʒ] before voiced segments, including word-initial vowels (11c):

- (11) a. [enʔen'deʃ||] ‘understand_{2PL}’
 b. [enʔen'deʃ'toʔo] ‘understand_{2PL} everything’
 c. [enʔen'deʒ'eʃto] ‘understand_{2PL} this’

Word-final sibilants in Judeo-Spanish (and presumably Old Spanish) undergo voicing before voiced consonants and vowels, and similar patterns are observed elsewhere in Ibero-Romance languages (↗23 Catalan; ↗26 Portuguese). Regressive place assimilation is another source of postalveolar /ʃ/ in Eastern Judeo-Spanish. Dental /ʃ/ has undergone retraction to /ʃ/ in word-medial contexts before the voiceless velar plosive /k/, albeit with some exceptions:

- (12) Turk./Rm. JSp. Sp.
 [ʔkaʃka] [kaʃka] ‘peel, skin’
 [miʃ'kiʃa] [meθ'kiʃa] ‘mosque’

Postalveolar /ʃ/ is also found before /k/ in some words in Moroccan Judeo-Spanish. Old Spanish shows a similar pattern, in which retraction was likely further conditioned by a preceding stressed vowel, e.g. [ʔmoʃka] ‘fly’ vs. [deʃ'kanʃo] ‘rest’.

Although the expulsion occurred before devoicing and velarization of OSp. /ʒ/, contact with contemporary non-Sephardic Spanish has introduced the voiceless velar fricative in a subset of words in Istanbul Judeo-Spanish, e.g. /ʔixo/ ‘son’, /ʔixa/ ‘daughter’, /muʔxer/ ‘woman’ (cf. JSp. /ʔiʒo/, /ʔiʒa/, /muʔzer/) (Romero 2013). However, post-

alveolars are still maintained in Turkish and Romanian loanwords (6c), as well as in Hispanic lexical items word-finally (11) and before /k/ (12).

3.2 Sonorant consonants

The Old Spanish contrast between the palatal nasal /ɲ/ and the alveolar nasal+palatal glide sequence /nj/ is maintained in normative Spanish but has been lost in Judeo-Spanish, with cross-dialectal variation in the outcome of neutralization, as shown in (13) (↗24 Spanish, on the depalatalization of /ɲ/ in contemporary Argentinean Spanish). Spanish ['ɲuðo] 'knot' does exist, but it is likely an analogy to [aɲu'ðar] 'tie_{INF}' (< INNODĀRE) and is not as common as the /n/-initial variant in (13b):

(13)	Thessaloniki JSp.	Bucharest Jsp.	Istanbul Jsp.	Sp.		
a.	['uɲa]	['unja]	['unja]	['uɲa]	<i>uña</i>	'fingernail'
b.	['ɲuðo]	['njuðu]	[an'juðo]	['nuðo]	<i>nudo</i>	'knot'
c.	['neɰo]	['njeɰu]	[in'jeɰo]	['njeɰo]	<i>nieto</i>	'grandson'
d.	['nervo]	['njervu]	[in'jervo]	['nerβjo]	<i>niervo</i>	'nerve'

In Thessaloniki Judeo-Spanish, /ɲ/ appears word-medially between vowels (13a) and word-initially (13b) and also results from the coalescence of initial /nj/, both etymological (13c) and derived by long-distance glide metathesis (13d) (i.e. ['njervo]<['nervjo]). In Bucharest Judeo-Spanish, /nj/ appears instead of /ɲ/ in medial (13a) and initial position (13b), and both etymological and derived /nj/ sequences are maintained (13c, d). In Istanbul Judeo-Spanish, etymological word-medial /ɲ/ has undergone splitting (13a), as in Bucharest Judeo-Spanish. Hualde/Şaul (2011, 101) report that there is a syllable boundary between the nasal consonant and the glide in every case, which accounts for the epenthesis of a vowel before word-initial /nj/ in (13c, d) (cf. below on the implications of heterosyllabic nasal+glide sequences for syllable contact).

The Old Spanish palatal lateral /ʎ/ is preserved in traditional northern central Peninsular Spanish, but most contemporary Spanish varieties are now *yeístas*, having delateralized /ʎ/ to a constricted palatal fricative /j/, as well as other obstruent allophones that arise through syllable-initial strengthening (↗24 Spanish). In Judeo-Spanish, /ʎ/ and, in some words, /lj/ have undergone delateralization to a palatal glide /j/, which is noticeably more open than Spanish /j/. In Eastern Judeo-Spanish dialects, word-medial intervocalic /j/ is susceptible to elision in the context of an adjacent front vowel:

(14)	Eastern JSp.	<i>yeísta</i> Sp.	traditional Sp.		
a.	[kaʃ'tijo] ~ [kaʃ'tio]	[kaʃ'tijo]	[kaʃ'tiʎo]	<i>castillo</i>	'castle'
	[ga'jina] ~ [ga'ina]	[ga'jina]	[ga'ʎina]	<i>gallina</i>	'hen'
	[fa'mija] ~ [fa'mia]	[fa'milja]	[fa'milja]	<i>familia</i>	'family'

b.	[ka'vejo] ~ [ka'veo]	[ka'βejo]	[ka'βeɔ]	<i>cabello</i>	'hair'
	[ka'je̞nte] ~ [ka'e̞nte]	[ka'lje̞nte]	[ka'lje̞nte]	<i>caliente</i>	'hot'
c.	['gajo]	['gajo]	['gaɔ]	<i>gallo</i>	'rooster'
d.	[ja'mar]	[ja'mar]	[ɣa'mar]	<i>llamar</i>	'call _{INF} '
	['jẽ̞so]	['ljẽ̞so]	['ljẽ̞θo]	<i>lienzo</i>	'canvas'

Eastern Judeo-Spanish /j/ corresponding to etymological /ɣ/ and /lj/ is variably deleted next to front vowels /i/ (14a) and /e/ (14b) but is maintained next to non-front vowels (14c) and word-initially (14d). Etymological /lj/ sequences are preserved in both *yeísta* Spanish and traditional northern central Peninsular Spanish, but in *yeísta* Spanish, /ɣ/ now corresponds to the palatal fricative /j/, which strengthens to plosive [j] after a pause (14d). In Eastern Judeo-Spanish, non-etymological [j] is variably inserted in the context of two vowels in hiatus when one is a front vowel:

(15)	Eastern JSp.	Sp.		
a.	['tia] ~ ['tija]	['tia]	<i>tía</i>	'aunt'
	['mio] ~ ['mijo]	['mio]	<i>mío</i>	'mine'
b.	[re'ales] ~ [re'jales]	[re'ales]	<i>reales</i>	'type of coins'
	['veo] ~ ['vejo]	['beo]	<i>veo</i>	'see _{1SG} '

Interestingly, variable epenthesis of [j] (15a, b) occurs in the same phonological contexts in which /j/ (</ɣ/) is variably deleted (14a, b), i.e. next to a front vowel.

Moroccan Judeo-Spanish diverges slightly from Eastern varieties in the evolution of palatal sonorants. As in the Thessaloniki dialect, Moroccan Judeo-Spanish retains etymological /ɲ/ (16a) and shows coalescence of /nj/ (16b), but other outcomes are also sporadically attested, including depalatalization of /ɲ/ (16c) and denasalization to a palatal glide (16d) (also cf. 3.4 on the resyllabification of /Vɲwe/ sequences).

(16)	a.	['aɲo]	'year'	
	b.	['neɲo]	'grandson'	
	c.	[a'nezɔ]	'mature'	cf. Sp. [a'ɲexo] <i>añejo</i>
	d.	[saβa'joneɣ]	'chilblains'	cf. Sp. [saβa'ɲoneɣ] <i>sabañones</i>

Old Spanish /ɣ/ and, in some words, /lj/ have undergone delateralization in Moroccan Judeo-Spanish, as in the Eastern dialects, but deletion of the resulting /j/ is more restricted:

- (17) a. [ˈʂia] ‘chair’ b. [kaˈβejo] ‘hair’
 [aˈnio] ‘ring’ [ˈbejo] ‘beautiful’
 [ʂeˈβia] ‘Seville’ [kaˈjeŋte] ‘hot’
 [faˈmia] ‘family’ c. [kaˈβajo] ‘horse’
 [gaˈina] ~ [ˈgajna] ‘hen’ d. [ˈjuβja] ‘rain’

Only the close front vowel /i/ triggers glide deletion (17a), while /j/ surfaces intact next to mid front /e/ (17b), non-front vowels (17c), and word-initially (17d). Finally, in both Moroccan and Eastern Judeo-Spanish, alveolar /l/ now appears instead of etymological /ʎ/ in several words of Ibero-Romance origin, e.g. [kaˈleza] ‘passage, alley’, [ˈluβja] ‘rain’ (cf. Sp. [kaˈlɛxa] *calleja*, [ˈluβja] *lluvia*), even though delateralization is otherwise the norm (cf. the examples in 14 and 17). Such lexical items were likely borrowed before the expulsion from Aragonese and Astur-Leonese, which already had alveolar /l/ in the corresponding forms.

Contemporary normative Spanish has two apicoalveolar rhotics: a tap /ɾ/, which involves a brief lingual contact, and a trill /r/, in which two or more lingual contacts are passively induced under an applied airstream. At the word level, syllable-initial rhotics are obligatorily trills except after a vowel, where /ɾ/ contrasts with /r/ (24 Spanish). Judeo-Spanish has lost the obligatory strengthening of word-initial taps to trills, and there is a tendency to neutralize the word-medial intervocalic contrast in some dialects. In late 19th- and early 20th-century Morocco, rhotics were pronounced as a single-contact tap in word-initial position (18a), and there was word-medial intervocalic contrast between the trill (18b) and tap (18c), albeit with few truly minimal pairs. Intervocalic trills were commonly found in a subset of inherited lexical items that take the prefix /a-/ (18d), as well as in words derived from Arabic borrowings (also cf. 3.3 on regressive consonant gemination).

- (18) a. [ˈroza] ‘rose’ c. [ˈkara] ‘face’
 b. [ˈtjera] ‘earth’ d. [arekoˈzer] ‘pick up_{INF}’

Istanbul Judeo-Spanish also lacks word-initial strengthening, as in (18a), and the word-medial intervocalic contrast is much less stable. Only a few lexical items consistently show medial intervocalic [r], and many such trills alternate with taps, e.g. [koˈrer] ‘run_{INF}’ vs. [koˈreŋdo] ‘run_{PROG}’. Words prefixed by /a-/ show either fluctuation between a trill and a tap (19a) or just a tap (19b):

- (19) a. [araˈpaðo] ~ [araˈpaðo] ‘shave_{PST.PTCP}’ b. [aroˈɣar] ‘beg_{INF}’
 [areˈɣar] ~ [areˈɣar] ‘water_{INF}’ [arekoˈzer] ‘pick up_{INF}’

Both taps and trills are often weakened to approximant stricture, which can be narrowly transcribed as [ɾ̥]. Devoicing of word-final /r/ and /l/ can be observed for some speakers due to interference from Turkish final liquid devoicing.

At the most innovative end of the neutralization continuum are the northwestern and northeastern varieties of Eastern Judeo-Spanish, spoken in the Balkan Peninsula and Romania. The trill /r/ has been lost in favor of a single rhotic phoneme, which is generally pronounced as a tap /r/:

- (20) a. [ˈroza] ‘rose’ c. [arumˈper] ~ [rumˈper] ‘break_{INF}’
 b. [ˈtjera] ‘earth’ [aruˈgar] ~ [ruˈgar] ‘beg_{INF}’

Trills are absent from word-initial position (20a), as well as word-medially between vowels (20b). In Bucharest Judeo-Spanish, there is general variation in /a-/ prefixation, but only the tap appears in either case (20c). Sala (1963, 352–353) views the loss of /r/ as an internal development, further enabled by the low functional load of the tap-trill opposition in Bucharest Judeo-Spanish, independently of any phonological influence from contact with Romanian (⤴17 Romanian). Even in dialects lacking /r/ in Hispanic words, trills can be found in Hebrew loanwords and personal names.

Syllable contact, or the preference for consonant sequences to avoid rising sonority across the syllable boundary, is implicated in the metathesis of sonorant consonants in Old Spanish and Eastern Judeo-Spanish. Let us assume a standard sonority scale that ranks segments by relative loudness:

(a) obstruents (plosives, affricates, fricatives)	1	least sonorous
(b) nasals	2	
(c) liquids (laterals, rhotics)	3	
(d) glides	4	
(e) vowels	5	most sonorous

Syllable contact can be quantified by subtracting the sonority value of the coda consonant from that of the following onset, where positive values denote a sonority rise; zero, a flat sonority plateau; and negative values, a sonority fall. First, unstressed vowel deletion in spoken Late Latin often derived new consonant sequences within the morpheme. Rising-sonority sequences of plosive+nasal (a rise of +1) and plosive+lateral (+2) underwent variable transposition in Old Spanish (21), among other repairs not shown here. Judeo-Spanish and Spanish maintain the metathesized falling-sonority sequences:

(21)	Lat.	OSp.	Eastern JSp.	Sp.	
a.	LEGITIMU(M)	<i>lidmo</i> ~ <i>lindo</i>	[ˈlindo]	[ˈlindo]	‘pretty’
b.	SPATULA(M)	<i>espadla</i> ~ <i>espalda</i>	[eʃˈpaɫɖa]	[eʃˈpaɫɖa]	‘back’

Second, in Old Spanish irregular future and conditional verbs, deletion of the theme vowel of the infinitive often derived nasal+rhotic sequences of rising sonority (+1), which were subject to variable metathesis, assimilation, and intrusive stop formation. The Judeo-Spanish varieties spoken in Bosnia and Thessaloniki show synchronic alternations in such verbs, whereby metathesis changes rising-sonority /nr/ into falling-sonority /rn/, e.g. [t̪er'ne] 'have_{1SG.FUT}', [ver'ne] 'come_{1SG.FUT}' (cf. Sp. [t̪en'dre] *tendré* < /t̪e'ner/ 'have_{INF}', [ben'dre] *vendré* < /be'nir/ 'come_{INF}'). Third, in the context of a plural imperative followed by a clitic pronoun, metathesis in Old Spanish variably targeted homorganic /ɲn/ and /ɲl/ (22a, b) but failed to affect heterorganic /ɲm/ (22c) (cf. the metathesis of morpheme-internal /ɲm/ (21a), which is accompanied by nasal place assimilation). OSp./Sp. first person plural /nos/ 'us' corresponds to JSp. /mos/ 'us', due to an independent change (cf. Section 4). Eastern Judeo-Spanish maintains the productive metathesis of homorganic /ɲl/ (22b), but heterorganic /ɲm/ (22a, c) remains intact. In the corresponding normative Spanish forms, rising-sonority sequences do not undergo metathesis:

(22)	OSp.	Eastern JSp.	Sp.	
a.	<i>dadnos ~ dandos</i>	[ɖaðmoʃ]	[ɖaðnoʃ]	'give _{IMP.PL=1PL.DAT} '
b.	<i>dadlo ~ daldo</i>	[ɖaɭɖo]	[ɖaðlo]	'give _{IMP.PL=3SG.M.ACC} '
c.	<i>dadme</i>	[ɖaðme]	[ɖaðme]	'give _{IMP.PL=1SG.DAT} '

Eastern Judeo-Spanish also shows innovative patterns of /r/-metathesis in which the avoidance of rising-sonority heterosyllabic sequences is not at issue:

(23)	Eastern JSp.	Sp.	
a.	[veðre]	[berðe]	'green'
	[goðro]	[gorðo]	'fat'
b.	[pri'ʃona]	[per'ʃona]	'person'
	[t̪re'ʃeru]	[t̪er'θero]	'third'
c.	[impruvi'ʃer]	[empoβre'θer]	'impoverish _{INF} '
	[proʃtime'rias]	[poʃtime'rias]	'final stage _{PL} '

Inherited words that contained intervocalic /rɖ/ sequences of falling-sonority (−2) in Old Spanish now have corresponding [ðr] onsets in Eastern Judeo-Spanish (23a). An exception is found in Bosnian dialects, in which (i) /rɖ/ sequences are maintained intact, and (ii) voiced plosives lack spirant approximant allophones (cf. 3.1). Assuming that taps were weakened to approximants in coda position (cf. 3.2), the [Vɾ.ðV] > [V.ðrV] shift in Eastern Judeo-Spanish (23a) would have repaired the structurally marked sequence of adjacent, maximally similar segments while maintaining the segmental adjacency. In other lexical items, /r/ in consonant sequences migrates leftward, either within the same syllable from coda

to complex onset (23b), or into the preceding syllable from one complex onset to another (23c).

The patterning of sonorant consonants in (21–23) shows that metathesis in Eastern Judeo-Spanish is motivated not only by syllable contact but also by similarity avoidance and phonotactic constraints against taps in heterosyllabic sequences (cf. Bradley 2007a). Hualde/Şaul (2011, 102) observe that /rɔ̃/-metathesis in present-day Istanbul Judeo-Spanish is “no longer an active process, as can be seen by the existence of words like *dakordo* ‘in agreement’ < French *d’accord*.” The fact that Istanbul Judeo-Spanish also tolerates heterosyllabic nasal+palatal glide sequences of rising-sonority (+2) in (13), as well as the tap+palatal glide sequence (+1) in [korʲjeɲɔ̃] ‘running’, suggests that metathesis is generally no longer productive within the morphological word but remains an active repair for /ɔ̃l/ sequences in imperatives followed by enclitic pronouns in (22b).

3.3 Regressive consonant gemination

Although morpheme-internal phonemic geminates are absent from Old Spanish, Spanish, and the Hispanic component of the Eastern Judeo-Spanish lexicon, phonetically long consonants are a hallmark characteristic of spoken Judeo-Spanish in late 19th- and early 20th-century Morocco, no doubt influenced by similar consonant gemination processes in local Arabic varieties. Moroccan Judeo-Spanish shows a complex pattern of regressive gemination targeting some, but not all, consonant sequences that arise across the word boundary. Total assimilation of a word-final coda to a word-initial onset is sensitive to the degree of sonority difference between the heterosyllabic consonants, which gives evidence of sonority distance effects in the optimization of syllable contact.

In words of Hispanic origin, possible final consonants include the coronals /ɔ̃ ʒ n l r/. Obstruent+liquid sequences present the greatest sonority rise (+2) across the syllable and undergo gemination without exception:

- (24) a. /ɔ̃#r/ → [r] *una ciudad rica* ‘a rich city’
 b. /ɔ̃#l/ → [l:] *la verdad la diré yo* ‘the truth, I will say it’
 c. /ʒ#r/ → [r] *gaínas refritas* ‘thoroughly fried hens’
 d. /ʒ#l/ → [l:] *es la que quiero yo* ‘it is the one that I want’

Assimilation to word-initial /r/ yields a single phonetic trill [r] in (24a, c), as well as (25a), (26e), and (27b) below, which patterns as the geminate counterpart of /r/. Regressive assimilation across the word boundary is thus a common source of intervocalic surface trills in Moroccan Judeo-Spanish (cf. 3.2). Assimilation also targets the smaller sonority rise (+1) in sequences of nasal+liquid (25a, b) and obstruent+nasal (25c, d), except when the coda obstruent is a sibilant (25e, f):

- (25) a. /n#r/ → [r] *el buen rey* ‘the good king’
 b. /n#l/ → [l:] *en la ciudad* ‘in the city’
 c. /d̥#n/ → [n:] *siudad ninguna* ‘no city’
 d. /d̥#m/ → [m:] *la libertad me gusta* ‘liberty pleases me’
 e. /s̥#n/ → [zn] *las niñas* ‘the girls’
 f. /s̥#m/ → [zm] *los mayores* ‘the oldest ones’

Most sequences of flat sonority undergo regressive assimilation. These include sequences of identical coronal consonants (26), as well as non-identical consonants of the same sonority class: nasal+nasal (27a), liquid+liquid (27b, c), and obstruent+obstruent (27d, e), except when the adjacent obstruents differ in stridency (27f, g) or major place of articulation (27h):

- (26) a. /d̥#d̥/ → [d̥:] *la ciudad de Toledo* ‘the city of Toledo’
 b. /s̥#s̥/ → [s̥:] *vos serís* ‘you_{PL} will be’
 c. /n#n/ → [n:] *un niño* ‘a boy’
 d. /l#l/ → [l:] *mal lograda* ‘poorly carried out’
 e. /r#r/ → [r] *dar razón* ‘to give reason’
- (27) a. /n#m/ → [m:] *en mano* ‘in hand’
 b. /l#r/ → [r] *mal rayo* ‘bad lightning’
 c. /r#l/ → [l:] *subir la ‘scalera* ‘to go up the stairs’
 d. /d̥#t̥/ → [t̥:] *de verdad te lo digo* ‘in truth I tell you’
 e. /s̥#j/ → [j:] *los sharales* ‘the thickets’
 f. /s̥#d̥/ → [z̥̞] *des-dicha* ‘misery’
 g. /d̥#s̥/ → [ʃ̥̞] *siudad sekreta* ‘secret city’
 h. /d̥#b/ → [ʈ̥̞] *siudad briyante* ‘shining city’

Finally, sequences of falling sonority, i.e. nasal+obstruent (-1), liquid+nasal (-1), and liquid+obstruent (-2), are immune to gemination, except for sequences of a lateral+voiced coronal consonant:

- (28) a. /l#n/ → [n:] *del negro mazzal* ‘of the dark fate’
 b. /l#d̥/ → [d̥:] *el de* ‘the one from’
 (cf. [ld̥] by the early 20th century)

Lateral+nasal sequences surface as geminates (28a), while the patterning of /l#d̥/ (28b) shows two diachronic stages: regressive gemination in the late 19th century, then faithful realization by the early 20th century.

The data in this section reveal syllable contact (cf. 3.2) to be gradient in nature: regressive gemination in heterosyllabic sequences is sensitive to the sonority distance – including flat sonority – between coda and onset. Gemination in lateral+coro-

nal sequences shows that constraints on adjacent similar consonants are also at play in Moroccan Judeo-Spanish (cf. Bradley/Adams 2018).

3.4 Secondary labialization and palatalization

Spanish prevocalic glides are conventionally understood to group together with the following vowel in a complex syllable nucleus. Data from Judeo-Spanish suggest that [w] and [j] can pattern instead as a secondary articulation that is superimposed on an adjacent consonant, depending on the consonant's primary place of articulation (i.e. labial, coronal, palatal, or dorsal). Varieties spoken in Turkey, southeast Bulgaria, Greece, Macedonia, and Jerusalem can be classified as "labializing" Judeo-Spanish:

- (29) Labializing JSp. Sp.
- | | | | | |
|----|-------------------------------------|--|-----------------|------------------------|
| a. | [^h gwe _ʃ o] | [^h we _ʃ o] ~ [^h gwe _ʃ o] | <i>hueso</i> | 'bone' |
| b. | [^h pwe _ʃ e] | [^h pwe _ʃ e] | <i>puede</i> | 'can _{3SG} ' |
| | [bwe _n 'da(ʃ)] | [bon'daʃ] | <i>bondad</i> | 'goodness' |
| | [^h fwe _n te] | [^h fwe _n te] | <i>fuelle</i> | 'fountain' |
| c. | [^h kwe _ʃ ra] | [^h kwer _ʃ a] | <i>cuerda</i> | 'rope' |
| | [gwa'ʃrar] | [gwar'ʃar] | <i>guardar</i> | 'keep _{INF} ' |
| d. | [tu'pwa _ʃ re] | [tu'pa _ʃ re] | <i>tu padre</i> | 'your father' |
| e. | [un'gwa _ʃ o] | [un'ga _ʃ o] | <i>un gato</i> | 'a cat' |
| | [a'ʃukwar] | [a'ʃukar] | <i>azúcar</i> | 'sugar' |
| | [lu'ʃwar] | [lu'ʃar] | <i>lugar</i> | 'place' |

The strengthened word-initial [gw] (29a) is obligatory in labializing Judeo-Spanish dialects but variable in normative Spanish. Strengthening does not apply when [w] appears after labials (29b) or dorsals (29c). In labializing Judeo-Spanish, non-etymological [w] appears after labials (29d) and dorsals (29e) in the context of a preceding /u/ but never after coronals in the same context. Furthermore, tautosyllabic coronal+[w] sequences are avoided by several phonological repairs:

- (30) Labializing JSp. Sp.
- | | | | | |
|----|---------------------------------------|--------------------------------------|---------------|----------------|
| a. | [t _h 'ʃwer _ʃ o] | [t _h 'wer _ʃ o] | <i>tuerto</i> | 'twisted' |
| b. | [el'ʃwe _ʃ o] | [lwe _ʃ o] | <i>luego</i> | 'later' |
| c. | [e _ʃ 'mwe _ʃ o] | [ʃwe _ʃ o] | <i>sueño</i> | 'sleep, dream' |
| d. | [^h mweve] | [^h nweve] | <i>nueve</i> | 'nine' |

The glide undergoes strengthening after non-nasal coronals, which are resyllabified into the preceding syllable created by medial vowel epenthesis after plosives (30a) and by prothesis before laterals (30b) and fricatives (30c). Glide strengthen-

ing and resyllabification do not apply after /n/, which becomes labial (30d). The place restrictions in (29) and (30) motivate an analysis of [w] as a secondary labialization, which these Judeo-Spanish dialects allow to be superimposed on dorsals and labials [f^w p^w b^w/β^w k^w g^w/ɣ^w m^w n^w] but not on coronals (cf. Bradley 2009).

Apart from obligatory word-initial [g^w], labialized consonants are absent from other Judeo-Spanish varieties spoken in Bosnia, Serbia, Croatia, Macedonia, western Bulgaria and Romania, and Greece (Kastoria), which are instead “palatalizing”:

(31)	Palatalizing JSp.	Labializing JSp.	
a.	[kaŋˈtikʰa]	[kaŋˈtika]	‘song’
	[ˈtrigʰu]	[ˈtriɣo]	‘wheat’
b.	[ˈricu] ~ [ˈriʃu]	[ˈriko]	‘rich’
	[aˈmiɰu] ~ [aˈmiðʒu]	[aˈmiɣo]	‘friend’
c.	[ˈcen] ~ [ˈʧen]	[ˈkjen]	‘who’
	[ˈmejoˈɰia] ~ [ˈmedʒoˈɰia]	[ˈmeɰjoˈɰia]	‘noon’

In casual spontaneous speech, dorsal plosives after stressed /i/ either develop secondary palatalization (31a) or undergo full palatalization, becoming palatal plosives or postalveolar affricates (31b). Palatal [j] can also trigger full regressive palatalization of a preceding dorsal or coronal plosive (31c). In palatalizing Judeo-Spanish, labial consonants are exempt from palatalization.

While secondary labialization and palatalization are found in mostly non-overlapping dialect zones of Eastern Judeo-Spanish, Moroccan Judeo-Spanish has both types but with different distributions. Consider first the following examples of labialization:

(32)	Moroccan JSp.	Sp.	
a.	[ˈkʷaŋdo]	[ˈkwaŋdo]	<i>cuando</i> ‘when’
b.	[ˈnuŋkʷa]	[ˈnuŋka]	<i>nunca</i> ‘never’
c.	[ˈkʷeɾta]	[ˈpweɾta]	<i>puerta</i> ‘door’
	[reʃˈkʷeʃta]	[reʃˈpweʃta]	<i>respuesta</i> ‘answer’
d.	[ˈweʃo]	[ˈweʃo] ~ [ˈgweʃo]	<i>hueso</i> ‘bone’
e.	[luˈw:ar]	[luˈɣar]	<i>lugar</i> ‘place’
f.	[ˈweno]	[ˈbwenɔ]	<i>bueno</i> ‘good’
	[aˈwelo]	[aˈβwelo]	<i>abuelo</i> ‘grandfather’
g.	[lau̯ˈwertɛ]	[laˈmwertɛ]	<i>la muerte</i> ‘the death’
h.	[ɖeũˈweβo]	[ɖeˈnweβo]	<i>de nuevo</i> ‘again’
i.	[bau̯ˈwelo]	[baˈɲwelo]	<i>bañuelo</i> ‘bath _{DIM} ’

Voiceless dorsal plosives readily accommodate secondary labialization, both from a following labiovelar [w] (32a) and from progressive spreading after /u/ (32b). Furthermore, voiceless labial plosives become dorsal before prevocalic [w], which is realized

as secondary labialization (32c). Secondarily-labialized voiced dorsals [g^w]/[ɣ^w], on the other hand, are avoided: [w] appears in syllable-initial contexts (32d–i), and progressive labialization in /ugV/ sequences yields a lengthened glide (32e). Whereas voiceless /p/ shifts to dorsal before prevocalic [w] (32c), voiced /b/ is deleted in the same context (32f). After a word-final vowel, word-initial /m n ɲ/ before [w] undergo weakening to a nasalized velar glide [ũ] and are resyllabified into the preceding syllable (32g–i). Non-nasal coronal+[w] sequences remain intact, unlike in Eastern labializing dialects (cf. examples 30a–c).

Moroccan Judeo-Spanish also allows secondary palatalization on coronal plosives as the result of progressive spreading in /iɰV/ sequences (33a) and, in the late 19th century, as a possible realization of syllable-initial [j] (33b). Regressive palatalization, both secondary and full, is attested in the context of etymological [kjV] (33c):

- (33) a. [ʃefe'ritʰo] 'book_{DIM}'
 b. [a'ð̞i'er] 'yesterday' cf. Sp. [a'jer] *ayer*
 c. ['k'ero] ~ ['t̞jero] 'want_{1SG}' ['kjero] *quiero*

In sum, the patterning of prevocalic [w] and [j] across Judeo-Spanish dialects suggests that labialization and palatalization, respectively, are separate processes that can occur independently of each other or, as in Moroccan Judeo-Spanish, together in the same grammar (cf. Bradley 2015).

3.5 Vowels

Judeo-Spanish employs the same five-vowel phonemic system (cf. Table 25.3) as contemporary Spanish. Unlike the phonology of consonants, relatively fewer sound changes and processes target Judeo-Spanish vowels. A notable feature of northern and western dialects of the Balkans (excluding Thessaloniki Judeo-Spanish) is the raising of close-mid /e o/ in unstressed syllables, which can be attributed to the influence of Old Portuguese (↗26 Portuguese):

- (34) Balkan JSp. Istanbul JSp.
 a. [ʃimi'zan̩ti] [aʃeme'zan̩te] 'similar'
 b. [puɖi'roz̩u] [poð̞e'roz̩o] 'powerful'

The dialect of Monastir (present-day Bitola, Macedonia) also raises word-final open central /a/ to close-mid front [e] (cf. Por. word-final open-mid central [ɐ]):

- (35) Monastir JSp. Istanbul JSp.
 a. ['kaze] ['kaʒa] 'house'
 b. ['pere] ['pera] 'pear'

In the Judeo-Spanish of Sofia, Bulgaria, only the back close-mid vowel /o/ raises to [u] in unstressed syllables, while unstressed word-final /a/ raises to a mid-central schwa [ə]. This pattern can be attributed to convergence with the Sofian variety of Bulgarian, which has similar processes of vowel raising (cf. Gabriel/Kireva 2014). Vowel raising also affects unstressed /e/ in speakers with an Eastern Bulgarian dialect background, at least in casual speech, where they raise unstressed /e/ to [i] (in contrast to their reading pronunciation) (cf. Gabriel/Grünke 2018).

As compared to Istanbul and Thessaloniki Judeo-Spanish, stressed close-mid vowels in Bosnian Judeo-Spanish have a more closed timbre, likely influenced by the raising of unstressed close-mid vowels in word-final position (cf. the Balkan Judeo-Spanish examples in 34). Bosnian Judeo-Spanish also shows the opposite process of vowel lowering, which targets close-mid front /e/ before rhotics in several phonological contexts:

(36)	Bosnian JSp.	Istanbul JSp.		Bosnian JSp.
a.	[ˈparu]>[ˈparu]	[ˈpero]	‘dog’	g. [ˈkwerpu] ‘body’
b.	[aˈvjaɾtu]	[aˈvjertɔ]	‘open’	h. [ˈpwerku] ‘pig’
c.	[varˈða]	[veˈðra]	‘truth’	i. [aˈfwera] ‘outside’
d.	[parˈʂona]	[perˈʂona]	‘person’	
e.	[ˈkwarnu]	[ˈkwerno]	‘horn’	
f.	[ˈparla]	[ˈperla]	‘pearl’	

Etymological /e/ lowered to /a/ before word-medial trills (36a), prior to the loss of phonemic /r/ (cf. 3.2), and before a coda tap followed by an onset coronal consonant (36b–f). Lowering in Bosnian Judeo-Spanish did not apply in all pre-rhotic contexts, as /e/ remains intact before tap+labial (36g), tap+dorsal (36h), and tap+vowel (36i) sequences. For an analysis of this and similar patterns of mid front vowel lowering before rhotics in Catalan and other Western Romance varieties, cf. Bradley (2011).

In Bucharest Judeo-Spanish, vowels undergo regressive nasalization before nasal+fricative clusters, most often when the fricative is a voiceless coronal (37a, b). The coda nasal is subject to variable deletion in the same context but is maintained before voiced coronal /z/ (37c, d) and voiceless velar /x/ (37e):

(37)	a. [ãṇˈʂina] ~ [ãˈʂina]	‘thus’
	b. [ẽṇˈjaɣˈar] ~ [ẽˈjaɣˈar]	‘rinse _{INF} ’
	c. [mãmˈzɛr]	‘bastard’
	d. [mãmˈziʝa]	‘misfortune’
	e. [ẽṇxamiˈnaɖu]	‘angry’

The opposite change of coda nasal epenthesis occurred in /munˈtʃo/ ‘many’ (cf. OSp. *mucho* ~ *muncho* vs. Sp. /muˈtʃo/ *mucho*) and related forms, e.g. /munˈtʃiɣwar/

'increase_{INF}', /amunt̪iɣwamjento/ 'increase', /munt̪jeɰdumbre/ 'crowd', as found in a number of Judeo-Spanish dialects. Presumably, nasality spread rightward from the word-initial nasal through the vowel and onto the initial closure phase of the post-alveolar affricate, yielding the percept of a reduced coda nasal: /mut̪jo/ > [mũⁿt̪jo]. Syllable contact (cf. 3.2) independently licenses falling-sonority nasal+obstruent clusters across the syllable boundary, which explains why some listeners could have plausibly reinterpreted [mũⁿt̪jo] as [mũn̪t̪jo] and then stored /munt̪jo/ as the new underlying representation for this highly frequent lexical item.

Other processes in Judeo-Spanish involve a change in the number of vowel segments in a word. First, Vulgar Latin words that began with a cluster of /s/+consonant developed a prothetic /e/ in Old Spanish, which remains a synchronically productive process in contemporary Spanish, e.g. *esfera* ~ *hemisferio* 'sphere' ~ 'hemisphere', *estrés* < Eng. *stress* (↗24 Spanish). Judeo-Spanish words generally retain Old Spanish prothetic /e/, and labializing dialects have extended prothesis to novel contexts (cf. word-initial /lwe/ and /ʃwe/ in 30b,c). Second, Aragonese had a tendency, due to Basque influence, to insert prothetic /a/ before word-initial trills, where the choice of the open central vowel parallels the /e/ > /a/ shift before word-medial trills in Bosnian Judeo-Spanish (36a). The likely etymological source of the prefix before rhotics in Judeo-Spanish (18d), (19), and (20c) is Aragonese prothetic /a/, which was extended to other words (especially transitive verbs) lacking initial rhotics. Third, in the Judeo-Spanish of Bucharest and Monastir (present-day Bitola), word-initial [e]/[i] is subject to apheresis after a word-final vowel or a pause:

- (38) a. [ku'neʃtapin̪'ʃada] *kun esta pinsada* 'with this thought'
 b. [liʃ'tavaj'neʃ'kriʃta] *li stava in ea skríta* 'it was written to him on it'
 c. [ʃ'tapin̪'ʃandu'jon] *sta pinsandu Ión* 'Ion is thinking'

Resyllabification of the word-final nasal in (38a) into the following syllable blocks the deletion of word-initial /e/ in [ku.'neʃ.ʃa]. Apheresis in [ʃ'ta.va] and [ʃ'kri.ʃa] avoids hiatus after word-final vowels in (38b) and allows /ʃ/ in both cases to be syllabified in coda position: [liʃ.'ʃa.vaj.'ne.ʃ.'kri.ʃa]. Apheresis can even apply phrase-initially (38c) in the absence of a preceding consonant or vowel – most likely the result of influence from Romanian and Macedonian, which allow word-initial /sC/ clusters.

Other Judeo-Spanish varieties also show a tendency to avoid hiatus. The examples from Eastern Judeo-Spanish in (14a, b) and (15a, b) involve a variable alternation between [j] and Ø in the specific context of an adjacent front vowel. In Moroccan Judeo-Spanish, words of Hispanic origin with an internal sequence of any two vowels in hiatus sometimes show insertion of a voiceless glottal fricative /h/ or plosive /ʔ/, which are both found in Arabic, e.g. [d̪i'haβlo] 'devil', [maʔu'jar] 'meow_{INF}', [ma'ʔujo] 'meow' (cf. Sp. *diablo*, *maullar*).

Many Judeo-Spanish dialects show variation involving diphthongs and monophthongs. VLat. open-mid /ɛ ɔ/ in stressed syllables had become rising diphthongs

/je we/ in central and northern areas of the Iberian Peninsula (↗24 Spanish) but remained monophthongs in the eastern and western areas of the south. This variation at the time of the expulsion was carried into Judeo-Spanish, which showed competition between forms of words with etymological /ε ɔ/. In many cases, the attested outcome in contemporary Judeo-Spanish lacks the diphthong found in the corresponding Spanish form, e.g. Istanbul JSp. [ˈpreto] ‘dark’, [ˈponte] ‘bridge’, [ˈʃorte] ‘fate’, Bosnian JSp. [kenˈker] ‘whoever’, [kwalˈker] ‘whichever’, [ˈportu] ‘port’, vs. Sp. [ˈprieto] *prieto*, [ˈpwente] *puente*, [ˈʃwerte] *suerte*, [kjenˈkjera] *quienquiera*, [kwalˈkjer] *cualquier*, [ˈpwerto] *puerto*. Particular lexical items in some Judeo-Spanish dialects can show free variation, e.g. Balkan JSp. [ˈdenti] ~ [ˈdjen̩ti] ‘tooth’, [ˈkorpu] ~ [ˈkwerpu] ‘body’, vs. Sp. [ˈdiente] *diente*, [ˈkuerpo] *cuerpo*. Diphthongization under stress has even been generalized to words that never had etymological /ε ɔ/, e.g. Bucharest JSp. [ˈkjezu] ~ [ˈkezu] ‘cheese’, [ˈpwelvu] ~ [ˈpolvu] ‘dust’, [ˈpwenju] ~ [ˈpunju] ‘fist’, vs. Sp. [ˈkeʃo] *queso*, [ˈpolβo] *polvo*, [ˈpuɲo] *puño*. By the opposite process of monophthongization, the falling diphthong /ej/ changed to a close-mid /e/ in many 20th-century Judeo-Spanish varieties, except those of Greece and Israel, e.g. [ˈpleto] ‘dispute’, [aˈzeɾe] ‘oil’, [afeˈtarʃe] ‘shave_{INF}’, vs. northern central Peninsular Sp. [ˈplejto] *pleito*, [aˈθejte] *aceite*, [afejˈtarʃe] *afeitarse*. In some Eastern Judeo-Spanish dialects, due to contact with Greek, labiovelar [w] in coda position strengthens to a labiodental obstruent [ɱ], e.g. [evˈropa] ‘Europe’ vs. Sp. [ewˈropa] *Europa*, effectively reducing the number of possible falling diphthongs.

4 Morphophonological alternations

Analogical extension has given rise to changes in Judeo-Spanish pronominal paradigms. In the first-person plural object pronoun and its related possessive, the alveolar nasal has become bilabial, i.e. OSp. /noʃ/ ‘us’, /nweʃtro/ ‘our’ > JSp. /moʃ/, /mweʃtro/, plausibly the result of a double analogy with the first-person singular object pronoun /me/ ‘me’ and the first-person plural verbal ending /-moʃ/ (a similar phenomenon can be found in Valencian and Balearic Catalan, ↗23 Catalan). Analogy with /n/-final third-person verbal endings has given rise to an enclitic allomorph [ʃen] of the third-person plural reflexive pronoun /ʃe/ ‘themselves’, e.g. [empeˈʃaronamiˈraʃen] *empe-saron a mirarsen* ‘they began to look at themselves’, which is also found in southern Peninsular Spanish.

Several instances of morphological leveling are found in verbal paradigms. First, the singular and plural endings /-i/ and /-imos/ of the first-person preterite forms of /-er/ and /-ir/ verbs have been generalized to /-ar/ verbs, e.g. [kanˈti] ‘sing_{1SG.PRET}’, [kanˈtamos] ‘sing_{1PL.PRET}’ vs. Sp. [kanˈte] *canté*, [kanˈtamos] *cantamos*, thereby simplifying the first-person preterite paradigm for all three verb classes. Second, in second-person singular forms of the preterite, /s/ has migrated rightward from preconsonantal

to word-final position, e.g. [a'vlat̪es̪] (</a'vlat̪e/) 'speak_{2SG.PRET}', [i'zite̪s̪] (</i'zite/) 'do_{2SG.PRET}' vs. Sp. [a'βlaſte] *hablaste*, [i'θiſte] *hiciste*. Sibilant metathesis in the preterite has the effect of regularizing the entire paradigm of second-person singular verb forms, all of which end in /s̪/. Third, recall that in second-person plural forms of the present, word-final /j̪s̪/ clusters coalesce to a voiceless postalveolar sibilant, e.g. [kaŋ'ta] (</kaŋ'tajs̪/) 'sing_{2PL}' (cf. 3.1). Postalveolar /j̪/ has been analogically extended to the corresponding second-person plural preterite forms, e.g. [a'vlat̪e] 'speak_{2PL.PRET}', [i'zite] 'do_{2PL.PRET}', [kaŋ'tate] 'sing_{2PL.PRET}', such that word-final /j̪/ now marks second-person plural in both the present and the preterite. Fourth, many verbs in contemporary Spanish show a morphophonological alternation between unstressed close-mid [e o] and stressed rising diphthongs [je we] (cf. 3.5). Judeo-Spanish levels such alternations to the monophthong, e.g. [ro'ʎo] ~ [ro'ʎar] 'beg_{1SG}' ~ 'beg_{1INF}', [kero] ~ [ke'rer] 'want_{1SG}' ~ 'want_{1INF}', or the diphthong, e.g. [pwe'ðo] ~ [pwe'ðer] 'can_{1SG}' ~ 'be able_{1INF}', [mwes̪'tro] ~ [mwes̪'trar] 'show_{1SG}' ~ 'show_{1INF}', vs. Sp. [rwe'ʎo] *ruego* ~ [ro'ʎar] *rogar*, [kjero] *quiero* ~ [ke'rer] *querer*, [pwe'ðo] *puedo* ~ [po'ðer] *poder*, [mwes̪'tro] *muestro* ~ [mos̪'trar] *mostrar*. Similarly, the rising diphthong has been generalized in the morphologically-related pair JSp. [bwe'no] ~ [bwen̪'dað] 'good' ~ 'goodness, kindness', vs. Sp. [bwe'no] *bueno* ~ [bon̪'dað] *bondad*.

Some phonological processes in Judeo-Spanish are limited to specific morphological contexts and have often led to the creation of new surface allomorphs. Although coda sibilants in Judeo-Spanish are otherwise immune to weakening, a process of consonant deletion targets the final /s̪/ of first- and second-person plural object pronouns /mo̪s̪/ 'us' and /vo̪s̪/ 'you_{PL}' when they appear before another clitic pronoun, e.g. [moloðe'fo] 's/he left it to us', [voloði'ðo] 'I tell it to you_{PL}', vs. Sp. [nozloðe'xo] *nos los dejó*, [ozloði'ðo] *os lo digo*. The opposite process of consonant epenthesis is found in many Balkan Judeo-Spanish dialects. Plausibly modeled on, e.g. /en/ 'in', /kon/ 'with', /šin/ 'without', the vowel-final prepositions /a/ 'to', /para/ 'for', and /ði/ (</ðe/) 'of' have developed a non-etymological [n] before vowel-initial personal or demonstrative pronouns, thereby avoiding hiatus in these contexts, e.g. [a'nel] 'to him', [para'nešte] 'for this one', [ðina'kel] 'of that one'. In Bulgarian Judeo-Spanish, an apocopated variant /or/ of the Romanian conjunction /ori/ 'or' has replaced Hispanic /o/ 'or' in both prevocalic and preconsonantal contexts.

In forming the plural of nouns and adjectives, Judeo-Spanish draws from a range of suffixes, including not only Hispanic /-s̪/ but also Hebrew /-im/, Aramaic /-in/, and Turkish /-lar/. The most productive suffix is /-s̪/, which can be used with Hispanic words as well as loanwords and shows the following distribution of allomorphs: [e̪s̪] appears with nominals ending in a consonant or glide, and [s̪] with nominals ending in a vowel, whether unstressed or stressed, e.g. [kal] > [kale̪s̪] 'synagogue_{PL}', [palo] > [pale̪s̪] 'stick_{PL}', [maŋ'ti] > [maŋ'tis̪] 'dumpling_{PL}'. The exceptionless distribution of allomorphs suggests a maximally simple process of /e/-epenthesis that derives [e̪s̪] from underlying /-s̪/ after a singular base ending in a consonant or glide. Contemporary Spanish shows a slightly different

distribution in which [eɣ] appears after stressed vowels, e.g. [xaβa'li] > [xaβa'lies] 'wild boar_{PL}', and [ɣ] after consonant-final loanwords, e.g. ['fan] > ['fanɣ] 'fan_{PL}'.

The most complex interaction of morphology and phonology is found in the formation of diminutives, which in Judeo-Spanish are used to express smallness, youngness, and weakness, among other meanings. In Eastern dialects, nominals ending in unstressed morphological class markers /-o/, /-a/ form their diminutives with the suffix /-iko/, /-ika/, e.g. ['palo] > [pa'liko] 'stick_{DIM}', ['rama] > [ra'mika] 'branch_{DIM}'. The presence of a dorsal consonant in the final syllable of the stem triggers a process of place dissimilation in the suffix, thereby avoiding repeated dorsal onsets across a vowel, e.g. ['sako] > [sa'kiɰo] 'sack_{DIM}', ['miɣa] > [mi'ɣiɰa] 'crumb_{DIM}'. When the stem ends in a stressed non-front vowel, hiatus is variably maintained or avoided by palatal glide epenthesis, e.g. [pa'ra] > [para'ika] ~ [para'jika] 'money_{DIM}', while stem-final stressed front vowels are deleted, e.g. [maɳ'ti] > [maɳ'tiko] 'dumpling_{DIM}', [kʲef'te] > [kʲef'tika] 'meat patty_{DIM}'. In Thesaloniki Judeo-Spanish, final stressed /-a/ and the initial vowel of the suffix undergo coalescence to a close-mid front vowel, e.g. [pa'ra] > [par'eka] 'money_{DIM}'. Finally, the suffixal allomorph [-zik-] attaches to monosyllabic stems that take the class markers /-e/ or Ø, in which case /e/-epenthesis applies to satisfy a minimal word condition requiring at least two syllables before the suffix, e.g. /boɰ+e/ [boɰe'ziko] 'jar_{DIM}', /kal/ [kale'ziko] 'synagogue_{DIM}'. The /z/-initial allomorph also attaches to monosyllabic stems that are underlyingly bimoraic, even if they end in class markers /-o/, /-a/. Examples contain either a rising or falling diphthong in the initial syllable, e.g. ['pjano] > [pjane'ziko] 'piano_{DIM}', ['rejna] > [rejne'zika] 'queen_{DIM}', or an intervocalic trill in word-medial position, e.g. ['gera] > [gere'zika] 'war_{DIM}', which supports a phonological representation of the trill as a moraic tap /r/ (cf. Bradley/Smith 2011 for a complete analysis of Judeo-Spanish diminutive allomorphy).

5 Stress and intonation

As in Spanish, stress is lexically contrastive, e.g. Istanbul JSp. ['pera] 'pear' vs. [pe'ra] '(name of a neighborhood)'. Many Hispanic proparoxytones have shifted their stress onto the final syllable, likely due to influence from Turkish and French, e.g. [paʃa'ro] 'bird', [nume'ro] 'number', cf. Sp. ['paxaro] *pájaro*, ['numero] *número*. In some Judeo-Spanish words, the hiatus sequence of the Spanish etymon now corresponds to a diphthong, as a result of stress shift onto the more open vowel, e.g. [dʒu'ɰjo] 'Jewish' (cf. Sp. [xu'ði.o] *judío*), [gaj.na] < [ga'i.na] 'hen' (cf. the example in 17a).

Spanish is a syllable-timed language, showing relatively equal duration between syllable boundaries. Although not to the same degree as English, Bulgarian is stress-timed, showing greater variation in the duration of consonant and vowel intervals.

For Bulgarian Judeo-Spanish, Fischer/Gabriel/Kireva (2014) report values of durational variability in vowel intervals that are intermediate between the values observed in monolingual Spanish and Bulgarian, which points to a convergence of rhythmic systems in Bulgarian-Judeo-Spanish bilingual speakers.

Although intonation is largely missing from traditional descriptions of Judeo-Spanish, recent studies have begun to document intonational contours using acoustic analysis. Hualde/Şaul (2011) report that the main contours of Istanbul Judeo-Spanish do not differ significantly from Peninsular Spanish. Pitch peaks associated to stressed syllables show progressive downstepping from the beginning of declarative sentences. Nuclear, i.e. sentence-final, peaks fall within the stressed syllable, while prenuclear peaks are typically displaced onto the following unstressed syllable. Andreeva et al. (2017; 2019) show that speakers of Sofia Judeo-Spanish use virtually the same inventory of pitch accents and boundary tones in both of their languages, i.e. Bulgarian and Judeo-Spanish.

6 Conclusion

This chapter has offered a unified description of the sound system of Judeo-Spanish. Drawing upon an extensive corpus assembled from previous literature spanning more than a century, the description not only summarizes long-known facts about the Judeo-Spanish phonology but also synthesizes new insights that recent studies have brought to light over the past decade. Regular sound correspondences have served to illustrate linguistic variation across Judeo-Spanish varieties, which includes the patterning of loanwords from co-territorial languages. It is my hope that by increasing the visibility of the language within a broader typology of Romance phonetics and phonology, this chapter will encourage even more students and researchers to take a look at the phonology of Judeo-Spanish and, in particular, to continue investigating its lesser studied aspects, such as stress and intonation patterns.

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26 Portuguese

Abstract: This chapter offers an overview of some of the most significant aspects of Portuguese phonetics and phonology. It contemplates the language's phonological inventory, and several lexical and post-lexical segmental processes, accounting for major (morpho)phonological alternations in the language. It also describes various aspects of suprasegmental phonology, such as word and phrasal prominence, tonal inventory, tones distribution, duration, and rhythm. The phonology of prosodic domains operative in the language is surveyed, exposing areas of interaction of phonology with other components of grammar. While its main focus is the standard variety of European Portuguese, this chapter also includes dedicated sections highlighting distinctive traits of other dialects of this variety, as well as the Brazilian variety of Portuguese.

Keywords: Portuguese, segmental phonology, prosodic phonology, intonational phonology, rhythm

1 Introduction

Portuguese is spoken in Europe (Continental Portugal and the Azores and Madeira archipelagos), South America (Brazil), Africa (Cape Verde, São Tomé and Príncipe, Guinea-Bissau, Angola, Mozambique), Asia (Macao, East Timor, and only to a residual extent, in some areas of India; cf. Segura 2013a). While Portuguese is the native language of more than 210 million, often monolingual, speakers in Portugal and Brazil, in the other regions of the world it tends to coexist with other native languages. Globally, over 230 million people are estimated to speak Portuguese as a native language (Reto 2012; Segura 2013a).

In this chapter we outline the major facts of Portuguese phonetics and phonology, with particular focus on the standard variety of European Portuguese, spoken in the Lisbon area. In our description, we adopt the distinction between *lexical* and *post-lexical phonology*, as well as the basic tenets of feature geometry theory, autosegmental phonology, prosodic phonology, and intonational phonology (cf. Kaisse/Shaw 1985; Goldsmith 1990; Nespor/Vogel 1986/2007; Clements/Hume 1995; Ladd 1996/2008; and

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references therein). Along the lines of most literature on Portuguese phonology in the last decades, we may assume that phonetic realization follows from the application of rules to underlying forms (*à la* Chomsky/Halle 1968) or the interaction of ranked constraints, as modeled in the framework of Optimality Theory (Prince/Smolensky 1993/2004, among others).

We first describe the segmental inventory of the language and lexical segmental processes (Sections 2–3). Post-lexical phonological and phonetic processes are surveyed in the section devoted to prosodic phonology, where various kinds of phonological phenomena are considered (Section 4). A few areas of variation across European Portuguese dialects are also highlighted, as well as major differences between European Portuguese and the variety of Portuguese spoken in Brazil (Sections 5–6). We conclude in Section 7 with some final remarks.

2 Segmental inventory

2.1 Vowels and glides

The underlying vowel system comprises seven oral vowels (cf. Table 26.1). Central close and mid-close vowels (respectively, [i] and [e]) are phonetic variants found in specific phonological contexts (cf. 3.1). Underlying glides (i.e. obligatory, unpredictable glides) tend to appear only in post-vocalic position (*pai* ['paj] ‘father’; *pau* ['paw] ‘stick’). Prevocally, glides are most often optional variants of underlying vowels (*piano* [pi'enu]~['pjenu] ‘piano’).

Table 26.1: Oral vowels (and glides) in European Portuguese.
Underlying segments inside slashes; variants only found superficially inside square brackets.

	Front	Central	Back
	Unrounded	Unrounded	Rounded
Close	/i/ [i] (/j/ [j])	[i]	/u/ [ũ] (/w/ [w])
Close-mid	/e/ [ẽ]	[e] [ẽ]	/o/ [õ]
Open-mid	/ɛ/		/ɔ/ [õ]
Open		/a/ [ã]	

Obligatory rising diphthongs have long been noticed in words with velar consonants (*água* ['agwe] ‘water’; *quando* ['kwẽdu] ‘when’). Their phonological status is controversial. For example, for Massini-Cagliari/Cagliari/Redenbarger (2016) these sequences correspond to obligatory rising diphthongs, while for other scholars they contain an underlying labialized velar plosive (/k^w g^w/), instead of a velar consonant

and a full glide (e.g. Mateus/d'Andrade 2000). Despite Mateus/d'Andrade (2000, 110, fn. 2) and others, we should notice that there are actually other consonants that precede obligatory, unpredictable rising diphthongs, for instance with the sequence <ion>, as in *racional* [resju'nal] 'reasoned', *avioneta* [evju'nete] 'small aircraft' (but *diurno* [di'urnu] or [dju'urnu] 'diurnal'; *biologia* [biulu'zie] or [bjulu'zie] 'biology') (Vigário 2016). This means that European Portuguese has underlying glides preceding vowels with which they will form a rising diphthong. Whether this analysis is suitable only for the sequence <ion> or should be adopted for the sequences involving velar plosives mentioned above requires further research.

For some authors, glides always correspond to underlying vowels (Mateus/d'Andrade 2000, 30). In this case, it is necessary to explain why some vowels always surface as glides, while others do not (e.g. *vaidade* [vaj'dad] 'vanity' vs. *sairia* [sei'rie] 'leave_{3SG.COND}'; *avioneta* [evju'nete] 'light aircraft' vs. *viola* [vi'ole] or [vjole] 'guitar').

The formation of oral diphthongs coming from the combination of underlying vowels depends on prosodic information, as we will see in 3.1, 4.2, and 4.3.2. Nasal vowels result from the association of a nasal feature to a syllabic nucleus (cf. 3.2). Because open and open-mid nasal vowels undergo a general raising process (e.g. *campo* ['kẽpu] (← /kaNpu/) 'field'), the open-mid and close-mid contrast is neutralized in this context (e.g. *vento* ['vētu] 'wind', *[vẽtu]; *ponto* ['põtu] 'dot', *[põtu]), and nasal variants of /ɛ/, /a/, and /ɔ/ are usually supposed not to exist in Standard European Portuguese (Mateus/d'Andrade 2000, 19; Bisol/Veloso 2016). However, this is in fact not accurate, as [ã] and [õ] regularly emerge as a result of central vowel merging across words (cf. 4.3.2) and of Spondaic Lowering (cf. 3.1), respectively.

Nasal diphthongs are a particular feature of Portuguese, considering the Romance languages area (e.g. *mãe* ['mẽj] 'mother'; *cão* ['kẽw] 'dog'; *põe* ['põj] 'put'). Because of their phonological origin, nasal diphthongs are mostly found in word-final position (cf. 3.2).

Position in the word and relative to word stress are the major conditioning factors for vowel distribution, together with feature similarity between vowels and adjacent segments (cf. 3.1).

European Portuguese vowels and glides are commonly characterized with the following binary distinctive features: [high], [low], [back], [round] (Mateus 1975/1982; d'Andrade Pardal 1977; Mateus/d'Andrade 2000). Under this approach, close-mid vowels are characterized as [-high, -low], whereas open-mid and open vowels are [+low], since open-mid and open vowels often pattern as a single class. A three-way distinction in height ([±open₁], [±open₂], and [±open₃]) is also found in the literature, especially when the Brazilian variety of Portuguese is considered (Wetzels 1992; Bisol/Veloso 2016). Central and back vowels are classified as [+back], whereas front vowels are [-back]; and front and central vowels are [-round], whereas [u o ɔ] are [+round].

2.2 Consonants

The consonantal system comprises the consonants in Table 26.2.

Table 26.2: European Portuguese consonants. Underlying consonants appear between slashes; variants only found superficially between square brackets.

	Bilabial, Labiodental		Dental, Alveolar		Postalveolar, Palatal	Velar	Uvular
Plosive	/p/	/b/	/t/	/d/		/k/	/g/
Fricative	/f/	/v/	/s/	/z/	/ʃ/	/ʒ/	[ʁ]
Nasal	/m/		/n/		/ɲ/		
Lateral			/l/ [ɫ]		/ʎ/		
Trill			[r]		[ʀ]		
Tap			/ɾ/				

Plosives may also surface as (non-strident) fricatives, but this is not a salient phenomenon in Standard European Portuguese (e.g. Mateus/d'Andrade 2000). For this reason, we have not included these realizations in Table 26.2. Most phonologists report spirantization of voiced plosives only ([β ð γ]; e.g. Barbosa 1965/1983, d'Andrade Pardal 1977; Mateus/d'Andrade 2000). Spirantization can occur when the underlying plosive appears between vowels (as in *o gado* [u'ɣaðu] 'the cattle') or when it is preceded or followed by a liquid or a glide. By contrast, the process does not apply if the preceding vowel or glide is nasal (Barbosa 1965/1983; d'Andrade Pardal 1977).

There is individual variation in the use of trills in Standard European Portuguese, i.e. [ʀ] or [r] may be found, depending on the speaker, but the uvular variant is currently the most common, also surfacing as a fricative ([ʁ] or [χ]). Trills are in complementary distribution with the tap (/ɾ/). Distributional evidence indicates that trills result from a process of strengthening of /ɾ/ (cf. 3.2).

Alveolar laterals are usually realized with some degree of velarization (Andrade 1999; Rodrigues et al. 2019), but the secondary velar articulation has been particularly noted in phonological literature when laterals are in syllable final position, in which case they are represented as [ɫ] (cf. 4.1, 4.3.2).

There is some disagreement as to the underlying status of palatal sonorants. These segments are explicitly assumed to be underlying singleton palatals in Pereira (1999) and Mateus/d'Andrade (2000), among others. However, there are several distributional facts pointing to the underlying complex nature of [ɲ] and [ʎ], which, for that reason, have also been proposed to be in fact underlying geminates, associ-

ated to syllable onset and the coda of a preceding syllable (Wetzels 2000; Massini-Cagliari/Cagliari/Redenbarger 2016; Collischonn/Wetzels 2016). For example, palatal sonorants may appear word-internally, but not in prosodic word-initial position; and, although the syllables that precede [ɲ] and [ʎ] are always superficially open, they seem to behave as closed syllables when we look at main stress distribution. We may note, nevertheless, that palatal sonorants do not trigger the same effects in the preceding vocalic nucleus as postvocalic glides and coda nasals (cf. 4.1); besides that, stress may be accounted for without reference to syllable weight (cf. 3.3).

Other limitations in consonants' distribution relate essentially to syllable constraints (cf. 3.2, 4.1). Processes that affect consonants often involve the specification of underspecified underlying segments, conditioned by prosodic position.

According to Mateus/d'Andrade (2000, 26), the distinctive features in (1), organized along the lines of the feature geometry framework of Clements/Hume (1995), are involved in the European Portuguese consonantal contrasts and processes.

- (1) Root node features/nodes: [sonorant], [lateral], [nasal], Laryngeal,
Oral cavity
Laryngeal node feature: [voice]
Oral cavity node feature/node: [continuant], C-Place
C-Place nodes: labial, coronal, dorsal
Coronal feature: [anterior]
Dorsal feature: [back]

European Portuguese laterals are classified synchronically as [+continuant] on the basis of their distribution within the syllable, since they are allowed in coda position, unlike [-continuant] consonants, i.e. plosives and nasals (Mateus/d'Andrade 2000; cf. 4.1).

Mateus/d'Andrade (2000) argue for an underlying consonantal system that is very much underspecified. Underspecified segments may be specified by default, via systemic or physical redundancy rules, or by the application of phonological processes. Considering only the latter kind, underspecified consonants in European Portuguese are limited to domain-final segments (cf. 3.2, 4.1).

3 Lexical processes

As in other languages, there are several lexical phonological processes that, despite being conditioned by lexical or morphological information, apply quite systematically in Standard European Portuguese.

3.1 Segmental processes affecting vowels

A number of lexical processes affect European Portuguese vowels. Here we briefly review some of the most important ones.

3.1.1 Vowel reduction

Vowels undergo dramatic reduction in both pretonic and posttonic position. Vowel reduction (VR) consists of the raising of central and back vowels (/a/ → [e]; /ɔ o/ → [u]), and the raising and centralization of non-back non-close vowels (/ɛ e/ → [i])¹ (cf. e.g. Mateus 1975/1982; Mateus/d'Andrade 2000). The examples in (2) illustrate typical vowel alternations in stressed and unstressed position.

(2)	cedo	[ˈsedu] ‘early’	cedinho	[siˈdɨnu]	‘early _{DIM} ’
	testa	[ˈtɛʃtɐ] ‘test _{3SG} ’	testar	[tiʃˈtar]	‘test _{INF} ’
	fala	[ˈfalɐ] ‘speak _{3SG} ’	falar	[fɐˈlar]	‘speak _{INF} ’
	gordo	[ˈɡordu] ‘fat _{M.SG} ’	gordura	[ɡurˈdure]	‘fat _{NOUN} ’
	roda	[ˈɾodɐ] ‘turn _{3SG} ’	rodar	[ruˈdar]	‘turn _{INF} ’

Extending Wetzel’s (1992) analysis of pretonic vowel neutralization in Brazilian Portuguese, Bisol/Veloso (2016) analyze European Portuguese vowel reduction as the delinking of aperture features and two distinct processes: neutralization, which consists of the raising of non-back and of round vowels, and subsequent centralization of [i] → [ɨ] and [a] → [ɐ].

Stressless /i/ only undergoes VR (i.e. centralization) in verb-final syllables (*partir* [pɐˈtir] ‘leave_{INF}’ / *partes* [ˈpartɨʃ] ‘leave_{2SG}’ or, more frequently, [ˈpartʃ], after schwa deletion; cf. 4.1, 4.2).

There are systematic exceptions to VR, which depend on various kinds of prosodic, and in some cases also morphological, information (Mateus 1975/1982; Mateus/d'Andrade 2000; Vigário 2003, 67–73 and 92–99; cf. also 4.1, 4.2). For instance, unstressed vowels do not reduce completely in prosodic word-initial position (thus, the initial vowel of *ovelha* ‘sheep’ may be realized as [o] or [ɔ], but not as [u]). Additionally, VR does not apply in syllables containing diphthongs or ending in a lateral (e.g. unstressed /a/ in *vaidade* ‘vanity’ and *salgado* ‘salty’ surfaces as low, instead of close-mid), nor at the right edge of a prosodic word that contains a morphological root within a morphological compound (always in non-final position of the

¹ From a phonological point of view, /e/ and /ɛ/ are classified as non-back and [i] as back; from a phonetic perspective, when we look at the so-called vocal triangle, [i] is a central vowel. This is why reduction of non-back vowels in stressless position is usually characterized as (raising and) centralization.

compound), as in *monogâmico* ['mɔnɔ'gɐmiku] 'monogamous' (cf. Vigário 2003 for further illustration).²

Unpredictable exceptions are also frequent (e.g. *procura* [prɔ'kure] 'search', *retórica* [ɾɛ'tɔrike] 'rhetoric'). As noted in Vigário (2003; 2016), exceptions must be lexically specified for whole words rather than morphemes, because the same morpheme may be realized with or without VR depending on the word within which it appears – for example, /ɛ/ in the root *velh-* surfaces as low in *velharia* [vɛɫɐ'ɾie] 'antique' but as schwa/∅ in *envelheço* [ẽvɨ'ɫɛsu] or [ẽv'ɫɛsu] 'age_{1SG}', despite the fact that in both cases it is in stressless position;³ furthermore, except for PW initial position, when unstressed non-close vowels do not undergo VR they always surface as open.

3.1.2 Centralization of /e/

In Standard European Portuguese /e/ usually surfaces as [ɐ] when followed by a high palatal segment, as illustrated in (3) (Mateus 1975/1982; d'Andrade 1994a; Mateus/d'Andrade 2000; Vigário 2003).

(3) fecho	['fɛʃu]	'zip'
cereja	[si'ɾɛʒɐ]	'cherry'
engenho	[ẽ'ʒɛɲu]	'cleverness'
telha	['tɛɫɐ]	'tile'
europeizar	[ewɾupɛi'zar]	'europeanize _{INF} '
areia	[ɐ'rejɐ]	'sand'

Palatal fricatives in coda position, by contrast, do not trigger /e/ centralization (*cesto* ['sɛʃtu]/*['sɛʃtu] 'bin', *mesmo* ['mɛʒmu]/*['mɛʒmu] 'even'). D'Andrade (1994a) interprets the absence of centralization in this context to follow from the fact that, when /e/ centralization operates, coda fricatives are not yet specified as palatal, being specified as such only at a later stage. This analysis cannot be applied here, however, as there is

² *Monogâmico*, like many other morphological compounds and other types of morphosyntactic words, is formed of two prosodic words (PW), each of which with one PW-level stress (i.e. ['mɔnɔ] and ['gɐmiku]). The two PW are grouped into one prosodic word group (PWG). At the PWG level, prominence falls on the last PW. Since in our phonetic transcriptions, we mark PW-level stress, the transcriptions of this type of words include more than one main stress. Cf. 4.2 for the distinction between PW- and PWG-level stress.

³ As we will see in 4.1, schwas, and less frequently stressless [u], are often deleted in normal, and more so in fast speech rate. In these cases, the organization of segments within the syllable becomes unclear. In order to avoid any assumption on the post-lexical status of the syllable in European Portuguese, in this chapter stress marks are indicated right before what we take to be the *lexical* syllable. Additionally, the phonetic transcription of the variants with and without schwa and [u] deletion will be given only occasionally.

evidence that coda fricatives must be specified at least as non-back at the lexical level, because the place of articulation of the plural morpheme ([ʃ]) participates in the lexical specification of the back feature of glides derived from nasals and laterals in rhyme position – e.g. in *animais* [eni'majʃ], the plural form of *animal* [eni'maɫ] ‘animal’, the lateral surfaces as a glide that is homorganic to the following fricative, instead of the preceding vowel, that is, it surfaces as [j] instead of [w] (Morales-Front/Holt 1997; Vigário 2003, 74–82; cf. also 3.2, below). For Vigário (2003), therefore, there are two contexts for /e/ centralization: *heterosyllabic /e/ centralization* applies when /e/ is followed by a(ny) high palatal segment that belongs to a different syllable, as shown in the examples in (3); and *tautosyllabic /e/ centralization* applies when a palatal glide is part of the same syllable nucleus as /e/ (as in *leiteiro* [lej'tej.ru] ‘milkman’).

With heterosyllabic fricatives only, there is a very small number of exceptions to /e/ centralization (e.g. *mexo* ['mefu] ‘touch_{1SG}'). By contrast, enclitics, which incorporate post-lexically into the host prosodic word, never trigger it, e.g. *dê-lha* ['deʎe]/*['deʎe] ‘give_{3SG.IMP-3SGDAT-ACC.F.SG}'). The fact that /e/ centralization has exceptions and that palatal segments that do not trigger centralization integrate the same prosodic word as /e/ only post-lexically indicates that this is a lexical process (Vigário 2003).

3.1.3 Monophthongization of /ow/

The diphthong /ow/ systematically undergoes monophthongization, surfacing as [o] (e.g. *roupa* ['rope] ‘clothes’) (Mateus 1975/1982; Miguel 1994; Mateus/d'Andrade 2000). Evidence for the underlying diphthong is the fact that monophthongized [o] in stressless position does not undergo vowel reduction, unlike synchronic underlying /o/ (e.g. *roupa* [ro'pejru]/*[ru'pejru] ‘wardrobe’ vs. *sopeira* [su'pejre]/*[so'pejre], ‘household servant_F’, compared with *sopa* ['sope] ‘soup’; Miguel 1994).

To our knowledge, except for word-initial position, in native words [o] in stressless position can only be found in (superficially) open syllables that derive from /ow/; by contrast, underlying /o/ in open syllables undergoes systematic vowel reduction in stressless position, except in prosodic word-initial position, where vowels systematically reduce less (*ocupado* [oku'padu] or [ɔku'padu], but *[uku'padu]) (cf. Vigário 2003, 92–99). The diphthong [ow] may nevertheless also surface in European Portuguese because when /o/ is stressed and followed by /u/ in prosodic word-final position, post-lexical V2 semivocalization optionally applies, as in *doo*, realized as ['dou] or ['dow] ‘donate_{1SG}’ (monophthongization cannot apply here, however; Vigário 2003, 100–102).

3.1.4 Underlying V+/N/ sequences: nasalization and raising

In most accounts of Portuguese phonology and in different theoretical frameworks, nasal vowels are assumed to correspond to underlying oral vowels followed by an

underspecified nasal segment in syllable final position – usually represented as /N/, but also analyzed within the autosegmental framework as a floating autosegment (Câmara 1953; Barbosa 1965/1983; d'Andrade/Kihm 1988; cf. also Morales-Front/Holt 1997, 429, endnote 2, for work adopting a phonemic account of nasal vowels, and Guimarães/Nevins 2013, who found evidence for one particular phonemic nasal vowel in Brazilian Portuguese). Thus, words such as *mundo* ['mũdu] 'world' vs. *mudo* ['mudu] 'mute' are not minimal pairs, because in the underlying representation there is an additional segment in *mundo* (cf. /muNdu/ vs. /mudu/). Distributional evidence corroborates this analysis. For example, syllables with nasal vowels may not be closed by liquids (*['mũrdu], *['mũɫdu]) (cf. 4.1); and segments that may not follow heterosyllabic consonants, such as the tap or palatal sonorants, cannot follow a nasal vowel either, indicating that the nasal autosegment patterns like a coda consonant (Câmara 1953; Morales-Front/Holt 1997; Mateus/d'Andrade 2000; cf. 2.2, 3.2).

Non-close vowels preceding underlying nasals tend to surface as non-open, and more so when vowels surface as nasal, i.e. when the underlying nasal is syllable final (Mateus 1975/1982). This behavior is found in European and Brazilian Portuguese. Nevertheless, in Standard European Portuguese only, /a/ systematically escapes raising to [ɐ] before a nasal consonant in the past perfect tense, e.g. *falámos* [fe'lamu] 'speak_{IPL,PRET}'. Exceptions to the raising of vowels when followed by a nasal are more frequent with non-central vowels, however, in particular in words with exceptional stress patterns (cf. below). Furthermore, as pointed out in Mateus (1975/1982), in 1st-conjugation verbs non-close non-central vowels preceding nasal consonants usually surface as open, as in *tomas* ['tome] 'take_{2SG}'.

3.1.5 Processes dependent on particular stress patterns

Four major processes are concomitant with exceptional stress patterns.

Dactylic Lowering and Spondaic Lowering, which were first described for Brazilian Portuguese by Wetzels (1992; 2006/2007), also operate in the European variety of Portuguese (Vigário 2016). Dactylic Lowering is a process that opens stressed vowels in proparoxytone non-verbs, e.g. *esquelético* [ʃk'letiku] (or [ʃki'letiku]) 'skeletal', compared with *esqueleto* [ʃk'letu] (or [ʃki'letu]) 'skeleton'. In European Portuguese this rule wins over the rather general process that neutralizes open-mid and close-mid oral vowels before nasal consonants, with vowels usually surfacing as close-mid, as we have seen above – cf. *António* [ẽ'tɔnju] (proper name), *prémio* ['premjɐ] 'prize', *anónimo* [ẽ'nɔnimu] 'anonymous'.

Spondaic Lowering opens stressed close-mid vowels in non-verbs with penultimate stress ending in a closed syllable, as in *dócil* ['dɔsi] 'gentle', to be compared with *doce* ['dosi], or most often ['dos] 'sweet' (cf. also 4.1). In European Portuguese this rule is also responsible for the only instances of [ɔ̃] in the language, which can be found in the speech of many speakers of European Portuguese (e.g. *ontem* [ʔtẽj])

‘yesterday’; *anteontem* [ẽ'tjõtẽ] ‘the day before yesterday’; Vigário 2016). Furthermore, despite the fact that non-close vowels often surface as close-mid before a nasal consonant, Spondaic Lowering may explain why open and open-mid vowels appear in that context, as *ténis* [ˈtɛniʃ] ‘tenis’, *Vénus* [ˈvɛnuʃ] ‘Venus’, *abdómen* [ɐbˈdõmɐn] ‘abdomen’.

In European Portuguese there is yet another rule of opening that affects non-close vowels in words with exceptional stress patterns, but instead of targeting stressed vowels, in this case it affects post-tonic vowels in syllables closed by non-inflectional consonants in prosodic word-final position, as in *júnior* [ˈʒunjɔɾ] ‘junior’, *revól-ver* [Rˈvɔʎvɐɾ] ‘revolver’, *âmbar* [ẽˈbar] ‘amber’, *sílex* [ˈsileks] ‘silex’, *Lúcifer* [ˈlusifer] ‘Lucifer’, *abdómen* [ɐbˈdõmɐn] ‘abdomen’ (Vigário 2003; 2016).⁴ Importantly, the rule applies equally to words with penultimate and antepenultimate stress.⁵

The last process that operates in a particular way because of a marked stress pattern is post-tonic non-final gliding, as in *família* [fɛˈmiljɐ] (Mateus 1975/1982; Vigário 2003; 2016; Wetzels 2006/2007). Because of its post-lexical status, we will return to this process in 4.2.

3.1.6 Other lexical processes affecting vowels

There are a number of specific and very systematic processes, many of them operating in the verbal system (Mateus 1975/1982; d’Andrade 1994b; 1994c; Mateus/d’Andrade 2000, 81–87; Vigário 2003, 73–78; Matzenauer/Miranda 2005). For space limitations, we merely list some of them here: deletion of the theme vowel when followed by a vowel, as in *falo* [ˈfalu] (/fal+a+u/) ‘speak_{1SG}’; hiatus resolution via glide insertion, where the first vowel is /e/, as in *passeio* [pɛˈsɛju] (← [pɛˈseju] /pase+u/) ‘walk_{1SG}’; assimilation of place features of a following glide by the theme vowel, as in [fɛˈlej] (← [fɛˈlej] /fal+a+j/) ‘speak_{1SG.PRET}’; vowel harmony in verbs and metaphony in non-verbs, accounting for alternations as those in, respectively, *movo* [ˈmovu] ‘move_{1SG}’ vs. *movem* [ˈmɔvẽ] ‘move_{3PL}’, and *grosso* [ˈɡrosu] ‘thick_M’ vs. *grossa* [ˈɡɾɔsɐ] ‘thick_F’.

Several other major processes that affect vowels are purely phonological and interact with prosodic information. These include other hiatus resolution processes, external sandhi phenomena, phonetic reduction and schwa insertion, and will be surveyed in 4.2 and 4.3.

⁴ With the central vowel /a/ only, VR may apply in this context in a few very frequent words. In these cases, [a] alternates with [ɐ] (*açúcar* [ɐˈsukɐɾ] or [ɐˈsukɐɾ] ‘sugar’). Also, unlike non-central vowels, /a/ undergoes vowel raising before word-final nasal consonants, as in *íman* [ˈimɐn] ‘magnet’.

⁵ Like many other facts of Portuguese phonology described in the literature in the last decades and reviewed in this chapter, the realization of stressless vowels as low in word-final syllables ending in *r* and *l* (but, in contrast with present-day European Portuguese, not *n*) is already reported in Gonçalves Viana (1883/1973).

3.2 Segmental processes affecting consonants

Most, though not all, productive lexical processes affecting consonants refer to the realization of syllable-final consonants.

3.2.1 /r/ strengthening

The trill has been considered by many phonologists to derive from the tap, despite the superficial existence of pairs of words where the tap and the trill seem to contrast, as in *caro* ['karu] 'expensive_M' / *carro* ['karu] 'car' (Câmara 1953; Barbosa 1965/1983; Morales-Front/Holt 1997; Mateus/d'Andrade 2000).

Word internally, /r/ strengthening, as it has been called, operates when the tap is preceded by an underlying heterosyllabic consonant, as in *Israel* [iʒrɐ'ɛɫ] (state name), *melro* ['mɛɫru] 'blackbird', *honra* ['õrɐ] 'honor'. The fact that the trill does not occur superficially preceded by a tap is assumed not to be an accidental gap, but rather a consequence of the merging of two underlying taps, realized as a single trill; thus, a word like *carro* corresponds to the underlying form /karru/, and therefore does not form a minimal pair with *caro* (/karu/).

In addition to these observations, the fact that in prosodic word initial position only the trill but not the tap can surface (e.g. *ratu* ['ratu]/*['ratu]), also suggests that [ʀ] and [r] are allophones of the same underlying segment. Importantly, besides /r/ strengthening, there are other phonological facts related to the strength of the left edge of the PW in European Portuguese, namely optional initial stress and emphatic stress assignment and absence of full vowel reduction (Vigário 2003; cf. also 4.2.1).

In the case of Standard European Portuguese, the place of articulation is frequently uvular, meaning that /r/ strengthening also involves a change in place of articulation; furthermore, the uvular segment often surfaces as a fricative rather than a trill (cf. also Jesus/Shadle 2005 for some interesting acoustic details on the realization of the trill and the tap in several syllabic positions).

3.2.2 Realization of /N/

Underlying nasals that are fully specified surface as consonants with contrastive place of articulation in syllable onset position. By contrast, in syllable-final position nasals are usually underspecified and undergo nuclearization (Mateus 1975/1982; d'Andrade/Kihm 1988; Morales-Front/Holt 1997; Mateus/d'Andrade 2000, 54–58). Word-internally, nuclearization seems to be complete, that is, the nasal segment, analyzed in d'Andrade/Kihm (1988) as a floating nasal feature, associates to the preceding syllable nucleus, and the vowel in the nucleus surfaces as nasal, as in *campo* ['kẽpu] (/kaNpu/) 'field'. Importantly, however, the fact that /r/ strengthening applies

when the tap is preceded by a nasal vowel, as we have seen in sections 3.1.4 and 3.2.1, supports the view that the nasal segment is anchored to the coda, instead of being a floating feature. Thus, like laterals, it is possible that rhyme nasals are not fully nuclearized (cf. 4.1).

When the nasal is part of a word-final rhyme, a nasal glide surfaces, also indicating that in this context the nasal is not just a floating feature, but rather part of an anchored non-vocalic segment, although still underspecified for place of articulation. In the latter case, if no segment follows, the place of articulation of the glide corresponds to that of the vowel in the preceding nucleus. Thus, the word-final nasal glide is [w̃] when the preceding nucleus contains a back vowel, as in *pão* ['pẽw̃] (/paN/) 'bread' or *falam* ['falẽw̃] (/fala+N/) 'speak_{3PL}', and [j] when the vowel in the preceding nucleus is non-back, as in *comem* ['kõmẽj] (/kõme+N/) 'eat_{3PL}'. By contrast, when the nasal glide is followed by a coda fricative, the nasal glide acquires the place of articulation of the fricative.⁶ In these cases, therefore, the nasal surfaces as a non-back glide, like the coda fricative, irrespective of the value of the back feature of the vowel in the preceding nucleus, as in *pães* ['pẽjʃ] (/paN+S/) 'bread_{PL}' (Morales-Front/Holt 1997; Vigário 2003, 74–78).

In derived environments, /N/ normally surfaces as a coronal consonant, as in [ke'niɫ] (/kaN+il/) 'kennel', compared with *cão* ['kẽw̃] (/kaN/) 'dog'. The exact behavior of the underspecified nasal segment in derivational and inflectional environments is complex and not entirely systematic (cf. Mateus 1975/1982, 44–71; d'Andrade/Kihm 1988; Mateus/d'Andrade 2000, 72–73; Vigário 2003, 74–78).

3.2.3 Realization of laterals followed by a fricative in word-final position

Due to syllable constraints, laterals lose the consonantal feature when followed by a tautosyllabic fricative (cf. 4.1). The combination of lateral+fricative usually results as a consequence of plural inflection in the nominal system.⁷ In this case, there is full nuclearization of the lateral, which surfaces as a non-back, coronal glide, as in *animais* [eni'majʃ] (/animal+S/) 'animal_{PL}' (Morales-Front/Holt 1997 and references therein). As with the glide that originates as /N/, the place of articulation of the glide corresponding to an underlying lateral has been hypothesized to match the place of articulation of the following fricative; this analysis implies that coda fricatives must be at least partially lexically specified for place features (Morales-Front/Holt 1997; Vigário 2003, 74–82).

⁶ A post-vocalic N is followed by a tautosyllabic fricative in word-final position only (Veloso 2007), typically as a consequence of nominal or verbal inflection.

⁷ Word-internal combinations of lateral+fricative are very rare, as in *solstício* [soɫ'tisju] 'solstice', and in these cases, the lateral does not semivocalize. It is possible that in European Portuguese this sequence in word internal position involves an intervening V-slot (cf. 4.1).

3.2.4 Other lexical processes affecting consonants

As in other Romance languages, in Portuguese many morphophonological alternations, in derived and also in inflected environments, involve consonants, e.g. [k]/[s], as in *elétrico* [e'letriku] 'electric' / *eletricidade* [eletrsi'dad] 'electricity'; [t]/[s], as in *democrático* [dmu'kratiku] 'democratic' / *democracia* [dmukre'sie] 'democracy'; [g]/[ʒ], as in *psicólogo* [psi'kolugu] 'psychologist' / *psicologia* [psiklu'ʒie] 'psychology' (Mateus 1975/1982; d'Andrade Pardal 1977; Mateus/d'Andrade 2000, 88–108). These alternations cannot be accounted for by general phonological rules of Portuguese, being analyzed as involving allomorphy, instead.

Unlike nasals and rhotics, the realization of laterals and of fricatives that are syllable-final at the lexical level depend on post-lexical processes, including resyllabification (cf. 4.1, 4.3).

3.3 Word stress assignment

There is some contention in the literature as to whether Portuguese word stress is weight-sensitive – a position advocated for in particular by Wetzels (2003; 2006/2007) for the nominal system – or assigned with reference to a morphological domain (Mateus 1983; Lee 1995; Pereira 1999; Mateus/d'Andrade 2000, 113–119; Vigário 2003, 64–67; cf. also the review in Magalhães 2016, and Garcia (2017), who defends a probabilistic approach to stress in the nominal system).

In non-verbs and in verbs in present tense forms only, it is particularly defensible that stress location is weight-sensitive. In non-verbs, stress is penultimate if the word ends in a light syllable, and final if the last syllable of the word is heavy. Heavy syllables are syllables closed by glides or non-inflectional consonants, for instance consonants different from the fricative that marks the plural in the noun system, or the 2nd person singular in the verbal system, which are generally assumed to be extrametrical, that is, not computed for the purpose of stress rules (e.g. Bisol 1994; Magalhães 2016). Thus, in words ending in a vowel, or in a vowel plus inflectional fricative, stress falls on the penultimate syllable, as in *janela/s* [ʒe'nɛ.lɐ]/[ʒe'nɛ.lɐʃ] 'window_{SG/PL}'; by contrast, in words ending in a syllable closed by an underlying non-inflectional consonant or a diphthong, stress falls on the final syllable, as in *favor* [fe'vor] 'favor', *anel* [e'nɛl] 'ring', *jardim* [ʒer'di] 'garden', *chapéu* [ʃe'pɐw] 'hat', *rapaz* [ɾe'paʃ] 'boy'. Items not following this pattern, namely with antepenult stress (as *pêssego* [pe.sɨ.gu] 'peach'), with penult stress but ending in a non-inflectional consonant (as *fácil* [fa.sɨ] 'easy'), or with final stress but ending in vowel (*café* [ke'fɛ] 'coffee'), must be lexically specified as exceptional (Mateus 1975/1982; Bisol 1994; Wetzels 2006/2007).

Some generalizations concerning possible syllable structures and stress patterns seem to corroborate the weight-sensitive approach. For example, no heavy syllables are found in post-tonic non-final position, as in **pífalto*, **súcaula*, or **rámurga*.

Although rare, words with antepenultimate stress ending in a heavy syllable do exist, however, such as *Lúcifer* ‘Lucifer’, *Júpiter* ‘Jupiter’, *sífilis* ‘syphilis’ (Magalhães 2016). This pattern may be accounted for assuming that the domain-final syllable is extra-metrical or disregarded for the purpose of stress assignment, like in other words, such as *abóbora* ‘pumpkin’ (e.g. Wetzels 2006/2007).

Under an alternative approach, in the nominal system stress is assigned to the last syllable of the derivational stem (DS) (cf. Mateus 1983; Lee 1995; Pereira 1999). This accounts for stress assignment in words ending in a vowel (possibly followed by an inflectional consonant), because the last vowel is not part of the derivational stem, as in *acento/s* (*acent*_{DS}) [ɐ'sêtu]/[ɐ'sêtuʃ] ‘stress_{SG/PL}’. It also accounts for words ending in a sonorant consonant, like *animal* (*animal*_{DS}) [ɐni'maʃ] ‘animal’, and for oxytone words ending in a vowel, like *café* [kɐ'fe] (*cafe*_{DS}), because words of these types lack material to the right of the derivational stem. Under this view, oxytone words ending in a vowel are not exceptional with respect to stress location; but it is unclear how stress is assigned in words like *Lúcifer* (*lucifer*_{DS}), since in these words, more than one syllable or vowel has to be lexically marked for not bearing word stress.

To the possible exclusion of the forms in the present tense, which show penult stress, but where most often stress also falls on the syllable containing the last vowel of the verb root, the position of stress in verbs is fixed, falling (i) on the syllable containing the theme vowel in the past tense forms, and (ii) on the first syllable of the tense-mood-aspect (TMA) morpheme in the future and conditional forms (Vigário 2003, 64–67; cf. also Pereira 1999; Mateus et al. 2003, 1050–1059; Wetzels 2006/2007 for similar though not identical generalizations). Thus, for example in past imperfect inflected verbs the syllable that contains the theme vowel bears stress independently of syllable count/weight considerations – e.g. *falava* [fe'lave] (/fal+a+va/) ‘speak_{1SG.IMPF}’, *falávamos* [fe'lavemuʃ] (/fal+a+va+muS/) ‘speak_{1PL.IMPF}’; and in all future and conditional inflected forms word stress falls on the TMA morpheme, e.g. *falaria* [fele'rie] (/fal+a+ria/) ‘speak_{1SG.COND}’, *falaríamos* [fele'riemuʃ] (/fal+a+ria+muS/) ‘speak_{1PL.COND}’.

We may add one piece of evidence showing that in European Portuguese fixed position is extending to present tense verb forms as well. In Portuguese, there is only one inflected form in the present tense where stress does not fall on the last syllable of the root, which is the 1st person plural, as in *percebamos* [prs'bemuʃ] (/perseb+e+a+muS/) ‘understand_{1PL.SBJV}’. In this case, in present subjunctive forms it is not at all uncommon to hear speakers displacing stress from the penultimate syllable to the final syllable of the verb root, as in [pr'sebemuʃ].⁸ For the speakers with this inno-

⁸ Educated speakers of Portuguese are well aware of the prevalence of this type of non-standard stress displacement among the Portuguese population. Like other kinds of innovations and non-standard variants this *wrong placement of stress* is very much stigmatized and is a feature that may contribute to social exclusion, as admitted in official documents from the national Ministry of Education, which contain recommendations on how to work in Portuguese classes to train students to be aware of the fact that this is a non-standard variant and how to avoid it (e.g. Costa et al. 2011, 18).

vative grammatical feature, stress has also become positionally fixed in the present tense, since for these speakers stress always falls on the last syllable of the verb root in present (subjunctive) inflected forms. The fact that currently this only happens in the present subjunctive, but not in the present indicative, may be due to the high frequency of use of the present indicative, since high frequency is a factor known to oppose regularization (Bybee/Hopper 2001). Notice, furthermore, that proparoxyton stress is very marked and infrequent and tends to be avoided in European Portuguese.⁹ Such a tendency for using this marked pattern must therefore have been created by a powerful force. In our perspective, this force is a new grammar of stress assignment in verbs in European Portuguese, whereby stress is assigned with reference to morphological information and stress location contributes to tense marking: stress on the final syllable of the verb root marks present tense (though not yet in indicative forms, due to their high frequency); stress on the syllable containing the theme vowel marks the past tense; and stress on the first syllable of the TMA morpheme marks the future.

Possibly in part related to the current nature of stress in European Portuguese is the fact that, in the absence of vowel quality cues (i.e. vowel reduction cueing stressless position), European Portuguese speakers show stress-deafness effects, like for instance French speakers, while when vowel quality cues stress location, they perceive word stress like, e.g., Spanish speakers (Correia et al. 2015).

A final note on the word-stress window: stress falls on one of the three final syllables of the word, but enclitics may originate prosodic words (PWs) with the stress on the fourth or fifth syllable counting from the right edge of the word, as in *dávamo-vola* ['davemuvule] 'give_{1PL,IMPF=2PL,DAT=3SG,F.ACC}'. There is evidence that pronominal enclitics incorporate into the verb's PW and are attached to the verb post-lexically, while word stress has the properties of a lexical process; thus, enclitics do not induce violations of the maximal stress window, if this constraint operates at the lexical level only (Vigário 2003; cf. also 4.2).¹⁰

⁹ In the FrePOP database (Frota et al. 2010), based on a corpus from various sources containing more than two million words, in the adult materials (speech and written), totaling 763,168 words, only 1.0% of the total number of tokens, and 1.4% of the total number of PW are stressed on the antepenult syllable. Similarly, very low rates of antepenult stress are also reported for smaller (speech) corpora in Viana et al. (1996) and Vigário/Frota/Martins (2010).

¹⁰ Veloso (2012) argues in favor of a different prosodization of clitics, crucially grounded on the lack of interaction between enclitics and word stress. As in other proposals for different Romance languages, Veloso claims that clitics do not attach to the prosodic word, but rather to a higher prosodic domain (in this case, the clitic group), thus falling outside the word stress window. This analysis does not, however, account for the existing evidence for enclitic incorporation into the preceding PW and seems to disregard the evidence in favor of word stress assignment being a lexical process and pronominal cliticization a post-lexical operation.

4 Prosodic phonology

An important part of Portuguese phonology refers to prosodic domains. Investigation on Portuguese prosodic phonology has mostly been conducted within the model of prosodic phonology developed by Nespor/Vogel (1986/2007) and others (cf. the reviews in Frota 2014 and Santos/Vigário 2016, and references therein). In this section, we survey the phonology and construction of each domain that is operative in the language, i.e. the syllable (σ), the foot (Σ), the prosodic word (PW), the prosodic word group (PWG), the phonological phrase (PhP) and the intonational phrase (IP).

4.1 The phonology of the syllable and the foot

In European Portuguese the syllable nucleus includes an obligatory vocalic position, which in unstressed syllables is not necessarily phonetically filled, as in *dedal* [d'daɫ] 'thimble' (alternating with [di'daɫ]). Post-vocalic glides are usually assumed to be under the syllable nucleus, together with the vowel (d'Andrade/Kihm 1988; Mateus/d'Andrade 2000). A major argument for this is the fact that in falling diphthongs nasality spreads to both the vowel and the glide, e.g. *pão* ['pẽw̃] 'bread'. We may add three further arguments in favor of glides being in the nucleus instead of the syllable coda: (i) glides in falling diphthongs do not trigger /r/ strengthening, unlike coda consonants and nasal segments, e.g. *Cairo* ['kajru]/*['kajru] (place name) (cf. 3.2); (ii) they block vowel reduction, like nuclearized nasals and velarized (partially nuclearized) laterals, and unlike full coda consonants (stops and fricatives) and glides in rising diphthongs (cf. 3.1);¹¹ (iii) glides can be followed by [ʀ], suggesting that they do not occupy the same position as [r] (e.g. ['bajru] ← /bajrru/).

There is nevertheless room for some controversy (e.g. Barbosa 1965/1983; Collischonn/Wetzels 2016). For example, Collischonn/Wetzels (2016) argue in favor of glides being syllabified as codas because (i) palatal sonorants cannot be preceded by glides, which therefore behave like other coda segments, also not found before palatal sonorants; and (ii) glides seem to contribute to syllable weight for the purpose of stress location (i.e. syllables with falling diphthongs pattern like heavy syllables). However, these are not clear-cut arguments, at least in European Portuguese, because in this variety of Portuguese there is evidence against the complex nature of palatal sonorants: (i) as we have just seen, stressless vowels that precede glides and tautosyllabic (partially nuclearized) laterals escape vowel reduction; nevertheless, vowel reduction usually applies before oral palatals (e.g. *falhar* [fɛ'ʎar]/*[fa'ʎar] 'fail_{INF}'); (ii) glides in falling diphthongs do not trigger /r/ strengthening, unlike coda consonants and nasal segments, e.g. *Cairo* ['kajru]/*['kajru] (place name) (cf. 3.2); (iii) glides can be followed by [ʀ], suggesting that they do not occupy the same position as [r] (e.g. ['bajru] ← /bajrru/).

¹¹ Some scholars have argued in favor of rhyme laterals being part of the nucleus instead of the coda (cf. Freitas 2016 for a review). However, the fact that /r/ strengthening is triggered by preceding laterals indicates that the lateral is not fully nuclearized (cf. 3.2.1).

oral palatal sonorants therefore pattern like singleton segments in this respect; (ii) the fact that there is no nasalization of the vowels that precede the palatal nasal (e.g. *apanha* [e'pɛɲɐ]/*[e'pẽɲɐ] 'catch') also shows that these segments do not trigger the typical phonology of coda nasals or of diphthongs in nasal context. Thus, the first argument above does not seem valid at least for European Portuguese.¹² The same can be said of the second argument, as stress assignment in Portuguese is not necessarily weight-sensitive, and hence stress distribution may be assumed not to be sensitive to syllable coda composition (cf. 3.3).

Consonants and glides may appear before and after the nucleus, within the syllable onset and rhyme, respectively. Syllable onsets may be empty (*ai* [e'i] 'there'), or filled with one or two consonants (*pato* ['pa.tu] 'duck', *prova* ['prɔ.vɐ] 'test'). Semivocalization may lead to prevocalic glides (*hiato* [i'a.tu]/[i'ja.tu] 'hiatus', *criança* [kri'ẽ.sɐ]/[kri'ẽ.sɐ] 'child'). The fact that prevocalic glides do not contribute to weight for the purpose of stress distribution and that nasality does not affect prevocalic glides, as the preceding example shows, indicates that they are not part of the nucleus (an assumption that is, however, challenged by some scholars, such as Freitas/Santos 2001, 40–46). This entails that onsets may have up to three segments. Rhymes usually contain one or two segments, but three-segment rhymes are also possible, as in *mais* 'more', *claustro* 'cloister'.

A small number of principles account for the distribution of segments within the syllable (Vigário/Falé 1994; Collischonn 1999; Mateus/d'Andrade 2000; Collischonn/Wetzels 2016). A major principle is the Sonority Sequencing Principle (SSP), according to which the sonority of segments in the syllable decreases from the nucleus to the syllabic edges. The SSP accounts for possible sequences such as [priʒ], [grẽw̃] or [dɛrʃ], as in *prisma* ['prizme] 'prism', *líderes* ['lidesr̃] 'leader_{PL}' and *grãos* ['grẽw̃] 'grain_{PL}', as well as for the impossibility of sequences such as *[lpiʃr]. Relative sonority is defined in Collischonn/Wetzels (2016) as in (4).

(4) *Sonority scale*

obstruents < nasal consonants < liquids < glides < vowels

¹² Co-occurrence restrictions among segments within the syllable rhyme may also suggest that postvocalic glides occupy the same position as postvocalic liquids (i.e. the coda), since glides cannot be followed by [r] and [l]. However, they can be followed by the palatal fricative, not only at the end of the word, but also word internally, as in *fausto* ['fawf.tu] 'luxury', *austero* [awf'tɛru] 'austere', *auscultar* [awf.kuɫ'tar] 'auscultate', *sexto* ['sejɫ.tu] 'sixth', *extra* ['ejɫ.tre] 'extra', while only very exceptionally are liquids followed by the fricative in word-internal codas (*solstício* 'solstice'), and in fact those exceptions should probably be analyzed not with a lateral in coda position followed by a tautosyllabic fricative, but with a lateral in the onset followed by an empty V slot and a coda fricative (i.e. *so.lVs.ti.cio*). This would suggest that glides and liquids occupy different syllabic positions: (i) postvocalic glides share the nucleus with vowels, (ii) liquids and fricatives occupy the word-internal coda position, and (iii) the prosodic word-final position may admit additional complexity (cf. below).

Combinations of consonants within a syllable cannot have the same degree of sonority or be adjacent in the sonority scale, as a minimal difference is required in the sonority scale (cf. Dissimilarity Condition in Vigário/Falé 1994; Mateus/d'Andrade 2000; or Minimum Sonority Distance in Collischonn/Wetzels 2016). Hence, sequences of obstruent plus liquid, as in *gra* are well-formed, while sequences of obstruent plus obstruent, obstruent plus nasal consonant and nasal consonant plus lateral or vibrant are ill-formed (e.g. *[fsa], *[tdi], *[fne], *[mla], *[nra]).

In some cases, however, orthography seems to indicate that such combinations might occur, as in *advogado* [ədvu'gadu] 'lawyer' (many examples can be found for instance in Mateus/d'Andrade 2000, 42). Nevertheless, in these cases, syllabification judgments become difficult and inconsistent, and syllable breaks are usually reported to be possible between the two relevant consonants. In order to account for the facts described, it has been proposed that in such words there is in fact a vocalic position intervening between the two consonants apparently violating the Dissimilarity Condition (Vigário/Falé 1994; Mateus/d'Andrade 2000). In the variety of European Portuguese, this vocalic position, or V-slot, may also be optionally filled by a schwa ([i]), in the same way as it may be filled by an epenthetic [i] in Brazilian Portuguese; in European Portuguese, however, the realization of the vowel is rather uncommon, while in Brazilian Portuguese vowel epenthesis in these contexts is systematic (cf. Section 6).¹³

Intrasyllabic constituents license particular features only. Collischonn/Wetzels (2016) adopt the following general constraints interacting in a language-specific way in order to account for syllable forms in Portuguese: *DEL(ETION) (MAX-IO) and *EP(ENTHESIS) (DEP-IO), respectively requiring that "input segments must have output correspondents" and "output segments must have input correspondents". These two constraints dominate ONSET and *CODA, respectively requiring that syllables "start with an onset" and "end in a vowel". Thus, for example, onsetless syllables (e.g. [.a]) are allowed to surface in the language because, although violating ONSET, other possible candidates are eliminated due to violation of a more highly ranked constraint, namely *EP or *DEL – the former excludes outputs with segments not in the input (e.g. [.ta]), and the latter penalizes outputs with less material than in the input (e.g. eliminating the syllable in the input altogether).

As we have seen in 3.2, some processes are motivated by syllable constraints. The fact that the coda position licenses only continuant segments may explain, for

¹³ Vigário/Falé (1994) point out that words like *segmento* 'segment' may be realized as either [seg. 'mētu] or [segi'mētu], and the V-slot can even be reflected in non-conventional spellings, for instance by graduate students (at least in the North of Portugal), as in <seguemento>. In adult speakers, this sort of phonetic alternations and spelling errors do not tend to occur when legal consonant clusters are involved (e.g. [p'roʋe] vs. *[pi'rʋe] and <prova> vs. *<perova> 'test'). Evidence from language acquisition also supports a distinction between legal consonant clusters and other consonant combinations with intervening V-slots, and the same is true of oral and written productions by children in the first years of schooling (Freitas 2016 and references therein).

instance, the nuclearization phenomena described in 3.2 involving syllable-final nasals and laterals.

Fricatives in syllable-final position, often represented as /S/ or /s/, are considered in the literature to be lexically underspecified for voice and place of articulation (Mateus/d'Andrade 2000, 142). These features are specified post-lexically, since both the realization of word-final laterals and fricatives may be affected by the post-lexical context, as we will see below. We may notice, nevertheless, that nothing prevents final fricatives at the lexical level from being *partially* specified for place of articulation. Since all existing realizations of the fricative, namely [ʃ ʒ z] (and also possibly [s]), are [+coronal, -back], it may be assumed that these features are part of the underlying specification of /S/; this would explain why (partially underspecified) word-final fricatives may play a role in the definition of the place of articulation of the glides that derive from laterals and nasal segments (cf. 3.2).

Another process that may be motivated by constraints on the maximum number of segments in coda is /l/ semivocalization when the lateral is followed by a tautosyllabic fricative. Tautosyllabic /l/+S/ combinations can be formed in word-final position with the addition of inflectional /+S/ to morphological bases ending in lateral, as in *animais* (← /animal+S/) 'animal_{PL}' (cf. 3.2). /l/ semivocalization allows avoidance of an important source of branching codas in Portuguese.

Prosodic word margins seem to have a special status, with implications for syllable forms apparently allowed. For example, more consonant types are allowed in word-final position (Velooso 2007), namely [n], [ks], [ps], as in *hifen* 'dash', *silex* ['sileks] 'silex', *bíceps* ['biseps] 'biceps'. /rS/ is also typically found in word-final position, as in *repórteres* [r'pɔrtɐʃ] (or [rɨ'pɔrtɐʃ]) 'correspondent_{PL}' (word internally, the position of the tap in the syllable is variable, and in more informal speech, the tap is often deleted, cf. Collischonn/Wetzels 2016). Besides that, only in word-final position can a nasal diphthong be followed by a fricative, as in *Guimarães* [gime'rẽʃ] (place name; cf. Velooso 2007).

Words phonologically starting with a partially underspecified fricative followed by a consonant admit two distinct resyllabification patterns when preceded by words ending in a fricative (5).

- (5) as escolas [ɐsʃ'kɔlɐʃ]¹⁴/[ɐʃ'kɔlɐʃ] 'the_{F,PL} school_{F,PL}'

¹⁴ In Standard European Portuguese the V slot is typically not filled (neither by a schwa nor by [i]) in prosodic word-initial position, unlike in other dialects (d'Andrade/Rodrigues 1999; Freitas/Rodrigues 2003). Interestingly enough, in these cases it is unclear whether the fricative before #/S/+C may be (partially) voiced, as occurs when the same fricative is followed by a word that starts in a full vowel, e.g. as *alunas* [ɐzɛ'lunɐʃ] 'the_{F,PL} student_{F,PL}' (Frota 2000). To our ears, only in the latter case does the fricative sound like a voiced segment. Further acoustic studies are needed in order to determine if the two fricatives indeed behave differently with respect to voicing.

These facts suggest two alternative syllabifications: one involving an empty V-slot at the left edge of the word (along the lines of d'Andrade/Rodrigues 1999), with a full syllable node projected, in which case the word-initial fricative is in coda and the preceding word-final fricative surfaces as [+anterior]; the other not involving a V-slot or an independent syllable, where the two identical adjacent fricatives (one word-final and the other word-initial) degeminate obligatorily.¹⁵

Additional segmental complexity at the left edge of the PW is also found in loan words (⋈16 Loanword phonology in Romance) starting with a fricative (in this case specified for place of articulation as [+anterior]), as in *stress* ['stres] 'stress', *sprint* ['sprīt] 'sprint'. In these cases, no vowel (including schwa) can be inserted between the fricative and the following C, indicating that in these cases there is no intervening V slot (d'Andrade/Rodrigues 1999).

In Mateus/d'Andrade (2000, 63) post-vocalic consonants are left unattached to a syllable node at the lexical level and are associated with a syllabic position only post-lexically. While this proposal elegantly accounts for resyllabification facts (cf. below), it may be problematic for the analysis of some lexical processes, such as vowel reduction, since vowels in syllables closed by laterals do not undergo vowel reduction, and in word-final position they undergo an opening process, as in *álcool* ['ałkwɔł] (or ['ałkɔł]) 'alcohol' vs. *alcooolizado* [ałkwuli'zadu] (or [ałkuli'zadu]) 'inebriated' (cf. 3.1). It may also be problematic for weight-based accounts of word-stress distribution, which rely on the presence/absence of final consonants for the computation of syllable weight relevant for stress location (cf. 3.3).

It is well-known that European Portuguese schwas, and to a lesser extent [u] in unstressed position, often delete in running speech, and more so in fast speech, resulting in multiconsonantal sequences (e.g. Mateus/d'Andrade 2000). Thus, sequences of six or even more consonants can be found, as in *desprevenidos* [dʃprv'nidʃ] 'unaware_{M.PL}', *restremecerás* [ʀʃtrms'raʃ] 'tremble again_{2SG.FUT}'. This sort of data seems to indicate that in European Portuguese constraints on core syllabification might be loosened post-lexically (cf. also Collischonn/Wetzels 2016, 96–97).

As in other Romance languages, in European Portuguese resyllabification applies in a phrasal domain (cf. 4.3.2), when the following word starts with an onsetless syllable, a glide, or an empty V-slot (superficially, a palatal fricative+C, cf. above). All coda consonants usually undergo resyllabification in the appropriate context (6a), with fricatives, which are partially underspecified for place of articulation, being specified by default as [+anterior] in the standard variety of European Portuguese. Resyllabified laterals surface with no noticeable secondary velarization. Resyllabification may also involve consonants that are already part of the onset in core syllabification, when

¹⁵ We refer to d'Andrade/Rodrigues (1999) for a more comprehensive description, based on a corpus of speech collected in Lisbon and Braga, and an analysis, within an OT model, of different types of words that may start with a palatal fricative+C cluster.

the first word ends in an underlying vowel that undergoes deletion, semivocalization, or vowel merger, and the following word starts with an underlying vowel or glide (6b), but, according to our intuition, not if it starts with a(ny) consonant (cf. also 4.3).

(6) a.	mar ameno	[ˈma.rɐˈmɛ.nu]	‘peaceful sea’
	mel agradável	[ˈmɛ.lɐ.grɐˈda.vɐʃ]	‘fine honey’
	giras imagens	[ˈʒi.rɛ.ziˈma.ʒẽʃ]	‘nice images’
	pós iodizados	[ˈpɔ.zju.diˈza.duʃ]	‘iodized powders’
b.	ponte usada	[ˈpõ.tuˈza.dɐ]	‘used bridge’
	amigo imaginário	[ɐˈmi.gi.mɛ.ʒiˈna.rju]/	
		[ɐˈmi.gwi.mɛ.ʒiˈna.rju]	‘imaginary friend’
	garota educada	[gɐˈro.te.duˈka.dɐ]/	
		[gɐˈro.ti.duˈka.dɐ]	‘polite girl’
	vela amarela	[ˈvɛ.la.mɐˈrɛ.lɐ]	‘yellow candle’

Let us now turn to the foot domain. Contrasting with the other prosodic domains reviewed in this section, the status of the foot in European Portuguese is not very clear, since there is no evidence for rhythmic alternating stresses in pretonic position, or other known phenomena referring to a foot that is not the head of the PW (although there is some disagreement on this in the literature; cf. Magalhães 2016; 4.3.3). In addition, as word stress has been claimed to be assigned with reference to morphological structure, rather than phonological information (cf. Section 3), it is unclear how PW prominence is connected to the foot domain (Vigário 2003). Nevertheless, the phenomena we have reviewed in 3.1.5, referring to marked foot formats, constitute evidence that PWs in European Portuguese are indeed headed by a foot.

4.2 The phonology of prosodic words, clitics, and prosodic word groups

It is well established for many languages that the notion of “word” varies according to the components of grammar. While arguably most frequently syntactic words, morphological words, prosodic words, and PWGs are isomorphic (e.g. *chuva* ‘rain’, *agradável* ‘pleasant’), in European Portuguese there are many instances of mismatches between the different sorts of words. Thus, for instance, (i) a single syntactic word may include more than one (minimal) morphological word and more than one prosodic word, forming a single PWG (e.g. *lava-louças* [ˈlaveˈloʃɐʃ] ‘sink’), (ii) one morphosyntactic word may not correspond to an autonomous prosodic word, i.e. it is a clitic form (e.g. *a* [ɐ] ‘the_F’, *que* [ki] ‘that’), and (iii) one syntactic word containing a single morphological word may form more than one prosodic word and a single PWG

(e.g. *monogâmico* ['mɔnɔ'gɛmiku] 'monogamous'; *agradavelmente* [ɛgrɛ'davɛɫ'mɛt] 'pleasantly'; *pré-acental* ['prɛɛsɛtu'aɫ] 'pretonic').¹⁶

In European Portuguese there is rich phonology associated with the prosodic word domain, as well as clear evidence for the identification of clitics and the way they are prosodically organized with their hosts (Vigário 2003; 2010). We survey below the phonology related to the word-level units.

4.2.1 Prosodic words and clitics

As in other languages with word-level stress, there is a one-to-one correspondence between word stress and the prosodic word (PW). Thus, presence or absence of main stress and the application of rules related to the presence or absence of stress are indicative of the phonological status of words. For example, vowel reduction, semivocalization and vowel deletion may only target stressless positions. Thus, a PW must have at least one vowel that does not undergo these rules, as in, for example, the first word of the sequences *pó azul* ['pɔɛ'zuɫ] (*[puɛ'zuɫ], *[pwe'zuɫ]) 'blue dust' and *nu artístico* ['nuɛr'tiftiku] (*[nwer'tiftiku]) 'artistic nude'. By contrast, words composed only of vowels to which one of the aforementioned processes may apply do not form independent PWs, i.e. they are clitics (CLs). This is the case for very frequent monosyllabic and disyllabic function words, such as *de* [di] 'of', *que* [ki] 'that', *se* [si] 'if', *a* [ɛ] 'the_F', *mas* [mɛʃ] 'but', *para* [pɛrɛ] 'to', *o* [u] 'the_M', *do* [du] 'of-the_M', *no* [nu] 'in-the_M', and all weak personal pronouns. Besides the presence of vowels that only appear in unstressed position, like schwa and [ɛ] (not followed by a nasal or a palatal segment), deletion and semivocalization also indicate absence of word-level stress, and hence CL status, as in *de aves* ['djavʃ]/['davʃ] 'from birds', *no artista* [nuɛr'tiftɛ]/[nwer'tiftɛ] 'in.the artist' (cf. Vigário 2003, 157–203, for the full list of clearly identifiable CL in European Portuguese and further evidence for their prosodic status).

A number of phonological processes apply with reference to the prosodic word domain, in particular, its edges. We review these in the following paragraphs.

Unstressed non-back non-close vowels (/ɛ ɐ/) and in verbs also /i/ are regularly deleted in PW-final position. The rule is blocked when the target vowel is followed by a word starting with a vowel that bears PWG prominence (cf. 4.2.2); and it is also optionally blocked in certain tonal configurations in Intonational Phrase-final position (cf. 4.3.2). In other contexts, deletion applies categorically, operating whether the vowel is in absolute final position or followed by another word; if followed by a word starting with a vowel, resyllabification subsequently operates, as illustrated in (7a). The application of non-back vowel deletion in PW-final position is revealing of how clitics are prosodized. With pronominal enclitics (i.e. post-verbal weak pronouns), the rule does not apply when the non-back vowel is verb-final, as in (7b), but it applies categorically

¹⁶ Token counts indicate that around 30% of the words used in European Portuguese are phonological clitics (Vigário/Frota/Martins 2010), and 0.3% correspond to compounds (Vigário/Garcia 2012).

when the vowel belongs to the enclitic, as in (7c). This indicates that enclitics incorporate into the verb's PW and become PW-final. By contrast, with proclitics the structural description of the rule is not met, and thus the rule does not apply. Instead, the underlying non-back vowel in proclitic-final position may surface with various degrees of reduction, as in (7d); according to Vigário (2003, 273–324), this and several other types of reduction are characteristic of clitics and other highly frequent words.

- (7) a. *colhe azeitonas* ['kɔʎezɐj'tonɐʃ] 'collect_{3SG} olive_{PL}'
 come ovos ['kɔ'mɔvuʃ] 'eat_{3SG} egg_{PL}'
 b. *come-os* ['kɔmjuʃ] 'eat_{3SG=M.PL.ACC}'
 c. *dou-te anéis* ['dote'nɐjʃ] 'give_{1SG=2SG-DAT} ring_{PL}'
 d. *se te achamos* [stʃe'fɐmuʃ]/
 [stʃe'fɐmuʃ]/
 [stʃe'fɐmuʃ] if_{2SG.ACC}=find_{1PL}
 'if we find you'

The obligatory realization of verb final /e/ as a glide, exemplified in (7b), indicates in addition that enclitics are incorporated into the preceding PW, a point previously unnoticed, to the best of our knowledge. Indeed, while in other contexts the formation of rising diphthongs tends to be optional, non-back vowels and round vowels obligatorily semivocalize when followed by a vowel in post-tonic position, as in *águia* ['agjɐ] 'eagle', *estátua* [ʃ'tatwɐ] 'statue' (d'Andrade/Viana 1994; Mateus/d'Andrade 2000); and thus the fact that semivocalization of the first vowel of the VV sequence (V1 gliding) is also obligatory when the post-tonic vowel belongs to an enclitic further supports the prosodic incorporation of the enclitic into the preceding PW.¹⁷

Stressless /u/ or /a/ in PW-final position may delete as well when followed by a word starting with a vowel, as in (8).¹⁸ In this case, the rules are optional. Note also that the presence of word stress in the second vowel of the VV sequence (V2), or particular stress clash patterns, often block these processes of hiatus resolution (Frota 2000; Mateus/d'Andrade 2000; Vigário 2010; cf. 4.2.2, 4.3).

- (8) a. *colho azeitonas* ['koʎezɐj'tonɐʃ] 'collect_{1SG} olive_{PL}'
 b. *compra hotéis* ['kɔpro'tɐjʃ]/['kɔpro'tɐjʃ] 'buy_{3SG} hotel_{PL}'

Example (8b) illustrates, in addition, the particular way vowel reduction applies to stressless vowels in PW-initial position. As briefly mentioned when discussing /ow/ monophthongization in 3.1, full VR does not occur PW-initially. Instead, non-close

¹⁷ Wetzels (2006/2007) also suggests that obligatory V1 gliding in post-tonic position is a post-lexical process, since these surfacing glides pattern like full vowels (i.e., contributing to the proparoxyton pattern) for the purpose of Dactylic Lowering, a lexical process (cf. 3.1).

¹⁸ If the two vowels in hiatus are central, only vowel merger may apply (cf. 4.3.2).

round vowels may surface as close-mid or open-mid ([o'tejf]/[ɔ'tejf]), but not as close (*[u'tejf]), and non-back vowels do not reduce to schwa, as they do in PW-internal position (e.g. [e'vitu]/[i'vitu]/*[i'vitu] 'avoid_{1SG}'; cf. Vigário 2003, 92–99, for further details).

Several other processes apply with reference to prosodic word edges, including the assignment of PW-initial secondary stress¹⁹ and PW-initial emphatic stress, as well as the opening of non-close vowels in PW-final syllables closed by non-inflectional consonants (cf. 3.1). Thus, for instance, the latter rule applies to the second vowel of *inter* in *inter-continental* [ĩterkõtĩnẽ'taɫ] 'intercontinental' because, although *inter* is not a morphological word, it is a PW and therefore the structural description of the rule is met, whereas the rule does not apply in similar contexts in PW-internal position (e.g. *interpretar* [ĩtir'pretu]/[ĩtr'pretu]/*[ĩter'pretu] 'interpret_{1SG}'; cf. Vigário 2003).

Phonotactic restrictions also single out prosodic word edges. The left edge is the domain of *r*-strengthening and incomplete vowel reduction, and thus, [r] and [i] do not occur in this position; [ɲ] and [ʎ] are also not found in this position in the native lexicon (cf. 2.2). In contrast, PW edges allow for more consonantal material than the edges of word-internal syllables (cf. 4.1).

Unlike in many languages, it has been claimed that PWs in Portuguese are not subject to a minimal size constraint, since PWs formed of a single open syllable are not uncommon (e.g. *é* 'be_{3SG}', *li* 'read_{1SG}', *cá* 'here'), and their production is adult-like since the first stages of language acquisition (Bisol 2000; Vigário 2003; Vigário/Freitas/Frota 2006). The issue is controversial, however. For instance, based on evidence coming from speakers' preferences in the pronunciation of abbreviations, Veloso (2017) sustains that the *minimal condition* is a functional constraint in European Portuguese which restricts the formation of PW minimally to three segments.

Finally, two particular processes of constituent deletion target the prosodic word. Clipping or truncation consists of the deletion of a PW when a morpho-syntactic word contains more than one PW, as in *hipermercado* [ĩpermir'kadu] → *híper* [ĩper] 'hypermarket', and *BMW* [be'ẽm'dẽblju] → *BM* [be'ẽm] 'BMW'; but *diapositivo* [diepuzi'tivu] → **diapo* [di'apu], **dia* [diẽ] 'slide', since here the word is formed of a single PW and hence it is not possible to truncate part of the word. Deletion under identity also depends on the presence of more than two PW, in this case in each of the members of a coordinate structure, as in *pré-verbal ou pós-verbal* [prẽvir'balo'pɔʒvir'baɫ] → *pré ou pós-verbal* [prẽo'pɔʒvir'baɫ] 'pre- or post-verbal'; but *desfazer e refazer* [dĩfẽ'zerĩrĩfẽ'zer] → **des e refazer* [dizĩrĩfẽ'zer] 'undo and redo_{INF}'. Both processes consist of the deletion of a PW, and the preservation of at least one PW, under specific conditions (Vigário/Frota 2002; Vigário 2003, 250–255).

Phonological evidence indicates that a prosodic word is formed of (i) an affix bearing word-level stress; and (ii) a root plus any following affixes that do not form

19 Cf. 4.3.3 for further details on secondary stress in European Portuguese.

independent stress domains (cf. 9a). Unstressed prefixes are Chomsky-adjoined to the prosodic word that contains the morphological base they attach to, yielding a recursive PW, since the phonology of the left-edge of PW applies both to the left edge of the morphological base and to the prefix itself – for example, in (9b) both the prefix and the initial syllable of the morphological base may bear emphatic stress, emphatic stress being assigned to the left edge of the PW; and the vowel that starts the morphological base (*organizado*) does not undergo full vowel reduction and shows variable heights (it is realized as [o] or [ɔ], but not [u]), a typical behavior of PW initial stressless vowels, as we have seen above. With the exception of weak post-verbal pronouns, which, as we have seen, incorporate into the host prosodic word (cf. the example 9c), all other clitics are proclitic and Chomsky-adjoin to the host prosodic word, as illustrated in (9d). Thus, similar to prefix+base formations, in proclitic+host combinations post-lexical phonology that characterizes PW-initial position applies both to the proclitic and the host PW to which the proclitic adjoins. For example, in (9d) emphatic stress and incomplete vowel reduction and variable realization of PW initial stressless vowels may be found in both *ou* or *ofereço*. (On the prosodic organization of words, clitics and affixes in European Portuguese cf. Vigário 2003).

- (9) a. (pós)_{PW}-(modernismo)_{PW} ‘postmodernism’
 b. (des (organizado)_{PW})_{PW} ‘disorganize_{PTCP}’
 c. (deve-o)_{PW} ‘owe_{3.SG=3SG.ACC}’
 d. (ou (ofereço)_{PW})_{PW} ‘or offer_{1SG}’

4.2.2 Prosodic word groups

Groups of prosodic words that show particular lexical or syntactic cohesion display specific phonology, indicating an independent level of prosodic organization. This domain has been called the “prosodic word group” (PWG; Vigário 2010; Vigário/Fernandes-Svartman 2010; Frota 2014; cf. also Santos/Vigário 2016 for a review).²⁰ PWGs essentially correspond to lexical syntactic heads. Since compounds and other syntactic words containing more than one prosodic word are not so frequent in European Portuguese (cf. fn. 16), most often a PWG is formed of a single prosodic word.

Like the other prosodic domains above PW, PWG prominence is final. Thus, in a branching PWG the last PW is the head, and a subtle difference can be noticed between the prominence pattern of two PWs that are internal to a branching PWG (as in *foi um sucesso* ((*hyper*)_{PW}(*monstruoso*)_{PW})_{PWG} ‘(it) was a super-great success’) and

²⁰ The PWG is claimed to differ from the clitic group or the composite group (Nespor/Vogel 1986/2007; Vogel 2009) because it is relevant for the prosodization of compound-like constructs in many languages, but not (necessarily) the prosodization of clitics; e.g. in European Portuguese phonological evidence indicates that clitics attach at the level of PW.

that of two PWs each forming an independent PWG (as in *viu um ((híper)_{PW})_{PWG} ((monstruoso)_{PW})_{PWG}* ‘(he) saw a huge hypermarket’).

As mentioned in 4.2.1, within a PWG, PW-final unstressed vowels (V1) systematically fail to delete when the following word starts in a vowel (V2) that bears PWG prominence. This is illustrated in (10a), where abbreviations form a single PWG and V2 is assigned PWG, but not phonological phrase prominence (adapted from Vigário 2010 and Santos/Vigário 2016). The example in (10b) shows that deletion of the underlying non-back vowel in PW-final position spans the PWG, i.e. the rule regularly deletes the unstressed vowel in PW-final position within the PWG, being blocked only when V2 bears PWG prominence (*eme*). The examples in (10c–d), in turn, show that with underlying back vowels, when V2 bears PWG prominence, the deletion of the vowel is blocked, just like underlying non-back vowels in similar context, while when V2 does not bear PWG stress, V1 deletion is optional.²¹

- (10) a. SN (*esse-ene*) objeto [‘ɛ’sjɛn]/* [‘ɛ’sɛn]
 ‘object NP (noun phrase)’
 b. RFM (*erre-efe-eme*) [‘ɛ’re’fjɛm]/* [‘ɛ’rjɛ’fjɛm]
 (name of radio station)
 c. JS (*jota-esse*) forte [‘ʒɔtɐ’ɛs]/* [‘ʒɔt’ɛs]
 ‘strong JS’ (a youth party)
 d. JSD (*jota-esse-dê*) [‘ʒɔtɐ’ɛs’dɛ]/[‘ʒɔ’tɛs’dɛ]
 ‘JSD’ (a youth party)

The same type of evidence indicates that the PWG is constrained by a maximality condition, imposing PWGs to include at most three PWs (Vigário 2010).

4.3 The phonology of phrasal domains

The phonological phrase and the intonational phrase are the domains of phonological and phonetic phenomena of various kinds. In this section we review some of the major aspects of phrasal phonology and phonetics in European Portuguese.

²¹ One of the editors of this book questions the existence of the internal adjacent word-level stresses. Nevertheless, a wide range of phonological evidence does show that several adjacent PW-level stresses may exist inside the PWG. For example, vowel reduction always fails to apply to the vowels in the syllables that bear stress inside abbreviations. Similarly, semivocalization of a high vowel followed by another vowel never applies to the vowels bearing PW stress, even if they immediately precede a syllable that bears PW and PWG prominence, as in *UL* [‘u’ɛɫ]/* [‘wɛɫ] ‘UL (University of Lisbon)’. Notice that semivocalization that creates rising diphthongs is a purely prosodic process that applies optionally, without exception, within and across words inside the intonational phrase, as in *Manuel* [mɐ’nwɛɫ] (or [mɐnu’ɛɫ]) (proper name) (cf. also 4.2.1 and 4.3.2).

4.3.1 Phonological phrases

Compared with the intonational phrase (IP), the phonological phrase (PhP) is weakly cued by phonological phenomena in European Portuguese, but it still plays an important role in the language (Frota 2000; 2014).

PhP-level prominence is often, but not always, perceptible. In neutral sentences, it falls on the rightmost PWG. Experimental work has shown that PhP-level prominence plays a critical role in processes related to stress clash avoidance (Frota 2000; 2014). For instance, a stress clash within, but not across PhP, yields the lengthening of the first stressed syllable in the clashing sequence, as illustrated in (11); in (11–12), capitalization indicates the syllable bearing PW stress.

- (11) a. (O caFÊ: LUso)_{PhP} contém cevada de boa qualidade. ‘The Lusitanian coffee contains barley of good-quality.’
 b. (O caFÊ)_{PhP} (LUta)_{PhP} pelo prêmio do produto mais qualificado.
 ‘The coffee disputes the award for the best product.’

In addition, hiatus resolution processes involving V1 deletion are blocked if deletion would originate a stress clash at the level of PhP (as in 12a, but not in 12b, where *sempre* ‘always’ is the head of the second PhP).

- (12) a. (O dançaRIno)_{PhP} (Ama)_{PhP} a bailarina russa. *dançarín[e]ma
 ‘The dancer loves the Russian chorus girl.’
 b. (O bailarIno)_{PhP} (ANda sempre)_{PhP} de limusine preta. ^{ok}bailarin[ẽ]da
 ‘The dancer always drives a black limousine.’

PhP also plays a crucial role in pitch accent distribution. Although internal PhP most often lack pitch accent, when there is one or more pitch accents in a PhP, the head of PhP must bear one (Frota 2000; 2014; Frota/Vigário 2000).

Another area where the phonological phrase plays a part is in word order preferences. It has been found, for instance, that speakers’ preference for the relative ordering of Direct and Indirect Objects is sensitive to PhP weight (cf. the details in Frota/Vigário 2002, and Santos/Vigário 2016 for a brief review).

Phonological evidence shows that PhP in European Portuguese is formed by a lexical head (Lex) plus all preceding material, within the domain of the maximal projection of Lex (Frota 2000; 2014).²² Modifiers and complements of Lex consisting

²² Lexical heads belong to the open classes, i.e. nouns, verbs, adjectives, and adverbs (Nespor/Vogel 1986/2007; Frota 2000). Like in other languages, prepositions do not pattern with lexical heads for the purpose of PhP construction in Portuguese. Although occasional phenomena of lexicalization may cause the introduction of a new preposition into the language vocabulary, this is by no means a typical property of this class.

of a single lexical head and appearing on the recursive side of Lex (i.e. to its right), are grouped in the same PhP as Lex; adverbs and adjectives on the non-recursive side of Lex, within its maximal projection, are included in the same PhP as Lex. (13) illustrates PhP formation in European Portuguese.

- (13) ((Os jovens ativistas)_{PhP} (plantaram árvores)_{PhP} (por todo o país)_{PhP})_{IP}
 the young activists plant_{PRET,3PL} trees over all the country
 ‘The young activists planted trees all over the country.’

4.3.2 Intonational phrases and compound prosodic domains

The intonational phrase (IP) is richly cued in European Portuguese (Frota 2000; 2014; Frota/Moraes 2016). For instance, the IP is the domain of the tune, minimally composed of a pitch accent and a boundary tone. In broad focus sentences, IP prominence falls on its rightmost PhP; the head of the IP always bears a pitch accent, and a boundary tone is associated with the syllable placed at the right IP boundary. Final lengthening and (acoustic or simply perceived) pause also usually mark the right edge of the IP.

The IP is the domain of sandhi and resyllabification processes as well (on resyllabification cf. 4.1). The examples in (14), taken from Frota (2000), illustrate sandhi and resyllabification involving word-final fricatives. In (14a), the whole sentence is a single IP, and whenever the fricative is followed by a word starting with a vowel, the fricative surfaces as [z] in syllable onset. In (14b), the same sentence is broken in two IPs, and the internal IP break blocks resyllabification of its final fricative, which then surfaces as [ʃ].

- (14) a. (As antigas alunas ofereceram livros aos amigos)_{IP}
 [z] [z] [z] [z] [z] [ʃ]
 b. (As antigas alunas)_{IP} (ofereceram livros aos amigos)_{IP}
 [z] [z] [ʃ] [z] [z] [ʃ]
 the_{F,PL} old student_{F,PL} offer_{3PL,PRET} book_{PL} to-the_{M,PL} friend_{PL}
 ‘The old students offered books to their friends.’

IP-bound sandhi phenomena include several optional domain-limit processes, i.e. they optionally apply at the edge of the PW within the IP domain, as experimentally demonstrated by Frota (2000). These include, (i) central vowel deletion (a process whereby /a/ deletes when followed by another vowel, different from /a/), as in *garota educada* [ge'ro.te.du'ka.dɐ] or [ge'ro.ti.du'ka.dɐ] ‘polite girl’ (previously given in (6b)), (ii) round vowel deletion (a process whereby a round vowel deletes when followed by another vowel), as in *amigo imaginário* [e'mi.gi.mɛ.ʒi'na.rju] ‘imaginary friend’ (also shown in (6b)), and (iii) syllable degemination (a process whereby the first of

two similar, though not necessarily identical syllables deletes), as in *campo poluído* ['kẽpupu'lu'idu] → ['kẽpulu'idu] 'polluted field'.

Other processes are domain-span phenomena, that is, they apply both word-internally and across words, within the IP domain (Frota 2000). IP domain-span processes include (i) fricative voicing, which tends to be obligatory (cf. (14) above, and Figure 26.1 in 4.3.3), (ii) semivocalization of unstressed non-open non-central vowels (an optional process whereby the first of two consecutive vowels semivocalizes), and (iii) central vowel merger (the latter two are exemplified in (6b) above).

In the case of central vowel merger, two central vowels are involved, V1 being oral and V2 being oral or nasal, and stressless, and the result is a single open vowel ([a] or [ã]). Notice that if V2 is nasal, the result of vowel merger will be an open nasal vowel, as in *compra anchovas* ['kõprẽ'jove] → ['kõprã'jove] 'buy_{3SC} anchovy_{PL}'. This is the only context where a central nasal vowel emerges as open in Standard European Portuguese. Like fricative voicing and resyllabification, vowel merger always tends to apply (cf. Frota 1997; 2000; Mateus/d'Andrade 2000; Vigário 2003; 2010; and 4.2, 4.3.1 for further details on sandhi phenomena).

We have seen that the deletion of word-final underlying non-back vowels /e/ or /ɛ/ (and /i/ in verbs) is a PW-domain limit rule which is bound by the PWG domain and is conditioned by V2 prominence (section 4.2). In addition to PWG prominence, the IP imposes further restrictions on the deletion of these vowels. In fact, in words that are paroxytons in lexical phonology, such as *nove* ['nõv] (/ nõve/) 'nine', deletion of the final vowel is often blocked so that the vowel, surfacing as a schwa ([i]), participates in the realization of a complex melody, usually involving a final rise or high tonal target. Blocking of deletion optionally happens, for example, when the vowel is at the right edge of a non-final IP bearing H% (signaling continuation), or at the right edge of the utterance in yes-no questions or calls (Frota 2002; 2014).

In the same intonational contexts, when the last word of the IP or utterance is stressed on the last syllable ending in a sonorant consonant, schwa insertion optionally applies. In fact, blocking of non-back vowel deletion and schwa insertion, as well as vowel lengthening and vowel splitting are strategies available in European Portuguese for ensuring the segmental space necessary for the realization of complex tonal material (cf. Frota 2002; 2014; Frota et al. 2016; Frota/Moraes 2016; Vigário/Cruz/Frota 2019).

Although the right edge of the IP is clearly more signaled than the left edge, there are a few known cues to the IP-left boundary as well. For example, clitics clearly tend to appear less reduced in IP-initial position than they do IP-internally (Frota 2000, 251–253; Vigário 2003, 283–298).

Yet another area where the IP plays a role in European Portuguese grammar is with respect to speakers' word order preferences (cf. Frota/Vigário 2002 for details; and Santos/Vigário 2016 for a short review).

As in other Romance languages (Nespor/Vogel 1986/2007), in European Portuguese syntactic constituents that are not attached to a root sentence form their own

IP; these include parenthetical expressions, topics, vocatives, explicative relative clauses, tags; any remaining sequence of adjacent PhPs in a root sentence also forms an IP (Frota 2000; 2014).

Besides the syntactic conditions on IP formation, phonological information plays a role in the construction of IP as well and may in fact be the sole motivation for IP formation. For example, as in other languages fast and slow speech rates promote larger and shorter IPs, respectively; long IPs tend to be broken into shorter IPs; there is a preference for utterances with balanced IPs or for the final one to be longer (Frota 2000; 2014). Long syntactic subjects (i.e. with more than eight syllables), unlike long objects, also tend to form their own IP (Elordieta/Frota/Vigário 2005).

Phonologically motivated IP phrasing is heavily constrained by syntactic information. For instance, the relation between heads and complements or modifiers tends not to be broken. Besides that, syntactically motivated IP boundaries cannot be undone or demoted. If syntax-phonology mapping rules create for instance two short IPs followed by a long IP, rather than being reorganized to forming a single longer IP, the two short IPs ($IP^{\min}$) are grouped into a compound IP domain ($IP^{\max}$). In such cases, both the internal IP and compound IP function like IP domains for the application of phonological rules, including external sandhi rules, which apply across the two $IP^{\min}$ within the $IP^{\max}$. In addition, the right edge of the internal $IP^{\min}$ is still phonologically signaled with the obligatory nuclear pitch accent, final lengthening and, very often, a H% boundary tone. However, the boundary cues are acoustically less marked, i.e. there is less final lengthening, H% is realized with a lower F0 and no acoustic pause tends to occur (Frota 2000; 2012; 2014; Elordieta/Frota/Vigário 2005).

4.3.3 Intonation and rhythm

It is well established that the domain for tonal contrasts in the languages of the world vary. As in other Romance languages, tonal contrasts in European Portuguese are phrasal, and they may be the only grammatical information distinguishing sentence type and broad and narrow focus (Frota 2000; 2014).

The minimal tune in neutral declarative sentences is formed by a nuclear falling pitch accent and a low boundary tone, i.e. H+L* L% (Frota 2000; 2014). IP-branching neutral declaratives tend to show a tonal event at the left edge of the IP, most typically a phrasal H, which aligns with the right edge of the first PW or its prominent syllable. This tonal event has also been interpreted as a H* pitch accent that may show late alignment (and in that case it is transcribed as <H*; cf. Frota 2003). Also frequent is the association of a L*+H pitch accent to the head of the first PhP of the IP. An example of a typical declarative contour is given in Figure 26.1.

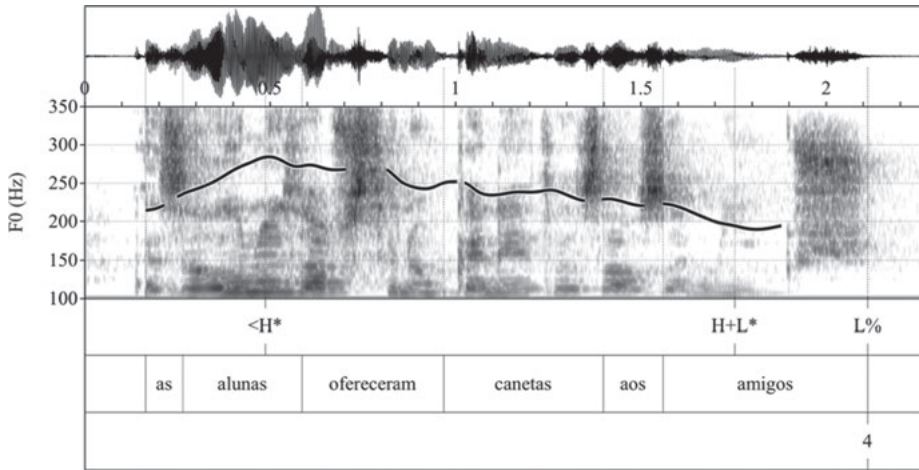


Figure 26.1: F0 contour of the utterance *As alunas ofereceram canetas aos amigos* ‘The students_f offered pens to their friends’, produced as a single IP by a Standard European Portuguese speaker (part of the Interactive Atlas of Portuguese Prosody database, Frota/Cruz 2012–2015).

The sparse distribution of pitch accents in Standard European Portuguese is a salient property of the language, contrasting with other dialects and varieties of Portuguese and other Romance languages (Frota 2000; 2014; Frota/Vigário 2000; Frota/Prieto 2015; Frota/Moraes 2016). It has been proposed that European Portuguese pitch accent paucity follows from the fact that obligatory pitch accent assignment in this variety of Portuguese operates at a higher level of the prosodic hierarchy than in other Romance languages, i.e. at the IP level (Frota 2014).

Specific tunes mark different sentence types; cf. the selection in (15) below, taken from Frota (2014).

- (15) Selected sentence type tunes
- | | |
|---------------------------------------|--------------|
| Neutral declaratives and wh-questions | (H) H+L* L% |
| Neutral yes-no questions | (H) H+L* LH% |
| Requests (multiword) | H* L* L% |
| Requests (one word) | %H L* L% |
| Vocative chants (greeting) | (L+)H* !H% |
| Vocative chants (insisting call) | (L+)H* L% |

Prosodic narrow or contrastive focus marking may vary as a function of focus location in the utterance (late vs. early focus) and sentence type (cf. Frota 2014 for details). In declaratives, the focused constituent is assigned a specific pitch accent, H*+L, be it late or early in the sentence. Early focus is always followed by a very reduced pitch range, and a downstepped reduced H+L* tune may still be detected, associated with the head of the last PhP, followed by the declarative boundary tone (L%).

There is controversy with respect to secondary stress in European Portuguese. Experimental work has shown that secondary stresses are typically found in PW-initial position, most often on the first or second syllable of the word (Frota/Vigário 2000; Vigário 2003; Castelo 2006). According to Castelo (2006), furthermore, (i) the relevant units for secondary stress assignment are segmental sequences containing one full vowel, not abstract syllables with non-surfacing vowels, (ii) vowel quality and eurythmic principles also play a role in perceived secondary prominence, (iii) IP-initial position moderately promotes PW-initial secondary stresses, and (iv) a few particular suffix combinations optionally induce a secondary stress on the second syllable preceding main word stress, irrespective of word size considerations. Nevertheless, some phonologists have also proposed that European Portuguese secondary stress assignment is more similar to that reported for other Romance languages, including a binary rhythmic wave (e.g. Mateus/d'Andrade 2000 and references therein).

The specific phonology of the language is correlated with particular rhythmic properties (78 Comparing and deconstructing speech rhythm across Romance languages). Studies looking at the proportion and variability of consonantal and vocalic intervals, along the lines of Ramus/Nespor/Mehler (1999), have shown that European Portuguese has a mixed rhythm (Frota/Vigário 2001). It patterns with other Romance languages regarding the proportion of vocalic intervals (V%), i.e. as a syllable-timed language, and behaves like languages such as English and Dutch with regard to the variability of consonantal intervals (ΔC), i.e. a stress-timed language.

5 Phonological variation across European Portuguese dialects

Phonological variation in European Portuguese has been traditionally considered from the point of view of segmentals, with some occasional, often impressionistic notes on suprasegmentals (Cintra 1971; Segura 2013b). More recently, prosodic variation in European Portuguese has been subject to systematic investigation (cf. in particular the material in Frota/Cruz 2012–2015 and the survey in Frota et al. 2015). Here, we will report only a few of the most striking differences of other dialects in comparison with the standard variety.

The underlying segmental system is very similar across dialects on the mainland, the most noticeable, widespread exception being the absence of the contrast between /b/ and /v/ in the northern varieties, where [β] is usually found (Cintra 1971; Rodrigues 2003; Segura 2013b). The vowel system in areas of the south (Barlavento) and Beira Baixa and Alto Alentejo (in the center of the country), as well as in some parts of the Azores (in particular, São Miguel) includes round front vowels (Segura 2013b; Krämer 2017 and references therein).

Some of the rules described in 3.1 do not operate in northern dialects, namely, raising by one degree of vowels preceding underlying nasals, /ow/ monophthongization, and /e/ centralization in the context of palatals; and more generalized monophthongization is found in central regions of Portugal and Alentejo. By contrast, stressed vowels tend to diphthongize in the northern region, and also, with some differences, in areas of Madeira (Cintra 1971; Rodrigues 2002; Segura 2013b; Vigário 2016). In Barlavento, in the south, and Beira Baixa and Alto Alentejo, in the center, not only underlying non-back vowels, but also [u] undergo generalized deletion in unstressed word-final position, as in *copo* ['kɔp], instead of ['kɔpu] 'glass' (Segura 2013b).

Consonantal external sandhi is very homogeneous across dialects in the mainland, but the realization of resyllabified fricatives is often palatal ([ʒ]), both in northern and southern dialects (Rodrigues 2003; Cruz 2013). Hiatus resolution processes are also largely similar, although with interesting differences in the frequency of occurrence of deletion and gliding (Paulino/Oliveira/Vigário to appear and references therein). In the northern region (penetrating slightly into the center), and in some areas of the Azores archipelago, [j] is inserted to break a hiatus involving two central vowels when V2 bears word stress, as in *Beira Alta* ['bejɾe'altɐ], instead of ['bejɾe'altɐ] (place name; cf. Segura 2013b; Oliveira et al. 2017). In parts of Alentejo, there are dialect-specific contexts for schwa or [i]-insertion and schwa-preservation in IP final position (Cruz 2013).

Segmental phonology on the islands shows many particularities (cf. the review in Segura 2013b and references therein). Among other unusual rules, one found in the Azores and Madeira (and residually in areas of the mainland) consists in the diphthongization of vowels bearing word stress when preceded by a syllable headed by a close vowel or glide, irrespective of any intervening consonant (Martins/Vitorino 1989; Segura 2013b). This process creates a rising diphthong containing a glide with the place of articulation of the triggering close vowel or glide, as illustrated in (16), taken from Martins/Vitorino (1989); in the examples, the target standard European Portuguese realization is given inside parentheses.

- (16) em casa [ĩ'kjaze] ([kaze]) 'at home'
 estão fartas [tẽw'fwarteʃ] ([farteʃ]) 'be tired_{3PL.F}'

Another very specific process, this time only found in Madeira, consists in the realization of word-final /S/ as [i] or [j] when followed by a word starting in a consonant other than a voiceless plosive, as in [uɨ'furuʃ], instead of [uʃ'furuʃ], 'the holes' (cf. Segura 2013b).

There is variation in the suprasegmental phonology of Portuguese dialects as well (Elordieta/Frota/Vigário 2005; Frota/Cruz 2012–2015; Cruz 2013; Barros 2014; Frota et al. 2015; Cruz et al. 2017). Prosodic variation is found, for instance, in (i) the tonal inventory – for example, in some dialects the nuclear pitch accent in declaratives is L*, instead of H+L*, and the boundary tone for yes-no interrogatives may be HL% or L%, instead of LH%; (ii) pitch accent density – several regions show much denser pitch accent distribution than Standard European Portuguese (e.g. Porto, Braga, Algarve, Alentejo); (iii) major

phrasing preferences – for example, SVO (subject verb object) sentences in Northern European Portuguese (Braga) and in areas of Alentejo (Castro Verde) tend to be phrased as (S)(VO), even when subjects are short, while (SVO) phrasing is preferred in the south (Albufeira), unless subjects are long, as in Standard European Portuguese; (iv) rhythm metrics – in some areas, correlates of linguistic rhythm point to stress-timed rhythm (the central interior, Alentejo and south), while in other areas they indicate a mixed rhythm (the north, including Braga and Ermesinde, Lisbon, and Castro Verde, in a southern part of Alentejo). Using an innovative approach, resorting to spatial interpolation methods and spatial interaction models, Cruz et al. (2017) attempt to map prosodic variation in European Portuguese (mainland) on the basis of intonational and rhythmic features. The results indicate that variation in prosodic properties is geographically non-continuous and less dependent on geography than is variation of non-prosodic features.

6 Brazilian Portuguese

European and Brazilian Portuguese are similar varieties, mutually intelligible to a large extent, although it is clearly easier for European Portuguese speakers to understand Brazilian Portuguese than the reverse.

While both varieties seem to share essentially the same underlying system, as well as many lexical and post-lexical processes, several rules are specific to each variety. In Brazilian Portuguese, as spoken in the São Paulo and Rio de Janeiro areas, stressless vowels reduce much less than in European Portuguese and in general do not delete, and [i] does not surface. Nevertheless, close-mid and open mid underlying vowels neutralize in pretonic position, the vocalic system being reduced to [i e a o u] in that position. Thus, for example, /ɔ/ is realized as [ɔ] in stressed position, like in *porta* ['pɔrta] 'door', but as [o] in pretonic position, as in *porteira* [por'tejra] 'door keeper'. Additionally, further reduction affects post-tonic final vowels, where only [i a u] are found (cf. Bisol/Veloso 2016 for a review).²³

Other very general processes that are specific to Brazilian Portuguese include (i) the lexical rule of coda /l/ semivocalization – for example, in *papel* 'paper', /l/ obligatorily surfaces as [w] because it is in coda position (i.e. [pa'pew]), while in *papelaria* 'library' the lateral surfaces as such because it is in the syllable onset (i.e. [papela'ria]); (ii) the palatalization of /t d/ → [tʃ dʒ] when followed by a close palatal vowel or glide ([i ỹ j ʝ]), as in *tio* ['tʃiu] 'uncle';²⁴ (iii) optional pretonic vowel harmony triggered by close vowels – e.g. in a word like *pepino* 'cucumber', the first vowel optionally assimilates the [+high] feature of the stressed vowel, and thus the

²³ In word-final positions the reduced system of vowels /i a u/ may surface more reduced, as [i ɐ u].

²⁴ Although palatalization is found in most Brazilian regions, it does not occur in all areas, even within the state of São Paulo.

word may surface as *p[e]pino* or *p[i]pino*; and (iv) optional nasal spreading in stressed syllable – e.g. *banana* ‘banana’ may surface as *ban[ẽ]na* (and in some dialects also as *b[ẽ]n[ẽ]na*) (cf. Massini-Cagliari/Cagliari/Redenbarger 2016; Bisol/Veloso 2016; Santos/Vigário 2016 and references therein).

Consonants appearing in positions that would otherwise violate basic principles of syllabification are resolved via V-slot insertion, usually filled with [i] – e.g. *advogado* [adʒivo'gadu]/*[advo'gadu] ‘lawyer’, *internet* [ĩter'netʃi]/*[ĩter'net] ‘internet’. Experimental research on perceptual epenthesis has shown dramatic differences in the behavior of speakers of each variety of Portuguese, with Brazilian Portuguese speakers patterning similar to Japanese subjects, i.e. showing perceptual epenthesis where no acoustic vowel between consonants exists, unlike European Portuguese speakers (Dupoux et al. 2011).

The formation of prosodic domains is very similar across varieties, with some noticeable differences in the prosodization of clitics, which appears to be somewhat less clear in Brazilian than in European Portuguese, and in the conditions on phonological phrase formation (Frota 2000; Tenani 2002; Sândalo/Truckenbrodt 2002; Bisol 2003; 2005; cf. also Santos/Vigário 2016 for a review). Like in European Portuguese, phonological evidence indicates that clitics are not incorporated into the host-PW – for example, proclitics do not pattern like pretonic vowels within the PW with respect to pretonic vowels’ raising (cf. 17a vs. 17b).

- (17) a. *por tela* [por'tɛla] ~ [pur'tɛla] ‘by screen’
 b. *Portela* [por'tɛla]/*[pur'tɛla] (place name)

This sort of behavior has led to distinct proposals on the prosodization of clitics. According to Bisol (2005), clitics either attach to the clitic group or to the so-called post-lexical PW, while for Brisolara (2008) proclitics are prosodically adjoined to the PW, and for Simioni (2008) they attach directly to PhP.

The formation of phrasal prosodic domains seems to be similar in both varieties of Portuguese, but short verb complements (e.g. containing article+N or possessive+N), have been suggested to form a PhP with the preceding verb, and the phonological phrase has been argued to be affected by the Uniformity Condition in Brazilian Portuguese, i.e. a condition that favors phonological phrases of equal length (Sândalo/Truckenbrodt 2002). Thus, *café quente* is a phonological phrase in (18a) but corresponds to two phonological phrases in (18b).

- (18) a. (café quente)_{PhP} (queima a boca)_{PhP}
 coffee hot burns the mouth
 ‘Hot coffee burns the mouth.’
 b. (café)_{PhP} (quente)_{PhP} (queima)_{PhP}
 coffee hot burns
 ‘Hot coffee burns.’

Evidence for this prosodic organization comes from stress retraction due to stress clash. This process operates within the phonological phrase only. Thus, in (18a) main stress in the last syllable of *café* moves to the previous syllable, because the following word (*quente*) starts in a stressed syllable and is within the same PhP as *café*, unlike in (18b), where stress retraction cannot operate, indicating that the two words now belong to different PhP.

Sandhi processes in the two varieties are very similar too, with some differences in the way clashes are resolved. For example, stress retraction is a stress-clash resolution strategy in Brazilian but not in European Portuguese, and the exact stress-clash configurations that are resolved differ across the two varieties as well (Sândalo/Truckenbrodt 2002; Tenani 2002; cf. also Barbosa 2002 for an alternative approach).

Rhythmic stress is more clearly binary and its domain excludes (pro)clitics, unlike in European Portuguese (Collischonn 1994; Frota/Vigário 2000; Fernandes-Svartman et al. 2012; Magalhães 2016).

Recent investigation has shown great variation in the intonational system across varieties of Portuguese (Frota/Vigário 2000; Tenani 2002; Fernandes 2007; Vigário/Fernandes-Svartman 2010; Frota et al. 2015; 2016; Frota/Moraes 2016, Vigário/Cruz/Frota 2019). Salient differences are found, for instance, in (i) tonal inventories, (ii) the preferred strategies for dealing with tone crowding – Brazilian Portuguese tending to preserve the text, at the expense of tune changes (e.g. showing tonal truncation), and European Portuguese tending to keep the tune and changing the segmentals (e.g. exhibiting vowel epenthesis); and (iii) tonal distribution (cf. Figure 26.2).²⁵

Dense tonal distribution in Brazilian Portuguese, clearly detectable in Figure 26.2 and contrasting with the sparse tonal assignment in European Portuguese, has been proposed to follow from the domain of assignment of obligatory pitch accent in this variety of Portuguese – specifically, the PW or the PWG, meaning that each word in a sentence tends to be assigned a pitch accent. Furthermore, when words are larger, namely when there are more than two pretonic syllables, more tonal material is usually found towards the beginning of the word, in particular in sentence-initial position (Frota/Vigário 2000; Vigário/Fernandes-Svartman 2010; Frota et al. 2015). The latter is an unusual feature of Brazilian Portuguese considering other Romance languages as well, which places Brazilian Portuguese closer to languages typologically more distant, such as Japanese and Korean (cf. Frota/Vigário 2000 and references therein).

Brazilian also differs from Standard European Portuguese, and in part from the other Romance languages, with respect to its rhythmic properties (Frota/Vigário 2001). Using similar kinds of data and measures as those employed in Ramus/Nespor/Mehler (1999) for investigating languages thought to belong to different rhythmic classes, it was found that the variability of consonantal intervals (ΔC) in Brazilian Por-

²⁵ Following Frota/Moraes (2016), we do not mark ‘**’ in the labeling of L+H prenuclear accents, because in Brazilian Portuguese both L and H often align within the stressed syllable, so it is unclear which of the two tones should be signaled as leading tone.

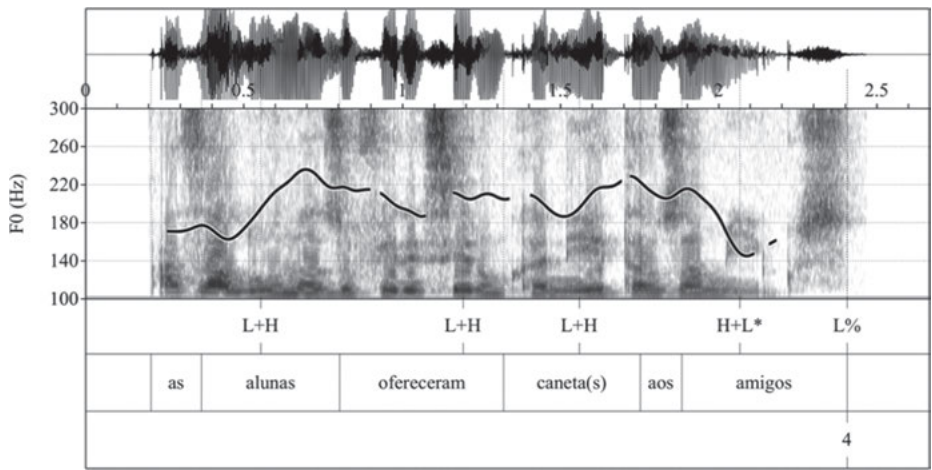


Figure 26.2: F0 contour of the utterance *As alunas ofereceram canetas aos amigos* ‘The students_f offered pens to their friends’, produced as a single IP by a Brazilian Portuguese speaker from São Paulo (part of the of the Interactive Atlas of Portuguese Prosody database, Frota/Cruz 2012–2015).

tuguese is similar to that in languages classified as syllable-timed, such as Italian and Spanish, while the proportion of vocalic intervals (%V) in this variety of Portuguese is analogous to that of languages classified as mora-timed, like Japanese or Basque.

7 Concluding remarks

In this chapter we have surveyed some of the most salient features of Portuguese phonetics and phonology. The Portuguese language has been subject to intense, exciting work especially since the end of the nineteenth century, with a tremendous growth in the last few decades. Some areas are particularly prone to controversy, and many issues also motivate further research. The comparative approach followed in recent years, involving dialects and varieties of Portuguese, as well as other Romance languages, has proved particularly fruitful and will most certainly continue to flourish.

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Fernando Martínez-Gil

27 Galician

Abstract: The initial two sections of this chapter aim at briefly introducing the Galician language within the broader context of the major Romance languages, including its historical origins, its geographical extension, and the major dialectal groupings based on well-documented linguistic features. The remainder of the chapter addresses the major phonetic and phonological features of Galician, with special emphasis on its phonemic inventory, patterns of allophonic distribution, and dialectal variation, as well as its prosody, including syllable structure, stress, and intonation, with reference to the most important studies on Galician phonetics/phonology carried out in the past.

Keywords: Galician, Hispano-Romance, Western Romance, vowel aperture, vowel opening, metaphony, *seseo*, *gheada*

1 Introduction and sociohistorical background

Galician (*galego*) is a Romance language spoken in the autonomous region of Galicia, in Spain's northwestern corner, north of Portugal, where it is co-official with Spanish. The region is divided into four provinces named for their capital cities: A Coruña (northwest), Lugo (northeast), Ourense (southeast), and Pontevedra (southwest) (cf. maps in Figures 27.1 and 27.2). The other major urban areas are Vigo, the most populated Galician city, Ferrol, and Santiago de Compostela, the Galician capital and headquarters of the autonomous government, the *Xunta de Galicia*.

A majority of Galicia's 2.7 million inhabitants are bilingual in Spanish and Galician. About 1.5 million speak Galician as their first language (although this number has declined in recent years, especially among younger speakers; cf. Regueira 1999; Beswick 2007; Rei-Doval 2007; Regueira/López Docampo/Wellings 2013; Ramallo/Rei-Doval 2015; Monteagudo 2017a), and over half a million use it as a second language. Around 70,000 speakers of Galician live in the bordering western regions of the autonomous communities of Asturias and Castilla-León. In addition, a large number of Galicians emigrated to the Americas during the 19th and 20th centuries, settling in Cuba, Uruguay, Venezuela, Brazil, Chile, Mexico, and especially Argentina (Buenos Aires), where significant portions of the population have Galician ancestry (cf. De Cristóforis/Fernández 2008; Lojo 2011; Sinner 2016; Monteagudo/Reyna Muniain 2020). Significant numbers of Galician speakers are also found in other autonomous communities and cities in Spain. Galician emigration to European countries peaked

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Figure 27.1: Galicia's location in Spain adapted from <https://imgur.com/r/mapporn/XtVbnqe>.



Figure 27.2: Galicia's four provinces (<https://www.mapainteractivo.net/fotos/mapa-de-galicia.html>).

in the 1960s and 1970s, mainly to Germany, the Netherlands, Switzerland, France, and England. For over 40 years now, Galician has been recognized as one of Spain's official languages, along with Castilian (Spanish), Catalan, and Basque; it is taught in Galicia's schools and universities, and is used regularly at political and cultural

events, as well as in the region's media, including newspapers, radio, and television (cf. Beswick 2002; 2007; Rei-Doval 2007; Monteagudo 2017a; 2017b).

Historically, both Galician and Portuguese descend directly from a common ancestor, known as (*Old*) *Galician-Portuguese*. Galician arose as a Western Romance language from the Vulgar Latin spoken in the Roman province of Gallaecia, which included modern Galicia, the northern part of Portugal south to the Douro River, as well as parts of western Asturias and León (for a history of Galician from medieval times cf. Monteagudo 1999; Mariño Paz 2008; 2017). The first recorded Old Galician-Portuguese words appear as glosses in administrative and notary documents from the early Middle Ages, written in Medieval Latin. During the *Old Galician-Portuguese* period (12th–14th centuries), the language was increasingly used for written documents, and it became the preferred medium for recording the Provençal-inspired lyric poetry produced in Christian Hispania. Until the 15th century the linguistic history of Galician was inextricably connected to that of Portuguese (cf. Carballo Calero 1979, 60–63; Monteagudo 1999; 2017b). The linguistic separation between Galicia and Portugal began around the 15th century, when the Galician kingdom was permanently annexed by the Castilian Crown. From this point onwards, Castilian replaced Galician as the official language of the region, a situation that lasted until the latter portion of the 20th century.

Galician became a literary language again in the 19th century, a period of significant cultural and linguistic revival known as *O Rexurdimento* ('Renaissance'). After the Spanish Civil War (1936–1939), the use of Galician in official events and written records was not recognized under Franco's regime (ironically, Franco was himself a Galician). The process of standardization in the modern era, which started in the early 1970s, was promoted to a significant degree by the work of the *Instituto da Lingua Galega* (ILG, 'Galician Language Institute') and the *Real Academia Galega* (RAG, 'Galician Language Academy') (cf. Santamarina 1995; Regueira 1997; 2005; Freixeiro Mato 1998, 32–35; Beswick 2002; 2007; Monteagudo/Bouzada Fernández 2003; Álvarez Blanco/Monteagudo 2005; Ramallo/Rei-Doval 2015). It was not until the early 1980s that the language achieved official status when Galicia became an autonomous region. An important step in that project was the publication by RAG/ILGA of *Normas ortográficas e morfolóxicas da lingua galega* ('Orthographic and morphological norms of the Galician language'), first published in 1982, and further revised in 1995 and 2003. The *Normas* are not based on any particular variety of Galician, although the phonological standards are closer to the central variety (cf. Section 2). In contrast, the morphological standards rely primarily on the language spoken in the inland regions of the western variety (cf. Álvarez Blanco/Dubert-García/Sousa 2006; Dubert-García/Sousa Fernández 2017). The orthographic conventions, on the other hand, are borrowed from Spanish.

Whether contemporary Galician and Portuguese are to be regarded as separate languages or rather dialects of the same language is a long-standing debate, with cultural and political overtones (cf. Álvarez Pérez 2013). The proponents of the standard prescribed in the *Normas*, the so-called *isolationists* advocate for the linguistic

independence of Galician vis-à-vis Portuguese, a stand shared not only by a majority of Galician scholars, but also a large portion of the media and political, social, and educational institutions. Opposed to this view is a vocal minority of Galician scholars, the *reintegrationists*, championed by the *Associação Galega da Língua* (AGAL, ‘Galician Language Association’), and more recently the *Academia Galega da Língua Portuguesa* (AGLP, ‘Galician Academy of the Portuguese Language’) who maintain that Galician is a regional variety of Galician-Portuguese, and push for orthographic and even lexical reintegration with Portuguese.

2 Major dialectal areas

Since the seminal work of F. Fernández Rei (1982; 1985; 1991; 1994; cf. also Fernández Rei/Hermida Gulías 2003), Galician dialectologists distinguish three major north-south running dialect areas, or blocks (*bloques*), as they are commonly known (cf. map in Figure 27.3): Western, Central, and Eastern Galician, a classification confirmed more recently by the dialectometric analysis of Álvarez Blanco/Dubert-García/Sousa (2006), Sousa (2006), Dubert-García/Sousa Fernández (2017), and Dubert-García (2018), among others. Western Galician includes western Pontevedra and A Coruña provinces. Central Galician comprises eastern Pontevedra and A Coruña provinces, as well as the vast majority of Lugo and Ourense provinces. Eastern Galician encompasses the easternmost areas of Lugo and Ourense provinces as well as some eastern areas of the autonomous regions of Asturias and Castilla-León. Other significant subdivisions have been identified within these three major dialectal domains. Western Galician consists of three main varieties: *Área Pontevedresa* (most of Pontevedra – except the northeast – and southwestern Ourense), *Área Fisterrá* and *Área Bergantiña* (western A Coruña). The Central block includes *Área Mindoniense* (northernmost A Coruña and Lugo provinces), *Área Lucu-Auriense* (southern Lugo and central and southern Ourense), and *Área Central de Transición* (a transition area of eastern A Coruña and northeastern Pontevedra together with a relatively narrow corridor that runs west to east between the *Mindoniense* and *Lucu-Auriense* varieties). The Eastern Galician block includes a narrow strip of the easternmost areas of Lugo and Ourense known as *Área Oriental-Central*, and three areas of transition from Galician to Asturian-Leonese: *Área Asturiana* (also known as *Eonaviego* or *Galician-Asturian* dialect) in Western Asturias, *Área Ancaresa* (the Ancares region between Lugo and the León province of Castilla-León), and *Área Zamorana* (a small region in the Zamora province of Castilla-León bordering southeastern Ourense). More finely grained divisions have been proposed within these subdomains (for surveys of dialectal and/or sociolinguistic variation, cf. Fernández Rei, F. 1991; Regueira 1997; Sánchez Rei 2013; Álvarez Blanco/Sousa 2017; Monteagudo 2017a; 2017b; Dubert-García 2018).

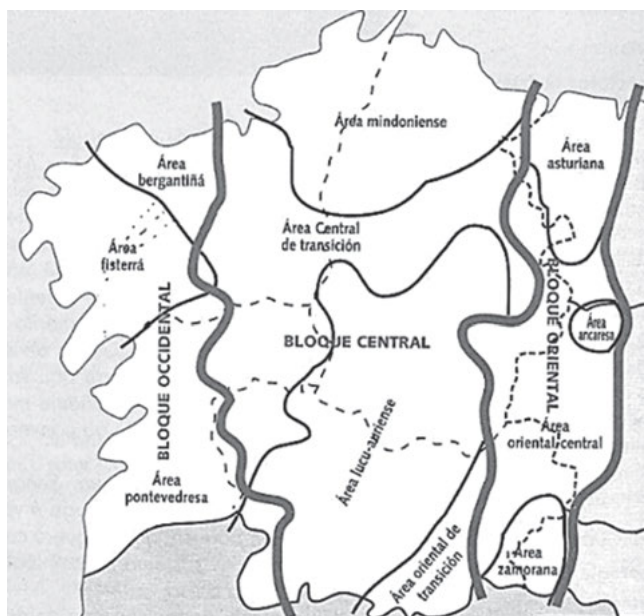


Figure 27.3: Major Galician dialectal blocks and areas (<https://www.slideshare.net/landin/bloques-e-reas-lingsticas-do-galego-noem-paz>).

A relatively new variety of Galician, used by a large number of native Spanish-speaking residents of the region who have learned Galician as a second language, is commonly known as *new urban Galician* (Regueira 1999), since it is found primarily in urban and semi-urban areas. Two of its predominant features are the absence of vowel reduction, and the loss of contrastive mid vowel aperture distinctions (cf. Section 3), commonly attributed to the interference from the Spanish phonological system (cf. Vidal Figueroa 1997; Dubert-García 2002; Ramallo 2010; Aguete Cajiao 2017; Kabatek 1997; 2000; 2017; González 2008; Tomé Lourido/Evans 2017).

3 Segmental phonology I: vowels

3.1 The vowel system

Galician exhibits a typical Western-Romance vowel system with four degrees of vowel height and a distinction between close and open mid vowels shown in Table 27.1.

As in many other languages, the presence vs. absence of stress affects the phonetic realization of vowels in Galician. In general, stressed vowels have a longer duration, as well as higher pitch and intensity, and generally preserve their underlying quality (cf. Veiga Arias 1965; 1970; Porto Dapena 1977, 16, 24; Álvarez Blanco 1991; González

Table 27.1: The vowel phonemes of Galician.

	Front	Central	Back
	Unrounded	Unrounded	Rounded
Close	i / j		u / w
Close-mid	e		o
Open-mid	ɛ		ɔ
Open		a	

González/Regueira 1994; Kabatek 2000; Molinos Castro 2002). In particular, the mid vowel close/open distinction holds mainly when the vowel bears primary stress, with a few important exceptions discussed later. In general, in the vernacular vocabulary this contrast between mid vowels is neutralized in unstressed positions, including pretonic and posttonic vowels word-internally, a result of a general process of reduction, whereby they undergo closing and centralization, most notable word-finally (cf. Taboada 1979, 26–33; Regueira 2007; Aguete Cajiao 2015). Word-final unstressed /a/ closes and centralizes. Following Regueira/Fernández Rei (to appear), the closed and centralized variants will be transcribed here as [ɪ u ɐ] (in some dialects, closing reduction of the higher-mid vowels produces the close vowels [i u]; cf. Martínez-Gil 2019). The minimal pairs in (1) illustrate the distinctions among vowel phonemes:¹

(1) a.	/i/			/u/		
	fin	['fɪŋ]	'end'	fun	['fun]	'go _{1SG.PRET} '
	vila	['bile]	'town'	bula	['bulɛ]	'hurry _{1SG.SBJV} '
b.	/e o/			/ɛ ɔ/		
	ven	['ben]	'come _{2SG.IMP} '	ben	['bɛŋ]	'well'
	peso	['pesu]	'weight'	peso	['pɛsu]	'weigh _{1SG} '
	bola	['bolɛ]	'bread bun'	bola	['bolɛ]	'ball'
	oso	['osu]	'bear'	oso	['ɔsu]	'bone'
c.	/a/					
	fan	['fan]	'do, make _{3PL} '			
	paso	['pasu]	'step'			
	bala	['balɛ]	'bullet'			

1 There is no distinction in standard Galician orthography between the close-mid and open-mid vowels. The 19th-century practice of using the graphemes *é, ó* (or *e, o*) for the close-mid vowels and *è, ò* for the open-mid ones, is no longer adhered to. The graphemes *b* and *v* both represent the phoneme /b/.

3.2 Phonemic variability

Due to a number of historical changes, the underlying close/open value of stressed mid vowels may be subject to dialectal variation in particular lexical items. Some of these dialectal differences are registered in Regueira's (2010a) Galician pronouncing dictionary. For example, while the stressed mid vowels in the Western Galician Área Pontevedresa are closed in *leite* ['lejtɪ] 'milk', *aquela* [a'keɫe] 'that one_F', *ollo* ['oju] 'eye', *noite* ['nojtɪ] 'night' etc., they are open in the variety spoken in the Central Galician Ferrol region (*Área Mindoniense*: ['lejtɪ], [a'keɫe], ['ɔju], ['nojtɪ] (cf. Porto Dapena 1977, 20, 26–28; Regueira 1989, 18–20; Freixeiro Mato 1998, 88–89; but cf. Regueira 2001). Furthermore, in most Galician varieties the underlying mid vowel is open in *mel* ['mɛl] 'honey', *neve* ['neβɪ] 'snow', *queres* ['kerɪs] 'want_{2SG}' etc., but close in these and many other items in some varieties spoken in the south of *Área Pontevedresa*: ['mel], ['neβɪ], ['kerɪs] etc. (cf. Costas González 1988; Fernández Rei, F. 1991, 46–48; Mariño Paz 1994).

In Western Galician, a close-mid vowel is generally found in the vernacular lexicon instead of an etymologically open one when followed by a syllable-final nasal: *tempo* ['tempu] 'time, weather', *dente* ['dɛntɪ] 'tooth', *ponte* ['poŋtɪ] 'bridge', *longo* ['loŋgu] 'long' etc. (cf. ['tempu], ['dɛntɪ], ['poŋtɪ], ['loŋgu] etc. in other dialectal areas; cf. Fernández Rei, F. 1991, 40–48). However, the historical raising process in Western Galician was far from systematic, as witnessed by items such as *sempre* ['sempɾɪ] 'always', *quente* ['kɛntɪ] 'warm', *fento* ['fɛntu] 'fern', *tenro* ['tenɾu] 'tender', *onte* ['ɔntɪ] 'yesterday', *ponla* ['pɔnlɐ] 'branch', *pomba* ['pɔmba] 'dove, pidgeon' etc.

3.3 Mid-vowel quality in Spanish loanwords

Throughout the centuries, especially in recent ones, a massive number of borrowings have entered the Galician lexicon from Spanish (many of these items may have been themselves borrowed by Spanish from other languages, including Latin and Greek). A notable feature of Spanish loanword adaptation in Galician is the marking of mid vowels other than posttonic as open, giving rise in some instances to new minimal pairs absent in earlier stages of the language, both in stressed position, such as in *fecha* ['fetʃe] 'date' vs. *fecha* ['fetʃe] 'sip', or *corte* ['kɔrtɪ] 'cut' vs. *corte* ['kɔrtɪ] 'stall, cowshed', as well as in pretonic position, thereby forestalling unstressed vowel reduction: *rodar* [rɔ'ðar] 'roll_{INF}' ~ *rodár* [ru'ðar] 'cut_{INF} with a hoe', *votar* [bɔ'tar] 'vote_{INF}' ~ *botar* [bɔ'tar] 'throw, cast_{INF}', *rentiña* [rɛŋ'tijɲe] 'very close' ~ *rentiña* [rɪŋ'tijɲe] 'rent_{DIM}', *cordeiro* [kɔr'ðejɾu] 'rope maker' ~ *cordeiro* [kur'ðejɾu] 'lamb' (cf. Santamarina 1974, 12–13; Porto Dapena 1977, 109–110; Taboada 1979, 24–25, 30–33; Regueira 1989, 21–24). In some neologisms the open/close specification of mid vowels in a given loanword is subject to geographical variation: *seso* ['sesu] ~ ['sesu] 'brain', *problema* [pru'βleme] ~

[pruβlɛmɐ] ‘problem’, *silencio* [siˈlɛnθjɔ] ~ [siˈlɛnθjɔ] ‘silence’, *cóndor* [ˈkoŋdɔr] ~ [ˈkoŋdɔr] ‘condor’, *ostra* [ˈostɾɐ] ~ [ˈɔstɾɐ] ‘oyster’ etc.

3.4 Nasalization

Vowels flanked by nasals are subject to nasalization: *moneca* [mõˈneke] ‘doll’, *mamón* [mãˈmõŋ] ‘idiot’, *membro* [ˈmẽmbɾu] ‘member’, *niño* [ˈnĩɲu] ‘nest’, *nen* [ˈnẽnu] ‘child’, *nome* [ˈnõmɪ] ‘name’ etc. Nasalization also occurs to a lesser degree when a vowel is followed by a syllable-final nasal, but this process is highly variable, and thus will be omitted from the phonetic transcriptions in this chapter. While nasalization in Galician is context-determined, the nasalized vowels of medieval Galician-Portuguese, long lost in most Galician varieties (cf. Carballo Calero 1979, 126–127; Regueira 2010b), apparently were preserved in the Ancares region of Eastern Galician until few decades ago: [ˈtʃãu] ‘floor, ground’, [ˈũe] ‘a, one’, [kaˈð̃ee] ‘prison’ vs. St Gal. *chan* [ˈtʃan], *unha* [ˈunɐ], *cadea* [kaˈð̃ee] (cf. Fernández González 1981, 31; Fernández Rei, F. 1991, 48; Vidal Figueroa 1992).

3.5 Stressed vocoids: conditioned mid-vowel contrasts

Although vowel aperture is contrastive in stressed positions in Galician, in a number of well-defined instances it is predictable on the basis of phonological (prosodic, segmental), and morphological factors, or some combination thereof, often leading to mid-vowel alternations on this dimension (cf. Freixeiro Mato 1998, 74–81; Álvarez Blanco/Xove 2002, 29–31). In non-verb forms, the quality of non-final mid vowels is predictable in many cases due to the aforementioned manner in which loanwords are adapted in Galician (cf. Regueira 2010a, 20–22).

3.5.1 Phonologically conditioned mid-vowel contrasts

As in Spanish (cf. Harris 1983, 84–85), unmarked nominal stress in Galician falls on the penult if the final syllable is light, and on the final syllable if heavy, e.g. *co'e.llo* ‘rabbit’, *es.ca'lei.ra* ‘staircase’ vs. *pa'pel* ‘paper’, *ir'mán* ‘brother’ (dots indicate syllable boundaries). In three types of marked stress patterns a mid vowel heading the corresponding metrical foot is to a large extent predictably open, as illustrated in (2); namely, in proparoxytonic words (2a), in paroxytonic words ending in a heavy syllable (2b), and in oxytonic words ending in a light syllable (2c). Following Wetzels’ (1992; 1995) analysis of Brazilian Portuguese, predictable mid-vowel opening in these three foot types will be referred to with the labels *dactylic*, *spondaic*, and *iambic opening*, respectively; dactylic opening has some lexical exceptions, including *bébedo* [ˈbeβiðu]

‘drunkard’, *lóstrego* [ˈlostriɣu] ‘lightning’, *cóncavo* [ˈkonkaβu] ‘concave’, and a few others (cf. Regueira 2010a, 20; Álvarez Blanco/Xove 2002, 31). The data appears to suggest that the marked status of a given foot type in Galician can be codified in part by means of the phonological association of its metrical head to the feature [-ATR], which characterizes open-mid vowels (Martínez-Gil 2019).

(2) a. *Dactylic opening*

xénero	[ˈxenɾu]	‘kind, type’	ótimo	[ˈɔptimʊ]	‘optimal’
néboa	[ˈneβuə]	‘fog’	hóspede	[ˈɔspɪðɪ]	‘guest’
método	[ˈmetʊdʊ]	‘method’	óxido	[ˈɔksiðʊ]	‘rust’

b. *Spondaic opening*

débil	[ˈdeβɪl]	‘weak’	fósil	[ˈfɔsɪl]	‘fossil’
néctar	[ˈnekɾɐ]	‘nectar’	cosmos	[ˈkɔzmʊs]	‘cosmos’
tenis	[ˈtenɪs]	‘tennis’	xoves	[ˈɔβɪs]	‘Thursday’

c. *Iambic opening*

bidé	[biˈðɛ]	‘bidet’	avó	[aˈβɔ]	‘grandfather’
Xosé	[ʃuˈsɛ]	(proper name)	dominó	[dɔmiˈno]	‘domino’
café	[kaˈfe]	‘coffee’	capó	[kaˈpɔ]	‘car hood’

Independent evidence for a productive phonological process of mid-vowel opening is illustrated in (3): the close-mid vowels /e o/, final in the stem of the base word (left column; underlined for clarity) are opened in proparoxytonic morphologically-derived words formed with the stressless suffix *-ico* added to the stem, given that the vowel in question has now become the head of a dactylic foot.

(3) atlet-a	[aˈtletɐ]	‘athlete’	vs. atlét-ico	[aˈtletikʊ]	‘athletic’
escen-a	[ɪsˈθenɐ]	‘scene’	vs. escén-ico	[ɪsˈθenikʊ]	‘scenic’
átom-o	[aˈtʊmʊ]	‘carbon’	vs. atóm-ico	[aˈtɔmikʊ]	‘atomic’
períod-o	[prɪˈɾiʊðʊ]	‘period’	vs. períod-ico	[prɪˈrjɔðikʊ]	‘periodic’

When a mid vowel is found in a lexical monosyllabic word (4), it is also subject to opening (with a handful of exceptions, such as *bo* [ˈbo] ‘good_M’, *vo* [ˈbo] ‘flight’, and *avó* [aˈβɔ] ‘grandfather’), a fact that can reasonably be construed as another instantiation of iambic opening.

(4) a.	fe	[ˈfɛ]	‘faith’	b.	do	[ˈdɔ]	‘grief, sorrow’
	pé	[ˈpɛ]	‘foot’		nó	[ˈno]	‘knot’
	té	[ˈtɛ]	‘tea’		só	[ˈsɔ]	‘only, alone _M ’

A second case of prosodically conditioned stressed mid-vowel opening occurs in paroxytonic words whose last syllable contains a rising diphthong (cf. Freixeiro Mato 1998, 75, 81–82; Álvarez Blanco/Xove 2002, 31; Regueira 2010a, 20); but there are some exceptions, such as *premio* [ˈpremjʊ] ‘prize’ (cf. *gremio* [ˈgrɛmjʊ] ‘guild’).

(5)	leria	[ˈlɛrjɐ]	‘chatter, idle talk’	croio	[ˈkrɔjɔ]	‘pebble’
	serie	[ˈsɛrjɐ]	‘series’	eloxio	[ɛˈlɔʃjɔ]	‘praise’
	egua	[ˈɛɣwe]	‘mare’	inocuo	[iˈnɔkwɔ]	‘innocuous’

Close/open alternations thus result when the nominalizing suffix *-ia/-io* is added to a stem containing an underlying close-mid vowel:

(6)	excelent-e	[ɛksθɪˈlɛntɪ]	‘excellent’	vs. excelenc-ia	[ɛksθɪˈlɛnθjɐ]	‘excellence’
	colon-o	[kɔˈlonɔ]	‘colonist’	vs. colon-ia	[kɔˈlɔnjɐ]	‘colony’
	Plutón	[pluˈton]	‘Pluto’	vs. plutón-io	[pluˈtɔnjɔ]	‘plutonium’

The close/open quality of a stressed mid-vowel may be determined by a combination of segmental features of a following consonant, or its position as a syllable coda, but front and back/round mid vowels do not always behave in the same manner.

First, there is a strong tendency for a stressed mid vowel to be open when followed by syllable-final /l/, both within words (7a) and word-finally (7b), including monosyllabic lexical items (7c). It is apparent that (7b–c) can be treated as further manifestations of iambic opening. However, for the back/round mid vowel in (7c) there is some variability and there are also a few exceptions (cf. Álvarez Blanco/Xove 2002, 29).

(7)	a.	pelve	[ˈpɛlβɪ]	‘pelvis’	colma	[ˈkɔlmɐ]	‘straw roof’
		celta	[ˈθɛl̩tɐ]	‘Celt’	volta	[ˈbɔltɐ]	‘turn, tour’
	b.	cordel	[kɔrˈðɛl]	‘string’	caracol	[karaˈkɔl]	‘snail’
		hotel	[ɔˈtɛl]	‘hotel’	alcohol	[alˈkɔl]	‘alcohol’
	c.	xel	[ˈʃɛl]	‘gel’	col	[ˈkɔl]	‘cabbage’
		mel	[ˈmɛl]	‘honey’	gol	[ˈgɔl]	‘goal’
		fel	[ˈfɛl]	‘bile, gull’	fol	[ˈfɔl]	‘bellows’

Second, there is also a strong tendency for stressed front mid vowels to be open in oxytonic words, both when followed by a syllable-final rhotic /r/ (8a) (the infinitive of verb forms excluded) or a nasal (8b), and for stressed back/round mid vowels to be open when followed by a coronal obstruent (8c), but close when followed by a syllable-final /r/ (8d) or /n/ (8e).

(8)	a.	muller	[muˈjɛr]	‘woman’	b.	sartén	[sarˈtɛn]	‘frying pan’
		taller	[taˈjɛr]	‘workshop’		refén	[rɪˈfɛn]	‘hostage’
		chofer	[ʃɔˈfɛr]	‘chauffeur’		alguén	[alˈɣɛn]	‘someone’
	c.	arroz	[aˈrɔθ]	‘rice’	d.	suor	[suˈɔr]	‘sweat’
		foz	[ˈfɔθ]	‘sickle, scythe’		fedor	[fɪˈðɔr]	‘stench’
		robot	[rɔˈβɔt]	‘robot’		doutor	[dowˈtor]	‘doctor’

e.	legón	[lɪ'ʝon]	'hoe'
	carbón	[kar'βon]	'coal'
	son	[ˈson]	'sound'

Mid vowels are generally open when followed by a plosive in syllable-final position, an environment invariably found in loanwords (cf. Regueira 2010a, 20):²

(9)	sexo	[ˈsɛksu]	'sex'	paradoxo	[paraˈðɔksu]	'paradox'
	obxecto	[ɔβˈʝɛktu]	'object'	rock	[ˈrɔk]	'rock music'
	inepto	[iˈnɛptu]	'inept'	stop	[isˈtɔp]	'stop'

It is unclear, however, whether the stressed open-mid vowels in data such as (9) result from a process of opening or from the aforementioned general trend in Galician to render non-final mid vowels as open in loanwords.

A stressed mid vowel is also generally open when it is the nucleus of the rising diphthongs /je we jo wɔ/, both in vernacular words and in Spanish borrowings, although there is dialectal variation (cf. Porto Dapena 1977, 25; Taboada 1979, 38; Álvarez Blanco/Monteagudo/Regueira 1986, 38–39; Regueira 1989, 22; Freixeiro Mato 1998, 122):

(10)	fiestra	[ˈfjɛstre]	'window'	idiota	[iˈðjɔte]	'idiot'
	ciencia	[ˈθjɛnθjɛ]	'science'	padiola	[paˈðjɔle]	'stretcher'
	sueco	[ˈswɛku]	'Swedish'	quórum	[ˈkwɔrun]	'quorum'
	secuela	[seˈkwɛlə]	'sequel'	secuoia	[srˈkwɔjɛ]	'sequoia'

In contrast with rising diphthongs, a nuclear mid vowel in a falling diphthong is generally close when the two members are either homorganic (/ej/ and /ow/) or heterorganic /oj/ (11a) (cf. Regueira 2001), but in a number of dialects it is open when the two members are heterorganic, as in /ɛw/ (11b).

- (11) a. /ej/ *feira* [ˈfejɾɛ] 'fair', *peito* [ˈpejtu] 'chest', *cereixa* [θɪˈrejʃɛ] 'cherry'
 /oj/ *moito* [ˈmojtu] 'much', *loita* [ˈlojte] 'struggle', *roibo* [ˈrojβu] 'redhair'
 /ow/ *touro* [ˈtowɾu] 'bull', *cousa* [ˈkowse] 'thing', *roupa* [ˈrowpe] 'clothes'
- b. /ɛw/ *deus* [ˈdɛws] 'god', *xudeu* [ʃuˈðɛw] 'Jewish', *bocareu* [bɔkaˈɾɛw] 'anchovy' (as well as in the third person singular form of two strong preterits: *deu* [ˈdɛw] 'give_{3SG.PRET}', *veu* [ˈbɛw] 'come_{3SG.PRET}')

The open mid vowels found in some Western Galician dialects in lexical items such as *bocoi* [bɔˈkɔj] 'cask, barrel', *convoi* [kɔmˈbɔj] 'convoy', *Raxoi* [raˈɔj] (proper name),

² The grapheme *x* in Galician has two different phonemic correspondences, illustrated in (9): /ks/, as in *sexo*, and /ʃ/, as in *obxecto*.

Hanoi [a'noɨ] (place name) etc. are not exceptional: The nuclear mid vowel is open because the falling diphthong is word-final and thus subject to iambic opening. However, falling diphthongs such as (11a) with open nuclear vowels have also been reported in the literature (cf. Freixeiro Mato 1998, 120–121; Álvarez Blanco/Xove 2002, 34–35). Dialectal realizations of the three diphthongs in (11a) with an open-mid vowel, perhaps resulting from dissimilation, have also been reported: [ɛj], [ɛw], and [ɔw] (cf. Couceiro 1976, 26–27; Porto Dapena 1977, 26). In some varieties [ɔj] is in variation with [oj] (Taboada 1979, 40). Exceptions to (11b) are the pronouns *eu* [ew] ‘I’, *teu* [tew] ‘your(s)’, *seu* [sew] ‘his/hers/their(s)_M’, and all third person singular forms of weak preterits (*ferveu* [fir'βew] ‘boil_{3SG.PRET}’, *comeu* [kɔ'mew] ‘eat_{3SG.PRET}’ etc.). In addition, in the Fisterrá and Pontevedresa areas of Western Galician, the diphthong /oj/ has changed to /uj/ (cf. St Gal. *moito* ['mojtu] ‘much, plenty’, *troita* ['trojte] ‘trout’ etc. vs. WGal. ['mujtu], ['trujte]).

Galician [ɛj] may derive from /aj/ in some Western varieties (cf. 3.6), but otherwise the stressed diphthongs /ja/, /wa/, /aj/, and /aw/ resist such closing:

- (12) /ja/ *piano* ['pjanu] ‘piano’, *cambiar* [kam'bjar] ‘change_{INF}’
 /wa/ *cuarzo* ['kwarθu] ‘quartz’, *guante* ['gwan̩ti] ‘glove’
 /aj/ *nai* ['naj] ‘mother’, *cairo* ['kajru] ‘rain shower’
 /aw/ *aula* ['awle] ‘classroom’, *causa* ['kawse] ‘cause’

There are three other instances in which mid-vowel contrasts are neutralized in Galician; all of them involve a stressed root mid vowel which is predictably close (Martínez-Gil 2019). First, there is a co-occurrence restriction in Galician that requires mid vowels to be close when followed by a (root-final) palatal consonant (cf. Carballo Calero 1979, 111; Freixeiro Mato 1998, 82), with few exceptions, almost all of them associated with non-vernacular vocabulary, including *fecha* ['fɛtʃe] ‘date’ (cf. native *fecha* ['fɛtʃe] ‘sip’), *coche* ['kɔtʃi] ‘car’ (cf. native *cocho* ['kɔtʃu] ‘swine’), *olla* ['ɔje] ‘pot’ (cf. native *ollo* ['ɔju] ‘eye’), and a few more. This restriction is most visible in the first conjugation, the only productive verb class, where mid-vowel aperture is otherwise contrastive. Thus, the rhizotonic forms (i.e. forms with root stress) of the present indicative of the verbs *fechar* ‘lock_{INF}’ and *mollar* ‘wet, drench_{INF}’ are *fecho*_{1SG} ['fɛtʃu], *mollo*_{1SG} ['moju]; *fechas*_{2SG} ['fɛtʃes], *mollas*_{2SG} ['mojes]; *fecha*_{3SG} ['fɛtʃe], *molla*_{3SG} ['moje]; *fechan*_{3PL} ['fɛtʃen], *mollan*_{3PL} ['mojen], but a similar present indicative paradigm with an open stress root vowel followed by a palatal consonant does not occur. Second, in verb roots that contain the homorganic falling diphthongs /ej/, /ow/, as in *cheirar* ‘smell, stink_{INF}’, *pousar* ‘lay down, rest_{INF}’, the stressed nuclear mid vowel is invariably close throughout the rhizotonic paradigm: cf. *cheiro*_{1SG} ['tʃejru], *pouso*_{1SG} ['powsu]; *cheiras*_{2SG} ['tʃejres], *pousas*_{2SG} ['powses]; *cheira*_{3SG} ['tʃejre], *pousa*_{3SG} ['powsɛ]; *cheiran*_{3PL} ['tʃejren], *pousan*_{3PL} ['powsɛn]. Other verbs of this class are *deitar(se)* ‘lay down, go to bed_{INF}’, *beixar* ‘kiss_{INF}’, *queimar* ‘burn_{INF}’, *deixar* ‘allow, leave_{INF}’, *queixar* ‘complain_{INF}’, *ousar* ‘dare_{INF}’, *dourar* ‘gild_{INF}’, *roubar* ‘steal_{INF}’, *escoitar* ‘listen_{INF}’, and many others.

Here, the close quality of the nuclear vowel follows from a general lexical constraint that prohibits open-mid vowels as the nucleus of a falling diphthong in the vernacular vocabulary, although there are a number of lexical exceptions, as in (11b) above (Freixeiro Mato 1998, 120).³ The third case in which only a stressed mid vowel is predictably close is found in the rhizotonic present indicative forms of verbs with the root-final /e/-increment used to form productive denominal/deadjectival first conjugation verbs in *-ear*, such as *nomear* ‘name, appoint_{INF}’, *branquear* ‘whiten, bleach_{INF}’, *tolear* ‘go_{INF} mad’, *marear* ‘get_{INF} seasick’, *bombear* ‘pump_{INF}’, *tourear* ‘fight_{INF} a bull’, and many others.

3.5.2 Morphologically conditioned mid-vowel contrasts

In some instances, the close/open quality of mid vowels in Galician is conditioned by a combination of morphological and phonological factors. In a number of Western and Central Galician dialects the word-final masculine marker *-o*, realized phonetically as [ɔ], triggers a metaphonic process whereby the underlying open vowel of the stem (the last one, if more than one) is raised and surfaces as close in a number of lexical items, giving rise to the close-mid/open-mid vowel alternations illustrated in (13) (cf. Porto Dapena 1973; 1977, 27–29; Carballo Calero 1979, 112–113; Álvarez Blanco/Monteagudo/Regueira 1986, 21–22; Álvarez Blanco 1988; Fernández Rei, F. 1991, 40–44; Hualde/Martínez-Gil 1994; Freixeiro Mato 1998, 86–91).

(13)	a.	cadelo	[ka'ðelɔ]	‘puppy’	cadela	[ka'ðele]	‘female dog’
		portelo	[por'telɔ]	‘small gate’	portela	[por'tele]	‘postern gate’
		mantelo	[maɲ'telɔ]	‘apron’	mantela	[maɲ'tele]	‘(type of) veil’
	b.	novo	[ˈnoβɔ]	‘new _M ’	nova	[ˈnoβe]	‘new _F ’
		sogro	[ˈsoɣrɔ]	‘father-in-law’	sogra	[ˈsoɣre]	‘mother-in-law’
		morto	[ˈmortɔ]	‘dead _M ’	morta	[ˈmorte]	‘dead _F ’

Historically, the alternations in (13) derive from a metaphonic process triggered by the masculine marker *-o* in a large number of lexical items. In forms that lacked a feminine counterpart, the open-mid vowels /ɛ ɔ/ (< Lat. short /e o/) were presumably reanalyzed as close-mid, thus failing to yield any alternations; e.g. MĚTU(M) > *medo* [ˈmeðɔ] ‘fear’, STĚRCU > *esterco* [is'terkɔ] ‘manure’, SPĚC(U)LU(M) > *espello* [is'pejɔ] ‘mirror’, ŌC(U)LU(M) > [ˈoju] *ollo* ‘eye’ etc. (cf. Álvarez Blanco 1988; Freixeiro Mato 1998, 86–91; Ferreiro 1999, 32–34; Mariño Paz 2017, 152–161). In some lexical items, however, meta-

³ Not all Galician dialects are subject to this constraint, at least not uniformly. Thus, in certain varieties, the nuclear vowel in such diphthongs is open (Porto Dapena 1977, 26). Mixed systems are also attested, as in the Verín Valley region described by Taboada (1979, 39), where the nuclear vowel is open in the diphthongs /ej/, /ew/ and /ɔj/, but close in /ow/.

phony operated in the opposite direction; namely, the close/open alternation came about historically by the metaphonic opening exerted by the feminine marker *-a* on the root close-mid vowel: *İLLE* > *el* ['el] 'he' vs. *İLLA(M)* > *ela* ['ela] 'she', *sĭCCU(M)* > *s[e]co* 'dry_M' vs. *sĭCCA(M)* > *s[e]ca* 'dry_F' (cf. Freixeiro Mato 1998, 156–157; Mariño Paz 2017, 154). The set of lexical items that undergo metaphony is small and subject to considerable variation in Western and Central Galician varieties. With regards to (13), it should be noted that: a) the meaning of each member of a pair is frequently lexicalized, and thus the gender markers no longer reflect a masculine vs. feminine distinction; and b) metaphony applies not only to stem vowels, but also to the initial vowel of some stressed suffixes, such as /-^helo/. In other cases, the gender relation has been lost, as in *porto* ['portu] 'harbor' ~ *porta* ['pɔrte] 'door', or *testo* ['testu] 'lid' ~ *testa* ['teste] 'forehead'.

From a synchronic point of view, it is apparent that nominal metaphony is lexically determined, since in a large number of nominal forms the stressed open vowel in masculine forms fails to undergo closing (cf. (14)), even though the structural conditions of metaphony are met. However, unlike the forms in (13), the members of this set do not exhibit any apparent lexicalization of meaning.

- (14) a. masculine feminine
- | | | | | |
|-------|---------|-------|---------|---------|
| vello | ['bɛjʊ] | vella | ['bɛjɐ] | 'old' |
| cego | ['θɛʝʊ] | cega | ['θɛʝɐ] | 'blind' |
- b. porco ['pɔrkʊ] porca ['pɔrkɐ] 'pig, swine'
- soio ['sojʊ] soia ['sojɐ] 'lonely, alone'

A second morphologically-conditioned process of mid-vowel opening affects the underlyingly close stressed theme vowel of the arrhizotonic forms (i.e. forms in which stress falls on an inflectional suffix) in the preterit indicative in the majority of second and third conjugation strong verbs, resulting in alternations between the close-mid theme vowel of the rhizotonic forms (here, the first person singular) vs. an open one in the arrhizotonic ones (all the other persons), as illustrated by *querer* 'want_{INF}' and *decir* 'say_{INF}', respectively: cf. *quixen*_{1SG.PRET} ['kiʃɪŋ] vs. *quixeches*_{2SG.PRET} [kiʃɛʃɪs], *quixemos*_{1PL.PRET} [kiʃɛmʊs], *quixestes*_{2PL.PRET} [kiʃɛstɪs], *quixeron*_{3PL.PRET} [kiʃɛrʊŋ]; and *dixen*_{1SG.PRET} ['diʃɪŋ] vs. *dixeches*_{2SG.PRET} [diʃɛʃɪs], *dixemos*_{1PL.PRET} [diʃɛmʊs], *dixestes*_{2PL.PRET} [diʃɛstɪs], *dixeron*_{3PL.PRET} [diʃɛrʊŋ] (cf. Santamarina 1974, 24–29, 88–102; Freixeiro Mato 1998, 74; Álvarez Blanco/Xove 2002, 252–261). The third person singular forms (here *quixo*, and *dixo*, respectively) lack a theme vowel. In addition, in the preterit subjunctive all forms are arrhizotonic, and thus also exhibit an open-mid theme vowel throughout the paradigm: *quixera*_{1SG.PRET.SBJV} [kiʃɛrɐ], *quiseras*_{2SG.PRET.SBJV} [kiʃɛrɛs] etc.; *dixera*_{1SG.PRET.SBJV} [diʃɛrɐ], *dixeras*_{2SG.PRET.SBJV} [diʃɛrɛs] etc. The strong preterit of two other defective verbs, *dar* 'give_{INF}' and *vir* 'come_{INF}', have an open-mid vowel in the third person singular: *deu* ['dɛw] 'give_{3SG}' and *veu* ['bɛw] 'come_{3SG}', respectively; otherwise, they behave in all relevant respects like the other strong preterits. In the

preterit paradigm, both indicative and subjunctive, of two defective verbs *ir* ‘go_{INF}’, and *ser* ‘be_{INF}’ (both with identical preterit forms), all forms are rhizotonic, and thus opening does not apply.

A third major pattern of morphologically-conditioned alternations in vowel aperture arises in the rhizotonic forms of the present indicative of second conjugation (-*er*), and third conjugation (-*ir*) verbs, where a non-open vowel in the verb root exhibits two distinct patterns of alternation (15): a) a close-mid vowel in the first person singular vs. an open-mid vowel in the other rhizotonic forms in the second conjugation, as illustrated in (15a) for the pairs *ferver* [fir'βer] ‘boil_{INF}’, and *coller* [kɔ'jer] ‘take_{INF}’; and b) a high vowel vs. open-mid vowel in the third conjugation, as for the pairs *servir* ‘serve_{INF}’ and *fluxir* ‘flee_{INF}’ (15b). Note that in verb morphology the mid-vowel aperture contrasts in verb roots hold only in stressed positions; in the arrhizotonic forms (first and second person plural) the contrast is neutralized.

(15)	a.	<i>ferver</i>		<i>coller</i>	
	1SG	ferv-o	[fir'βɔ]	coll-o	[kɔjɔ]
	2SG	ferv-es	[fir'βɪs]	coll-es	[kɔjɪs]
	3SG	ferv-e	[fir'βɪ]	coll-e	[kɔjɪ]
	1PL	ferv-emos	[fir'βemɔs]	coll-emos	[kɔ'jemɔs]
	2PL	ferv-edes	[fir'βeðɪs]	coll-edes	[kɔ'jeðɪs]
	3PL	ferv-en	[fir'βɪn]	coll-en	[kɔjɪn]
	b.	<i>servir</i>		<i>fluxir</i>	
	1SG	sirv-o	[sir'βɔ]	flux-o	[fu'βɔ]
	2SG	serv-es	[sɛr'βɪs]	fox-es	[fɔjɪs]
	3SG	serv-e	[sɛr'βɪ]	fox-e	[fɔjɪ]
	1PL	serv-ímos	[sir'βimɔs]	flux-imos	[fu'ʃimɔs]
	2PL	serv-ídes	[sir'βiðɪs]	flux-ides	[fu'ʃiðɪs]
	3PL	serv-en	[sɛr'βɪn]	fox-en	[fɔjɪn]

In the second conjugation the alternating pattern is almost systematic. Only five verbs are known exceptions: *querer* ‘want_{INF}’ and *poder* ‘can, be_{INF} able’ have an open-mid vowel in rhizotonic forms, whereas in *ver* ‘see_{INF}’, *crer* ‘believe_{INF}’, and *ler* ‘read_{INF}’ (and in certain dialects also *deber* ‘must_{INF}’) the root mid vowel is close throughout. In the imperative singular of second conjugation verbs the root mid vowel is always close, and thus minimal pairs arise with the present indicative third person singular (cf. *¡ferve!* [fir'βɪ] ‘boil_{2SG.IMP}’ vs. *ferve* [fir'βɪ] ‘boil_{3SG}’, *¡colle!* [kɔjɪ] ‘take_{2SG.IMP}’ vs. *colle* [kɔjɪ] ‘take_{3SG}’. Furthermore, the set of third conjugation verbs that exhibit the alternation in (15b) is much more limited (Álvarez Blanco/Xove 2002, 251) and, following the pattern of many other third conjugation verbs with a non-alternating underlying close root vowel, they have undergone leveling in many colloquial varieties of contemporary Galician, whereby the close root vowel of the first person singular has been generalized to all rhizotonic forms of the present indicative: *sirvo*_{1SG}, *sirves*_{2SG}, *sirve*_{3SG},

*sirven*_{3PL}; *fluxo*_{1SG}, *fluxes*_{2SG}, *fluxe*_{3SG}, *fluxen*_{3PL} (Álvarez Blanco/Monteagudo/Regueira 1986, 308–310).

As for the synchronic analysis of the alternations in (15), some authors have proposed for similar alternations in Portuguese that the first person singular form undergoes a metaphonic process triggered by the theme vowel, /e/ in the second conjugation, and /i/ in the third, which subsequently is deleted (cf., e.g., Harris 1974; Mateus 1977; Mateus/d'Andrade 2000). For other authors, the close-mid vowel quality in the first person singular has been morphologized and functions as complementary inflectional marker that, together with the desinence /-o/, serves to distinguish the first person singular from the other rhizotonic forms in the present indicative (e.g. Mattoso Câmara Jr. 1976, 153). Unlike those in the second and third conjugations, the rhizotonic forms of the first conjugation (-ar verbs) do not exhibit any root alternations.

3.6 Vowel aperture in unstressed vowels and diphthongs

As stated earlier, mid vowels in Galician are subject to a type of reduction that involves closing and centralizing, resulting in the neutralization of aperture contrasts, most conspicuously in posttonic syllables. The neutralizing reduction of unstressed mid-vowel aperture distinctions in Galician can be traced back to Hispanic Vulgar Latin. This pattern must have prevailed in the Galician vernacular lexicon throughout the centuries, and there is evidence that it still holds for older speakers of Central and Eastern Galician varieties (cf. Regueira 1989; Fernández Vior 1997). However, a number of significant changes have contributed to altering the distribution of mid-vowel aperture in pretonic positions in present-day Galician (cf. Freixeiro Mato 1998, 94–105; Álvarez Blanco/Xove 2002, 35–36; Martínez-Gil 2019, among others). First, as previously mentioned, there is a strong tendency for stressed mid vowels to be open in the phonological adaptation of neologisms, loanwords, and learned words, most of them entering the Galician lexicon via Spanish. As shown in (16), in such lexical items opening also applies to unstressed pretonic mid vowels in initial open syllables (16a) (cf., among others, Freixeiro Mato 1998, 98; Álvarez Blanco/Xove 2002, 30–31; Regueira 2008; 2009; 2010a, 19–21; Martínez-Gil 2019), and in syllables closed by /r/ or an underlying plosive (16b). In contrast, when the initial syllable is closed by a nasal or /s/, there is a very strong tendency for mid vowels to be close (16c). While the aperture of pretonic mid vowels in the new and learned vocabulary is to a large extent predictable, there are a significant number of exceptions, as well as a great deal of dialectal and even idiolectal variation. This area of Galician phonology is not completely understood, and systematic research has yet to be carried out on the topic.

(16) a.	enerxía	[ɛnɛr'ʃiɐ]	'energy'	oasis	[ɔ'asɨs]	'oasis'
	ecuestre	[ɛ'kwɛstri]	'equestrian'	obeso	[ɔ'βɛsɔ]	'obese'
	cretino	[krɛ'tinɔ]	'imbecile'	moqueta	[mɔ'kɛtɐ]	'carpet'

b.	vertical	[berti'kal]	'vertical'	cognado	[koɣ̃'naðu]	'cognate'
	mendigo	[mɛn'diɣ̃u]	'beggar'	normando	[nɔr'maɲdu]	'Norman'
	versátil	[ber'satil]	'versatile'	toxina	[tɔk'sine]	'toxin'
c.	endémico	[ɲ̃'demiku]	'endemic'	trompeta	[trum'pete]	'trumpet'
	estímulo	[is'timulu]	'stimulus'	prospecto	[prus'pektu]	'prospect'
	censura	[θen'sure]	'censorship'	concepto	[kun'θeptu]	'concept'

There is a tendency for stressed mid vowels to open in syllables closed by an underlying plosive in pretonic position, whether word-initial or word-internal: *exilio* [ek'silju] 'exile', *lección* [lek'θjon] 'lesson', *aceptar* [aθɛp'tar] 'accept_{INF}', *toxina* [tɔk'sine] 'toxin', *adoptar* [adɔp'tar] 'adopt_{INF}', *obxecto* [ɔβ̞'jektu] 'object' etc.

Moreover, as a result of opening in pretonic position, systematic variations in mid-vowel aperture often arise between morphologically-related vernacular vs. neological forms: cf. *ler* ['ler] 'read_{INF}' ~ *lectura* [lek'ture] 'reading', *segundo* [sr̞'ɣuɲdu] 'second' ~ *secundario* [sekun̞'darju] 'secondary', (WGal.) *pobo* [poβ̞u] 'people, town' ~ *popular* [pɔpu'lar] 'popular', *noite* ['nojtɪ] 'night' ~ *nocturno* [nɔk'turnu] 'nocturnal', (WGal.) *novo* [noβ̞u] 'new' ~ *novato* [nɔ'βatu] 'novice, freshman', *domingo* [du'miɲgu] 'Sunday' ~ *dominical* [dɔmini'kal] 'dominical' etc.

A second factor that accounts for open-mid vowels in pretonic positions in certain dialects is the preservation of the underlying open quality of basic forms in derivational morphology, when stress typically shifts rightwards from the stem to the first vowel of a stressed suffix: cf. *ferr-o* ['feru] 'iron' → *ferr-eiro* [fe'rejru] 'blacksmith', *ferr-uxe* [fe'ruʃi] 'rust'; *nev-e* [neβ̞i] 'snow' → *nev-ada* [ne'βaðe] 'snowfall', *nev-isca* [ne'βiske] 'freezing rain'; *port-a* [pɔrte] → *port-eiro* [pɔr'teiro] 'doorkeeper'; *os-o* ['ɔsu] 'bone' → *os-udo* [ɔ'suðu] 'bony', *os-ario* [ɔ'sarju] 'ossuary', and so on (cf. Hualde/Martínez-Gil 1994; Freixeiro Mato 1998, 956–998; Álvarez Blanco/Xove 2002, 36; Martínez-Gil 2019). A similar effect obtains in compounding, whereby the prominence of the first member of the compound is demoted to secondary stress: *cen* ['θɛɲ] 'a hundred' + *pes* ['pes] 'feet' → *cempés* [θɛm'pes] 'centipede'; *porta* [pɔrte] 'carry_{3SG}' + *avions* [a'βjons] 'plane_{PL}' → *portavions* [pɔrta'βjons] 'aircraft carrier' etc.

A third source of pretonic open-mid vowels arises by closing assimilation of /a/ to [ɛ] in the unstressed diphthong /aj/ in colloquial varieties of Western and Central Galicia (alternatively, it may be fronted to [æ] in other dialects), resulting in open/open-mid vowel alternations (Freixeiro Mato 1998, 108–109; Álvarez Blanco/Xove 2002, 36), cf. *caixa* ['kajfe] 'box' vs. *caixón* [kej'fon] 'drawer'; *gaita* [gajte] 'bagpipe' vs. *gaitero* [gej'tejru] 'bagpiper'; *baixo* ['bajɔ] 'low' vs. *baixar* [bej'far] 'descend_{INF}', *baile* [bajli] 'dance' vs. *bailar* [bej'lar] 'dance_{INF}'. The alternation is not registered in standard orthography because it is considered a dialectal feature.

A common process of unstressed vowel aperture assimilation in colloquial Galician involves the change of pretonic close-mid vowels to high when followed by a stressed high vowel: *cobiza* [ku'βiθe] 'haste, greed' (StGal. [ku'βiθe]), *veciño* [bi'θiɲu] 'neighbor_M' (StGal. [bi'θiɲu]), *mestura* [mis'ture] 'mixture' (StGal. [mis'ture]), *coruxa*

[ku'ruʃe] 'awl' (StGal. [kʊ'ruʃe]) etc. (cf. Porto Dapena 1977, 20–22; Álvarez Blanco/Monteagudo/Regueira 1986, 23; Freixeiro Mato 1998, 102–103; Álvarez Blanco/Xove 2002, 36). In many instances this process gives rise to open/close high vowel alternations, such as *collo* ['kojʊ] 'grab_{1SG}' vs. *collía* [ku'jie] 'grab_{1/3SG.IMPF}', *bebo* ['beβo] 'drink_{1SG}' vs. *bebías* [bi'βies] 'drink_{2SG.IMPF}', *moo* ['moʊ] 'mill, grind_{1SG}' vs. *moiño* [mu'ijnʊ] 'mill', *pequeno* [pr'kenʊ] 'small_M' vs. *pequeniño* [piki'nijnʊ] 'small_{DIM.M}', *fozar* [fʊ'θar] 'dig_{INF} up with the snout' vs. *fociño* [fu'θijnʊ] 'snout' etc.

While stressed nuclear mid vowels in rising diphthongs are generally open, in unstressed posttonic position only the reduced (i.e. closed and centralized) version [ɪ ʊ] occurs: *serie* ['sɛrjɪ] 'series', *especie* [es'pɛθjɪ] 'species', *tenue* ['tɛnwɪ] 'tenuous', *pingüe* ['piŋgwɪ] 'plentiful', *bimbio* ['bimbjʊ] 'wicker', *odio* ['ɔðjʊ] 'hate', *inxenuo* [iŋ'fɛnwʊ] 'naïve_M', *inocuo* [i'nɔkwʊ] 'innocuous_M'. Similar considerations apply to the open vowel /a/ in rising diphthongs: *leria* ['lɛrjɛ] 'chat', *boia* ['bɔjɛ] 'buoy'. In pretonic position a nuclear mid vowel in diphthongs is generally close; however, the specific aperture of a diphthongal mid vowel in a base word is generally preserved when rendered stressless in derived ones, in line with the aforementioned tendency to preserve mid-vowel aperture in morphologically related forms.

A number of other processes that apply to unstressed vowels in pretonic position which have been reported in the literature, but which cannot be addressed here due to space constraints, include sporadic cases of assimilation and dissimilation, vowel prothesis, apheresis, anaptixis, and syncope. These are largely stigmatized and are confined to small numbers of speakers in mostly rural areas (cf. Porto Dapena 1977, 18–24; Carballo Calero 1979, 128–132; Regueira 1989, 24–32; 1996; Freixeiro Mato 1998, 94–11; Álvarez Blanco/Xove 2002, 35–38, Fernández Rei, E. 2002a).

4 Segmental phonology II: consonants

The Galician system of consonantal phonemes is given in Table 27.2.

Table 27.2: The consonantal phonemes of Galician.

			Labial	Dental	Alveolar	Palatal	Velar
Obstruent	Plosive	Voiceless	p	t			k
		Voiced	b	d		ɟ	g
	Fricative	Voiceless	f	θ	s	ʃ	(x)
		Voiceless				tʃ	
Sonorant	Nasal		m		n	ɲ	(ŋ)
	Liquid	Lateral			l	(ʎ)	
		Rhotic			r r		

Regarding the segments enclosed in parentheses, the status of the velar nasal /ŋ/ as a phoneme of Galician continues to be debated to this day, and the palatal lateral /ʎ/ has been virtually dropped by the Galician-speaking population, except for the oldest speakers in some isolated areas (cf. 4.2.1, below).

4.1 Obstruents

As shown in Table 27.2, Galician obstruents exhibit five places of articulation and a voicing contrast between labial, dental and velar plosives. There is only one voiced palatal plosive, and one voiceless palatal affricate. The contrast between voiceless plosives and fricatives holds only at the labial and dental places of articulation. Fricatives lack voicing distinctions, as a result of a historical process of devoicing undergone by the medieval voiced sibilants around the 15th–16th centuries (cf. Ferreiro 1999, 186–192; Mariño Paz 2017, 483–488).

4.1.1 Plosives

In the vernacular Galician lexicon, the underlying plosives /p t k b d g/ occur only in syllable onsets, where voicing and continuancy contrasts are maintained. In coda position, whether word-medial or final, they are found exclusively in the learned vocabulary and in loanwords. In informal colloquial registers, coda plosives may undergo the following processes, resulting in the neutralization of voicing and/or continuancy distinctions (cf. Álvarez Blanco/Monteagudo/Regueira 1986, 28; Freixeiro Mato 1998, 138–141; Mariño Paz 2017, 516–524; Regueira/Fernández Rei 2022): a) spirantization and/or voicing assimilation: *hipnotismo* [iβno'tizmʊ] ‘hypnotism’, *absurdo* [aβ'surðʊ] ‘absurd’, *ritmo* ['riðmo] ‘rhythm’, *fútbol* ['fuðβʊl] ‘football, soccer’, *adxunto* [aθ'juɲtu] ‘adjunct, attached’, *técnica* ['teɲnike] ‘technique’; b) vocalization to [w], especially before a coronal obstruent *cápsula* ['kawsule] ‘capsule’, *absoluto* [awsʊ'lutu] ‘absolute’, *directo* [di'rewtu] ‘direct’, *dogma* ['dɔwme] ‘dogma’; c) gemination by total assimilation to a following consonant: *opción* [ɔθ'θjoɲ] ‘option’, *captura* [kat'ture] ‘capture’, *submarino* [summa'rinʊ] ‘submarine’, *ignorante* [innɔ'raɲti] ‘ignorant’, *acto* ['attu] ‘act’; and d) deletion: *aptitude* [ati'tuði] ‘aptitude’, *observar* [ɔser'βar] ‘observe_{INF}’, *fútbol* ['fuβʊl] ‘football’, *perfecto* [pr'fetu] ‘perfect_M’, *carácter* [ka'ratr] ‘character’, *eclipse* [e'klisi] ‘eclipse’. The mid palatal plosive /j/ and the pre-palatal affricate /tʃ/ do not occur in coda position.

There are two historical sources for /j/ in contemporary Galician: a) by obstruentization of an (older) palatal lateral /ʎ/ (orthographic *ll*), which has all but disappeared except for the oldest speakers in isolated regions: *ollo* ‘eye’ (older) /'oʎo/ > /'ojo/; and b) by the fortition of the front glide /j/ in absolute syllable-initial position, now a widespread process in most varieties of Galician, as in *iodo* /'jɔdu/ ‘iodine’, *maio*

/ˈmajʊ/ ‘May’, *raio* /ˈrajʊ/ ‘bolt of lightning’ (cf. Regueira 1996; 2009; Dubert-García 2013; Mariño Paz 2017, 566–567; Regueira/Fernández Rei 2022).

As in Spanish, the voiced plosives /b d ɟ g/ are realized as plosives word-initially after a pause, and after homorganic sonorants (nasals are always homorganic with a following consonant; /l/ is so only with a following coronal consonant), and as the approximants [β ɸ ʝ] elsewhere (i.e. after continuants and non-homorganic laterals), both word-internally (17a), and across word boundaries (17b) (cf. Regueira 1996; Dubert-García 2005; Martínez Celdrán/Regueira 2008).

(17) a.	bebé	[brˈβɛ]	‘baby’	b.	o bebé	[oβrˈβɛ]	‘the baby’
	dedo	[ˈdeðʊ]	‘finger’		o dedo	[oˈðeðʊ]	‘the finger’
	galo	[ˈgalʊ]	‘rooster’		o galo	[oˈɣalu]	‘the rooster’
	iate	[ˈjati]	‘yacht’		o iate	[oˈjati]	‘the yacht’
	corda	[ˈkɔrðɐ]	‘rope’		por día	[porˈðie]	‘by day’
	desde	[ˈdezðɪ]	‘from, since’		os días	[ozˈðies]	‘the days’
	musgo	[ˈmuzɣʊ]	‘moss’		os gatos	[ozˈɣatus]	‘the cats’
	lombo	[ˈlombʊ]	‘back’		un bico	[umˈbiku]	‘a kiss’
	cando	[ˈkaɳðʊ]	‘when’		un dedo	[unˈdeðʊ]	‘a finger’
	maio	[ˈmajʊ]	‘May’		un iate	[unˈjati]	‘a yacht’
	longo	[ˈlongʊ]	‘long’		un gato	[unˈgatʊ]	‘a cat’
	alba	[ˈalβɐ]	‘dawn’		mal dor	[ˈmaɫˈdor]	‘bad pain’
	galgo	[ˈgaɫɣʊ]	‘greyhound’		mal iate	[ˈmaɫˈjati]	‘bad yacht’

In some dialects intervocalic /j/ is not spirantized at all in the spirantization environments and surfaces faithfully instead of as the approximant [j] (cf. Dubert-García 1999b; 2013; Vidal Figueroa 1997). Furthermore, the phonetic realization of /j/ is subject to dialectal and even idiolectal variation, surfacing sporadically as a mid-palatal affricate [tʃ] instead of [j] in the fortition environments (Regueira/Fernández Rei 2022).

The massive adoption of learned words of Latin origin has given rise to several types of non-automatic morphophonemic alternations involving stem-final plosives in the athematic deverbal derivation of nouns and adjectives via suffixation. The most significant are: a) assibilation of a stem-final dental plosives /t d/ to /s/ before certain suffixes (18a); b) truncation of a verbal stem-final plosive before the nominalizing suffix *-ción* [-ˈθjon] (18b); c) devoicing of a stem-final voiced plosive also before the nominalizing suffix *-ción* (18c), and velar softening, involving the alternation /k g/ ~ /θ ɟ/, respectively, before several suffixes (18d).

(18) a.	exploṭ-a-r	‘explode _{INF} ’	~	exploṣ-ión	‘explosion’	exploṣ-ivo	‘explosive’
	permiṭ-i-r	‘permit _{INF} ’	~	permiṣ-o	‘permit’	permiṣ-ivo	‘permissive’
	diviḍ-i-r	‘divide _{INF} ’	~	diviṣ-ión	‘division’	diviṣ-ivo	‘divisive’

b.	adopt-a-r	'adopt _{INF} '	~	adop-ción	'adoption'
	desert-a-r	'desert _{INF} '	~	deser-ción	'desertion'
	absorb-e-r	'absorb _{INF} '	~	absor-ción	'absorption'
c.	recib-i-r	'receive _{INF} '	~	recep-ción	'reception'
	percib-i-r	'perceive _{INF} '	~	percep-ción	'perception'
	describ-i-r	'describe _{INF} '	~	descrip-ción	'description'
d.	sue[k]-o	'Swedish _M '	~	Sue[θ]-ia	'Sweden'
	opa[k]-o	'opaque _M '	~	opa[θ]-idade	'opacity'
	belg-a	'Belgian'	~	Bél[ʃ]-ica	'Belgium'
	análog-o	'analogous _M '	~	analo[ʃ]-ía	'analogy'

4.1.2 Affricates and fricatives

Galician has only one underlying affricate, the prepalatal /tʃ/. With the exception of some loanwords (e.g. *Munich* (place name)), it occurs only in syllable onsets (*chan* [ˈtʃan] 'floor, ground', *fechar* [feˈtʃar] 'lock_{INF}'). As mentioned, in some varieties the voiced mid-palatal affricate [dʒ] is a possible realization of /j/ in the fortition environments.

Standard Galician has voiceless fricatives at four places of articulation: labiodental /f/, interdental /θ/, alveolar /s/, and prepalatal /ʃ/. In the vernacular lexicon /f/ and /ʃ/ are found in onsets only, whereas /s/ and /θ/ can occur in both onsets and codas. The phonetic realization of /s/ is subject to dialectal variation; the most common realizations are apico-alveolar [s̺], predorsoalveolar [s], and predorsodental [s̺] (cf. Zamora Vicente 1951; Fernández Rei, F. 1991, 189–190; González 1991; Vidal Figueroa 1993; 1997; Regueira 1996; 2009; 2014; 2016; Fernández Rei, E. 2004; Labraña 2005; 2009; Regueira/Ginzo 2019; Regueira/Fernández Rei 2022).

In some coastal regions of Western Galician, syllable-final /s/ takes on an apico-postalveolar [s̺], or a prepalatal [ʃ] quality: *as festas* [aʃˈfɛʃtɛʃ]/[aʃˈfɛʃtɛʃ] 'the festival_{PL}' (cf. González 1991; Regueira 2014; Regueira/Ginzo 2019). In other Western Galician varieties, we find the opposite trend: the prepalatal fricative /ʃ/ is depalatalized, surfacing as either apico-postalveolar [s̺] or apico-alveolar [s̺] (e.g. *hoxe* [ˈoʃi]/[ˈoʃi] 'today', *feixe* [ˈfeʃi]/[ˈfeʃi] 'bundle, pile' compared to StGal. [ˈoʃi], [ˈfeʃi], respectively; González 1991, 544–545; Freixeiro Mato 1998, 166–169; Mariño Paz 2017, 488–489). Although /ʃ/ does not occur in a coda position lexically, in some dialects it may end up in a word-final coda by apocope of -e: *viaxe* [biˈaʃ] 'trip', *friaxe* [friˈaʃ] 'coldness' (StGal. [biˈaʃi], [friˈaʃi]; Freixeiro Mato 1998 161–162).

Coda /s/ assimilates in voicing to a following voiced consonant in colloquial styles: *lesma* [ˈlezme] 'slug', *desde* [ˈdezði] 'from, since' etc. In several non-standard varieties voicing of coda /s/ before a voiced consonant is manifested as rhotacism: *mesmo* [ˈmɛrmu] 'same_M', *as duas* [arˈðues] 'the two of them_F' (StGal. [ˈmezmu], [azˈðues]; cf. Álvarez Blanco/Monteagudo/Regueira 1986, 31; Fernández Rei, F. 1991,

57, 215; Dubert-García 1999a; Álvarez Blanco/Xove 2002, 42; López Viñas/Lourenço Mória/Moreda Leirado 2011, 121).

In Standard Galician, word-final /s/ is deleted within a clitic group when followed by a definite article or an atonic direct object pronoun, both o_M , a_F / $os_{M,PL}$, $as_{F,PL}$, in which case the allomorphs lo_M , la_F / $los_{M,PL}$, $las_{F,PL}$ are selected: *todos* ‘all’ vs. *todos los días* ‘every day’ (cf. *os días* ‘the day_{PL}’); *vos* ‘you_{PL}’ vs. *vo-las duas* ‘you two_{F,PL}’ (cf. *as duas nenas* ‘the two girls’), *viches* ‘see_{2SG,PRET}’ vs. *viche-lo can* ‘see_{2SG,PRET} the dog’, *vímo-lo* ‘see_{1PL,PRET} it_{M,SG}’ (cf. *o can ladróu* ‘the dog barked’) (cf. Carballo Calero 1979, 129; Fernández Rei, F. 1991, 67–68; Álvarez Blanco/Monteagudo/Regueira 1986, 136–138; Álvarez Blanco/Xove 2002, 444–445, López Viñas/Lourenço Mória/Moreda Leirado 2011, 123).

Seseo and *gheada* are two relatively widespread non-standard features of contemporary Galician related to the phonemes /s/ and /g/, respectively (cf. Zamora Vicente 1951; 1952; Fernández Rei, F. 1991, 53–56, 163–215; Recalde Fernández 1994; Regueira 1997; 2009; 2014; Freixeiro Mato 1998, 142–158, 162–174; Álvarez Blanco/Xove 2002, 39, among others). For the historical origins of *gheada* and/or *seseo*, cf. Freixeiro Mato (1998, 150–158, 162–164) and Mariño Paz (1994; 2017, 490–505).

There are two types of *seseo*. Complete *seseo*, found primarily in the Western Galician coastal regions of Pontevedra province and the Fisterrá variety of western A Coruña province, entails the lack of the /s/ ~ /θ/ phonemic distinction of the standard variety altogether: they have /s/ instead of /θ/ (cf. the Standard Galician minimal pairs *saga* /'saga/ ‘saga’ ~ *zaga* /'θaga/ ‘rear’, *lousa* /'lowsa/ ‘tombstone’ ~ *louza* /'lowθa/ ‘china, porcelain’, *voz* /'bɔθ/ ‘voice’ ~ *vos* /'bɔs/ ‘you_{PL}’ realized as [ˈsaga], [ˈlowsa], [ˈbɔs] for each pair, respectively, in complete *seseo* dialects). The inland and southernmost regions of Western Galician, as well as portions of eastern Central Galician, exhibit partial *seseo*: the standard /s/ ~ /θ/ contrast holds in syllable onsets (thus, /'saga/ ~ /'θaga/), but *seseo* is the norm in syllable-final position (e.g. [ˈbɔs] for both *voz* and *vos*) (cf. Fernández Rei, F. 1985; 1991, 54–56; Álvarez Blanco/Monteagudo/Regueira 1986, 30–33; Freixeiro Mato 1998, 142–158).

Varieties in the western half of Galicia, including most of Western Galician and western areas of Central Galician exhibit a feature known as *gheada*, whereby in all positions, except after a tautomorphemic nasal, instead of /g/ we find a voiceless fricative, which can be realized, depending on the particular dialect, as velar [x], uvular [χ], pharyngeal [ħ], or laryngeal [h] (cf. Zamora Vicente 1952; Carballo Calero 1968; Pensado 1970; Santamarina 1980; Prieto Alonso 1980a; Fernández Rei, F. 1982; Pensado/Pensado Ruiz 1983; Recalde Fernández 1994; Rodríguez Lorenzo 2008, among others). The historical origins of *gheada* have been subject to a great deal of debate (cf. Ferreiro 1999, 193–194 and Mariño Paz 2017, 490–505). Thus, while Pensado (1970) and Pensado/Pensado Ruiz (1983) attribute it to an ultracorrective change by bilingual speakers under the influence of Spanish /x/, Santamarina (1980) argues for an independent sound change in Galician. For simplicity, all four realizations will be transcribed here with the cover symbol [X].

Although in the *gheada* varieties [X] and [g] are in complementary distribution, the nature of the underlying consonant has been disputed (for a variety of theoretical approaches to *gheada*, cf. Prieto Alonso 1980b; Schroten 1980; Martínez-Gil 2004; Colina 2013). The data in (19) illustrate the occurrence of [X], instead of standard /g/, in a variety of environments: before vowels and tautosyllabic liquids word-initially (19a), word-medially (19b), after an oral consonant (19c), and after a heteromorphemic nasal (19d). However, after a tautomorphemic nasal only [g] occurs (20) (cf. Fernández Rei, F. 2004; 1991, 163–177; Freixeiro Mato 1998, 142–150; Regueira 2008; 2009).

- (19) a. gorxa [ˈXɔɾʃe] ‘throat’
 grilo [ˈXrilu] ‘cricket’
 b. fígado [ˈfiXaðu] ‘liver’
 agre [ˈaXɾi] ‘bitter’
 c. erguer [irˈXeɾ] ‘raise_{INF}’
 folga [ˈfoɭXa] ‘strike’
 trasgo [ˈtrasXu] ‘goblin’
 d. en+gordar [ɪnXurˈðar] ‘put_{INF} on weight’ (cf. gordo [ˈXorðu] ‘fat_M’)
 in+grato [ɪnˈXrato] ‘ungrateful’ (cf. grato [ˈXrato] ‘pleasing’)
- (20) longo [ˈlongu] ‘long_M’ fungo [ˈfunɣu] ‘fungus’
 angazo [aŋˈgaθu] ‘rake’ pingar [piŋˈgar] ‘drip_{INF}’
 lingua [ˈliŋgwe] ‘language’ inglés [iŋˈgles] ‘English’

In some Western Galician dialects the voiceless fricative [X] occurs also after nasals: [ˈloŋXu], [aŋˈXasu] etc.; in yet others, [k] appears in post-nasal position instead of [g]: [ˈloŋku], [aŋˈkaθu] etc. (cf. Fernández Rei, F. 1991, 54, 167).

Seseo and *gheada* have long been subject to considerable stigmatization in reference to Standard Galician, and it is very common for speakers who otherwise use these features in informal colloquial registers to readily switch to the standard when confronted with a formal or semiformal context.

The adoption of learned loans from Latin has given rise to a morphophonemic alternation involving the velarization and fortition of stem-final coronal fricatives /fθ/ (orthographic *x* and *c*, respectively) to /k/ (orthographic *c*) in athematic deverbal derivation by the nominalizing suffix *-ción*, as illustrated in (21).

- (21) protx-e-r ‘protect_{INF}’ ~ protec-ción ‘protection’
 correx-i-r ‘correct_{INF}’ ~ correcc-ción ‘correction’
 cocc-e-r ‘cook_{INF}’ ~ cocc-ción ‘cooking’
 dicc-i-r ‘say_{INF}’ ~ dicc-ción ‘diction’

4.2 Sonorants

4.2.1 Nasals

Among Galician sonorants, only nasals contrast in place of articulation; labial /m/, coronal /n/, and palatal /ɲ/: *amo* /'amʊ/ 'owner' ~ *ano* /'anʊ/ 'year' ~ *año* /'aɲʊ/ 'lamb'. These contrasts hold only syllable-initially (/ɲ/ mostly word-internally). In syllable-final position, they are neutralized and a nasal surfaces as [ŋ], except when followed by a consonant, in which case the nasal usually assimilates homorganically to that consonant, both within words and across word boundaries; cf. for example, the different places of articulation adopted by the nasal in the masculine indefinite article *un* [un]: *u*[mp]olo 'a chicken', *u*[ŋ]f]erro 'an iron', *u*[ŋ]θ]esto 'a basket', *u*[ŋ]d]ente 'a tooth', *u*[ŋ]t]eiro 'a smell', *u*[ŋ]k]ampo 'a field'.

Galician word-final nasals always adopt a velar place of articulation: *can* ['kan] 'dog', *tamén* [ta'meɲ] 'too, also' etc. As the result of post-lexical resyllabification to a following vowel across a word boundary, the velar nasal invariably ends up in onset position, cf. *o can* [ʊ'kan] + *aquel* [a'kel] → [ʊ'ka.ɲa'kel] 'that dog', *tamén* [ta'meɲ] + *estou* [is'tow] → [ta'me.ɲis'tow] 'I am too' (cf. Colina 2004; Colina/Díaz-Campos 2005; 2006, and references therein).

Galician phonologists commonly propose a velar nasal phoneme /ɲ/, partly on the grounds that it is found in onset position in the indefinite article *unha* ['u.ɲe] 'one_F' (and words derived thereof, such as *algunha* 'some_{F.SG}', *ningunha* 'none_{F.SG}'), forming a minimal-pair with *una* ['u.ne] 'join, unite_{1/3SG.SBJV}', or *uña* ['uɲe] 'nail' (cf. Veiga Arias 1976, 106–107; Porto Dapena 1977, 126; Álvarez Blanco/Monteagudo/Regueira 1986, 33–34; Freixeiro Mato 1998, 175–179; Regueira/Fernández Rei 2022). However, surface [ɲ] in *unha* can be readily analyzed as deriving from a word-level application of nasal velarization in the masculine *un* ['un] 'one_M', before suffixation of the feminine marker *-a*, a word-level suffix, followed by resyllabification of the velar nasal to the feminine marker (cf. Martínez-Gil 1993; Dubert-García 1998):

(22)	Underlying representations:	/un/	/a/
a.	Core syllabification:	un.	a
b.	Nasal velarization:	uɲ.	—
c.	/-a/ suffixation:	uɲ.+a	
d.	Resyllabification:	u.ɲa	

On the other hand, in most other lexical items a velarized nasal in the masculine does not resyllabify to the feminine marker, as in *laczán* [la.ka'θaɲ] 'lazy_M' ~ *laczana* [la.ka'θa.ne] 'lazy_{F.SG}' (not *[la.ka.θa.ɲe], *alemán* [a.le'maɲ] 'German_M' ~ *alemana* [a.le'ma.ne] 'German_F' (not *[a.le'ma.ɲe]), *testán* [tes'taɲ] 'stubborn_M' ~ *testana* [tes'ta.ne] 'stubborn_F' (not *[tes'ta.ɲe]) etc., which suggests that in the most general case the suffixation of the feminine marker precedes (and thus bleeds) velarization.

Other onset velar nasals arise in prefixation and compounding, likewise word-level morphological operations, following the derivation in (22), for a selective number of lexical items, especially, but not exclusively, involving prefixed words whose stem starts with orthographic *h*, including *in+halar* [i.ŋa'lar] 'inhale_{INF}', *in+humano* [i.ɲu'ma.nu] 'inhuman', *in+herente* [i.ɲi'reɲ.ti] 'inherent', *in+hospito* [i'ɲɔs.pi.tu] 'inhospitable', *en+herbar* [i.ɲeɾ'βar] 'cure_{INF} livestock with herbs', *en+eixar* [i.ɲej'jar] 'place_{INF} an axle on', and a few others (but there is dialectal variation between a velar and an alveolar nasal that occurs in several other prefixed words, including: *in+adecuado*, *in+odoro*, *in+alterable* etc.; cf. Martínez-Gil 1993). Resyllabification of a velar nasal is systematic in compounds: *ben+estar* [bɛ.ɲis'tar] 'well-being', *non+aliñado* [nu.ɲa.li'ɲa.ðu] 'non-aligned'.

In the vast majority of prefixed forms, however, the prefix-final nasal is resyllabified as alveolar to a following stem-initial vowel, which suggests that resyllabification here precedes, and therefore bleeds, nasal velarization: *in+epto* [i'nɛp.tu] 'inept', *in+animado* [i.na.ni'ma.ðu] 'inanimate', *in+audible* [i.naw'ði.βli] 'inaudible', *in+estable* [i.nes.ta.βli] 'unstable', *en+altecer* [i.nal.ti'θer] 'extol, praise_{INF}', *en+amorado* [i.na.mu'ra.ðu] 'in love', *en+arborar* [i.nar.βu'rar] 'hoist_{INF}', and many others. Similar considerations apply to stem-level suffixes, where resyllabification of a stem-final /n/ to a suffix-initial vowel precedes velarization (cf. *pan* [pan] 'bread' vs. *pan+adeiro* [pa.na'ðej.ru] 'baker', *son* [son] 'sound' vs. *son+oro* [su'nɔɾu] 'sonorous, voiced', *gran* [gran] 'grain' vs. *gran+el* [gra'nɛl] 'bulk', *man* [man] 'hand' vs. *man+ual* [ma.nu'al] 'manual' etc.).

A nasal is optionally inserted in a clitic group between a vowel-final verb and its direct object complement as a strategy for hiatus resolution: 'leva-o(s)' 'take_{2SG.IMP=3SG(PL).M.ACC}' → 'leva[n]-o(s)', 'leva-a(s)' 'take_{2SG.IMP=3SG(PL).F.ACC}' → 'leva[n]-a(s)'. There are two other hiatus-resolving alternatives: a) the insertion of the front glide [j] instead of [n]: 'leva-[j]-o(s)', 'leva-[j]-a(s)'; and b) in first conjugation verbs only, by coalescence of the verb-final /a/ and the direct object pronoun, creating a long vowel: 'leva-o(s) → 'lev[ɔ:] (s)', 'leva-a(s) → 'lev[a:] (s). In some Western Galician varieties (e.g. the Morrazo Peninsula, in the *Área Pontevedresa*) the coalescence of the abutting vowels in first conjugation verbs triggers a concomitant shift of stress from the verb root vowel onto the coalesced vowel sequence: 'leva-o(s) → le'v[ɔ:] (s), 'leva-a(s) → le'v[a:] (s).

Finally, in the first person singular of the preterit of second and third conjugation verbs, but not the first, a nasal /n/ is obligatorily inserted word-finally: cf. *levar* 'take_{INF}', *levéi* 'take_{1SG.PRET}' vs. *ferver* 'boil_{INF}', *fervín* 'boil_{1SG.PRET}', *fuxir* 'flee_{INF}', *fuxín* 'flee_{1SG.PRET}'. The epenthetic nasal also appears in strong preterits: *querer* 'want_{INF}', *quixen* 'want_{1SG.PRET}'.

4.2.2 Laterals

As mentioned earlier, the historical contrast between the two lateral phonemes, alveolar /l/ and palatal /ʎ/ has been virtually lost in contemporary Galician due to the obstruentization of /ʎ/ into /j/ (Ferreiro 1999, 194; Regueira 2009; Dubert-García 2013; for the historical origins of delateralization, cf. Mariño Paz 2017, 506–508).

Like nasals, a syllable-final lateral assimilates in place of articulation to a following consonant; however, unlike nasals, homorganic assimilation only takes place before coronal consonants: *solto* ['soɫto] 'loose_M', *alza* ['aɫθe] 'rise', *falso* ['falsu] 'false_M', *colcha* ['koɫtʃe] 'bedspread'. No assimilation occurs before labial and velar consonants. In some varieties, the realization of syllable-final /l/ in non-assimilating environments can be subject to velarization: *folga* ['foɫɣe] 'strike', *mel* ['meɫ] 'honey' (Regueira/Fernández Rei 2022).

4.2.3 Rhotics

Just as in Spanish, Galician exhibits two rhotic phonemes, the trill /r/ and the tap /ɾ/, which contrast only in intervocalic position within morphemes, as in *coro* ['koru] 'choir' vs. *corro* ['koru] 'run_{1SG}'. Elsewhere the contrast is neutralized. The tap /ɾ/ occurs in syllable-final (including word-final) position (*herba* ['eɾβe] 'grass', *muller* [mu'ɟeɾ] 'woman'), and after tautosyllabic plosives (*outro* ['owtɾu] '(an)other'). The trill /r/, on the other hand, occurs in stem-initial (including word-initial) position (*i-rrelevante* [iriɾ'βaɲti] 'irrelevant', *roupa* ['rowpe] 'clothes'), and after heterosyllabic consonants (*Israel* [iz.ra'el] 'Israel', *honrado* [uɲraðu] 'honest_M').

As in the case of word-final /-s/ discussed earlier, the verbal infinitive marker /-r/ is deleted when immediately followed by an enclitic definite article or a direct object pronoun: cf. *levar* 'take, carry_{INF}' vs. *vou leva-lo libro* 'I'm going to take the book', *vou leva-lo* 'I'm going to take it_M', *fechar* 'lock_{INF}' vs. *imos fecha-las portas* 'we are going to lock the doors'; *imos fecha-las* 'we are going to lock them_{F,PL}'.

5 Suprasegmentals

5.1 Syllable structure: phonotactics

The main attributes of syllable structure in Galician closely resemble those of Spanish, as described in Harris (1983), with some significant differences (cf. Álvarez Blanco/Monteagudo/Regueira 1986, 37–42; Freixeiro Mato 1998, 219–224; Álvarez Blanco/Xove 2002, 42–45; Regueira 2002; Regueira/Fernández Rei 2015; Regueira/Fernández Rei 2022).

Syllable length arising from core syllabification can reach up to six segments: CCGVGC (G = glide), as in the second syllable of *mens.truais* [menʃ.ˈtrwais] ‘menstrual_{PL}’. The nucleus, necessarily a vowel, may be optionally preceded or followed by a glide (a diphthong, as in *dous* [ˈdows] ‘two’), or flanked by two glides (a triphthong, as in *cambiei* [kamˈbjei] ‘change_{1SG.PRET}’). Syllable margins may consist of one or two consonants. Biconsonantal onsets must have a rising sonority profile subject to a minimal sonority distance, and the second segment in a complex coda is necessarily /s/, as illustrated in the first syllable of *trans.pi.rar* ‘transpire_{INF}’.

At the post-lexical level, however, more complex syllable types may arise as a consequence of a pervasive hiatus-resolving syllable merger: *un remedio a explorar* ‘a remedy to be explored’ (core syllabification [un.ɾeˈmɛ.ðju.a.eks.plɔˈrar]) → [un.ɾeˈmɛ.ðjwæks.plɔˈrar]) (for Galician vowel sandhi, cf. Fernández Rei, E. 2002a; Regueira/Fernández Rei 2022).

5.1.1 The nucleus

Only vowels can be syllabic nuclei in Galician. Complex nuclei consist of a diphthong or triphthong. Triphthongs are relatively rare; they occur mainly in the plural of /-l/-ending nominals (*igual* [iˈɣwal] ‘equal’ → *iguáis* [iˈɣwajs] ‘equal_{PL}’), as well as in the first and third person singular preterit forms of verbs (*odiéi* [ɔˈðjei] ‘hate_{1SG.PRET}’, *cambiou* [kamˈbjow] ‘change_{3SG.PRET}’).

Postvocalic unstressed close vowels are generally tautosyllabic with a preceding non-close vowel. Falling diphthongs, such as *ai*, *au*, *ei*, *eu*, *oi*, and *ou* are the most frequent in the vernacular vocabulary: *pai* [pai] ‘father’, *auga* [ˈaw.ɣe] ‘water’, *xeito* [ˈʃejtu] ‘manner’, *teu* [tew] ‘your(s)_M’, *noite* [noj.ti] ‘night’, *cousa* [ˈkow.se] ‘thing’, while rising diphthongs are most common in words of learned origin.

In sharp contrast with unstressed postvocalic close vowels, the syllabification of unstressed prevocalic close vowels in rising diphthongs is highly variable. Often, but not always, it is dependent on the presence vs. absence of stress in the nuclear vowel. Thus, when the nuclear vowel is unstressed, the sequence is generally parsed as a diphthong, especially word-finally (23a), but if the nuclear vowel is stressed, there is a tendency to parse the sequence as a hiatus, a phenomenon known as *exceptional hiatus* (23b).

(23) a.	<u>fem</u> ia	[ˈfe.mje]	‘female’	b.	<u>vi</u> axe	[biˈa.ɟi]	‘journey’
	serie	[ˈsɛ.rji]	‘series’		bi <u>ela</u>	[biˈe.le]	‘rod’
	cam <u>bio</u>	[ˈkam.bju]	‘change’		bi <u>ombo</u>	[biˈom.bu]	‘screen’
	ling <u>ua</u>	[ˈlin.gwe]	‘tongue’		men <u>sual</u>	[men.suˈal]	‘monthly’
	ten <u>ue</u>	[ˈtɛ.nwi]	‘tenuous’		Se <u>úl</u>	[seˈul]	‘Seoul’
	ardu <u>o</u>	[ˈar.ðwu]	‘arduous’		chipri <u>ota</u>	[tʃi.priˈɔ.te]	‘Cypriot’

However, there are a significant number of cases in which the nuclear vowel is stressed and yet the diphthong vs. hiatus parsing is unpredictable, as shown by the pairs in (24). Thus, the distinction must somehow be codified in the lexicon.

(24)	<u>d</u> iante	[ˈdjaɲ.ti]	‘in front’	vs.	<u>p</u> iano	[piˈa.nu]	‘piano’
	<u>V</u> iena	[ˈbjɛ.ne]	‘Vienna’	vs.	<u>cl</u> iente	[kliˈɛɲ.ti]	‘customer’
	can <u>c</u> ión	[kaɲˈθjon]	‘song’	vs.	avi <u>o</u> n	[aβiˈon]	‘airplane’
	<u>cu</u> arto	[ˈkwar.tu]	‘fourth’	vs.	<u>su</u> ave	[suˈa.βi]	‘smooth’
	<u>sue</u> co	[ˈswɛ.ku]	‘Swedish’	vs.	<u>cr</u> uel	[kruˈɛl]	‘cruel’
	acu <u>o</u> so	[aˈkwo.su]	‘aqueous’	vs.	<u>su</u> or	[suˈor]	‘sweat’
	<u>cu</u> ito	[ˈkuj.tu]	‘manure’	vs.	<u>mui</u> ño	[muˈi.ɲu]	‘mill’

It should be noted that as a consequence of a post-lexical syllable merger process, a hiatus-resolving strategy, the hiatus of close vowel plus stressed vowel sequences created by core syllabification, such as those in the right column of (24), can be resyllabified as diphthongs in fast, informal colloquial registers. The process can also apply to unstressed mid vowels adjacent to a stressed vowel, in which case desyllabification and/or closing can also occur, depending on the style: *ceo* [ˈθɛɹ] ~ [ˈθɛw] ‘sky’ (StGal. [ˈθɛ.ɹ]), *poema* [ˈpuɛ.me] ~ [ˈpwɛ.me] ‘poem’ (StGal. [puˈɛ.me]); *área* [ˈa.rɪɐ] ~ [ˈa.rjɐ] ‘area’ (StGal. [ˈa.rɪ.ɐ]), *seara* [ˈsja.re] ~ [ˈsjɑ.re] ‘sown field’ (StGal. [sɪˈa.re]). In addition, when an underived word contains a prevocalic close vowel in hiatus with a following non-close one, any words derived thereof maintain the hiatus, as faithfulness to the base, whether or not the nuclear vowel is now stressed: cf. *fio* [ˈfi.ɹ] ‘thread’ → *fiada* [fiˈa.ðɐ] ‘thread line’, *fiadeiro* [fi.aˈðei.ru] ‘easy to thread’; *duo* [ˈdu.ɹ] ‘duo’ → *dueto* [duˈe.tu] ‘duet’, *dualidade* [du.a.liˈðaði] ‘duality’.

5.1.2 The onset

Any consonant may constitute a one-segment onset, with the provisos that /r/ and /ɲ/ occur as onsets only intervocalically in word-medial position, and [ŋ] may appear syllable-initially only as a consequence of resyllabification, as discussed earlier. The /tʃ/ and /dʃ/ clusters do not occur as complex onsets. Otherwise, biconsonantal onsets are subject to a minimal sonority distance, whereby only combinations of an underlying plosive /p b t d k g/ and /f/ plus a liquid /l r/ are allowed: *plan* [ˈplan] ‘plan’, *amplo* [ˈam.plu] ‘wide’, *presa* [ˈpre.se] ‘hurry’, *lepra* [ˈle.pre] ‘leprosy’, *blusa* [ˈblu.se] ‘blouse’, *cable* [ˈka.βli] ‘cable’, *branco* [ˈbran.ku] ‘white’, *cobre* [ˈkɔ.βri] ‘copper’, *trasgo* [ˈtraz.ɣu] ‘goblin’, *catro* [ˈka.tru] ‘four’, *droga* [ˈdro.ɣɐ] ‘drug’, *podre* [ˈpo.ðri] ‘rotten’, *claro* [ˈkla.ru] ‘clear’, *ciclo* [ˈθi.klu] ‘cycle’, *cravo* [ˈkra.βu] ‘nail’, *azucre* [aˈθu.kri] ‘sugar’, *glosa* [ˈglo.se] ‘gloss’, *xungla* [ˈɟun.ɣle] ‘jungle’, *granxa* [ˈgran.ɟe] ‘farm’, *sogra* [ˈso.ɣre] ‘mother-in-law’, *flanco* [ˈflan.ɟu] ‘flank’, *aflixir* [a.fliˈɟir] ‘afflict_{INF}’, *freixo* [ˈfrej.ɟu] ‘ash tree’, *sufrir* [suˈfɾir] ‘suffer_{INF}’. For some lexical items there is dialectal variation

between /l/ and /r/ in plosive+liquid clusters, where /r/ occurs in those of vernacular origin, and /l/ is Spanish based, as in *branco* ~ *blanco* ‘white’, *praia* ~ *plaia* ‘beach’, *regra* ~ *regla* ‘rule’ etc.

When a prefix-final plosive is followed by a heteromorphemic stem-initial liquid the cluster is parsed heterosyllabically: *ab+rogar* [aβ.roˈɣar] ‘abrogate_{INF}’, *sub+lunar* [suβ.luˈnar] ‘sublunar’, *sub+liñar* [suβ.liˈɲar] ‘underline, emphasize_{INF}’ (cf. Álvarez Blanco/Monteagudo/Regueira 1986, 39; Regueira/Fernandez Rei 2015).

5.1.3 The coda

Regarding coda phonotactics, a crucial distinction must be made in Galician core syllabification between the popular vocabulary on the one hand and learned borrowings and incompletely adapted loanwords on the other, since the two types of lexical stock may be subject to partly different restrictions. In the vernacular vocabulary, syllable codas are limited to a single coronal anterior consonant: /s θ n l r/ or a glide /j w/ (coda /θ/ occurs only word-finally), as illustrated in (25).⁴

(25)	vos	[ˈbɔs]	‘you _{PL} ’	lar	[ˈlar]	‘homestead’
	festa	[ˈfɛs.tɐ]	‘festival’	parvo	[ˈpar.βɔ]	‘silly, idiot’
	dez	[ˈdɛθ]	‘ten’	serán	[siˈran]	‘evening’
	sal	[ˈsal]	‘salt’	xente	[ˈʝeɲ.ti]	‘people’
	volta	[ˈbɔl.tɐ]	‘turn, tour’	loita	[ˈloj.tɐ]	‘fight’
	farei	[faˈrej]	‘do, make _{1SG.FUT} ’	seu	[ˈsew]	‘his, her(s)’
	xeito	[ˈʝej.tu]	‘manner’	touro	[ˈtow.ru]	‘bull’

In contrast, in the learned/loanword vocabulary codas can incorporate any consonant or a cluster of consonant plus /s/. The following is a representative sample:

(26)	op.tar	‘opt _{INF} ’	ads.cri.to	‘attached’	sols.ti.cio	‘solstice’
	chips	‘chip _{PL} ’	af.ga.no	‘Afghan’	pers.pi.caz	‘shrewd’
	ob.xe.to	‘object’	pla.yoffs	‘playoffs’	zig.zag	‘zig zag’
	obs.ce.no	‘obscene’	ét.ni.co	‘ethnic’	ig.no.rar	‘ignore _{INF} ’
	clubs	‘club _{PL} ’	dé.fi.cits	‘deficit _{PL} ’	e[ks].pli.car	‘explain _{INF} ’
	ad.mi.rar	‘admire _{INF} ’	ins.pi.rar	‘inspire _{INF} ’	a.no.raks	‘anorak _{PL} ’

⁴ In Western Galician, the cluster /-ns/ is exceptionally allowed in the plural of /n/-final nominals, e.g. *can* ‘dogs’ → *cans*, *cabrón* ‘bastard, swine’ → *cabróns* (cf. Colina/Simonet 2014).

5.1.4 Coda-plosive deletion

A common strategy used in colloquial Galician in order to deal with coda consonants excluded by phonotactic constraints on syllable structure in the patrimonial vocabulary is deletion, illustrated in (27). Deletion optionally applies to: underlying plosives in word medial position (27a), plosives or nasals as the first member of a coda C/s/ cluster in coda position (27b), and word-medial or final plosives in loanwords (27c) (cf. Colina 1997; Freixeiro Mato 1998, 139–140; Álvarez Blanco/Xove 2002, 45; Regueira 2002; Regueira/Fernández Rei 2015; Mariño Paz 2017, 516–527).

(27) Plosive and nasal deletion in learned and loaned words

a.	óptimo	[ˈɔ.ti.mu]	‘optimal _M ’	digno	[ˈdi.nu]	‘worthy _M ’
	absoluto	[a.suˈlu.tu]	‘absolute _M ’	directo	[diˈrɛ.tu]	‘direct _M ’
	ritmo	[ˈri.mu]	‘rhythm’	sector	[sɛˈtor]	‘sector’
b.	eksplorar	[es.ploˈrar]	‘explore _{INF} ’	instante	[isˈtaŋ.ti]	‘instant’
	óxido	[ˈɔ.si.ðu]	‘rust’	abstracto	[asˈtra.tu]	‘abstract _M ’
	transmitir	[tras.miˈtiɾ]	‘transmit _{INF} ’	obstruir	[os.truˈiɾ]	‘obstruct _{INF} ’
c.	yogurt	[joˈɣur]	‘yogurt’	club	[klu]	‘club’
	Nova York	[ˈno.βaˈjoɾ]	‘New York’	internet	[in.teɾˈnɛ]	‘internet’
	fútbol	[ˈfu.βu]	‘football’	confort	[konɣˈfoɾ]	‘comfort’

5.1.5 Vowel epenthesis

There are several lexical-level vowel epenthesis processes in Galician, all of them set off by prosodic conditions, namely syllabic and/or metrical structure (cf. Colina 1997). The epenthetic vowel in Galician is the default vowel /e/, realized phonetically as the reduced version [ɪ], which is typical of unstressed positions.

First, epenthesis takes place word-initially before /#sC/ clusters, as illustrated by the adaptation of English loanwords, such as *stop* → *ɛstop*, *snob* → *esnob*, *stress* → *ɛstrés*, *ski* → *esquí* etc., as well as in contrast to prefixed forms such as *in+sculpir* ‘engrave_{INF}’ vs. *ɛsculpir* ‘sculpt_{INF}’, *in+star* ‘urge, press_{INF}’ vs. *ɛstar* ‘be, stand_{INF}’, *sub+strato* vs. *ɛstrato* ‘stratum’, *hemi+sferio* vs. *ɛsfera* ‘sphere’, *in+scribir* ‘write_{INF} in’ vs. *ɛscribir* ‘write_{INF}’, *iugo+slavo* ‘Yugoslav_M’ vs. *ɛslavo* ‘Slav(ic)_M’ etc.

A second type of epenthesis process takes place in word-medial position to break up disallowed /CrC/ consonant clusters, as in *pedra* [ˈpɛðrɐ] ‘stone’ vs. *peder+nal* [pɛðɪɾˈnal] ‘flint’, *abrir* [aˈβɾiɾ] ‘open_{INF}’ vs. *aber+tura* [aβɛɾˈtura] ‘opening’, *cubrir* [kuˈβɾiɾ] ‘cover_{INF}’ vs. *cober+tor* [kuβɛɾˈtor] ‘bedcover’ etc.

Third, as shown in the sample in (28), epenthesis also applies when a word would otherwise end in a disallowed consonant or consonant cluster (28a), but not in /r l n s θ/ (28b), the set of coda consonants allowed in the Galician patrimonial vocabulary. While final epenthesis does not produce any alternations, synchronically it is

still phonologically motivated by the predictability of the vowel in contexts such as those illustrated in (28a) (cf. Martínez-Gil 1997, who follows an analogous argument for Spanish advanced in Harris 1987).

(28) a.	/-b/	ceibe	[ˈθejβi]	‘free’	/-p/	rape	[ˈrapɪ]	‘angler fish’
	/-d/	edade	[iˈðaði]	‘age’	/-t/	metade	[mɪˈtaði]	‘half’
	/-m/	home	[ˈɔmi]	‘man’	/-k/	xeque	[ˈʃeki]	‘sheik’
	/-f/	hoxe	[ˈɔʃi]	‘today’	/-f/	xefe	[ˈʃɛfi]	‘boss’
	/-br/	pobre	[ˈpɔβɾi]	‘poor’	/-tʃ/	coche	[ˈkɔtʃi]	‘car’
	/-dr/	podre	[ˈpoðɾi]	‘rotten’	/-lp/	golpe	[ˈgɔlpɪ]	‘fox’
	/-tr/	cutre	[ˈkutɾi]	‘stingy’	/-rt/	forte	[ˈfɔrtɪ]	‘strong’
	/-nt/	fonte	[ˈfɔntɪ]	‘fountain’	/-st/	poste	[ˈpɔsti]	‘pillar’
	/-mpr/	sempre	[ˈsɛmpɾi]	‘always’	/-str/	mestre	[ˈmɛstri]	‘teacher’
b.	/-r/	mar	[ˈmar]	‘sea’	/-s/	tres	[ˈtres]	‘three’
	/-l/	mel	[ˈmɛl]	‘honey’	/-θ/	rapaz	[raˈpaθ]	‘child _m ’
	/-n/	ben	[ˈbɛn]	‘well’				

A fourth type of epenthesis is triggered by the addition of the plural marker /-s/ in consonant-ending nouns and adjectives. Galician plural formation is relatively complex. Epenthesis is determined by a conjunction of segmental and prosodic factors, and further complicated by the existence of several dialectal variants, as well as a number of exceptions (cf. Álvarez Blanco/Monteagudo/Regueira 1986, 66–67; Colina 1997; Freixeiro Mato 2000, 48–50; Álvarez Blanco/Xove 2002, 400–401). The two major types of plural epenthesis are illustrated in (29). The vowel /-e/, realized as [-ɪ] as expected, is inserted in words that end in /r s θ/ (29a), and in monosyllabic or polysyllabic paroxytones ending in /l/ (29b). However, if an /l/-ending word is oxytonic, /l/ is deleted and the epenthetic vowel is closed as it undergoes syllable merger with a preceding (stem-final) nuclear vowel other than /i/, and becomes the glide [j] (29c); if the last stem vowel is /i/, the glide coalesces with it: *cadril* [kaˈðɾil] ‘hip’ → *cadris* [kaˈðɾis], *candil* [kaɲˈdil] ‘oil lamp’ → *candis* [kaɲˈdis] etc., but in varieties of Western Galician, epenthesis is the norm in these word types: *cadril* → *cadriles*, *candil* → *candiles* etc.).

(29) a.	singular		plural	
	amor	[aˈmor]	amores	[aˈmorɪs] ‘love’
	mes	[ˈmes]	meses	[ˈmesɪs] ‘month’
	feroz	[fiˈɾɔθ]	feroces	[fiˈɾɔθɪs] ‘fierce’
b.	fol	[ˈfɔl]	foles	[ˈfɔlɪs] ‘bellows’
	fráxil	[ˈfraʃil]	fráxiles	[ˈfraʃɪlɪs] ‘fragile’
	caníbal	[kaˈniβɛl]	caníbales	[kaˈniβɛlɪs] ‘cannibal’

c.	azul	[a'θul]	azuís	[a'θujs]	'blue'
	cordel	[kur'ðel]	cordeís	[kur'ðejs]	'string'
	animal	[ani'mal]	animais	[ani'majs]	'animal'

In /r/-ending loanwords, epenthesis is variable: *póster* 'poster' → *pósters/posteres*; *gánster* 'gangster' → *gánsters/gánsteres*; otherwise, no epenthesis occurs: *coñac* 'brandy' → *coñacs*, *clip* 'clip' → *clips* (Álvarez Blanco/Xove 2002, 400). Interestingly, Standard Galician has adopted type (29c), prevalent in Central and Eastern varieties; in coastal Western Galician, type (29a–b) has been generalized to all /l/-ending words (i.e., no /l/-deletion and no closing/gliding): *azul* → *azules*, *cordel* → *cordeles* etc.). Furthermore, while the absence of epenthesis in the pluralization of /n/-ending words, typical of Western Galician, is now normative (*can* ['kan] 'dog' → *cans* ['kans], *feixón* [fej'fon] 'bean' → *feixóns* [fej'fonɐs] etc.), in Eastern Galician, these words follow types (29a–b) or (29c), depending on particular dialect (*can* → *cages*, *cájs*; *feixón* → *feixoes*, *feixois*). In Central Galician varieties /-n/ is deleted and no epenthesis takes place (*can* → *cás*, *feixón* → *feixós*). In these dialects, the plural allomorph is -es, as in (29a–b), and the nasal is deleted in the plural, presumably in order to avoid a word-final /-ns/ cluster.

Another case of epenthesis related to syllable structure arises in a number of Galician varieties as one of several hiatus-breaking alternatives, whereby the front glide [j] is optionally inserted between two heterosyllabic vowels, both within words and across word boundaries at the phrase level (cf. Carballo Calero 1979, 121–123; Colina 1997; Freixeiro Mato 1998, 127; Regueira/Fernández Rei 2022). Within words, [j]-epenthesis applies most commonly when the first member of the heterosyllabic vowel sequence is mid, and one of the vowels is stressed: *cadea* [ka'ðe.ə] 'prison' → [ka'ðe.je], *cheo* ['tʃe.ʊ] 'full_M' → ['tʃe.ju], *real* ['rɪ.al] 'real, royal' → ['rɪ.jal], *soo* ['so.ʊ] 'alone, lonely' → ['so.ju] (Colina 1997). At the phrasal level [j]-epenthesis also applies when the heterosyllabic vowels straddle two words in a phrase: *a miña alma* [a.mi.ɲe'al.me] 'my soul' → [a.mi.ɲe'jal.me], *esta época* ['es.te'e.pu.ke] 'this period' → ['es.te'je.pu.ke], *outro ermo* ['ow.tru'er.mo] 'another wasteland' → ['ow.tru'jer.mu].

Oxytonic words ending in one of the set of consonants allowed in the vernacular Galician lexicon, namely, /r l n s θ/, or a glide /j w/, are subject to an optional type of phrase-level final epenthesis, a paragogic vowel which Martínez-Gil (1997) analyzes as the manifestation of *catalexis*, whereby the epenthetic vowel introduces an additional syllable in order to conform to a left-headed disyllabic foot (a trochee). The process is reported to be more common when the oxytonic word in question is the last in an intonational phrase (cf. Carballo Calero 1979, 123–124; Álvarez Blanco/Monteagudo/Regueira 1986, 23–24; Freixeiro Mato 1998, 113–114; Martínez-Gil 1997): *Onte fomos bailar*[ɪ] 'yesterday we went dancing'; *Dinlle a Xoán o papel*[ɪ] 'I gave Xoán the paper'; *Ela ten un bo corazón*[ɪ] 'She has a good heart'; *Non sei canto diñeiro le deu*[ɪ] 'I don't know how much money s/he gave him/her'. Although less frequent, a paragogic

vowel has also been reported in paroxytones: *fácil*[ɪ] ‘easy’, *patácas*[ɪ] ‘potato_{pl}’ (cf. Carballo Calero 1979, 123).

5.2 Stress

5.2.1 Nominal stress

The following facts provide solid evidence that unmarked (regular) Galician nominal stress assignment is sensitive to syllable weight, which suggests a moraic trochee constructed on the right edge of the morphological word. As illustrated in (30a), stress falls on a heavy final syllable (a syllable closed by a consonant or a glide; inflectional consonants like *-s* and *-n* are extraprosodic). Otherwise, stress falls on the penult, light or heavy (30b). Antepenultimate stress is always marked, but precluded by a heavy penult (not by a light one); thus, hypothetical words like **in.ver.no*, **pe.men.to*, **te'ra.peu.ta*, **ou.tei.ro* etc., are systematically excluded. A final syllable closed by a glide, because it is heavy, rules out penultimate stress: **bo.coi*, **bo'ca.reu*. In unadapted loanwords antepenultimate stress co-occurs with a heavy penult (*Párkinson* ‘Parkinson’), or a heavy final (*décathlon* ‘decathlon’).

(30)	a.	pere'xel	‘parsley’	b.	for'mi.ga	‘ant’
		fei'xón	‘bean’		en'xe.bre	‘pure’
		xa.po'nés	‘Japanese’		in'ver.no	‘winter’
		ra'paz	‘child _m ’		pe'men.to	‘pepper’
		bo'coi	‘cask, barrel’		te.ra'peu.ta	‘therapist’
		bo.ca'reu	‘anchovy’		ou'tei.ro	‘hill(ock)’

Elsewhere, stress is marked, and therefore must somehow be lexically encoded, as in: a) paroxytones with a heavy ultima closed by a consonant (*dí'fí.cil* ‘difficult’, *crá.ter* ‘crater’); b) proparoxytones with a light penult (*lós.tre.go* ‘lightning’, *pa'rá.li.se* ‘paralysis’, *sé.cu.lo* ‘century’); and c) oxytonic stress in words with a light ultima (*ma'ná* ‘manna’, *cham'pú* ‘shampoo’, *ca'fé* ‘coffee’, *domi'nó* ‘domino’). The phonological adaptation of English loanwords conforms to these stress patterns, whether unmarked or marked: *wagon* → *va'gón*, *internet* → *in.ter'net*, *longplay* → *long'play*, *bungalow* → *bun.ga'low*, *Microsoft* → *Mi.cro'soft* etc.

Secondary stress is restricted chiefly to the first member of compounds and the adjectival base of *-mente* ‘-ly’ adverbs, where the adjective’s primary stress is demoted to secondary: *vacaloura* [ˌbake'lowre] ‘stag beetle’ (*vaca* ‘cow’ + *loura* ‘blond’), *xentilmente* [ʃenˌtil'menˌti] ‘kindly’, *fortemente* [ˌforti'menˌti] ‘strongly’.

5.2.2 Verbal stress

In contrast to its nominal counterpart, verbal stress is determined heavily by morphological factors. There is nothing like exceptional verbal stress in Galician. Stress in verb forms invariably falls on one of the three following loci: a) on the (last) root vowel, as in *levo* ‘carry_{1SG}’ (root = *lev-*), *lev-e-n* ‘carry_{3PL.SBJV}’; b) on the theme vowel, as in *le'var* ‘carry_{INF}’ (theme vowel = /a/), *le'vamos* ‘carry_{1PL}’, *le'vabas* ‘carry_{2SG.IMPF}’, *le'varan* ‘carry_{3PL.PRET}’, *le'vade* ‘carry_{2PL.IMP}’; or c) on the vowel of the tense/aspect/mood morpheme, as in *le'vou* ‘carry_{3SG.PRET}’, *le'vamos* ‘carry_{1PL.IMPF}’, *le'va'rei* ‘carry_{1SG.FUT}’, *le'va'riades* ‘carry_{2PL.COND}’. The vowel of the person/number morpheme, if present, is never stressed.

Any Galician weak (regular) verb has a total of 65 forms and 14 paradigms: present, imperfect, future (all three in both the indicative and in the subjunctive moods), preterit, pluperfect, conditional, the conjugated infinitive (whose forms coincide with the future subjunctive in weak verbs), three non-finite forms (infinitive, gerund, past participle), and imperative (singular and plural). The distribution is as follows:

- (a) Stress falls on the root vowel in nine forms of the present indicative (*levo*_{1SG}, *levas*_{2SG}, *leva*_{3SG}, *levan*_{1PL}) and the present subjunctive (*leve*_{1SG.SBJV}, *leves*_{1SG.SBJV}, *leve*_{3SG.SBJV}, *leven*_{3PL.SBJV}), and in the imperative singular (*leva*_{2SG.IMP}).
- (b) Stress falls on the theme vowel in 38 forms: four forms of the present indicative and present subjunctive (*le'vamos*_{1PL}, *le'vades*_{2PL}; *le'vemos*_{1PL.SBJV}, *le'vedes*_{2PL.SBJV}), four forms of the imperfect indicative and pluperfect (*le'vaba*_{1SG.IMPF}, *le'vabas*_{2SG.IMPF}, *le'vaba*_{3SG.IMPF}, *le'vaban*_{3PL.IMPF}; *le'vara*_{1SG.PST.PRF}, *le'varas*_{2SG.PST.PRF}, *le'vara*_{3SG.PST.PRF}, *le'varan*_{3PL.PST.PRF}), all six forms of the imperfect subjunctive (*le'vase*_{1SG.IMPF.SBJV}, *le'vases*_{2SG.IMPF.SBJV}, *le'vase*_{3SG.IMPF.SBJV}, *le'vásemos*_{3PL.IMPF.SBJV}, *le'vásedes*_{2PL.IMPF.SBJV}, *le'vasen*_{3PL.IMPF.SBJV}), all preterit forms except the first and third singular (*le'vaches*_{2SG.PRET}, *le'vamos*_{1PL.PRET}, *le'vástes*_{2PL.PRET}, *le'varon*_{3PL.PRET}), the six forms of both the future subjunctive and the conjugated infinitive, both identical pairwise (*le'var*_{1SG.INF/FUT.SBJV}, *le'vares*_{2SG.INF/FUT.SBJV}, *le'var*_{3SG.INF/FUT.SBJV}, *le'varmos*_{1PL.INF/FUT.SBJV}, *le'varden*_{2SG.INF/FUT.SBJV}, *le'varren*_{3PL.INF/FUT.SBJV}), the three non-finite forms, namely, the infinitive (*le'var*_{INF}), the gerund (*le'vando*_{GER}), the past participle (*le'vado*_{PST.PTCP}), and the imperative plural (*le'vade*_{2PL.IMP}).
- (c) In the remaining 18 verb forms, stress falls on the tense/aspect/mood morpheme, namely, the two forms of the imperfect indicative and pluperfect (*le'vamos*_{1PL.IMPF}, *le'vades*_{2PL.IMPF}; *le'vamos*_{1PL.PST.PRF}, *le'vades*_{2PL.PST.PRF}), all six forms of the future indicative (*le'va'rei*_{1SG.FUT}, *le'vá's*_{2SG.FUT}, *le'vá'rá*_{3SG.FUT}, *le'va'remos*_{1PL.FUT}, *le'va'redes*_{2PL.FUT}, *le'va'ran*_{3PL.FUT}), all six forms of the conditional (*le'va'ría*_{1SG.COND}, *le'va'rias*_{2SG.COND}, *le'va'ría*_{3SG.COND}, *le'va'ríamos*_{1PL.COND}, *le'va'ríades*_{2PL.COND}, *le'va'rían*_{3PL.COND}), and the first and third persons of the preterit (*le'vei*_{1SG.PRET}, *le'vou*_{3SG.PRET}).⁵

⁵ In strong (irregular) verbs, stress in these two preterit forms falls on the root vowel, as in *que-*

5.3 Intonation

Like all other Romance languages, Galician is an intonational language, in that modulations in pitch measured in terms of fundamental frequency (the intonational *melody*) are used to distinguish between the various utterance types and their pragmatic meanings, such as an assertion vs. a question, the configuration of sentence focus (known vs. new information), contrast, a speaker's emotions, and so on.

A detailed description of Galician intonation, including its role in the focalization of information, is beyond the scope of the present chapter. Instead, here we will survey the properties of three basic intonational patterns: declarative, wh-interrogatives, and absolute interrogatives (yes/no-questions).⁶

The most common melody of neutral (broad focus) statements in Galician rises to the first stressed syllable, and then steadily declines in pitch up to the phrase's (proparoxytonic) nuclear accent, as shown in Figure 27.4 for *Eu penso que laranxas* 'I think (that) oranges' (from Regueira/Fernández Rei 2022).

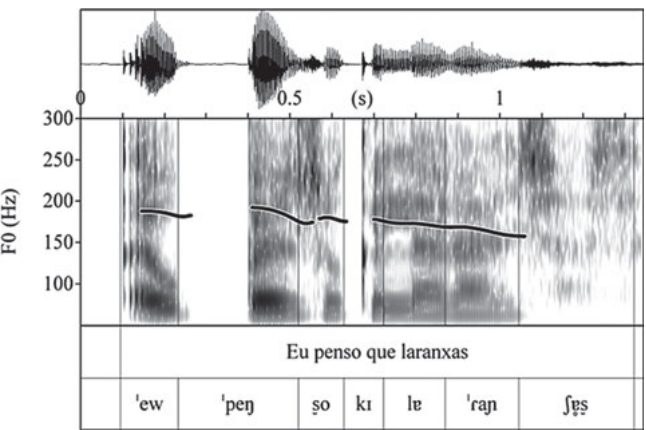


Figure 27.4: F0 contour and waveform for *Eu penso que laranxas* 'I think (that) oranges'.

rer 'want_{INF}': 'quixen 'want_{1SG.PRET}', 'quixo 'want_{3SG.PRET}'. Moreover, while the endings of the future subjunctive differ slightly from those of the conjugated infinitive in strong verbs, the locus of stress in both is identical.

6 For a more complete survey of the topic, the reader is referred to the description by Blanco Carril (1973), Porto Dapena (1977, 41–49) and, more recently, the seminal work of E. Fernández Rei and her associates (cf. Fernández Rei, E. 2002a; 2004; 2005; 2011; 2016; Escourido 2007; 2008/2009; Escourido et al. 2008; Fernández Rei/Escourido 2008; Fernández Rei/Engroba 2014; Fernández Rei/Martínez Calvo 2014; Fernández Rei/Moutinho/Coimbra 2014; 2016; Fernández Rei/Moutinho 2016; Filgueira 2015; Regueira/Fernández Rei 2022).

A similar pattern can be observed for the phrase *O soldado falaba co cómico* ‘The soldier was talking to the comedian’, uttered by a female speaker from Allariz (Figure 27.5, Southern Central Galician; from the *Amper Galicia* project, <http://ilg.usc.es/amper/>).

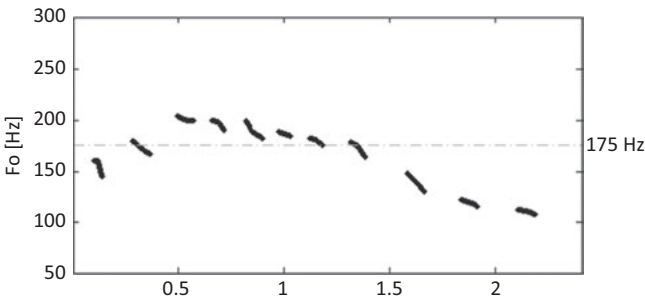


Figure 27.5: Pitch contour of the vowels in *O soldado falaba co cómico* ‘The soldier was talking to the comedian’.

Neutral wh-questions exhibit a contour somewhat similar to declaratives, but here a nuclear pitch accent at a substantially higher frequency range is associated with the phrase-initial wh-pronoun, followed by a sharp tonal drop that continues on to the end of the phrase, as in Figure 27.6 for the question *¿Quén alugóu esa casa?* ‘Who rented that house?’ (from Regueira/Fernández Rei 2022).

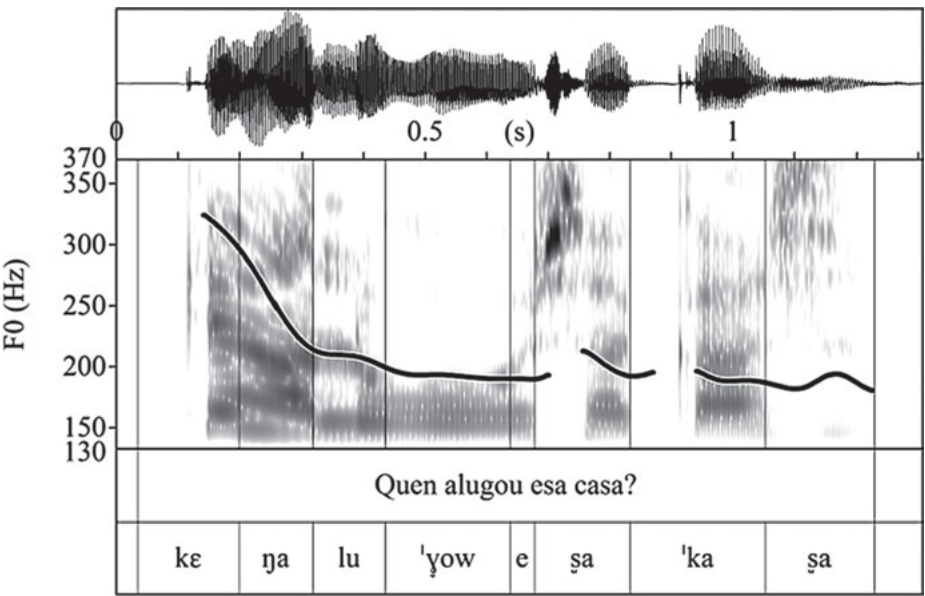


Figure 27.6: Pitch contour of the wh-question *¿Quén alugóu esa casa?* ‘Who rented that house?’.

As E. Fernández Rei (2008, 463) observes, absolute interrogatives exhibit the highest degree of variation in intonational contour shape among Galician dialects; some measure of variation also exists in declaratives and *wh*-questions, but to a much lesser extent than in yes/no-questions. This author reports four distinct intonation patterns for the absolute interrogative *¿O soldado falaba co cabalo?* [ʊ.sɔɫˈda.ð̞ʊ.faˈla.β̞e.ku.kaˈβa.lu] ‘Was the soldier speaking with the horse?’ in the Western Galician localities of Santiago (straddling the Western and Central Galician areas), Camelle (Bergatiñá variety), and Bueu and Goián (southwestern Pontevedresa region), as reflected in the stylized pitch contours in Figure 27.7 (from Fernández Rei, E. 2008, 463). According to E. Fernández Rei, the nuclear configuration of the Santiago variety is the most common pattern across the Galician territory (cf. also Regueira/Fernández Rei 2022).

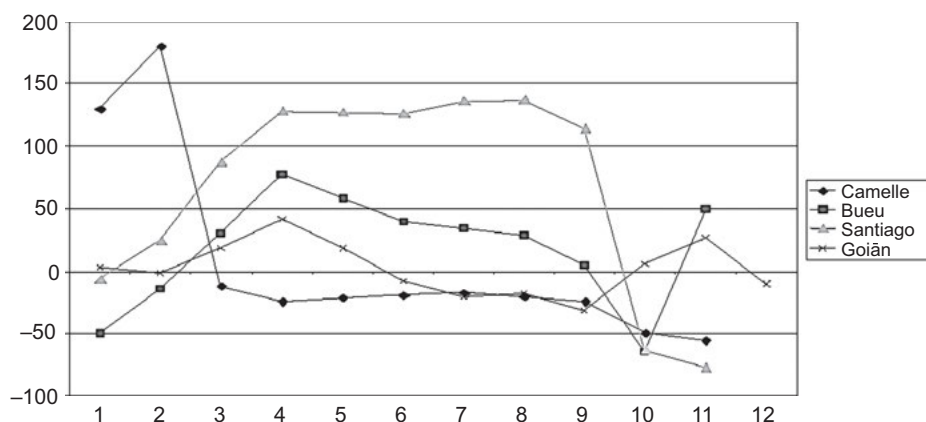


Figure 27.7: Stylized pitch contours of *¿O soldado falaba co cabalo?* ‘Was the soldier speaking with the horse?’ in four Western Galician varieties.

On the basis of such observations, as well as the empirical evidence gathered in the *Amper Galicia* project, Fernández Rei/Escourido (2008, 163–164) propose that the dialectal variation in Galician yes/no-questions stems from three basic configurations (cf. also Fernández Rei, E. 2016). First, the *Common Galician* pattern (CGP, found in most of Central and Eastern Galician varieties), in which F_0 reaches a peak around the tonal maxima on the posttonic syllable of the phrase’s subject, and then continues throughout the phrase until it reaches the nuclear stress, at which point it drops sharply, as reflected in the Santiago pitch contour. Second, the *Costa da Morte* pattern (CMP; the Fisterrá and Bergantiñá regions of Western Galician) in which nuclear stress is aligned with phrase-initial position, by means of an initial high-frequency pitch accent on the pretonic syllable of the phrase’s subject, immediately followed by a sharp and sudden tonal fall on the stressed syllable, and then it stays flat until it reaches the phrase’s last stressed syllable, where it falls a bit further, as in the Cam-

melle contour. And third, there is the *Rías Baixas* pattern (RBP; the coastal western and southwestern of the Pontevedresa region of Western Galician), two variants of which can be identified by their characteristic circumflex configurations. In the RBP-I, the Bueu type, F_0 rises sharply from a relatively low value to the initial pitch accent, located on the posttonic syllable, followed by a gradual tonal decline up to the last stressed syllable, and then it raises sharply on the final syllable, presumably as a way of marking the question (however, the final rise is not generalized for this pattern; cf. below the pitch contour of a Cangas speaker, also RBP-I). In RBP-II, the Goián type, F_0 rises to the initial pretonic syllable's pitch accent, as in the Bueu contour, falls on the stressed syllable, and declines gradually until the final circumflex movement where it rises on the nuclear accent and falls on the final unstressed syllable. These patterns are illustrated in Figures 27.8–27.11 by the data samples of F_0 vowel tracings of the neutral yes/no-question *¿O soldado falaba co cómico?* [ʊ.suɫ'da.ðʊ.fa.'la.βe.ku'kɔ.mi.ku] ‘Was the soldier talking to the comedian?’, taken from the *Amper Galicia* project (<http://ilg.usc.es/amper/>).

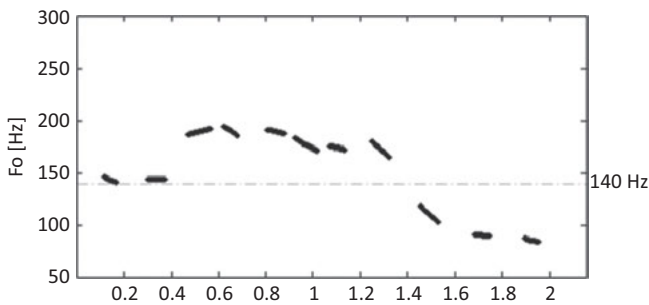


Figure 27.8: CGP, female speaker from Cariño, northern Central Galician.

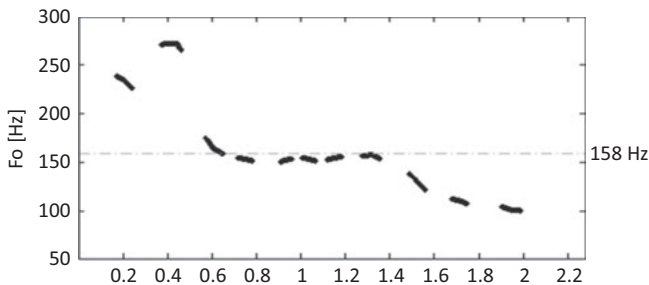


Figure 27.9: CMP, male speaker from Camariñas, coastal northern Western Galician.

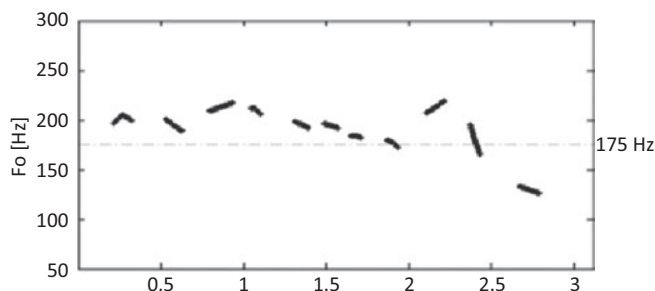


Figure 27.10: RBP-I, female speaker from Cangas, coastal southwestern Western Galician.

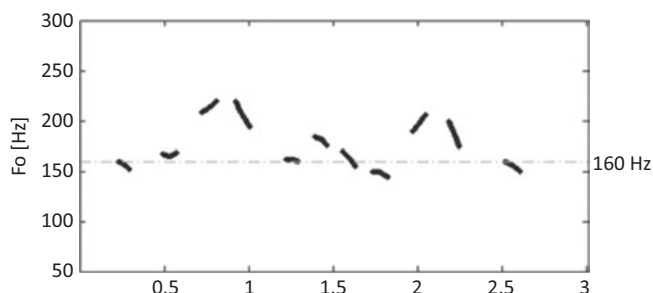


Figure 27.11: RBP-II, male speaker from Oia, coastal southwestern Western Galician.

5.4 Rhythm

As in most Romance languages, speech rhythm in Galician can be characterized as syllable-timed: syllables are coordinated at regular intervals, a type of temporal synchronization sometimes referred to as isochrony (78 Comparing and deconstructing speech rhythm across Romance languages). In such a system, the difference in duration between stressed and unstressed syllables is not as significant as in stress-timed languages like English (which have a foot-based rhythm). The first study of Galician rhythm, Fernández-Salgado/Rodríguez Banga (1999), focuses on allophonic duration within syllables. They found that: a) speed rate plays a significant role in allophonic duration; b) syllables closed by a voiced consonant exhibited an increase in duration; and c) the rate of allophonic duration was inversely proportional to the number of allophones in a syllable. However, the most important factors affecting allophonic duration according to these authors was primary stress and lengthening of stressed prepausal syllables (a typical consequence of phrasal stress), which can be two to three times the duration of non-final atonic syllables. In a subsequent study, E. Fernández Rei (2002b) found that the duration of intervals between primary stress bearers is directly related to the number of syllables in an intonational phrase: six-

syllable intervals, for example, encompass about nine syllables per second, or a ratio of 2.13 syllables per second more than one-syllable intervals. Fernández Rei concludes that although stressed syllables are slightly longer than unstressed ones in Galician, the language still adheres to syllabic isochrony, by utilizing certain phonological mechanisms that compensate for an excessive duration imbalance between stressed and unstressed syllables, including consonant deletion, hiatus formation, syllable merger at word boundaries, and avoidance of syllable merger word-internally.

6 Conclusion

The main goal of this chapter has been a focus on the most significant aspects of Galician phonology, both segmental and suprasegmental, and their contribution to the study of Galician and Ibero-Romance linguistics. Some of these phonological traits are bound to certain dialectal areas. Thus, the Western Galician variety can be readily identified by features such as *seseo*, *gheada*, nominal metaphony, and the distinct intonational patterns of absolute interrogatives, whereas typical of Central Galician and Eastern Galician are the morphophonological adjustments triggered by plural formation in /l/-ending nominals. While our understanding of Galician has made considerable advances in recent decades, especially due to studies in several linguistic domains related to phonology, such as phonetics, intonation, dialectal and sociolinguistic variation, and so on, other areas of phonological inquiry, such as syllable structure, stress, and the phonology-morphology interface have attracted relatively little attention to date. Hopefully, the collection of topics on Galician phonology surveyed in this chapter will serve as a starting point for researchers and students who wish to delve further into the Galician phonological system.

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Mirna Reyna and Eric Louis Russell

28 Romance-lexifier creoles

Abstract: This chapter describes the phonological inventories and most notable synchronic and diachronic processes observed in Romance-lexifier creoles, languages that emerged from contexts of intense linguistic coalescence, subject to particular sociolinguistic parameters. Focusing on the Ibero-Romance- and French-lexifier subgroups, we exemplify the major phonological characteristics of Papiamentu and Haitian, respectively. We also briefly address phenomenological issues of creole simplicity and complexity, reiterating arguments that assert this to be a specious dichotomy.

Keywords: contact, creoles, pidgins, Haitian creole, Papiamentu

1 Background

This chapter presents an overview of the phonological systems and patterns of Romance-lexifier creoles. Although a universally agreed-upon definition of what constitutes a creole is lacking, these are generally classified as languages born of contact vernaculars and having emerged in situations of intense coalescence (cf. Holm 2000; Sebba 1997). Often erroneously referred to as derivative forms of European languages (e.g. “Haitian French”), creoles are linguistic systems in their own right, albeit historically associated with others through the appropriation and adoption of surface forms, themselves overwhelmingly referential in nature, from a source language. The latter is appropriately known as the language’s lexifier, whose forms were subsequently but variably integrated into the distinct, emergent creole grammatical system.

A heterogeneous grouping by most measures, creoles are as grammatically divergent from their respective source languages and from one another as are French from Romanian or Japanese from Mandarin, to provide but two examples. They must be further distinguished from pidgins, contact languages that emerged in similar environments, in many, if not most instances, following similar trajectories: unlike the latter, creoles are the native or first languages of at least some members of their respective speech communities (cf. Siegel 2008, 1–10, for a useful introduction to the question of pidgins within the scope of contact vernaculars). The field of creolistics, which concerns itself with the study of these languages, their emergence, and related questions, came into its own in the mid-20th century, although scholarly interest can be traced back as far as the 18th century, if not earlier (Holm 1988, 13–44).

Creolistics has long been concerned with theories pertaining to the role of different languages and language families in the emergence of stable contact vernaculars. This concern is most notably seen in the substratist versus superstratist (or lexifier)

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theories of creole formation, as well as in debate about the role and content of language universals in these processes. A significant amount of work in this field has focused on morphological and syntactic questions, especially as these areas have proven fruitful for the study of relexification, universal grammar, and related domains of inquiry. On the other hand, phonology and questions concerning the emergence and organization of sound systems have more often than not been a tertiary concern for creolists – if one at all. Indeed, it was not until the mid-1990s that there were explicit calls for specific investigation into creole sound patterns (Singh/Muysken 1995). Fortunately, ensuing decades have been marked by an increase in scholarly interest, attending notably to questions concerning the status of creole phonological systems and their relation to other languages, both sub- and superstrate, as well as to inquiry addressing the structures, causalities, and pathways of phonological restructuring that are implicated in processes of creole emergence, stabilization, and eventual decreolization (cf. Winford 2005; 2008; Siegel 2008).

While the majority of recent publications considering creole phonology are implicationally diachronic, and more often than not explicitly theoretical, a relatively impressive body of descriptive literature facilitates the task of this chapter, i.e. sketching out the cardinal points of creole phonological systems, which are somehow, if only tenuously, related to Romance. However, caution should be exercised when it comes to the synthesis of extant literature. Perhaps more than other languages included in this volume, creoles are subject to wide-ranging variability and there is a corresponding lack of rigorous methodological and empirical documentation of such. Furthermore, the vast majority of extant creoles are not standardized, and the few that are have only recently been subject to orthographic and grammatical codification. Even in such cases, and again with a handful of exceptions, these creoles are frequently the object of social prejudice or, in many contexts, explicitly restrictive governmental policy.

Generally characterizable as lacking a uniformity comparable to more widely-studied languages of Europe, most spoken creoles exist along a dialect continuum, the apex of which – accepting this term and its connotations as the inheritance of many centuries of Eurocentrism – situates them in relation to their lexifiers, with acrolectal forms most similar, basilectal ones most distinct, and mesolectal ones somewhat intermediately positioned along this gradient (cf. Le Page/Tabouret-Keller 1985). Unsurprisingly, the more acrolectal forms dominate most existing literature and very frequently there is little or no non-anecdotal evidence attesting to the form and structure of basilectal varieties. Creole variability and historical divergence thus differentiate these from all other languages that are the object of chapters in this book in ways that surpass linguistic substance alone. To varying degrees and manners, these are languages that represent a radical rupture in inter-generational transmission and acquisition, in which a host of non-lexifying languages played an undeniable, even if unclear, role and whose sole definitive or incontrovertible connection to an Indo-European source involves the denotative lexicon, with the status of functional

or grammatical vocabulary being a matter of intense debate (cf. Mufwene 2001; Holm 2000; Sebba 1997; but consider also Tinelli 1981, who argues that Haitian should be treated as a Romance language). Accordingly, and while many texts and authors refer to creoles using the compound “...-based” (e.g. “French-based creole”), we believe it is more accurate to stress the nearly-singular lexical nature of these historic interactions and refer to them accordingly (e.g. French-lexifier creoles), using more specific names (e.g. Haitian, Mauritian) whenever possible and appropriate.

In what follows, and with full acknowledgment of the limitations of the task at hand, we provide a general overview of the phonology of Romance-lexifier creoles using two relatively well-documented languages that have been subject to standardization efforts for the purposes of description and comparison. We wish to stress that it would be impossible to fully describe the phonological systems and patterns of these languages within the current volume. Thus, the reader is cautioned to consider the data and discussion that follow as indicative of broad, but not fine-grained patterns observed across this group of languages, accepting that they may be only hesitatingly classified according to linguistic (as opposed to sociolinguistic) parameters and may be even less readily subsumed under the heading of “Romance languages” (Russell Webb 2012; Mufwene 2001; but cf. Bakker et al. 2011). Finally, the reader will note a certain paucity in our treatment of intonation and related issues. While there are certainly interesting topics to address in this area, the lack of available empirical evidence makes any serious description of Romance-lexifier intonation patterns a difficult task, with the exception of Palenquero, for which there are numerous important sources (Hualde/Schwegler 2008; Correa 2012; 2017). We can only point to this as an area sorely needing serious scholarly attention in the future.

The exact number of creoles, both extant and extinct, is a matter of considerable debate. In what may be the most cited of compendia on the subject, Holm (2000) counts no fewer than 89 – with creoles and pidgins combined – including 14 that have disappeared or were moribund at the time of publication, a number that appears in line with most other sources. Of these, he lists 28 that are lexified by, or stand in lexical relationship to, a Romance language: 15 by French, 12 by Ibero-Romance (9 Portuguese and 3 Spanish), and 1 by Italian (the extinct Eritrean Italian Pidgin, for which there is unfortunately little documentation).

The majority of creoles lexically associated with one or another Romance language trace their historic antecedence to the period of European global colonization, when the seafaring Atlantic powers (in this instance, France, Spain, and Portugal) and their commercial and military partners (e.g. the Netherlands, England) established colonies and settlements in far-flung locales. Predominantly centering on the Caribbean, the Indian Ocean, and along the trading routes of coastal Africa, this bloody enterprise involved the capturing and transportation of vast numbers of enslaved persons, as well as the employment of indentured labor from a wide swath of areas under the control of European powers, frequently within the confines of highly exploitative plantation and worker colonies producing export commodities, the most profitable

being sugarcane and tobacco. The cultivation of both required large and inexpensively obtained populations of manual laborers, a dynamic that contributed to the emergence of a secondary and equally lucrative – and of course equally savage – economy of slave trading. To fuel seemingly endless thirst for these and derivative products (e.g. rum), European colonists forcibly subjugated and displaced countless numbers of persons originating from geographically and culturally disparate areas, speaking untold numbers of distinct languages. Alongside tens of millions of captured and subjugated persons, many more were subsequently born into slavery in erstwhile colonies, a population that constituted the anthropological foundations from which creole emergence eventually took shape. These individuals, frequently separated from collocutors and their own families, faced extreme hardship – the life expectancy of an enslaved worker on Saint Domingue (present-day Haiti) was less than six years from arrival: many were purposefully traded outside of the area of their birth or settlement, a measure often undertaken to impede socio-cultural cohesion (Klingler 2003). The exact nature and scope of forces brought to bear on creole formation are topics that far exceed the present chapter: it should suffice to note that there are long-standing tensions between those who account for creole particularity drawing on conceptualizations of universal grammar or parameters (cf. Bickerton 1981; 1984), those who attribute this to sociolinguistic processes (e.g. Mufwene 2001; Russell Webb 2012), and those whose approaches constitute a sort of blending of the two (cf. Holm 1988; Sebba 1997).

It was within this traumatic context that creoles came into being, although it should be acknowledged that the profiles of creolizing societies and the pathways putatively taken toward creole formation and stabilization were diverse and varied on any number of levels, from ethnic to economic, from linguistic to legal. As concerns Romance, two contrastive groupings cohere along lexifier lines: French-lexifier and Ibero-Romance-lexifier varieties. The former includes Haitian, St. Lucian, Guyanese, Guadeloupean, and Martiniquais, as well as Louisiana creole in the Caribbean basin, Seychellois and Réunionnais in the Indian Ocean, Tayo in French Polynesia, and several more recently emergent (or perhaps merely more recently documented) forms in Sub-Saharan Africa. The latter group owes its somewhat tentative cohesion to the difficulties in distinguishing between Portuguese and Spanish (Castilian) influences (cf. Aub-Buscher 1993).¹ Somewhat less numerous than their French-lexified counterparts, both in the past and at present, these are equally diverse in geographic distribution, including Papiamentu, Saramaccan, and Sranan in the Caribbean, Korlai, Daman, and Diu in India, Macanese in Southeast Asia, and Cape Verdian, Annobonese, and Angolar on the Atlantic coast of Africa.

¹ Numerous theories of creole emergence, now largely disputed, suggested that a common Portuguese-lexified pidgin served as the basis for most Atlantic creoles (Thompson 1961; Whinnom 1965). Sebba (1997, 71–74) provides a useful overview of these and related historical approaches to creolization.

2 Phonology: inventories and processes

As noted in the introduction, the question of creole phonology is a relatively recent one, at least in comparison to more longstanding areas of interest focusing on morpho-syntax. This gap has resulted in a lack of scholarship looking at the general patterns of creole phonology, although there have been several works addressing tangential questions, notably the putative simplicity or complexity of creole linguistic systems (cf. below). There is additional evidence for similarities between creole phonology and the sorts of interlanguage phonology noted in language learning environments (cf. Brousseau 2005; Steele/Brousseau 2006), an observation that implicitly likens creole phonology to a sort of fixed, nativized L2. While not eschewing this point of view, Russell Webb (2010) suggests that the pathways of creole phonologization are strikingly similar to what we see in loanword adaptation (§16 Loanword phonology in Romance), with perceptual bias being particularly evident.

It is not our intent to enter into this debate here, but simply to signal its presence and importance. At the same time, we wish to point to a number of surface patterns among creoles that should be of interest to Romance scholars. Firstly, there is a general tendency for Romance-lexifier creoles to have phonological inventories that are partially overlapping with their lexifiers: this is particularly true in the case of consonants, and somewhat less so in the case of vowels (notably for French-lexifier creoles, cf. below). On the other hand, suprasegmental patterns in a number of these languages, particularly the ones chosen for illustration here, suggest that such a straightforward comparison may be problematic. As expanded upon in what follows, there is evidence for the use of tone in many creoles in ways wholly unobserved in Romance, a fact that should already serve to dismiss any facile comparison or simplistic conceptualization of creole evolution and genetic classification. Thus, while it may appear odd to include creoles in a volume dedicated to Romance, it is not entirely without merit: even if we do not call for these to be understood as Romance languages, they are not entirely without formal and structural contiguity, and their historical pathways, as well as present-day forms, exemplify a number of interesting divergences and convergences, including some that are of striking similarity to processes and outcomes affecting the pathways taken by Romance itself.

2.1 General phonological patterns of creoles

Generally speaking, few surface patterns unite Romance-lexifier creole phonologies. While it is true that all seem to include the five cardinal vowels and display obstruent voicing contrasts, similar to e.g. Spanish, this observation is hardly sufficient to promote anything more than the loosest of typological classifications. Indeed, as exemplified by the descriptions provided in this chapter, a more in-depth consideration of phonemic inventories is suggestive of divergences from Romance and convergences

with a number of other languages, notably Niger-Congo varieties. Likewise, Romance-lexifier creoles do not present a distinctive set of phonological processes allowing for anything more than a tentative grouping. While it is true that there is a slightly augmented preference for open-syllables and coda elision in comparison to Romance, a pattern putatively more common to basilectal registers, this phenomenon is also well-documented in other languages. Suprasegmental phenomena, such as tone, are variably present across the creole grouping, and even then, with controvertible status (a matter taken up below). Thus, while it is certainly possible to describe the general patterns of creoles, both collectively and within lexifier categories, it is perhaps most interesting to consider two languages in more depth, and allow these to stand as examples and in contrast to their respective lexifiers. We have selected two of the best documented Ibero-Romance- and French-lexifier creoles for inclusion here, Papiamentu and Haitian Creole. These present the additional advantages of having undergone orthographic and grammatical standardization and of being used by relatively large populations in the present day.

2.2 Papiamentu

Papiamentu (also spelled Papiamentu) is spoken by some 270,000 people in the leeward islands of the Netherlands Antilles (Aruba, Bonaire, and Curaçao), as well as by significant numbers of immigrants residing in the Netherlands. Today, Papiamentu serves as an official language of the Netherlands Antilles, where it enjoys status alongside Dutch and English. The language is used in several newspapers, radio and television media, and literary publishing, while also being an officially sanctioned vehicle of instruction in public schools.

Consensus as to the exact origins of Papiamentu is lacking, as is frequently the case for creoles, although written records of vernaculars associable to the language can be traced to the 17th century. This period corresponded to the height of the Dutch slave trade and expansion on the island of Curaçao, an endeavor that involved Portuguese sailors alongside local rulers, with national and linguistic boundaries being frequently blurred. In an early 18th-century account by a priest, Papiamentu is referred to as “broken Spanish”, testifying to the close historical connection between the two languages, an affiliation partially reflected in many lexical forms at present. While its referential vocabulary is largely Spanish-derived, leading many to designate the language as being Spanish-lexified (Maduro 1966; Munteanu 1996; 2007; Sebba 1997), there is evidence of significant influence of Portuguese, particularly at the level of phonology, leading us to use a more collective moniker (cf. Studemund-Halévy 2016 for a useful historical discussion, including the possibility of Judeo-Spanish contributions to these creoles’ emergence).

The discussion of phonological inventories and patterns below is founded largely on a synthesis of Holm (2000), Klein (2011), and Kouwenberg/Muysken (1995). These

generally agree on the Papiamentu phonological inventory, which includes as many as 33 phonemes: 10 vowels and 23 consonants. Additional features to consider include the dual stress pattern distinguishing between penultimate and ultimate syllables, palatalization, the status of /ə/, the phonological features of liquids, and particularities concerning the voiceless fricative /x/, as well as instances of apheresis.

2.3 Papiamentu vowel inventory

In many respects, Papiamentu represents a relatively straightforward vowel inventory of seven non-nasal members, in which back vowels are rounded and front vowels unrounded, as in Table 28.1, which includes marginal or marked segments in parentheses.

Table 28.1: Vowel inventory of Papiamentu (Kouwenberg/Muysken 1995; Klein 2011).

	Front	Central	Back
Close	i (y)		u
Close-mid	e (ø)		o
Open-mid	ɛ	(ə)	ɔ
Open	a		

As can be gleaned from Table 28.1, little distinguishes Papiamentu from its putative lexifiers, save the absence of phonologically contrastive nasalization, a prominent feature of Portuguese, which is largely absent in Spanish. However, as may be inferred from the parenthetical segments, such a facile picture begs nuancing upon closer examination. While some establish the phonemic status of front rounded vowels /y/ and /ø/, Klein (2011) interprets them as marginal and does not include them in his proposed inventory. Likewise, Baum (1976) excludes /y/ and /ø/ from phonemic status, observing that they are only produced in Dutch loanwords. Otherwise, minimal pairs are formed with these front rounded vowels as in (1).

- (1) Pap. a. pis [pis] ‘hiss_{INF}’ vs. pis [pys] ‘purple’
b. trek [trɛk] ‘extract_{INF}’ vs. trùk [trøk] ‘truck’

It is further noted that, for some speakers at least, front rounded vowels are entirely absent and appear as [i] and [ɛ], respectively, even in items such as those above (Baum 1976, 84). This closely follows Kouwenberg/Murray (1994), who observe that they are replaced by unrounded equivalents, questioning their phonemic status, at least in more basilectal variants or among speakers less affected by the standard.

Regarding the status of the mid central unrounded /ə/, Baum excludes this from the phonemic inventory, demonstrating that it can be derived from surface rules, as it only occurs in atonic word final syllables with [r] and [l] codas, as in (2) (Baum 1976, 86).

- (2) Pap. a. sanger ['sangər] 'blood'
b. agradabel [agra'dabəl] 'pleasant'

/ə/ merits additional attention within the vowel inventory, particularly as its presence is restricted to limited morpho-phonotactic sequences and is only found preceding liquids, especially in forms having entered the language through Dutch and English loanwords, as in (3).

- (3) Pap. a. apel ['apəl] 'apple'
b. lèter ['lètər] 'letter'

However, it appears that this vowel has also entered pronunciation for words with Ibero-Romance origins (Kramer 2015, 194). Spanish endings *-le*, *-el*, and *-lo* correspond to [əl], whereas *-re*, *-er*, *-ro* correspond to [ər], as in (4).

- (4) Pap. a. tratable [tra'tabəl] 'sociable, friendly' (< Sp. *tratable*)
b. prober ['prøbər] 'poor' (< Sp. *pobre*)

2.4 Papiamentu consonant inventory

Similar to observations made above concerning vowels, Papiamentu consonants are demonstrative of both similarities and divergences vis-à-vis its Romance lexifiers, as well as other Romance-lexifier creoles, as can be seen in Table 28.2.

Table 28.2: Consonant inventory of Papiamentu (Baum 1976; Kouwenberg/Muysken 1995; Kramer 2015)

	Labial		Dental		Alveopalatal		Palatal	Velar		Glottal
Plosive	p	b	t	d				k	g	
Affricate/ Fricative	f	(v)	s	(z)	tʃ	dʒ		(x)		h
					ʃ	ʒ				
Nasal		m		n			j			
Liquid				l	r					
Approximant		w					j			

At first blush, little distinguishes the consonantal system of Papiamentu from those of corresponding Ibero-Romance lexifiers, especially Portuguese: this is par-

ticularly notable with regard to the velar fricative and a relatively complex set of nasals, although it should be noted that velar nasals are absent. Certain asymmetries serve to distinguish Papiamentu from both Spanish and Portuguese, most prominently the marginal status of voiced fricatives /z/ and /v/, as well as the set of postalveolar affricates /tʃ/ and /dʒ/. Regarding the former, several sources (Holm 2000; Klein 2011) exclude /v/ from the inventory, whereas Baum (1976, 88–89) ascribes the presence of the voiced labial fricative to a limited set of Dutch loanwords, as in (5), and forms possibly influenced by Spanish orthography, as in (6). Few other examples are noted in which /v/ appears with regularity, two examples of which are given in (7), and may be plausibly attributed to later borrowings or allochthonous influences.

- (5) Pap. a. fakansi [va'kansi] 'vacation'
 b. vlam [vlam] 'flame'
- (6) Pap. a. evità [evi'ta], [ebi'ta] 'avoid_{INF}'
 b. grave ['grave], ['grabe] 'serious'
- (7) Pap. a. move ['move] 'move_{INF}'
 b. verdura [ber'dura] 'vegetables'

Beyond this, it is observed that /z/ was not originally present in Papiamentu, although it appears to have been introduced and integrated through loanwords, again of Dutch (as well as some of French) origin (Kramer 2015, 204), as in (8).

- (8) Pap. zolder ['zolder] 'balcony'

An additional feature of Papiamentu liquids that impacts phonological processes is the clearly dental articulation of these segments. Given a relatively more fronted, apico-dental place of articulation, it is perhaps unsurprising that neutralization with rhotics is variably observed: indeed, evidence suggests that Pap. /r/ is sometimes pronounced as [l], as can be seen in (9). At the same time, the production of [r] as an allophone of /l/ also occurs, as in (10) (Kramer 2015, 206).

- (9) Pap. arrastrar [las'tra] 'drag_{INF}'
- (10) Pap. a. calzón [kar'son] 'trouser'
 b. dadel [da'der] 'date'

These patterns appear far from categorical, however, and have been alternatively analyzed as a fossilization of past phonological processes, rather than a productive phenomenon operative today.

A related consonantal consideration involves word-final liquids, which tend to elide or undergo deletion, as in (11) (Kramer 2015, 206).

- (11) Pap. a. piscador [piska'do] 'fisherman'
 b. metselaar [mes'la] 'butcher'

Collectively, these data are demonstrative of liquid neutralization not noted in the respective Romance lexifiers, at least not to the degree seen here, although there are certainly many forms of Spanish in which final rhotic elision is more prevalent.

Particular attention should be paid to the status of the voiceless fricative /x/, a segment which, like so many other variables under discussion, has been alternatively excluded from consideration and understood as having entered the language through cross-linguistic influence. According to source data, /x/ occurs preceding /e/ and /i/ in loanwords from Spanish, as in (12) (Kramer 2015, 203).

- (12) Pap. gentil [xen'til] 'friendly'

Baum (1976, 90–91) explains that this segment is observed only in acrolectal variants of Papiamentu and is either absent or replaced in basilectal forms, an observation in line with broader trends in both Papiamentu and other creoles. In such cases, /x/ normally surfaces as the voiceless glottal fricative [h], although instances involving surface forms with [g] and [s] are also noted.

Finally, apheresis is widely attested (Wood 1972). Kramer describes the loss of the initial syllable as very frequent among Ibero-Romance derived forms that have the prefixes *a-*, *al-*, *de-*, *em-*, *en-*, *ex-*, *es-*, *in-*, and *re-*, which appear to have stabilized as in (13) (Kramer 2015, 208).

- (13) Pap. apurar [pu'ra] 'hurry_{INF}'

Holm (2000, 141) further describes this phenomenon as being stigmatized among speakers having undergone varying levels of decreolization and among whom hyper-corrected forms are known to appear, as in (14).

- (14) Pap. trueno ['strena] 'thunder'

2.5 Phonological processes

For many decades, it was an unquestioned truism that creoles showed little by way of phonological alternation. Certainly, this should be called into question, even if there is a paucity of data in source references attesting to present-day patterns. One of the more notable phonological processes observed in Papiamentu is palatalization, pat-

turning similarly to many Romance varieties. According to Baum (1976, 89), [d] and [s] adjusted in Papiamentu to [dʒ] and [ʃ] preceding a pre-vocalic [j] as in (15).

- (15) Pap. a. djente [ˈdʒente] ‘tooth’
 b. okashon [okaˈʃon] ‘occasion’

Spanish borrowings containing /si/ sequences are noted to alternate between a palatal or post-alveolar fricative, as in (16) (Baum 1976, 89).

- (16) Pap. edificio [ediˈfiʃo], [ediˈfisjo] ‘building’

The distinction between patterns in (15) and (16) derives from diachronic considerations, which render the status of this process somewhat tenuous, at least in a synchronic light: in the former examples, Papiamentu shifted to a voiced palatal affricate, whereas the latter concern recent loans from Spanish and variation along the acro- to basilectal continuum.

2.6 Tone and intonation

Although there is scant information on higher-level prosodic patterns in Papiamentu, the status and form of phonemic tone are notable, pointing to probable substrate transfer or influence. There are two level tones in the language, high (H) and low (L), and two main stress patterns, affecting penultimate and ultimate syllables. In bisyllabic words, tones correspond to accented or unaccented syllables (Kouwenberg/Muysken 1995, 208). This is illustrated in several hundred pairs of bisyllabic words having identical segmental composition, but whose meanings are distinguished, as in (17) and (18) (Römer 1977; Kouwenberg/Murray 1994, 12; Kouwenberg 2004, 55).

- (17) Pap. a. papa [ˈpâpa] (HL) ‘porridge’
 b. papa [ˈpăpa] (LH) ‘father’
- (18) Pap. a. mata [ˈmâta] (HL) ‘plant’
 b. mata [ˈmäta] (LH) ‘kill_{INF/3SG}’

Kouwenberg/Murray (1994, 12) note that tonal differences are not found in monosyllabic, trisyllabic, or longer words. Furthermore, every word contains at least one high tone, which coincides with the main stress in the word, except for bisyllabic verbs, as in (18b) and (19).

- (19) Pap. kaska [ˈkăska] (LH) ‘peel_{INF}’

Accordingly, bisyllabic nouns and verbs are distinguished by HL and LH patterns, respectively. In a similar vein, Holm (2000, 166) remarks the importance of verbal tonal distinctions, as in (20).

- (20) Pap. a. *matá* ['matá] (LH) 'kill_{PST.PTCP}'
 b. *mata* ['măta] (LH) 'kill_{INF/3SG}'

However, such minimal pairs are not always associable to base derivation or lexical category particularities: indeed, Kouwenberg/Muysken (1995, 208) present no fewer than 85 pairs lacking verb-noun oppositions with a lexical relationship, examples of which are in (21) and (22).

- (21) Pap. a. *sala* ['sâla] (HL) 'living room'
 b. *sala* ['săla] (LH) 'salt_{INF}'
- (22) Pap. a. *para* ['pâra] (HL) 'bird'
 b. *para* ['păra] (LH) 'stand_{INF}/stop_{INF}'

In a similar vein, Papiamentu data demonstrate lexical stress patterns distinguishing minimal and near-minimal pairs. Penultimate stress is observed in words ending in an open syllable or in *-er*, *-el*, and *-en*, as in (23), whereas words ending in other sounds have stress on the last syllable as in (24) (Kouwenberg/Muysken 1995, 208).

- (23) Pap. a. *kuminda* [ku'minda] 'food'
 b. *korda* ['korda] 'remember_{INF}'
 c. *liber* ['liber] 'free'
- (24) Pap. a. *kantor* [kan'tor] 'office'
 b. *kurason* [kura'son] 'heart'
 c. *robes* [ro'bes] 'wrong'

There are exceptions to this apparent rule, particularly where tri- or quadrisyllabic verbs are concerned. These are differentiated from other words of the same length and always bear final-syllable stress, as in (25) (Kouwenberg/Muysken 1995, 208).

- (25) Pap. a. *kumindá* [kumin'da] 'greet_{INF}'
 b. *ekiboká* [ekibo'ka] 'make_{INF} a mistake'

Finally, Kouwenberg/Murray (1994, 16) describe the behavior of particular closed-class items that are assigned contextually contrasting tone. These include singular pronouns *mí*_{1SG}, *bo*_{2SG}, and *e*_{3SG}, the copula *ta*, the preverbal modal marker *lo*, the prepositions *di* 'of, from', *ku* 'with', *na* 'at', *pa* 'for', and the conjunctions and comple-

mentizers *i* ‘and’, *olòf* ‘or’, *pa* ‘for’, *ku* ‘that’, and *si* ‘if’. They illustrate the polarizing behavior of the preposition *di* and the copula *ta*, as can be seen in (26) and (27): Here, high tones are noted with a supra-vocalic line and low tones with a sub-vocalic one.

- (26) Pap. a. ūn glās dī rōm ‘a glass of rum’
 b. ūn glās dī bīnāger ‘a glass of vinegar’
- (27) Pap. a. ē kās tā kāsī klā ‘The house is nearly finished.’
 b. ē kās tā māshā grāndī ‘The house is very big.’

Kouwenberg/Murray (1994) are careful to state that this process is not well understood and that there are numerous apparent exceptions to supposed rules: for example, this appears to be blocked by some, but not all, syntactic boundaries.

3 Haitian Creole

Haitian Creole (*kreyòl ayisien*) is spoken by some ten to twelve million individuals, the majority of whom reside in Haiti, with other large populations clustered in North American conurbations around Montreal and New York, and in the state of Florida. The first attestations of a language distinct from French on Saint Domingue date to at least the 17th century, when the area began to gain in economic importance, a process that continued uninterrupted until the Haitian revolution (1791–1804), when slaves rose up against their masters and founded the first black republic in the Western hemisphere (cf. Singler 1996; Lefebvre 2006; Chaudenson 1979; 1992).

Linguistic interest in Haitian Creole is well-established in academic circles and has taken several different paths, including its controvertible exemplification of “L-languages” by Ferguson (1959), who distinguishes between high (H) and low (L) according to functional distributions. Given its demographic importance, as well as numerous historic particularities affecting the language, its speakers, and the Haitian state, it is perhaps unsurprising that this is among the most described of French-lexifier creoles. The relative richness and plurality of descriptive sources is, indeed, one of the primary reasons we have selected it for discussion and illustration (although, once again, the reader is continually cautioned as to the variable nature of creole data and relevant patterns). Our presentation of phonological data is a synthesis of several sources, most notably Johnson/Alphonse-Férère (1972), Férère (1977), Valdman (1978), Tinelli (1981), and Nikiema (2002). As noted in the following, these are only partially overlapping, particularly as concerns the status of Haitian Creole phonemic inventories. Turning attention to phonological processes, our description focuses on three that are most interesting in light of the wider topic of this book, as Haitian Creole presents a number of compelling distinctions vis-à-vis both its lexifier

and distally related languages: phonotactically conditioned rhotic asymmetries and elision, the status of epenthetic vowels, and palatalization.

3.1 Haitian Creole vowel inventory

The Haitian Creole vowel inventory includes at least ten and as many as sixteen contrastive vowels, depending upon the source, as in Table 28.3, with questionable segments included in parentheses.

Table 28.3: Vowel inventory of Haitian Creole
(Tinelli 1981; Férère 1977).

	Front	Central	Back
Close	i (ĩ) (y)		u (ũ)
Close-mid	e (ø)		o
Open-mid	ɛ ĕ (œ)	(ə)	ɔ ɔ̃
Open		a ă	

At first glance, this vocalic inventory appears quite unsurprising: there is a relatively even distribution, at least as this concerns the uncontroversial members of the set, with front vowels being unrounded and back vowels rounded, a pattern seen in much of Romance – but, importantly, not in French (which also has front rounded vowel phonemes).

A comparison with its lexifier reveals further differences, although in addition to the great deal of variation mentioned earlier, there is uncertainty with respect to the historical lexifier forms that putatively served as input, making definitive statements to this regard necessarily tentative (cf. Chaudenson 1979; 1992). Indeed, the status of lexifier front rounded vowels has been a matter of keen interest on the part of creolist phonologists. In the vast majority of lexifier tokens containing /y ø œ/, Haitian Creole correspondences are /i e ɛ/, respectively (Férère 1977, 25), as in (28).

- (28) HCr. a. biro [bi'ro] 'desk'
b. blé [ble] 'blue'
c. kè [kɛ] 'heart'

The absence of the front rounded series has been understood by many as the result of West African substrate influence, in which front rounded vowels are absent (as in a large majority of languages), although the factors underlying this are a matter of significant debate (cf. Brousseau/Nikiema 2006; Russell Webb 2010). There is, however, some evidence for the presence of front rounded vocoids in acrolectal forms

of Haitian Creole. Férère (1977) argues that these should be included in the vocalic inventory, although others (Russell Webb 2008; Valdman 1978) consider them marginal and extra-systemic, as they are associated with educated, urban, bilingual (i.e. Haitian Creole and French) speakers, and may thus be considered exceptional results of bilingualism and/or decreolization. Certainly, they are relatively rare, even in acrolectal forms, whereas the historical neutralization of lexifier rounded reflexes is widely attested and systemically generalized.

Likewise, the status of nasal vowels presents a number of interesting comparisons to the French lexifier, as well as some controversy. Generally speaking, two types of nasal vowels can be distinguished in Haitian Creole. The first set, restricted to /*ẽ ã ỹ*/, corresponds to the one found in French: these occur prior to non-nasals and word-finally, as in (29) (Férère 1983, 77).

- (29) HCr. a. vin [vẽ] 'come_{3SG}'
 b. gangan [gã'gã] 'voodoo priest'
 c. tonton [tõ'tõ] 'uncle'

A second set of nasals, /*ĩ û*/, are only seen preceding historical nasal consonants of non-French origin, as in (30) and (31). This suggests that they are the result of nasal assimilation, either past or present, in a manner that is distinct from the lexifier (Férère 1983, 78).

- (30) HCr. a. ounsın [ũ'sĩ] 'voodoo priest'
 b. ou si [u'si] 'You are sure.'

- (31) HCr. a. ounfò [ũ'fɔ] 'voodoo temple'
 b. ou fo [u'fɔ] 'You are strong.'

Holm (2000, 150) attributes the two sets to substrate vs. superstrate influences, an assertion supported by the distinction between words following one or the other pattern. The former derive from French and are, generally speaking, lexical or referential; the latter are words not seen in French (and whose origin is unknown, although likely attributable to Niger-Congo substrates) and are functional or grammatical, or are plausibly derived from referential forms closely associated with substrate cultural denotata. It should again be noted that the phonemic status of the latter vowels is one of significant debate. Given their dissimilar distribution and origin, Cadely (2002, 438; 1994/2018) argues for their phonemic status; on the other hand, Valdman/Iskrova (2003, 26) maintain that any such conclusion is tenuous due to the necessary conditioning environment of nasal consonants, whether this be understood as historic or contemporary, and thus consider [*ĩ û*] to be allophonic variants of /*i u*/.

3.2 Haitian Creole consonant inventory

Compared to the vowel inventory, the Haitian Creole consonants appear significantly more straightforward, being closely aligned with the inventory of French, as shown in Table 28.4.

Table 28.4: Consonant inventory of Haitian Creole (Valdman 1978; Nikiema 2002).

	Bi-labial	Labio-dental	Labial-velar	Labial-palatal	Alveolar	Post-alveolar	Palatal	Velar	Uvular	Glottal
Plosive	p b				t d			k g		
Affricate/Fricative		f v			s z	tʃ dʒ ʃ ʒ			χ	(h)
Nasal	m				n		ɲ	ŋ		
Trill					r					
Lateral					l					
Approx.			w	(u)			j			

With the exception of /h/, a cursory glance hints that little in the consonant inventory distinguishes Haitian Creole from varieties of French: even affricates /tʃ/ and /dʒ/ are not unknown in many regional forms of the latter. Nevertheless, a handful of caveats deserve specific attention.

The first of these concerns the status of rounded glides /ɥ w/. Férère (1977, 26) suggests that /ɥ/ should not be assigned phonemic status based on its alternation with /w/, because the former is used irregularly, mirroring the marginal presence of /y/ described above. This consideration is largely followed by other authors. Of course, similar neutralization is also attested in many French varieties past and present, leaving open questions as to any historical pathway of change.

Another distinction is seen in the presence of the laryngeal contoid /h/. Unlike in its lexifier, at least at present, although possibly reflecting regional forms of the past, this is found in only a handful of words of French origin, as in (32). This is somewhat more frequently observed in recent loanwords, especially from French and English, as in (33a) (noted to be a relatively recent borrowing), as well as in forms of probable substrate origin, as in (33b).

- (32) HCr. a. lotel, hotel [lo'tɛl], [ho'tɛl] 'hotel'
b. hanche [hɑ̃ʃ] 'hip'
- (33) HCr. a. hèn [hɛ̃n] 'hatred'
b. houngan [hũ'ɲɑ̃] 'voodoo priest'

Questions as to whether the presence of /h/ is a fossilized historical residue, a more recent contact-induced innovation, or merely another example of acrolectal particularity remain largely unresolved.

Finally, passing mention should also be made of the phonetic form of the Haitian Creole rhotic. Depending upon the source, this segment is alternatively described as a velar, uvulo-velar, or uvular fricative, although there are no mentions of this as being a uvular trill, with the corresponding IPA symbols being used in source transcriptions. Following Russell Webb (2008), we present this as /ʁ/, although this is more by convention than as a means of close phonetic description, as most sources also agree that there is a good deal of variation with regard to the articulation of rhotics in contemporary Haitian Creole, be this along stylistic, register-related, or simply idiosyncratic lines. It should be further noted that this segment is in a more-or-less complementary distribution with /w/ according to phonemic context, a matter taken up below (Johnson/Alphonse-Férère 1972, 35; Nikiema 2002, 80).

3.3 Phonological processes

In many respects, fully accounting for the productive phonological constraints or patterns in Haitian Creole is a difficult task. Even given the widespread documentation of the language, little of this has given serious attention to synchronic variation, the vast majority of phonological literature being chiefly or exclusively concerned with questions of emergence and phonological nativization. To this, the ever-present question of what level of a creole should be considered foundational must be added. Certainly, one would not be surprised if there were more or at least differently patterned variation in basilectal forms versus acrolectal ones. The former, however, are among the least well-documented registers. Despite the caution that must be taken, it is possible to identify three processes that afford an intriguing comparison to French and, more broadly, Romance: rhotic coda elision and rhotic-labial distribution, as well as the status of epenthetic vowels and palatalization.

One of the most recognizable features of Haitian Creole is rhotic deletion, which operates nearly universally in word-final positions, as in (34). Importantly, this does not seem to affect /l/, as may be noted in (35).

- (34) HCr. a. pou [pu] 'for'
b. flè [flɛ] 'flower'

- (35) HCr. a. bòl [bɔl] 'bowl'
b. vil [vil] 'city'

While all sources agree on the generalization of final rhotic elision, there is disagreement as to whether this is historical or productive. Nikiema/Bhatt (2003) attribute

coda rhotic deletion to cluster simplification (e.g. *pòtè* corresponding to French *porter* ‘carry_{INF}’, a pattern seen in a number of other lexically-related creoles, and well documented in different varieties of French). The nature of such examples is, however, far from simple as can be seen in a number of pairs in which the historical presence or synchronic status of the rhotic appears to contribute to vowel quality, as in (36) (Valdman 1978, 160–161).

- (36) HCr. a. mo [mo] ‘word’
 b. mò [mɔ] ‘dead person’

Perhaps more interesting in a synchronic light is the asymmetrical distribution of pre-vocalic /ɸ/ and /w/, which is also a matter of controversy as this concerns the phonemic status of one or the other consonant. These two sounds are in complementary distribution where /w/ precedes round vowels and /ɸ/ precedes unrounded vowels, as in (37) (Russell Webb 2008; 2010).

- (37) HCr. a. rout [wut] ‘road’
 b. rate [ɸate] ‘fail, miss_{INF}’

Interestingly, similar processes are noted in other French lexifier creoles, but with distinct outcomes. For example, in St. Lucian, the complementary distribution of /ɸ/ and /w/ emerges from syllable structure and not vocalic adjacency, with the former appearing in simplex and the latter in complex onsets, which appear to be unaffected by rounding processes (cf. Carrington 1984; Russell Webb 2008; 2010). Thus, while both creoles exhibit sensitivity to rhotic distribution, the precise form of this is quite divergent.

Another notable phonological process of Haitian Creole concerns the epenthetic vowel, which is typically classified as lexicalized, although it may also surface in online borrowings and other types of synchronic contact phenomena and is apparently more prevalent in basilectal registers. Similar to diachronic processes operative in Romance, this is or was variably inserted in initial positions to resolve complex consonant clusters, as in (38).

- (38) HCr. espò [ɛsˈpɔ] ‘sport’

This observation has raised interesting questions about the status of epenthetic vowels in the language, also taking into account the pattern seen in the general rephonologization of French /œ/ as its unrounded equivalent /ɛ/ (as in 34b). It is notable that the tense /e/, an epenthetic segment in much of Romance, does not appear to surface as such in Haitian Creole, regardless of register. Nikiema (2000, 175) argues that this apparent exception is attributable to the internal structure of Haitian Creole vowels: according to his analysis, an epenthetic vowel is inserted in order to impede illicit

surface forms, also noting that lax vowels are preferred in closed and in non-final open syllables, a pattern that follows from data in French, although in Haitian Creole these are unrounded.

An additional and equally significant phonological process that may be noted in Haitian Creole concerns palatalization, taking a distinct form from that seen in Papiamentu. In Haitian Creole plosives may be palatalized before high or mid front vowels or semi-vowels, as in the example variants in (39) (Holm 2000, 159–160; Johnson/Alphonse-Férère 1972, 35).

- (39) HCr. a. kè [tʃɛ], [kɛ] ‘heart’
 b. dyab [dʒjab], [djab] ‘devil’

At the same time, other plosives are variably palatalized before front or back non-low vowels, as in (40), following similar patterns (Holm 2000, 159).

- (40) HCr. a. tyen be [tʃjɛ̃ˈbɛ], [kjɛ̃be] ‘hold (on)’
 b. gyòl [dʒɔl], [gjɔl] ‘muzzle’

It should be noted that the underlying status of the plosive in (39) and (40) is unclear: what is clear is the pattern of contextually influenced palatalization. Following the overall trends noted in Haitian Creole, and hardly uncommon in non-creoles, variation in the surface forms of /s/ in these environments is particularly common, as in (41) (Holm 2000, 160).

- (41) HCr. sòsyè [ʃoˈʃɛ], [soˈsjɛ] ‘witch’

In the last instance, source data suggests that palatalization is far more prevalent in meso- and basilectal registers, although much of this rests on anecdotal evidence. As with most questions of synchronic creole phonology, this observation underscores the need for more and more explicitly evidentiary study of creole phonologies and processes, including those of Haitian Creole.

3.4 Tone and intonation

As in Papiamentu, there is a scarcity of information on prosody in Haitian Creole, a fact lamented by both Holm (2000) and Iskrova (2009). Despite this, Holm (2000, 163) notes that both Atlantic creoles and post-creole languages differ significantly from their European lexifiers in terms of intonation, but is able to provide only a few examples. Likewise, Iskrova (2009) details intonation contours in Guadeloupean, which would be expected to show similarities, but does not demonstrate that these are significantly different from their correspondents in French. Holm (2000, 166) does cite

Ariza (1980), whose work on Haitian Creole looks at phrase-level pitch patterns and refers to Sylvain's (1936/1979) fieldwork (cf. also Ariza 1991). The latter observed a bi-tonal pattern associated with adjective reduplication. This pattern is understood to convey intensity and attenuation, as in the distinction between *rón-ròn* (HL) 'very round' and *ron-ron* (level tone across both syllables), 'rather round'.

Iskrova's (2009) study of Guadeloupean provides additional insight into the organization of the intonation system of French-lexifier creoles in general, serving as a foundation for contrastive analysis, with a notable diachronic bent (Iskrova 2009, 136). From her study of declaratives, a nuanced distinction vis-à-vis the French lexifier can be inferred, although she hypothesizes that this difference reflects either older stages of the superstrate spoken during the colonization period or that Guadeloupean particularities were inherited through substrate transfer. Iskrova notes that the most intriguing component of Guadeloupean intonation is the differences between this language and its lexifier (i.e. French). Among the most interesting differences she observes in her data are the use of high tones (H) at intermediate phrasal boundaries, penultimate falls without corresponding preceding rises, and an edge-marking falling pattern (HL%).

4 Complexity and simplicity in Creole phonology

The relative phonological complexity or simplicity of creoles, as well as pidgins and other contact varieties, has long been a matter of discussion. It is in fact possibly one of the most oft-repeated claims in linguistic literature that these languages lack the grammatical complexity of putatively distinct, non-creole languages (e.g. McWhorter 2001; 2005; Parkvall 2008), an assertion that has and continues to color phonological description and analysis (e.g. Tinelli 1981; Uffmann 2003; 2009). This point of view appears particularly appealing to those who view relative complexity or simplicity under the optic of defined characteristics, most notably the relative size and make-up of phonemic inventories, and for good cause: when compared to their Romance lexifiers, Ibero-Romance- and French-lexifier creoles do demonstrate tendencies toward systemic reduction, such as those noted in the comparison of French and Haitian Creole vowel inventories.

There are, however, a number of potential shortcomings to such an assertion. Firstly, one might well point to evidence that contact languages do not inevitably include radically smaller phonemic inventories than do their lexifiers: in fact, certain forms of creoles have been observed to be more complex than their respective adstrates in this regard (Bakker 2009). Furthermore, an important number of creoles evidence potential systemic complexification, particularly if all segments are taken into consideration, including those that come from substrate (e.g. the high nasals of Haitian Creole) or other source borrowings (e.g. the front rounded vowels of Papi-

mentu). In both instances, a creole might lack certain phonemic oppositions noted in its Romance lexifier, but concurrently have a series of oppositions unknown to the latter, albeit frequently only in acrolectal registers (reflecting, it must be mentioned, systemic variability in non-creoles). It should be further noted that phenomena entirely absent in lexifier languages are seen in contact varieties, this plausibly due to substrate influence, an observation serving to weaken claims to systemic minimalism or reduction. Clearly, the tidy assertions of simplicity – or complexity, for that matter – begin to break down when phonological systems are considered more broadly (cf. Faraclas/Klein 2009 and the individual contributions included therein for discussion).

Additionally, the shape and constituency of the respective lexifiers is hardly a matter of historic certainty, most notably when considered within the historico-social environments in which creoles and other contact vernaculars emerged. As argued by Chaudenson (1992), it is highly unlikely that anything approximating standard Hexagonal French served as the lexifier for Haitian Creole or related Caribbean creoles, asserting that it is more than probable that intermediate varieties, already subject to systemic modification, were the input to diachronic relexification. This suggests that the status of lexifier grammars, phonological or otherwise, cannot be taken for granted in any comparison or historical analysis. There were very likely a host of distinctions differentiating contact variety speaking persons from their European lexifier homologues, both in terms of linguistic forms and structures. Beyond this, access to any lexifier forms that emerging creole speakers might have integrated, adopted, or acquired was also widely variable across different spaces and conditions. Collectively, such considerations leave large – and largely unanswerable – questions as to whether it is even useful to make direct comparisons between French and Haitian Creole, Spanish, Portuguese and Papiamentu, or any other lexifier-creole pairing (cf. Winford 2008; DeGraff 1999; 2001).

Finally, the very notion of phonological complexity vs. simplicity must be called into question, as does Russell Webb (2009), who argues that this polarity is specious. He argues that fixation on valutive dialectics draws attention away from the more compelling questions of how linguistic systems, in general, and phonological grammars, in particular, are reshaped in contexts of intense and multifaceted contact (cf. also Russell Webb 2012). While it far surpasses the scope and nature of the present volume, this position can be distilled as refutation of qualitative polarity: even if isolated components of one language might be quantitatively or qualitatively describable as less dense than another, such observations hardly amount to the former language being simpler, except under the narrowest of optics. What can be gleaned from comparison is how different characteristics of one or another language are more or less susceptible to be carried over through creole emergence and under what circumstances this is more or less likely to take place. This speaks to broader – and, again, possibly irresolvable – questions of universality vs. locality, e.g. whether the maintenance of cardinal vowels in Haitian Creole and the corresponding loss of cross-linguistically less prevalent ones is the byproduct of some sort of universal compo-

nent of human language or if this is simply a probabilistic outcome given a number of factors, from environment to learning, population density to inter-community social networks or communities of practice (cf. especially Mufwene 2001; 2008). For scholars of Romance phonology in particular, refutation of a complexity-simplicity divide may also be seen as a step toward disciplinary coherence. While it is readily acknowledged that shifts from Vulgar Latin to different forms of Romance involved the loss of some characteristics, few can convincingly argue that modern French or Portuguese – or any other Romance variety – are holistically either simpler or more complex than Latin, at least in the way that these descriptors are frequently deployed in creolistic literature: they are merely different. The description and explanation of these differences, along with any similarities, inform us about the languages themselves, as well as about human language more broadly. Likewise, Haitian Creole and Papiamentu can be considered distinct from, but lexically related to vernacular French and Ibero-Romance, respectively.

5 Conclusion

As presented in the preceding sections, the overview of Haitian Creole and Papiamentu is intended to exemplify the characteristics of Ibero-Romance- and French-lexifier creoles, respectively. We illustrated general surface patterns pertaining to inventory constituency and general phonological processes, drawing attention to patterns of lexifier divergence. It was noted that the phonological patterns of these languages do not allow for a straightforward comparison with their Romance lexifiers, as demonstrated by, for example, the presence of tone distinctions in Papiamentu and nasal vowel particularities in Haitian Creole. This shows that, despite many similarities, creoles both diverge from and converge with their Romance lexifiers and other adstrates: they constitute distinct linguistic systems, ones that emerged in a particular time and place, subsequently being subject to the types of evolutions noted in all languages (e.g. borrowings, neutralizations). We further touched upon important arguments concerning the putative simplicity of contact vernaculars. With necessary brevity, we suggested that such descriptors are neither uncontroversial nor particularly helpful in the description of these languages and in the understanding of their historicity.

While creoles are subject to wide-ranging variability in comparison with more widely studied European languages, especially the standard forms of these, their inclusion in such a volume sheds light onto the path that Romance surface forms took in particular historico-social contexts, and the outcomes of unique and uniquely complex contact environments. Beyond documenting these languages, for which considerable additional fieldwork is clearly needed, this comparison opens compelling paths of inquiry for Romance linguists, as well as for any scholars interested in contact phenomena.

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Index

accent

- (phonetics, phonology) 54, 72, 285, 301, 306–308, 316, 389, 393–395, 427, 429, 443, 452, 453, 477, 486, 487, 490, 551–553, 579–580, 622, 641–647, 651–656, 700–703, 735–739, 765–767, 769–774, 796–800, 834, 865–866, 868–869, 871, 874, 916–919 *cf.* stress, pitch accent
- (sociophonetics) 348, 352, 366, 580, 670
- foreign accent 409, 435, 437, 446, 454, 474
- accent didactique* (French) 305
- accentual phrase 270, 283, 289, 299, 305, 311, 428, 476, 701, 735
- acrolectal vs. basilectal form 930, 938, 943, 945, 949
- acronym 55–58, 65–67, 70, 73–75, 77, 572, 696–697, 699, 751, 753
- adaptation (loanword phonology) 503–523 *cf.* loan, loanword
- adequacy (of theoretical frameworks) 203, 270
 - explanatory adequacy 203, 322
 - observational adequacy 322
- affricate, affrication 15, 48, 63, 173, 175–177, 179, 183–201, 205, 208, 210, 255, 347–348, 351–354, 382–383, 411–412, 514, 516, 544, 546–547, 561, 563, 566, 568, 603, 606, 614, 634–636, 638, 650, 659, 663, 679–680, 718, 720–723, 746–747, 755–758, 761, 788–791, 812, 815–817, 822, 827, 830, 899–903, 936–937, 939, 944
- Afrikaans 454, 484–485
- age *cf.* social factors
- alignment 209, 286, 305, 324, 573, 577, 645, 868
 - alignment constraint *cf.* constraint
 - alignment of articulatory gestures 209
 - alignment of tonal targets 316, 393–396, 437, 452, 486
- analogy 467, 551, 675–676, 722, 819, 831
- antepenult(imate) 32, 35, 43, 58, 65, 68–72, 78, 243, 250–251, 302, 391, 489, 549–550, 572–574, 591, 642, 651, 764, 796, 848, 851–853, 914
- apocope, apocopation 34, 37, 48–49, 242, 254–256, 479–480, 549, 582–583, 589, 718, 722, 724, 832, 902

- approximant, approximation 94, 117, 154, 195, 236, 347, 349, 354–357, 361, 409, 418–420, 437, 448, 450, 475, 547–548, 561, 569–570, 603, 605–608, 634, 637, 640, 650, 659, 678, 721, 725, 746–747, 756, 761, 782, 787, 790, 792, 813–815, 822–823, 901, 936
- Arabic 217, 378, 412, 464, 780, 781, 808, 811–816, 821, 824, 830
- Aragonese 41, 45, 90, 108, 780, 813, 821, 830
- Aramaic 808, 812, 832
- Articulator Theory 179, 183, 187
- articulator, articulation, articulatory 1, 5, 7, 9–10, 12–13, 17–18, 51, 62–63, 107, 127, 129, 135, 138–139, 141, 143, 153–154, 173–175, 179–202, 205–210, 217–218, 236, 255, 269, 342–343, 345, 350, 377, 380, 396, 411, 413, 416–418, 420, 449, 546–548, 553, 563, 565, 567, 591, 670, 675, 678–679, 735, 760–762, 784–785, 789, 793, 811, 816, 825–826, 846, 849–850, 857–858, 871, 900, 902, 905, 907, 937
 - articulation rate 283
 - articulatory gesture 144, 182–185, 265, 269, 288
 - designated articulator 179, 181, 187, 191, 193, 196
 - hyper-articulation 360
 - primary articulation 187, 201
 - secondary articulation 187, 201, 826
- Articulatory Phonology 12, 17, 182–185, 206, 543, 547, 554, 811
- assibilation 344, 358, 442, 546, 901
- assimilation 16, 41, 44, 99, 107–108, 116, 128, 132–133, 135, 179, 181–183, 185, 199–201, 219–221, 224, 229–231, 382, 283, 413, 416, 418–421, 430, 435–437, 473, 548, 561, 590, 605, 608, 617, 639, 659, 679, 750, 758–761, 764, 774, 793, 818, 823–825, 848, 898–899, 900, 907, 943
 - homorganic assimilation 907
 - nasal assimilation 219–221, 224, 229–231, 382, 418–421, 548, 659, 793, 943
 - total assimilation 824, 900
 - voicing assimilation 116, 590, 679, 750, 758–761, 818, 900

<https://doi.org/10.1515/9783110550283-031>

- vowel assimilation 128, 132, 413, 473,
898–899 *cf.* metaphony, vowel harmony
- Astur(ian)-Leonese 90, 94, 133, 141, 218, 228,
229, 780, 821, 885
- attrition *cf.* first language attrition
- Automatic Speech Recognition (ASR) 543
- Autosegmental Phonology 14–15, 160, 422,
839, 847
- Autosegmental-Metrical (AM) model 15, 302,
305–307, 393, 490, 551–553, 579–580,
641–647, 651–656, 660–662, 735–739,
868–870, 874–875
- babbling 376–379, 391, 394–397, 420
- Basque 45, 248, 453, 463, 488, 586, 679, 713,
718, 780, 830, 875, 883
- betacism 604, 607, 722–723
- bilingual acquisition of phonology 375,
407–430
- bilingualism, bilingual 248, 280, 345–346,
348, 350, 355, 375, 390, 393, 407–430,
439–441, 444–447, 449–450, 452–454,
463, 465–467, 469–470, 473–475, 477,
479, 482–485, 489, 506, 508, 511, 591,
709, 712, 780–781, 783, 785, 810, 834,
882, 903, 943
- borrowing 35, 54, 95, 118, 216, 217, 261, 287,
351, 364, 465–467, 505–515, 519, 521–523,
532–533, 546, 550, 679, 699, 722, 730,
788, 793, 794, 811–812, 817, 821, 884,
888, 892, 910, 937, 939, 944, 946, 948,
950
- boundary tone 15, 306–307, 308, 316, 393,
395–396, 452–453, 487, 490, 552–553,
580, 622, 641–644, 651, 654, 656,
660–662, 702, 735–736, 739, 766–768,
773, 798, 800, 834, 866, 868–869, 871
- Buben effect 509
- Bulgarian 152–156, 277, 280, 467, 473,
485, 488, 808, 810, 812–813, 817, 829,
833–834
- C-ORAL-ROM *cf.* corpus
- casual speech 346, 355, 362, 472, 547, 765,
787, 827, 829
- Catalan 14, 17, 41, 45, 50, 61, 63, 67–68, 71,
79, 90, 94, 107, 108, 115, 116, 128, 133,
134–135, 136, 140, 141–142, 144–146,
155–157, 161, 186, 218, 219, 225–227,
229, 265, 272–273, 277, 279, 281–282,
284, 285, 286, 302, 311–313, 346–349,
354–356, 375, 376, 388–389, 391–392,
393–394, 395, 396, 397, 407, 410–418,
423, 425, 426, 427, 439–441, 465, 470,
472, 488–489, 599, 603, 713, 714,
718–719, 728, 736, 738–739, 743–775,
780, 792, 817, 829, 831, 883
- Algherese Catalan 470, 488–489, 533, 497,
743, 757, 762
- Balearic Catalan 68, 145, 155, 156, 411, 412,
743, 745–746, 748–752, 753, 756–757,
760–764, 769, 771
- Catalan in contact with Spanish 346,
414–415
- Central Catalan 346, 743–747, 750–751, 754,
756–758, 761, 762, 766, 769, 717, 773
- Eastern Catalan 68–69, 140, 144–145, 146,
155, 281, 346, 354, 410, 413, 743, 744, 747,
751, 757
- Eivissa Catalan *cf.* Ibiza Catalan
- Formenteran Catalan 68
- Ibiza Catalan 757, 761
- Majorcan Catalan 156, 348, 356, 439, 440,
470, 488, 756, 761, 762–764
- Menorcan Catalan 762
- Northern Catalan 753, 745–746, 750–751,
753, 761–764, 769, 771
- Northwestern Catalan 743, 748, 751, 761,
762, 771
- Valencian 128, 133, 757
- Western Catalan 133, 140, 141, 155, 281, 413,
743
- Xava Catalan 346–347
- categorical data *cf.* data
- centralization *cf.* vowel centralization
- Chinese 484, 489–490, 514
- CLEARPOND *cf.* database
- clipping 73–77, 862
- clitic, cliticization 64, 68, 70, 97, 105, 160,
163, 166, 337, 350, 471, 539, 541, 551,
576–577, 599, 608, 620–622, 643, 653,
681, 684–686, 687, 697–699, 701, 702,
735, 755, 764, 795, 823, 824, 831–832,
846, 853, 859–863, 867, 873–784, 903,
906–907
- clitic group 686, 755, 853, 862, 873, 903, 906
- cluster 41, 74, 78, 89–90, 92, 94–100,
102–103, 105, 108, 110, 111, 116–117,

- 143, 159, 163, 179, 183, 219–221,
229–232, 234, 235, 254–255, 275, 281,
283–284, 287–288, 337, 347, 355, 379,
382, 384–387, 389, 392, 397, 411, 424,
471, 480, 482–483, 505, 510, 517–519,
539–540, 545–548, 549, 553, 563, 566,
568–570, 578, 589–590, 598, 602,
604–608, 612–617, 622, 677, 679,
683–685, 691–694, 703, 717, 718, 721,
722, 724, 726, 748–749, 754, 757–758,
761–762, 774, 794–795, 829–830, 832,
856, 858, 909–911, 913, 946
- cluster reduction/simplification 219, 229,
379, 385, 693, 703, 758, 761–762,
774, 946
- nasal cluster 219–221
- tautosyllabic cluster vs. heterosyllabic
sequence 91, 95, 97–98
- coarticulation 145, 351, 356, 442, 538, 541,
543–544
- coda 16, 32, 38, 40–41, 42, 47–48, 51, 54–55,
59–60, 67–68, 72, 76–77, 89–119, 127,
204, 233, 235, 236, 287, 348, 355, 359,
384, 387–390, 395, 417, 420, 422–424,
425, 471, 517–520, 522, 545, 547–548,
568–570, 582–583, 589–590, 604–605,
607–608, 612, 616–618, 640, 645–646,
663, 677, 680, 687, 691–692, 694, 695,
716, 718, 722, 724–727, 731–732, 746–750,
754–756, 757, 758–764, 774, 782, 788,
792–794, 822–825, 829–831, 832, 843,
845–846, 847, 850, 854–858, 872,
891, 900, 902, 908, 910–911, 934, 936,
945–946
- Coda Mirror 102
- L1 acquisition of codas 384, 387–390, 395
- nasal coda neutralization 905–906
- weakening of codas 90, 546
- cognate 130, 355, 440, 454
- colonization 463, 505, 781, 931, 948
- comparative construction 467
- complex, complexity 89–92, 191, 196–197,
203–204, 207, 269–270, 273, 275, 278,
281, 288, 316, 392, 395, 410, 423, 429,
449, 451, 470, 548, 565, 692, 701, 765,
855, 858, 933, 948–950
- consonant lengthening *cf.* geminate, length
constraint (Optimality Theory) 16–17, 18,
202–210, 244–260, 413, 418, 420, 424,
537, 550, 582–584, 587–588, 686, 840,
856–858
- alignment constraint 16, 207, 244, 550
- faithfulness constraint 16–17, 203–204, 209,
418, 537, 584
- markedness constraint 16, 203–205, 207,
246, 418, 424, 584
- constraint-and-repair model 204, 210
- contact
- articulatory contact 183, 187, 188,
191, 195, 196, 208–209, 821, 929,
946, 948
- contact variety, contact vernacular 280,
283, 348–349, 351, 464–465, 469, 472,
474, 476, 484, 486, 488–489, 503, 929,
948–949
- contact-induced change 350, 462–491, 945
- cultural contact 453, 462–464
- language contact 2, 19, 34, 45, 140, 279, 283,
345, 346–351, 355–356, 408, 410–411, 427,
440, 452, 462–491, 502, 504–506, 508,
511, 512, 518, 522, 523, 532, 599, 679, 700,
718, 725, 736, 738–739, 780, 782–783,
791, 808–809, 813–815, 818–819, 822,
831, 929
- migration-induced contact 427, 439,
462–463
- syllable contact 570, 591, 754–755, 761, 762,
764, 819, 822, 824–825, 830
- territorial contact 462–463
- convergence 280, 378, 394, 467, 474, 485,
834, 933, 950
- social convergence 361
- coronal, coronalization 173, 179, 181, 184–186,
189–192, 194, 205, 208–210, 546
- corpus 319–337
- C-ORAL-ROM 326
- Corpus di italiano parlato (corpus) 326
- Corpus parlato di italiano (corpus) 327
- Fonología del español contemporáneo
(FEC) 12, 326
- French Learner Language Oral Corpora 327
- Interfonología del español contemporáneo
(IFEC) 327
- Interphonologie du français contemporain
(IPFC) 327
- Leiden Learner Corpus 327
- Phonologie du français contemporain
(PFC) 12, 162, 165–167, 326–327,

- 329–330, 337, 360, 504, 669, 688–689, 693
- Rhapsodie 326
- Spanish learner language oral corpora (SPLLOC) 327
- speech corpora 319–337
- Spoken Portuguese Corpus 327
- corpus phonology 12, 17–18, 319–337
- Corsican 234–235, 345, 616, 724, 773
- count data *cf.* data
- creole 223, 464, 480–481, 783, 929–950
- emergence/formation of creoles 930, 932
- English-lexifier creoles 783
- French-lexifier creoles 223, 464, 783, 931, 932, 941–948
- Ibero-Romance-lexifier creoles 480–481, 934–941
- Romance-lexifier creoles 929–950
- Spanish-lexifier creoles 784
- creolistics 929
- creolization 464
- Cretic shortening 245–247
- critical period (L1 acquisition) 437, 464
- cross-linguistic influence (CLI) 409, 413, 422, 428, 429, 438, 439, 454, 464–465, 467, 470–471, 475, 488, 938
- Cumulative Enhancement Model (CEM) 438
- CV Phonology 15, 153
- CVCV Phonology 102, 105, 153, 160 *cf.* Strict CV Phonology
- Radical CV Phonology 153
- Strict CV Phonology 111 *cf.* CVCV Phonology
- Daco-Romance 40, 43–46, 93, 143, 228, 235, 531–532, 547
- data
- categorical data 329–331
- count data 329, 331–333
- database 91, 323, 326, 327–328, 329–331, 337, 853, 867, 875
- CLEARPOND 329, 331, 335
- Interactive Atlas of Portuguese Prosody 867, 875
- Lexique 328
- phonological databases 327–328
- SUBTLEX-ESP 328
- World Atlas of Language Structures (WALS) 91
- deaccentuation 304, 739, 799 *cf.* destressing
- decreolization 930
- degemination 43–47, 90, 104, 144, 230–231, 344, 350–351, 866
- delabialization 222, 648
- delateralization 820–821
- deletion 34, 41, 45, 49, 67, 103, 109–110, 116, 133, 142–143, 144, 146, 150, 157–159, 160, 162, 163, 166, 168, 198, 218, 219–220, 230, 232–234, 237, 242–243, 246–247, 248, 250–254, 256–258, 259, 260, 275, 280, 284, 287, 331, 347, 379, 382, 384–385, 387, 393, 416–417, 418, 472, 539–540, 541, 547, 548, 577, 578, 583, 590, 599, 615, 620, 680, 684, 686, 691, 692–693, 694, 716, 722, 724, 729, 731, 754, 761–762, 786, 788, 794, 820–823, 829–830, 832, 844–845, 848, 859, 860, 862, 864–867, 871, 900, 911, 913, 921, 938, 945–946
- schwa deletion *cf.* schwa
- vowel deletion *cf.* vowel
- delinking 16, 194, 198–201, 844
- degemination 43, 46, 47, 90, 104, 107, 144, 174, 230–231, 344, 350–351, 858, 866
- denasalization 221–222, 224–226, 230, 234–235, 732, 820
- depalatalization 194, 218, 228–229, 721–722, 726, 764, 792, 818, 820, 902
- Dependency Incremental (DI) model 308–317
- Dependency Phonology 16, 150, 153
- destressing 145 *cf.* deaccentuation
- desyllabification 537, 909
- devoicing 34–35, 37, 42, 48–49, 116, 118, 142, 157, 260, 275, 286, 344, 345–349, 353, 357, 359–360, 423, 463, 472–475, 516, 547, 638, 650, 659, 663, 676–677, 680, 720, 747, 750, 757–758, 788, 815, 816, 818, 822, 900–901
- final obstruent devoicing 34–35, 37, 42, 48–49, 116, 118, 347–349, 547–548, 638, 650, 659, 663, 720, 747, 750, 757–758, 788, 901
- vowel devoicing *cf.* vowel
- dialectology 8–9, 342–343, 349, 367, 560, 581, 780, 788–789, 885
- diasystem 719, 720–721, 724–726, 729, 732
- diphthong, diphthongization 4, 18, 43, 46–47, 48, 51, 54, 94, 99, 100, 104, 106–107, 115, 127, 129, 134, 135–139, 142, 143, 145–146, 151, 178, 223–224, 227, 232, 234–235, 302, 363, 387, 413, 450–451,

- 518, 532–537, 540–543, 545, 550, 553,
562, 564–566, 568–569, 571, 575, 591,
632–633, 639, 663, 675–677, 715–717, 719,
728–729, 732–734, 748–749, 752–754,
784, 785–787, 794, 796, 801, 830–834,
840–841, 844, 846, 851, 854–855, 857,
861, 864, 871, 890, 892–894, 897–899,
908–909
- conditioned diphthongization 135
 - unconditioned diphthongization 136
- Dispersion Theory 17
- Distinctive Feature Theory 13, 14
- Djidió *cf.* Judeo-Spanish
- Djudjo *cf.* Judeo-Spanish
- Djudyó *cf.* Judeo-Spanish
- dominance *cf.* language dominance
- Dutch 268, 327, 328, 378, 381, 387, 390, 393,
445–446, 480, 765, 870, 934–937
- ear loans 509, 522
- education *cf.* social factors
- element (Dependency Phonology) 153–158,
160–161
- element loss 168
 - empty elements 155, 160
- elision 16, 142, 146, 275, 349, 355, 472,
480–483, 503, 510, 513, 517–518, 520–521,
540–541, 560, 576–577, 698–700, 722,
819, 934, 938, 942, 945 *cf.* deletion
- empty nucleus *cf.* nucleus
- empty vowel *cf.* vowel
- enchaînement* (French) 426, 687, 698–700 *cf.*
resyllabification
- English 51, 53, 54, 67, 96, 153, 158, 185, 186,
206, 217, 238, 248, 259, 266, 268, 269,
271–272, 274, 277–282, 286, 288, 290,
301, 327, 328, 349–350, 351, 364, 377,
378, 390–394, 421, 422, 426, 428–429,
436, 439, 440–453, 464, 474–475, 485,
504–511, 514–515, 518–522, 523, 532,
548, 549, 579, 585, 622, 679, 700, 765,
783–784, 785, 787, 792, 799, 809, 833,
870, 911, 914, 920, 934, 936, 944
- multicultural London English 472
 - Singapore English 271
 - Taiwan English 271
 - Welsh Valleys English 271
- epenthesis 16, 51, 63, 70, 93–94, 96–97, 107,
114, 116–118, 127, 139–143, 161–163,
203, 284, 347, 387, 389, 393, 425, 471,
481, 503, 517–523, 537, 589–590, 599,
604–605, 608, 612–614, 620, 650, 659,
683, 716, 749–750, 754–755, 762, 774,
794, 796, 819, 820, 826, 829, 832–833,
856, 873–874, 906, 911–914, 942, 944,
946
- schwa epenthesis *cf.* schwa
 - vowel epenthesis *cf.* vowel
- equivalence classification (L2
learning) 436–437, 444
- equivalence relation 467
- eSpeak (text-to-speech system) 328
- ethnicity *cf.* social factors
- exemplar 17–18, 451
- Exemplar Theory 17–18
- experimental phonetics 9, 216, 302
- Experimental Phonology 11
- eye loans 509, 513, 522
- Feature Geometry 14, 16, 18, 179–202, 839,
843
- final obstruent devoicing *cf.* devoicing
- first language acquisition *cf.* L1 acquisition
- first language attrition 429, 464, 475, 488
- fission 197, 210
- Fonología del español contemporáneo* (FEC) *cf.*
corpus
- foot 32, 50, 60, 62, 67–69, 71–73, 75–77, 79,
129, 131, 133, 140, 243–249, 251, 253–258,
260, 166, 343, 386, 390–392, 395,
417–418, 476, 550, 560–561, 567, 572–576,
578, 590, 591, 696, 839, 854–859,
889–890, 913, 920
- foreign accent *cf.* accent
- foreign language (learning) 6, 327, 390,
435–454, 464, 474, 477, 488, 509,
513, 590
- formant 8, 353, 441, 447, 451, 470, 472, 480,
538, 542–543, 546
- fossilization 473, 490, 937, 945
- Frame-Content Theory 379
- Francoprovençal 8, 34, 39–40, 46, 49, 94–99,
106, 114, 117–118, 136, 223, 228, 237, 672,
710, 716
- Hauteville Francoprovençal 40, 46, 94,
97–99
 - Valaisan Francoprovençal 237
 - Vinzelles Francoprovençal 40, 47

- French 4–5, 7, 14, 16–17, 34, 37, 38–39, 41–48, 50, 65, 73–77, 90, 92, 94–96, 99–104, 108, 110–111, 114–118, 134, 136, 138, 124–146, 150–168, 178, 215–218, 220–228, 230–234, 236–238, 242–261, 265–266, 268, 273, 282–283, 287, 290, 299–305, 308–316, 325–329, 331–332, 334, 337, 342, 345, 347, 351–353, 356–357, 359–366, 376–379, 381, 383–387, 389–393, 395–398, 407, 410–412, 418, 420, 422–429, 439, 441–444, 451–452, 463–464, 469–470, 476–480, 485, 490, 504–519, 521–523, 532, 533, 549, 583, 612, 669–703, 709–710, 712–715, 722, 725, 728, 730, 735, 738–739, 774, 787, 793, 808, 809, 817, 833, 853, 929, 931–932, 937, 941–950
- Acadian French 92
- African French 167, 469–470, 477–480, 490 *cf.* Central African French, Senegalese French
- Alsatian French 37, 237
- *banlieue* French 353, 366, 472 *cf.* multiethnic Parisian French
- Basque Country French 679
- Belgian French 39, 356, 680
- Burgundian French 39, 42–43
- Canadian French 222 *cf.* Laurentian French, Acadian French, Quebec French, Montreal French
- Central African French 470
- Corsican French 488
- Eastern Regional French 347
- Frenchville French 474
- Haitian French 929 *cf.* Haitian Creole
- Laurentian French 38, 157, 162, 167, 672–674, 676, 680, 683, 685, 689
- Lorraine French 37, 237
- Louisiana French 167, 689
- Middle French 108, 116, 469, 477, 672–673
- Midi French 76–77, 100, 108, 111, 151, 158, 165–166, 232, 485, 672–673, 676, 678, 683–685, 738–739
- Montreal French 357
- multiethnic Parisian French *cf.* *banlieue* French 353, 365–366, 472
- New Caledonian French 222
- Norman French 39, 224
- northern (European) French 159, 161, 166
- northern Metropolitan French 362–364
- Old French 4, 90, 102, 111, 114–116, 118, 140, 143, 145, 216, 232, 236–237, 243, 253–256, 260, 347, 583
- Parisian French 38, 220, 357, 361, 464, 676, 701
- Quebec French 92, 157, 352, 357, 363, 383
- Saint-Etienne French 685
- Senegalese French 477–480
- southern (European) French *cf.* Midi French
- Standard/Reference French 38–39, 41, 100, 151–152, 159, 359, 476–477, 669–703, 715
- Swiss French 50, 162–163, 672–673, 685
- Vaudois French *cf.* Swiss French
- Walloon French *cf.* Belgian French
- working-class French 356
- French Learner Language Oral Corpora *cf.* corpus
- fricative, fricativization 51, 93–95, 107, 115, 157, 173–177, 179, 183, 188–189, 194–199, 209–210, 346, 348–349, 353, 356, 359–360, 378–380, 382–383, 384, 394–395, 387–389, 394–395, 408, 411–412, 416, 418–420, 475, 516, 522, 544, 546–547, 561–563, 566, 603–607, 614–616, 619, 635–637, 650, 659, 676, 678–679, 691–692, 718–720, 722–723, 726, 747, 749, 756, 758, 760, 763–764, 774, 781–782, 788, 790–791, 795, 811–816, 818–820, 822, 826, 829–830, 842, 845–846, 849–851, 854, 855, 857–858, 866–867, 871, 899–900, 902–904, 935, 937–938, 939, 944–945
- L1 acquisition of fricatives 378–380, 382–383, 384, 395, 387–389, 394–395
- Friulian 34–35, 37, 41–42, 43, 47–50, 116, 132, 136, 140–144, 157, 175–176, 178, 195, 198–199, 201, 275, 485, 582, 628–647, 655, 663, 774
- Carnico Friulian 34
- Central Friulian 34, 632–635, 638–639, 642, 644
- Eastern Friulian 175, 199
- Lower Tagliamento Friulian 34
- Northern Friulian 645–647, 659, 663
- Northwestern Friulian 175, 198
- Western Friulian 34, 653, 663
- Full Transfer/Full Access (FTFA) 438

- Galician 45, 63, 70, 90, 94, 95, 219, 279–280, 444–445, 465, 484, 486, 488, 724, 780, 882–923
 - Central Galician 885, 888, 894–895, 898, 903, 918, 921
 - Eastern Galician 885, 889, 897, 913, 918, 921
 - (Old) Galician-Portuguese 45, 90, 94, 95, 724, 780, 884, 885, 889
 - Southern Central Galician 917
 - Standard Galician 902–904, 913
 - Western Galician 885, 888, 892–893, 895, 898, 902–904, 906, 910, 913, 918–920, 921
- Gallo-Italian 34
- Gallo-Romance 4, 9, 37–40, 45, 47, 90, 92, 97, 103–104, 116, 118, 178, 220, 233, 237, 238, 345, 347, 708, 710–711, 713, 714
- Gascon 45, 95, 144, 228, 234, 710, 712–714, 716–719, 721–726, 729–734, 728, 780
 - Landais Gascon 144
- geminat, gemination 33, 40–41, 44–46, 48, 67, 70, 94–95, 99, 104, 107, 112, 118, 144, 174–175, 177, 178–179, 229–231, 243, 250–253, 260, 274–278, 329, 344, 345, 350–351, 355, 445, 514, 520, 562, 568–569, 578, 585–586, 590, 599, 603, 604, 606, 608–609, 613–614, 616–617, 720, 727, 730, 746, 748, 756–757, 761, 791, 821, 824–826, 842, 900
- gender *cf.* social factors
- generalized linear (mixed-effects) models 329, 334–337
- Generative Phonology 13–16, 18, 41, 65, 158–160, 321, 409, 510, 582, 686, 747, 758, 779
 - Natural Generative Phonology 14
- German 54, 71, 96, 131, 186, 253, 266, 277, 282, 283, 327, 328, 377, 386, 388, 390–391, 393, 412, 416, 419–424, 426–429, 439, 443, 444, 450, 452, 463, 474–475, 548, 590, 635, 650, 659, 663, 817
 - Swiss German 283
- Germanic 52, 95, 347, 381, 429–430, 474, 476, 477, 514, 583, 598, 699, 799
- Germanism 679
- gesture, gestural 12, 144, 182–185, 206–209, 265, 269, 288, 536–537
 - articulatory gesture *cf.* articulator, articulation, articulatory
 - gestural blending 206
 - gestural landmarks 207
 - Gestural Optimality Theory *cf.* Optimality Theory (OT)
 - gestural score 182–183, 207
 - gestural timing 183, 277
- gheada* 903–904, 921
- glide, gliding 14, 51, 54, 64, 78, 93–94, 99–100, 106, 112, 117, 131, 136, 138, 150–152, 156, 173–174, 175–177, 179, 182–183, 189, 199, 201–202, 209, 219, 223, 229–230, 234–236, 271, 329, 351, 378, 380, 384–387, 389, 423–425, 450, 532, 534, 540–541, 543, 545, 561–562, 564–565, 569, 570–571, 575, 576, 591, 604, 609, 658, 676–680, 686, 691, 719–720, 723, 732–733, 747–749, 752–753, 755–756, 762–764, 774, 786–787, 790–792, 802, 812–813, 820–822, 824, 826, 828, 832–833, 840–843, 846, 848, 850–851, 854–855, 857–859, 861, 871–872, 900, 906, 908, 910, 912–914, 944
 - bilingual acquisition of glides 423–425
 - L1 acquisition of glides 378, 380, 384–387, 389
 - L2 acquisition of glides 450
- glottal, glottalization 93, 174, 180, 182, 206, 426, 470, 544, 603, 650, 659, 699, 718, 722, 788, 802, 812–813, 816, 830, 936, 938, 944
- Government Phonology 16, 18, 43, 91, 153, 158, 160
- grapheme–phoneme correspondences 513, 516
- Greek 3, 5, 71, 808, 810, 812, 814, 816, 831, 888
- Guarani 470, 783
- guttural 180, 812
- h aspiré* 682, 699–700
- Haitian Creole 783, 931, 934, 941–948
- Haketi(y)a *cf.* Judeo-Spanish
- Harmonic Serialism *cf.* Optimality Theory (OT)
- Hebrew 3, 450, 808, 810, 812, 815–817, 822, 832
- heritage language, heritage speaker 407, 422, 424, 426, 444, 449–450, 453, 463, 473, 475, 485, 560, 590–591, 599, 615
- heterogeneity (rhythm) 265, 289, 290

- hiatus 42, 47–48, 58, 74, 93, 127, 144, 146,
158, 179, 204, 234, 450, 539–541, 543,
565, 575, 578, 716, 752–754, 785–786,
790–791, 796, 820, 830, 832–833,
848, 855, 861, 865, 871, 906, 908–909,
913, 920
- history of phonetics 1–10
- history of phonology 10–18
- Hunsrückisch (West Central German) 474
- hypocoristic (form/meaning) 60–61, 66–69,
71–72, 75–77, 79
- iamb, iambic 69, 73–75, 247–248, 391, 413,
427, 476, 571, 573, 889–891, 893
- iambic-Trochaic Law 247–248
- Ibero-Romance 40–41, 43, 45, 63, 90, 94, 97,
103, 106, 116, 143, 279–280, 346, 428,
475, 713, 808, 811, 818, 821, 921, 931, 932,
934, 936, 938, 948, 950
- identity *cf.* social factors
- imitation (loanword phonology) 503, 505–510,
514–518, 520–521, 523 *cf.* loan, loanword
- immersion (education) 444, 452, 709
- imposition 465, 468, 479–481, 483
- Interactive Atlas of Portuguese Prosody *cf.*
database
- interface 19, 319, 343, 398, 466–467, 488, 576,
591, 921
- Interface Theory, Interface
Hypothesis 466–467, 488
- Interfonología del español contemporáneo*
(IFEC) *cf.* corpus
- Interphonologie du français contemporain* (IPFC)
cf. corpus
- intonation 15, 278, 279, 284, 285, 299–317,
364–366, 376–377, 393–394, 396–397,
425, 427–428, 436–437, 441, 443–444,
446, 452–453, 465, 466, 467, 480–481,
485–490, 551–554, 560, 579–580, 586,
589, 622–623, 641–648, 651–656,
660–663, 700–702, 735–739, 765–775,
783–784, 797, 798–800, 833–834,
839, 854, 860, 864–870, 872, 875, 913,
916–921, 930, 939–941, 947–948
- bilingual acquisition of intonation 425,
427–428
 - intonation in contact 465, 466, 467,
480–481, 485–490
 - L1 acquisition of intonation 377, 393–394,
396–397
 - L2 acquisition of intonation 436–437, 441,
443–444, 446, 452–453
- Italian 5, 12, 17, 32–33, 35–37, 42–44, 46–47,
49, 50, 70–72, 73, 94–99, 100, 103, 104,
107–108, 112, 116, 117, 118, 129, 136,
137, 140–143, 145–146, 157, 174–175,
178, 190, 194, 202, 217–221, 228–229,
231, 235, 238, 248, 250–253, 266, 268,
269, 273–278, 279–280, 288, 289, 290,
301, 302, 303, 310–312, 326–327, 329,
345, 350–351, 376–379, 381, 383, 384,
386, 390, 396–397, 410, 416, 417, 422,
445–446, 450, 452–453, 467, 484–488,
504–505, 508, 511–521, 523, 559–591,
599–600, 602–603, 606–607, 609, 616,
620, 635, 636, 639, 655, 715, 728, 736,
738, 765, 768, 773, 774, 783, 808, 813,
875, 931
- American Italian (heritage language) 351, 560
 - Apulian Italian 107, 137, 141
 - Bari (Barese) Italian 220, 277, 487, 589
 - Basilicata Italian 42, 97
 - Bolognese Italian 37, 47, 49, 95, 97, 98, 108,
117, 143, 235, 251–252
 - Calabrian Italian 33, 42, 97, 104, 137, 229,
600
 - Casale Corte Cerro Italian 36–37, 42
 - Central Italian 487, 582, 616
 - Cremonese Italian 35, 41, 43, 44, 47–49, 143
 - Emilian Italian 35, 37, 47, 97–98, 143, 251
 - Eritrean Pidgin Italian (extinct) 931
 - Foggiano Italian 587
 - Frignanese Italian 47, 50
 - Friulian Italian 143
 - Genoese Italian 35–36, 49, 251, 599 *cf.*
Ligurian Italian
 - Ischia Italian 588
 - Lazian Italian 130–132, 580
 - Ligurian Italian 35, 194, 251, 582
 - Lombard Italian 34, 36–37, 41–43, 98, 107,
130, 132, 143, 144, 662
 - Marchigiano Italian 220
 - Milanese Italian 36, 42, 47–49, 143–144,
219, 222, 228, 274 *cf.* Lombard Italian
 - Neapolitan Italian 16, 70, 128, 130–132,
137–138, 141, 220, 228, 275, 277, 487

- Northern Italian 136, 142–143, 194, 217, 221, 487, 560, 586
- Old Genoese Italian 599, 610
- Old Pisan Italian 599
- Old Tuscan Italian 143
- Palagiano Italian 33
- Piedmontese Italian 35, 98, 130, 142, 144, 217, 221, 228, 610, 736
- Pisan Italian 277, 487, 599
- Romagnol(o) Italian 35, 252
- Roman Italian 230, 351, 578, 580, 590
- Salentino Italian 127, 129–130, 132, 137, 139, 202
- Sicilian Italian 137, 139, 201, 220, 230, 275, 278
- Southern Italian 129, 143, 487
- Standard Italian 32–33, 37, 42–44, 46, 49, 140, 157, 248, 250–251, 274, 276–277, 345, 351, 560–561, 586–587, 589
- Swiss Italian 132, 582
- Teramo Italian (Abruzzese) 94, 136
- Turin/Torino Italian 297, 350, 487
- Tuscan Italian 70, 130, 132, 136, 137, 142, 145, 190, 250, 275, 277, 345, 560, 580, 583–584
- Umbrian Italian 130, 131, 580, 588
- Venet(i)an Italian 278, 582, 588, 631, 662
- Italo-Romance 33, 90, 94, 97, 103–104, 106, 107–108, 112, 116–118, 250, 274–277, 345, 350, 427, 463, 560, 581–582, 597, 738
- Japanese 248, 266, 327, 390, 444, 873, 874, 875, 929
- Judeo-Spanish 280, 349, 463, 465, 467, 473, 475, 485, 488, 782, 784, 788, 808–834, 934
 - Bulgarian Judeo-Spanish 280, 467, 473, 485, 488, 810, 812–813, 829, 832, 833–834
 - Greek Judeo-Spanish 810, 812, 814, 816, 830
 - Judeo-Spanish dialect zones 809
 - Moroccan Judeo-Spanish 809, 811–816, 818, 820–821, 824, 826–828, 830
 - Old *yīšūv* Sephardim dialect 809–810, 812
 - Turkish (Istanbul) Judeo-Spanish 472, 810, 812–813, 815, 816–817, 818, 819, 822, 826, 832, 833
- Judezmo *cf.* Judeo-Spanish
- Kreyòl ayisyen *cf.* Haitian Creole
- L1 acquisition 162, 164, 270, 375–398, 407–430
- L2 acquisition 270, 280, 426, 435–454, 464, 466, 472–473, 477, 479, 481–482, 484–485, 488, 489–490, 503, 508–509, 584, 785, 933
- L2 Intonation Learning Theory (LILt) 437
- L3 acquisition 375, 435–454
- labial, labialization, labiality 94, 95, 101, 108, 139, 173–177, 179, 181, 182, 183, 199–201, 205–206, 218–222, 230–231, 377–382, 411, 412, 416–417, 471, 537–539, 543–544, 546–547, 561–562, 567, 571, 591, 603, 605, 606, 634, 636, 650, 659, 678, 715, 716, 720, 729, 746, 748, 752, 760, 762, 782, 783, 792, 812, 814, 816, 826–828, 829, 830, 840, 842–843, 899–900, 905, 907, 936, 944–945
- Laboratory Phonology 10–11, 12, 323, 531, 739,
- Ladin 8, 35, 43, 46–47, 49, 98, 116, 136, 140, 142–143, 144, 157, 582, 628–630, 648–656, 663
- Ladino *cf.* Judeo-Spanish
- language contact *cf.* contact
- language dominance 355, 424, 445, 454, 485
- laryngeal, larynx 6–7, 9, 14, 179, 181, 197, 202, 206, 306, 590, 780, 782, 843, 903, 944
- laryngeal realism 590
- latency (phenomena) 681–690
- lateral, lateralization 33, 45, 47, 91, 95, 96, 98, 107, 108, 112, 115, 131, 160, 174, 180, 187, 197, 202, 255, 354–356, 384–385, 388, 411, 450, 469–470, 475, 522, 523, 544, 548, 561, 562, 563, 565, 570–572, 603–604, 606–608, 634, 637, 650, 659, 678, 679, 720, 725–726, 746, 748, 754, 757, 759–763, 774, 787, 790, 792, 812, 819, 820–822, 825, 826, 842–843, 844, 846, 850–851, 854–858, 872, 899–901, 907, 944 *cf.* liquid
- L2 acquisition of laterals 384–385, 388
- Latin 4–5, 8, 34, 43, 44, 46, 53, 71, 79, 89–90, 92–93, 94, 95, 101–104, 106–108, 112, 114, 115, 118, 128, 142–144, 158, 174, 178, 194, 215, 216, 227–231, 233–235, 242–261, 275, 277, 287, 289, 302–303, 315, 345, 349, 350, 351, 355, 366, 409–410, 487, 477, 504–505, 507, 509–511, 518–520, 523, 531–533, 538–539, 547, 559, 562, 580,

- 582, 597–600, 602–609, 612, 614–617, 620, 633, 634, 638, 639, 710, 712–713, 714–720, 722–724, 728, 730, 731, 732, 733, 746, 788, 801, 808, 811, 813, 822, 830, 884, 888, 897, 901, 904, 950
- Late Latin, Vulgar Latin 103, 228–229, 505, 510, 511, 518, 597, 603, 632, 634, 639, 710, 715, 822, 830, 884, 897
- layered foot 573
- Leiden Learner Corpus *cf.* corpus
- length, lengthening 32–50, 63, 64, 67, 71–72, 76, 79, 94, 101–108, 112, 115, 126, 135, 137–138, 141, 143–144, 195–196, 219, 224–225, 228, 230, 231, 237–238, 242, 244, 248–254, 260, 272, 276–280, 282–283, 287–288, 305, 335–336, 347, 350, 378, 393, 410, 453, 477–480, 482, 484, 486, 560, 563, 564, 569, 571–573, 576, 579, 586–587, 590, 600, 609, 616, 638–639, 649, 656, 658, 662–663, 673–675, 688, 701, 702, 716, 723, 724, 726, 729–730, 735, 747, 766, 768, 772, 797, 798, 800, 828, 865–868, 873, 908, 920, 940
- consonant length, lengthening 32–50, 67, 79, 94, 107, 112, 115, 195–196, 219, 230, 277, 305, 350, 563, 579, 609, 616, 726, 747, 828 *cf.* geminate, gemination
 - vector length 451
 - vowel length, lengthening 32–50, 63, 64, 67, 71–72, 76, 101–106, 108, 126, 135, 137–138, 141, 143–144, 224–225, 228, 231, 237–238, 242, 244, 248–254, 260, 277, 279, 288, 347, 378, 393, 410, 453, 482, 564, 571–573, 590, 600, 638–639, 649, 658, 663, 673–675, 716, 723, 724, 729–730, 797
- lenition 16, 33, 43, 44–45, 47, 48, 92, 95, 99, 100, 112, 115, 199, 345, 418, 430, 440, 448–449, 475, 510, 520, 605–607, 614–617, 787
- lexical form 130–131, 137, 532, 934
- Lexical Phonology 14, 18, 838, 863, 867
- lexifier language 949
- Lexique *cf.* database
- liaison* 103, 109–110, 118, 226, 232, 329–331, 347, 425–426, 476, 668, 670, 681, 686–690, 695, 698–700, 703
- L1 acquisition of *liaison* 425–426
 - L2 acquisition of *liaison* 441, 443
- linear regression 329, 334–335
- lingua franca 91, 464, 504, 509, 700
- linguistic geography 9–10
- Linguistic Proximity Model (LPM) 438
- liquid 34, 41, 47, 50, 74, 92, 95–100, 104–107, 112, 117, 142, 144, 163, 255, 329, 347, 354–355, 378–379, 384–385, 387, 389, 394–395, 519, 546–548, 570–571, 599, 604–605, 607, 608–609, 612, 615–619, 638, 659, 663, 677–678, 683–685, 691–694, 724, 748–749, 756, 763, 781–782, 791–792, 794–795, 822, 824–825, 842, 847, 855–856, 899–900, 909–910, 935–938
- L1 acquisition of liquids 378–379, 384–385, 387, 389, 394–395 *cf.* L1 acquisition of laterals
- loi de position* (French) 38, 76–77, 108, 144, 361, 673
- loan, loanword 51–55, 57–58, 62, 64, 67–68, 70–71, 94, 99, 102, 107–108, 112, 143, 217–218, 229, 238, 253, 255–257, 259, 351, 464, 482, 484, 503–523, 532, 550, 560, 569, 570–572, 585, 589, 590–591, 598, 602–604, 606–608, 610, 612, 615, 620, 635–636, 639, 650, 659, 674, 722, 728, 734, 746–747, 749, 751–752, 755–756, 793–794, 808, 811–813, 815–817, 819, 822, 832–834, 888–889, 892, 897, 900, 902, 904, 910–911, 913–914, 933, 935–939, 944
- pseudo-loan 514–515
 - reloan 504
- markedness, (un)marked 16, 56–57, 60, 64–65, 68, 70–71, 92, 113–114, 116, 156, 192, 196, 198, 203–205, 207, 244, 246, 275, 286, 347, 357, 389, 409–410, 412, 416, 418, 424, 426–427, 429, 453–454, 466, 468–469, 471, 512, 517–518, 549, 551, 584, 688, 697, 747, 795, 823, 848, 853, 859, 889–890, 914, 935 *cf.* constraint
- Maya 463, 783
- merger 44, 45, 194, 232, 353, 469, 604, 635, 720, 816, 908, 909, 912, 921 *cf.* vowel merger
- metadata 323, 324, 326
- metaphony 18, 127–138, 535–539, 560, 581, 585, 587–589, 599–601, 610–612, 848, 895, 921

- metathesis 177, 229, 598, 608, 609, 617–619, 819, 822–824, 832
- metrical grid 475, 480, 481, 483, 490
- Metrical Phonology 15–16, 311, 422, 476
- metrical tree 15, 310–312
- mid vowel 5, 38, 46, 47, 59–63, 75–77, 97, 106, 108, 127, 128–144, 152, 155, 159, 205, 222, 359–361, 410, 413, 415, 439, 440, 445, 447, 470, 533, 534, 536, 541, 562, 564–566, 571, 574, 575, 587–589, 599, 600, 610, 611, 632, 639, 658, 671–676, 715, 745, 746, 751, 753–756, 784–786, 789, 801, 829, 841, 847, 848, 886–899, 909
- Midi French *cf.* French
- mobility *cf.* social factors
- mora, moraic, moraicity 11, 32, 33, 38, 41–43, 49, 50–52, 55, 56, 59–62, 64–69, 71–79, 105, 243–249, 251, 252, 260, 266, 277, 284, 386, 390, 395, 476, 550, 569, 573, 574, 578, 586, 591, 645, 696, 697, 833, 875, 914
- morphophonemic alternation 178, 751, 754, 755, 757, 758, 762, 763, 901, 904
- morphophonological alternation 31, 159, 217, 225–227, 233, 694–695, 722, 732, 784, 792, 801–802, 811, 831–833, 851
- motoseo*, *motosidad* (Andean Spanish) 470
- multilingual(ism) 176, 344, 408, 423, 426, 429, 444, 465–469, 471, 472, 481, 484, 490, 491, 784
- muta cum liquida* 34, 41, 47, 50, 95–97, 104–106
- nasal
- L1 acquisition of nasals 377–382, 384, 385, 388, 394, 395
 - nasal consonant 61, 217–221, 227–236, 238, 410, 420, 443, 512, 538, 540, 583, 673, 721, 724, 726, 728, 729–732, 757, 793, 819, 847, 848, 855, 856, 943
 - nasal typology 236–238
 - nasal velarization 217–218, 221–222, 235, 781, 795, 905–906
 - nasal(ized) vowel 39, 51, 54, 73, 139, 216, 218, 220, 221–226, 230–238, 344, 358, 359, 362–364, 381, 410, 420, 442, 443, 447, 469, 505, 512, 515, 670, 673, 674, 695, 716, 724, 731, 732, 841, 846, 847, 850, 867, 889, 943, 950
- nasalization, nasality 15, 51, 108, 127, 139, 202, 215–238, 362, 363, 381, 442, 590, 607, 675, 695, 715, 716, 731, 732, 760, 820, 828, 829, 830, 846, 854, 855, 889, 935
- history of nasalization in French 232–233
 - history of nasalization in Portuguese 234–235
 - history of nasalization in Romanian 235
- Natural Generative Phonology 14
- Natural Phonology 13–14
- Navarro-Aragonese 90, 780
- neighborhood density 328, 331, 332, 335, 336
- Neogrammarian School 8–10
- neutralization 11, 13, 35, 36, 38, 44, 61–63, 107, 144, 161, 162, 175, 201, 202, 309, 315, 348, 385, 423, 445, 471, 542, 548, 564, 600, 636–638, 659, 671, 672–674, 679, 698, 721, 723, 725–727, 729–731, 758, 759, 774, 781, 782, 784, 786, 788, 791, 792, 813, 816, 817, 819, 821, 822, 841, 844, 847, 872, 887, 893, 896, 897, 900, 905, 907, 937, 938, 943, 944, 950
- nucleus 60, 75, 91, 92, 98–100, 102, 111, 112, 136, 144, 207, 265, 420, 422, 423, 540, 543, 545, 565, 566, 568, 569, 571, 645, 677, 726, 749, 794, 826, 841, 843, 846, 849, 850, 854, 855, 892, 894, 908
- empty nucleus 91, 92, 102, 109–112, 151, 160, 590
- obstruent 34, 35, 37, 42, 44–48, 92, 95–101, 103, 107–109, 111, 112, 116, 117, 142–144, 157, 163, 175–178, 189, 217, 219–221, 223, 230, 255, 287, 345, 347, 348, 353, 378, 389, 411, 420, 537, 546, 561, 569, 570, 582, 583, 590, 607–609, 614–617, 628, 638, 650, 659, 663, 677–680, 683–685, 691, 692, 694, 726, 755, 758, 759, 761, 763, 813–819, 822, 824, 825, 830, 831, 855, 856, 891, 899, 900, 907, 933
- Occitan 16, 34, 39, 40, 47, 103, 112, 114, 116, 118, 136, 138, 140–142, 144, 218, 222, 356, 465, 469, 477, 485, 700, 709–739, 774, 780
- Occitano-Romance 713
- Old Galician-Portuguese *cf.* Galician
- Old Spanish *cf.* Spanish
- onset 16, 60, 70, 73–77, 89, 90–102, 106, 107, 108–112, 114, 115, 118, 160, 177, 179, 204, 207, 208, 287, 355, 517–519, 522–523, 532,

- 540, 545, 547, 548, 562, 563, 565, 566,
568–571, 583, 590, 591, 612, 616, 637,
640, 677, 691, 692, 694, 696–698, 700,
702, 718, 722, 724, 726, 732, 746–750,
756–759, 761, 763, 792, 794, 795,
822–825, 829, 833, 843, 849, 855, 856,
858, 866, 872, 900, 902, 903, 905, 906,
908, 909, 946
- bilingual acquisition of onsets 411, 417, 418,
420, 423–426
- L1 acquisition of onsets 381–387, 389, 391,
393–395
- strong onsets 100–102
- typology of complex onsets 91–92
- weak onsets 100–102
- open syllable lengthening *cf.* syllable
- Optimality Theory (OT) 16–19, 173, 174, 203,
206, 242, 244, 246, 251, 260, 305, 413,
536, 537, 550, 582, 811, 840
- Gestural OT 17, 206–209
- Harmonic Serialism OT 16, 246, 248, 251
- output–output faithfulness (OT) 17
- Stratal OT 16
- orthography, orthographic 4–5, 54, 56–57,
159–161, 164–168, 217–219, 221, 232, 236,
259, 276, 289, 303, 304, 307, 324, 327,
350, 411, 476, 482, 505, 509, 511, 518, 523,
535, 563, 682, 686, 714, 719, 753, 788, 790,
791, 793, 809, 810, 813, 856, 884, 885,
887, 898, 900, 904, 906, 930, 934, 937
- orthographic reform 4–8
- oxyton(ic) 53–56, 67, 69–70, 113, 137, 143–146,
256, 258, 276, 350, 616, 620, 643, 646,
656, 728, 748, 755, 852, 889, 891, 912–914
- palatal, palatalization, palatality 4, 45, 93,
94, 99, 100, 103, 110, 132, 134, 136, 138,
139, 145, 152, 153, 158, 173–201, 217–219,
228–230, 235, 238, 344, 347, 351–353,
355, 382, 384, 411, 412, 417, 469, 470,
534, 536, 537, 544–547, 553, 560–563,
565–568, 570, 591, 603, 605–608, 614,
628, 633–635, 637, 638, 650, 659, 663,
678, 715–723, 725, 726, 746, 748, 759,
760, 764, 782, 790–793, 801, 812, 813,
819, 820, 824, 826–828, 833, 842, 843,
845–847, 854, 855, 858, 860, 871, 872,
893, 899–902, 905, 907, 935, 936, 938,
939, 942, 944, 945, 947
- first palatalization 174, 175–177
- palatal plosive *cf.* plosive
- second palatalization 174, 175, 178
- Papiamento, Papiamentu 480, 929, 932,
934–940, 947, 949, 950
- paragoge, paragogic(al) 116, 117, 143, 514, 520,
523, 608, 612, 617, 620, 726, 913
- paroxyton(ic) 49, 53–54, 57, 61, 63, 67, 72,
104–106, 113, 128–129, 133, 137, 143–144,
252, 254, 256, 260, 274, 620, 643, 728,
867, 889, 890, 912, 914
- Particle Phonology 153, 537
- penult(imate) 32–37, 43–44, 46, 58, 64–66,
68–69, 71–72, 114, 243, 250–251, 257–258,
278–279, 302–303, 366, 391, 451, 482,
549–551, 564, 569, 571–574, 587, 620–622,
642, 651, 660, 701–702, 715, 727, 734–735,
739, 748, 764, 795–797, 847–848,
851–852, 889, 914, 935, 939–940, 948
- perception, perceptual, perceptive 1, 96, 134,
135, 140, 141, 167, 174, 185, 186, 192,
195, 225, 266–268, 270, 272, 274, 275,
277–282, 285, 288–290, 307, 309, 316,
321, 331, 343, 346, 348, 351, 353–355, 358,
363, 364, 375, 386, 391, 396, 398, 436,
437, 440, 442, 444–447, 452–454, 467,
471, 472, 474, 477, 508, 543, 546, 547, 567,
670, 731, 755, 765, 766, 789, 865, 873, 933
- Perceptual Assimilation Model (PAM) 437
- pharyngeal, pharyngealization 183, 206, 810,
812, 903
- phonetic alphabet 5–6, 324
- phonetic orthography 3–5
- phonological annotation 324–327
- Phonological CorpusTools 328
- phonological framework 11–19, 43, 102, 105,
119, 150, 153, 157, 158, 173, 174, 182, 186,
194, 195, 203, 204, 206, 273, 277, 299,
301, 302, 305, 316, 393, 397, 435, 437, 454,
466, 479, 490, 503, 510, 536, 579, 580,
601, 609, 641, 686, 734, 735, 739, 779,
811, 840, 843, 846, 847
- Phonologie du français contemporain* (PFC) *cf.*
corpus
- phonometrics 320, 323
- pidgin 784, 929, 931, 932, 946
- Piro 476
- pitch accent 15, 267, 279, 284, 285, 301, 302,
305–308, 316, 393–396, 427, 429, 452,

- 453, 486, 487, 490, 551–553, 579–580,
622, 641–642, 651–656, 700–703,
735–736, 765–774, 797–800, 834,
865–866, 868–869, 871, 874, 917–919 *cf.*
accent
- pitch accent density 800, 871
- Pitch Dynamism Quotient 443
- plosive 33, 40, 44, 45, 47, 94–97, 99, 101, 103,
106, 107, 118, 136, 139, 174, 175, 177–179,
181–186, 192–199, 201–202, 206, 208,
219–221, 223, 343, 345, 348, 349, 351,
352, 360, 469, 474–475, 503, 505, 510,
518–523, 540, 544, 546, 547, 560–563,
566, 567, 603–609, 612, 614–617, 619,
620, 628, 633–635, 638, 650, 658, 659,
663, 678–680, 691–693, 699, 716, 720,
721, 723, 726, 727, 746, 748, 749, 755–762,
787, 788, 790, 791, 794, 795, 812,
814–816, 818, 820, 822, 823, 826–828,
830, 840–843, 871, 892, 897–901, 907,
909–911, 936, 944, 947
- bilingual acquisition of plosives 409, 411,
412, 418, 420, 421
 - L1 acquisition of plosives 377–382, 387, 394,
395
 - L2 acquisition of plosives 440–441, 444, 445,
448, 449
 - palatal plosive 628, 633–635, 638, 650, 659,
663, 746
- Polish 96, 186, 450
- Pomeranian, Pomerano (Low German) 474
- Portuguese 5, 13, 17, 45, 50, 64–65, 68, 93, 94,
99, 106, 107, 113, 118, 136, 142, 146, 157,
158, 177, 215, 216, 218, 221–223, 227–229,
231, 234, 236–238, 265, 273, 284–289,
302, 326–327, 355, 376, 379, 386,
395–397, 407, 410–412, 420, 423–425,
427, 446, 480, 485, 504, 774, 792, 813,
828, 839–875, 884–885, 897, 931, 932,
934–937, 949, 950
- Alentejo Portuguese 870–872
 - Azores, Azorean Portuguese 361–362,
870–871
 - Brazilian Portuguese 17, 50, 51–63, 66, 68,
94, 103, 134, 140, 141, 146, 157, 219, 224,
275, 284–286, 289, 327, 379, 382–384,
386, 389, 396, 408, 446–448, 462–464,
471, 474, 510, 783, 872–875, 889
 - Eastern Portuguese 146
 - European Portuguese 13, 16, 17, 63–65, 99,
103, 113–114, 133, 140–142, 146, 157, 224,
268, 273, 275, 280, 284–286, 311–314,
327, 361–362, 383–385, 387, 389,
391, 393, 396, 397, 408, 411, 424, 427,
471–472, 481, 510, 839–872
 - Madeira Portuguese 871
 - (Old) Galician-Portuguese *cf.* Galician
 - Olivenza Portuguese 280
 - São Miguel (Azorean) Portuguese 361–362,
870
- post-lexical phonology *cf.* Lexical Phonology
- preantepenult(imate) 70, 549, 551, 571
- prestige 350, 354, 358, 362, 464, 466, 474,
506, 508, 523
- proparoxytone, proparoxytonic 32, 33, 49,
58–59, 61, 67, 69, 104, 105, 129, 131–133,
137, 143, 144, 145, 242, 251, 252, 254–257,
259–261, 620, 642, 715, 727, 748, 753,
833, 847, 853, 861, 889, 890, 914, 916
- adaptation of proparoxytones by final syllable
deletion 257
 - adaptation of proparoxytones by stress
shift 256
 - adaptation of proparoxytones by vowel
deletion 254, 255, 259
- prosodic hierarchy 19, 388, 398, 560, 576, 585,
869
- prosodic morphology 60, 65, 72–73, 78, 79,
694, 696–697
- prosodic phonology 290, 422, 466, 839, 840,
854
- prosodic phrase 286, 359, 539, 641, 766, 767,
770
- prosodic phrasing 765–766, 771
- prosodic position 50, 60, 345, 417, 422, 423,
425, 676, 843
- prosodic prominence 269, 277, 279, 765, 799
- prosodic structure 71, 72, 76, 204, 272,
286, 299, 301, 302, 305, 306, 308, 309,
311–316, 387, 398, 416, 425, 566, 571, 578,
591, 618, 735, 765–766
- prosodic word 15, 55, 59, 60, 64, 66, 72–79,
259, 282, 305, 306, 308, 309, 389, 390,
417, 418, 426, 475–478, 482, 549–551, 553,
584, 586, 587, 622, 644, 818, 843–849,
853–855, 857, 859–863
- prosodic (word) group 282, 308, 845, 854, 859,
863

- prosody, prosodic 2, 11, 15, 50, 60, 61, 64,
68–74, 78–79, 145, 166, 199, 243, 258,
260, 265, 267–273, 275, 277–280, 282,
283, 285, 286, 288–291, 299–302,
305–316, 326, 344, 364–366, 538,
548, 560, 566–568, 580, 586, 587, 622,
643 645–655, 670, 681, 683, 684, 686,
688–689, 694, 696, 698, 700–702,
734–739, 752–753, 764–774, 800, 802,
818, 841–848, 853, 859–875, 889, 911,
912, 939, 947
– bilingual acquisition of prosody 416–418,
422, 425–427
– L1 acquisition of prosody 375, 377–379, 386,
387–391, 394–398
– L2 acquisition of prosody 443–446,
448–449, 451–454
– prosody in contact 463, 475–488
prosthesis, prosthesis 98, 99, 102, 103, 128,
143, 518, 613, 826, 830, 899
Proto-Romance 43, 44, 46, 47, 49, 102, 511
- quantitative methods 319, 321, 323, 328–329
quantity 15, 31, 33, 34, 40–46, 61, 70–72, 79,
103, 113, 114, 144, 151, 247, 248, 251, 351,
410, 411, 424, 476, 535, 572, 633
Quechua 280, 412, 452, 463, 469, 470, 472,
480–483, 485, 486, 783, 785
questione ladina 629
- raddoppiamento (fono)sintattico* 33, 94, 276,
329, 350, 560, 578, 616
reanalysis 77, 106, 259–261, 417, 436, 467–468,
479, 481, 482, 607, 687, 800, 894
regression *cf.* linear regression
relatinization 510, 518, 523
reloan *cf.* loan, loanword
repair 93, 96–99, 102–103, 107, 116–117, 173,
192–194, 196, 198–201, 203–204, 206,
210, 247, 443, 503, 517–518, 521, 523,
540–541, 570, 589, 590, 604, 608, 613,
620, 750, 762, 794, 822–824, 826
repair strategy 503, 517–518, 521, 523, 590
resyllabification 16, 89, 109–113, 115, 117–118,
160, 426, 443, 698, 747, 750, 774, 791, 795,
820, 826–828, 830, 851, 857–858, 860,
866–867, 871, 905–906, 909 *cf.* syllable
Rhaeto-Romance 34, 129, 136, 143, 465,
628–663
- Rhapsodie *cf.* corpus
rhotacism 228, 235, 756, 757, 763, 774, 902
rhotic, rhoticization 45, 63, 75, 95, 96, 98, 99,
131, 138, 143, 344, 354, 356–358, 464,
544, 548, 561, 570–571, 608, 613, 637,
650, 659, 678–680, 718, 722, 724, 725,
732, 747, 748, 757, 761–763, 782, 784, 791,
792, 794, 812, 821–823, 829, 830, 851,
891, 899, 907, 937, 938, 942, 945, 946
– bilingual acquisition of rhotics 411, 412, 416
– L1 acquisition of rhotics 379, 384–385, 388,
394
– L2 acquisition of rhotics 449–450
– rhotic deletion 938, 942, 945–946
– strengthening of rhotics 718, 747, 757, 762,
842, 849, 854, 862
rhythm, rhythmic(al) 49, 77, 90, 146, 244, 251,
259, 260, 264–291, 299, 364–366, 468,
471, 476, 480, 481–485, 489, 490, 549,
571, 622, 700, 701, 702, 738, 739, 765,
774, 783, 800, 834, 859, 868, 870, 872,
874, 920
– bilingual acquisition of rhythm 425,
427–428, 430
– L1 acquisition of rhythm 376–377, 389–393,
395–397
– rhythm class 264, 266, 270, 273, 281, 288
– rhythm metrics 267–272, 274–275, 278,
280–284, 286, 289, 365, 393, 428, 484,
872
Romanian 17, 40, 44, 50, 78–79, 93, 95, 99,
100, 103, 106, 116, 117, 128, 134, 136, 138,
142, 146, 217, 220, 228, 235, 238, 253, 265,
268, 273, 287–289, 302, 311, 312, 314,
376, 378, 379, 396, 504, 531–554, 724,
808, 816, 817, 819, 822, 830, 832, 929
Romansh 35, 46, 94, 97, 106–107, 116, 117, 132,
136, 140, 142, 143, 157, 582, 628–629,
656–663
- sandhi 94, 98, 103, 105, 115, 117, 127, 337, 425,
560, 586, 604, 607, 613, 614, 616, 691,
694, 698–699, 848, 866–868, 871,
874, 906
Sango 283, 471, 700
Sardinian 33, 43, 102, 128, 134, 140–142, 175,
199, 222, 228, 229, 234–235, 289, 350,
445, 465, 470, 488–489, 582, 588–589,
597–623, 724, 773

- Campidanese Sardinian 141, 588–602, 604–611, 613–615, 617–621, 623
- Logudorese Sardinian 33, 134, 470, 598–607, 609–611, 613–617, 620–621, 623
- Nuorese Sardinian 33, 598, 602, 604, 614, 620, 622
- scaling (intonation) 393–396
- Scalpel Model 438
- schwa 39, 41, 50, 76, 92, 99, 103, 108–110, 114, 139, 140, 142, 146, 150–168, 218, 233, 255–258, 329, 334, 337, 347, 473, 476, 512, 513, 533, 570, 588–590, 612, 669, 670, 673, 680–686, 688, 693, 698, 699, 701, 703, 829, 844, 845, 848, 856–858, 860, 862, 867, 871
- abstract schwa 160, 165
- bilingual acquisition of schwa 410, 411, 414, 415
- phonetic schwa 153, 156, 158, 159
- phonological schwa 151, 154, 158, 159, 166–168
- schwa alternation 152–153, 158, 160–162, 164, 165, 166, 167–168, 682, 684
- schwa epenthesis 161–163, 347, 683
- schwa deletion 103, 109, 110, 146, 158, 160, 162, 166–168, 256, 684, 686, 691, 844–845
- second language acquisition *cf.* L2 acquisition
- secondary labialization 591, 812, 826–828
- secondary palatalization 228, 545–546, 553, 562, 591, 812, 826–828
- secondary stress 247, 249, 259, 260, 549–551, 702, 765, 774, 797, 862, 870, 898, 914
- secondary velarization 842, 858
- sentence modality 299–301, 316, 643, 660, 701, 774
- Serbian 808
- seseo* 781, 789, 903–904, 921
- simplicity 91, 929, 933, 948–950
- simultaneous bilinguals 407–410, 420, 422, 424, 425, 429, 449, 454
- social class *cf.* social factors
- social evaluation 346, 350, 355
- social factors 221, 343, 347, 359, 362, 484, 505
 - age 9, 343, 348, 352, 353
 - education 346, 350, 354, 358, 364
 - ethnicity 343, 352, 365
 - gender 9, 343, 346, 348, 350, 352, 353, 355, 358, 365, 789
 - identity 346, 348, 350, 352–355, 357, 362, 364–366
 - mobility 354, 358, 362, 463
 - social class 343, 346, 347, 352, 358, 360, 361, 486
 - social mobility 354, 358
- social mobility *cf.* social factors
- social network 343, 345, 348, 358, 364, 365, 491, 506, 950
- social status 346, 348, 350, 355, 359, 670
- social variation 326, 343, 344, 350, 466, 484, 580
- social-indexical meaning 342–345, 348, 353, 359–361, 364, 366
- sonorant 33, 44–47, 52, 54–56, 60, 77, 92, 94, 97–99, 103, 107–109, 111–112, 116–118, 143, 163, 176, 177, 180, 189, 192, 196–200, 202, 276, 287, 378, 411, 423, 548, 568–569, 582–583, 590, 634, 659, 680, 694, 726, 748–749, 760, 819–820, 822, 824, 842–843, 847, 852, 854–855, 867, 899, 901, 905
- sonority 75, 77, 93, 95, 96, 107–109, 114, 117, 152, 156, 377, 397, 411, 424, 475, 481, 483, 564, 565, 568–571, 583, 591, 640, 650, 663, 691, 694, 747, 749, 755, 759, 761, 764, 774, 787, 822–825, 830, 855–856, 908–909
- sound change 3, 10, 46, 49, 127, 191, 194, 199, 215, 230, 238, 302, 342, 347, 353, 355, 359, 469, 503, 510, 611, 782, 802, 828, 903
- sound law 8–9
- Spanish 4, 12–15, 17, 44, 45, 47, 50, 65–68, 90, 94, 96, 97, 99, 103, 106, 107, 112, 113, 118, 133, 134, 136, 141, 142, 143, 145, 146, 152, 154, 176, 177, 216–219, 221, 222, 228–230, 235, 237, 248, 253, 266, 268, 271–274, 277–283, 286–290, 301, 302, 311–313, 316, 326–329, 332–333, 336, 346–350, 353, 355–357, 364, 375–382, 384, 385–398, 407–428, 436, 439–441, 444–454, 462–464, 467, 469–473, 475, 477, 480–486, 488–490, 504–506, 508–523, 562, 565, 599, 603, 605, 612, 620, 700, 715, 718, 736, 738, 739, 746, 755, 759, 765, 768, 779–802, 808, 809, 811, 813–824, 826, 828, 830–834, 853, 875, 882–884, 886, 888, 889, 892, 897, 901, 903, 907, 910, 912, 931–939, 949

- Andalusian Spanish 40, 108, 133, 218, 781–785, 789
- Andean Spanish 452, 470, 472, 482, 486, 485
- Argenchino Spanish 485, 489
- Argentinean Spanish 274, 353, 357, 452, 454, 484, 485, 779, 781, 782, 783, 792, 796, 819
- Bolivian Spanish 357, 781, 789
- Buenos Aires Spanish 280, 353, 427, 453, 464, 484–489, 783, 788, 791, 792, 800
- Caribbean Spanish 41, 781, 782, 783, 788, 789, 791, 793, 800
- Castilian (Spanish) 45, 90, 94, 107, 108, 154, 271, 274, 278, 279, 280, 286, 453, 470, 484, 488, 779, 780, 785, 788, 798, 883, 884, 932
- Catalanian Spanish 346, 472
- Chicano Spanish 146
- Chilean Spanish 96, 357, 470, 781, 789
- Colombian Spanish 357, 377, 380, 391, 470, 781, 782, 783, 787, 789
- Costa Rican Spanish 346, 357, 781, 782, 789, 792
- Cuban Spanish 41, 47, 221, 381, 514, 779, 781
- Dominican Spanish 329, 781, 783
- Ecuadorian Spanish 346, 357, 759, 781, 789
- Extremaduran Spanish 472, 485, 780, 782, 785
- Galician Spanish 512
- Guatemalan Spanish 357, 781, 789
- Iberian Spanish 447, 779, 781, 786, 787, 794, 801
- Latin American Spanish 66, 67, 107, 463, 504, 505, 509, 519, 779, 781–783, 786–787, 794, 796, 809
- Mainstream Spanish 469, 471, 475, 489, 810, 811
- Majorcan Spanish 348, 356, 439, 440, 470, 488
- Mexican Spanish 280, 357, 364, 380, 381, 382, 391, 444, 446, 449, 483, 505–506, 518–523, 779, 781, 785, 789, 794
- Mexico City Spanish 357–358, 365, 779, 791, 800
- Miami Cuban Spanish 41, 47, 453
- Modern Spanish 97, 346
- Old Spanish, Old Castilian 97, 780, 782, 788, 808, 811, 813, 815–820, 822–824, 830
- Olivenza Spanish 280, 472, 485
- Panamanian Spanish 237
- Paraguayan Spanish 357, 464, 470, 488, 781, 783, 792
- Peninsular Spanish 66, 67, 280, 357, 453, 510, 779, 781–783, 788, 792, 809, 813, 816, 819, 820, 831, 834
- Peruvian Spanish 280, 463, 470, 472, 481–483, 510, 781, 789
- Porteño Spanish 280, 453, 463, 484–489
- Puerto Rican Spanish 380, 385, 781, 782, 783, 792
- Spanish in contact with Catalan 346–347, 348–349, 355–356
- Spanish in contact with English 349–350
- Uruguayan Spanish 353, 781, 782
- US Spanish 349–350
- Yucatecan Spanish 471, 490
- Spanish learner language oral corpora (SPLLOC) *cf.* corpus
- Spanyol *cf.* Judeo-Spanish
- speaking machine 7–8
- Speech Learning Model (SLM) 436–438, 445, 453
- speech rhythm *cf.* rhythm
- speech synthesis 7–8, 446
- spelling pronunciation 351, 509, 514, 521, 523
- spirantization 255, 349–350, 355, 475, 560, 756–758, 774, 787–788, 842, 900–901
- bilingual acquisition of spirantization 409, 418–420, 429
- L1 acquisition of spirantization 380
- L2 acquisition of spirantization 448–449
- Spoken Portuguese Corpus *cf.* corpus
- standardization 598, 599, 714, 884, 931, 934
- stop *cf.* plosive
- strengthening 150, 345, 360, 597, 599, 616–617, 747, 756, 758, 762, 819, 821, 826, 842, 849, 854, 862
- stress(less), (un)stressed, (un)stressable 31, 32–33, 34–36, 38–40, 43, 44, 46, 49–50, 51–59, 61–63, 64–73, 78–79, 90, 93, 94, 103, 104–106, 113, 114, 127–146, 152–156, 158–159, 165, 166, 220, 224, 228–232, 234, 236, 237, 242–245, 247–261, 267–269, 274–284, 287–290, 300–312, 315–317, 321, 334, 360–361, 385–391, 395–397, 410–411, 413, 416–417, 423, 427–428, 436, 443–444, 446, 449–453, 463, 467–469, 470, 472–474, 475–482,

- 485, 532–539, 541–544, 547, 549–552,
562, 564, 566, 568, 569, 571–578,
586–590, 600, 610, 616, 620–622,
631–634, 638, 639, 641–645, 649, 651,
656, 660, 663, 676, 681, 700–702,
715, 716, 723, 724, 727–735, 738–739,
743, 745–746, 748, 750–757, 764–768,
772–774, 784–788, 790, 795–798, 800,
801, 818, 827–834, 841, 843–849,
851–855, 858–865, 867, 870–874,
886–899, 906, 908–909, 911, 913,
914–916, 918–921, 939–940 *cf.* accent,
secondary stress
- bilingual acquisition of stress 410–411, 413,
416–417, 423, 427–428
 - L1 acquisition of stress 385–386, 387–388,
389–393, 395–397
 - L2 acquisition of stress 436, 443, 444, 446,
449, 450, 451–452, 453
 - stress deaf(ness) 260, 290, 452, 477, 853
 - stress pattern 15, 52, 57, 58, 61, 64, 65, 68,
70, 71, 113, 259, 366, 452, 467, 477, 489,
549–551, 553, 599, 622, 734, 764, 765, 786,
847–848, 851, 889, 914, 935, 939, 940
 - stress retraction 576, 586, 874
 - stress rule 51–55, 64, 77, 301–303, 305, 477,
795–798, 851
 - stress-shift 68, 70, 71, 255, 256, 391, 620,
621, 723, 794, 796, 906, 908
- stress-timed, stress-timing 90, 142, 264,
266, 267, 268, 269, 273, 274, 275, 277,
280, 281, 284–286, 288, 365–366,
390, 392–393, 395, 427, 430, 481, 483,
549, 700, 765, 833, 870, 872, 920 *cf.*
syllable-timed, rhythm
- strong vs. weak position (syllable, onset,
foot) 15, 62–63, 100–102, 105, 153, 166,
258, 306, 311, 389, 413, 423, 475, 484,
486, 489, 532, 619, 735
- structuralism, structuralist phonology 10–12,
41, 47, 59, 159, 320, 337, 409, 469,
779–780
- substrate, substratum 347, 464, 466, 490, 506,
508, 510, 598, 680, 713, 784, 929, 939,
942, 943, 944, 948, 949
- SUBTLEX-ESP *cf.* database
- superstrate, superstratum 466, 506, 713, 929,
930, 943, 948
- supra-dialect 709, 710, 713, 714, 715, 717, 718
- supralaryngeal 14, 154
- syllabicity (loss of) 151–152, 168
- syllabification 89, 91, 92, 109, 110, 111, 117,
118, 119, 246, 251, 436, 481, 516, 522, 691,
694, 747, 748, 750, 755, 774, 786, 790–791,
794, 795, 856, 858, 873, 905, 908, 909,
910 *cf.* resyllabification
- bilingual acquisition of syllabification 425
- syllable
- bilingual acquisition of syllable
structure 422–425
 - checked syllable *cf.* open vs. closed syllable
 - closed syllable *cf.* open vs. closed syllable
 - closed syllable adjustment 108, 160, 361 *cf.*
loi de position
 - L1 acquisition of syllable structure 377, 378,
386–389, 393, 395–397
 - Latin vs. Romance syllables 89, 93, 302–304
 - open syllable lengthening 104–105, 127, 143,
231, 242, 250–251, 253, 260, 274,
287, 572
 - open vs. closed syllable 90, 97–98, 104–106,
111, 112, 113, 127, 129, 130, 134, 136–138,
143, 144, 157, 158, 243, 252, 361, 532, 565,
568, 572, 671–675, 696, 728–729, 731,
734, 947
 - syllabic complexity 89, 90, 91, 92, 115, 267,
275, 278, 280, 281, 288, 481, 483, 510,
518, 765
 - syllable phonotactics 583, 589, 907–911
 - syllable structure 89, 91, 96, 103, 108, 110,
111, 119, 143, 144–145, 160, 203, 231, 267,
272, 275, 277, 279, 280, 284, 285, 327,
468, 481, 505, 510, 516–519, 542, 548,
568, 598, 613–614, 623, 639–640, 673,
675–676, 691, 696, 700, 748, 750, 765,
794, 802, 851, 854, 856–858, 907–911,
913, 921, 946
 - syllable weight 50–79, 243–245, 248, 249,
549, 550, 569, 572–574, 696, 734, 843,
851, 852, 854, 858, 889, 914
- syllable-timed, syllable-timing 90, 264, 266,
267, 268, 271, 273, 278, 279, 282, 283,
284–285, 287, 288, 290, 365, 390, 392,
393, 395, 396, 430, 481, 549, 700, 765, 774,
833, 870, 875, 920 *cf.* stress-timed, rhythm
- syncope 90, 95, 96, 97, 98, 99, 127, 139, 142,
158, 159, 160, 230, 248, 253, 255, 256, 260,
599, 676, 715, 730, 899

- tap 356, 357, 379, 544, 548, 561, 608, 637, 650, 718, 724, 747, 784, 791, 794, 821–822, 823, 824, 829, 833, 842, 847, 849–850, 854, 857, 907
- L1 acquisition of taps 380, 384, 394
 - L2 acquisition of taps 449–450
- third language acquisition *cf.* L3 acquisition
- timing 12, 15, 113, 183, 264, 267, 270, 271, 272, 273, 275, 277, 278, 279, 280, 282, 283, 285, 286, 288, 289, 290, 379, 390, 394, 396, 425, 428, 453, 477, 478, 481, 543, 547, 548, 765 *cf.* rhythm, stress-timed, syllable-timed
- Tone and Break Indices (ToBI) 305–307, 311–312, 316, 393, 551–553, 641, 651, 660
- tone language 480, 485, 489–490, 700
- transcription, transcriptional 6, 9, 10, 222, 305, 307, 311, 316, 324, 326–328, 393, 512, 547, 561, 579–580, 641, 651, 660, 734, 744, 785
- transfer, transference 280, 429, 438, 439, 445–448, 452, 464, 465, 467, 468, 472–475, 477, 481, 484, 486, 488, 490–491, 709, 725, 738, 739, 783, 785, 939, 948
- transphonologization 45
- trill 45, 138, 143, 145, 351, 356, 357, 379, 544, 548, 561, 604, 605, 607, 608, 637, 718, 724, 725, 747–748, 782, 784, 791–792, 812, 821–822, 829, 830, 833, 842, 849, 907, 945
- L1 acquisition of trills 384, 395
 - L2 acquisition of trills 449–450
- trochee, trochaic 32, 67, 72, 77, 244, 247, 248, 251, 260, 387–392, 395, 417, 429, 476, 550, 571–572, 591, 620, 784, 913
- (bi)moraic trochee 60, 64, 65, 68, 69, 71, 72, 78, 79, 243–244, 247, 260, 914
 - (di/bi)syllabic trochee 65, 66, 71, 72, 78, 247, 254, 572
 - (un)even trochee 60, 242, 244, 247, 248–249, 260
- truncation 60, 65–69, 71, 76–79, 392, 418, 645, 696–697, 773, 862, 901 *cf.* clipping
- tonal truncation 645, 874
- Turbidity Theory 588
- Turkish 186, 287, 378, 439, 444, 473, 532, 533, 808, 809, 810, 812, 816, 817, 819, 822, 832, 833
- Typological Primacy Model (TPM) 438, 448
- universal, universality 13, 15, 16, 75, 203, 205, 209, 236, 237, 247–248, 307, 375, 376, 378, 388, 392, 395–397, 468, 469, 480, 483, 503, 508, 588, 622, 750, 929, 930, 932, 945, 949
- Jakobson's universals 375, 377, 379, 394, 395, 409–410, 412, 468
- unstressed vowel reduction 62, 127, 132, 137, 139, 140, 142, 144, 146, 152–156, 158–159, 224, 231, 250–253, 254, 260, 267, 269, 274–275, 278, 280, 281, 284, 287, 361, 385, 467, 472–474, 533, 541–542, 562, 564, 566, 571, 572, 574–575, 632–634, 639, 641, 676, 700, 729, 730, 743, 745, 750–754, 756, 786, 829, 844–845, 854, 858, 860, 867, 887, 888, 897–899, 911
- bilingual acquisition of unstressed vowel reduction 410–411, 413, 417
 - L1 acquisition of unstressed vowel reduction 386, 388
 - L2 acquisition of unstressed vowel reduction 450
- velar, velar fronting, velarization 93, 94, 96, 97, 99, 101, 107, 108, 113, 136, 139, 152, 158, 173–179, 181–191, 194, 205, 208–210, 217–219, 221–222, 223, 227, 229, 232, 235–236, 238, 344, 351, 355–357, 377, 380, 382, 440–441, 472, 505, 514–515, 537, 544, 545, 547, 548, 560, 561–563, 566–567, 603, 605–607, 614, 615, 633, 635, 637, 650, 658, 659, 663, 679, 680, 715, 717, 724, 725, 746, 749, 753, 760, 761, 762, 781, 782, 788, 793, 795, 801, 812, 814–816, 818, 828, 829, 840–841, 842, 854, 858, 900–901, 903–907, 937, 945
- Venetian 177, 635
- vernacular 4, 19, 33, 34, 37, 38, 40, 47, 79, 343, 352, 362, 365–366, 416, 559, 560, 578, 712, 809, 811, 887, 888, 892–894, 897, 898, 900, 902, 908, 910, 913, 929, 934, 949, 950
- voice (human voice) 1, 6–7, 8, 350, 519
- Voice Onset Time (VOT) 474–475, 547
- bilingual acquisition of Voice Onset Time (VOT) 421–422, 430
 - L1 acquisition of Voice Onset Time (VOT) 381
 - L2 acquisition of Voice Onset Time (VOT) 441, 444

- voicing 35, 42, 48, 98, 103, 107, 144, 177, 220, 230, 255, 344, 345–346, 349, 378, 380–381, 394, 412, 421, 472, 474, 547, 560, 583–584, 590, 636, 663, 678, 679–680, 722, 758–759, 774, 787, 789, 801, 817–818, 867, 900, 902, 933
- voicing process 746, 758–759, 763
- vowel
 - devoicing of vowels *cf.* vowel devoicing
 - empty vowel 150, 154, 155, 168, 855, 858
 - vowel alternation 34, 36–37, 42, 118, 128, 130, 152–153, 279, 290, 413, 472, 473, 535–537, 538, 541, 575, 590, 613, 730, 731, 801, 844, 848, 889, 891, 894–895, 896–897, 898–899 *cf.* schwa alternation
 - vowel centralization 133, 139–140, 143, 144, 156–157, 274, 275, 472, 535, 538, 557, 543, 553, 728, 844, 845–846, 871, 887, 897, 899
 - vowel closing *cf.* vowel raising
 - vowel contact *cf.* hiatus
 - vowel deletion 142–144, 146, 220, 242, 246–249, 253, 254–255, 260, 275, 280, 385, 393, 472–474, 539–541, 577, 583, 684, 691, 753–754, 822, 823, 830, 848, 859, 860, 864–867, 871 *cf.* schwa deletion
 - vowel devoicing 142, 157, 275, 286–287, 359–360, 423, 463, 472–474, 676–677
 - vowel epenthesis 51, 63, 94, 107, 114, 116–118, 127, 139–143, 387, 389, 393, 425, 481, 590, 604–605, 608, 612–614, 749–750, 754–755, 794, 796, 826, 856, 873–874, 911–914, 942, 944, 946
 - vowel-glide alternation 151, 562, 575–576, 676, 677, 732
 - vowel harmony 108, 127, 128–135, 157, 167, 186–187, 385, 413, 417, 470, 473, 639, 675, 677, 752, 754, 756, 774, 848, 872
 - vowel laxing 157, 676–677
 - vowel length 31–33, 34–44, 46–50, 64, 71, 72, 79, 103–105, 108, 143–144, 225, 231, 250, 253, 254, 378, 393, 564, 572, 590, 600, 649, 658, 662–663, 673–675, 716, 729
 - vowel lengthening *cf.* lengthening
 - vowel lowering *cf.* vowel opening
 - vowel merger 137, 145, 153, 167, 222, 233, 362–363, 470, 859, 861, 867
 - vowel opening 47, 62, 63, 138, 222, 233, 728, 731, 746, 754, 756, 789, 848, 858, 862, 889–892, 895–896, 897–898
 - vowel raising 127, 128–132, 137, 138, 139–140, 141, 144, 151, 153, 155–157, 363, 388, 472–473, 533, 535, 538–539, 568, 587–589, 601, 610–612, 785, 786, 789, 828–829, 841, 844, 846–848, 871, 873, 888 *cf.* metaphony
 - vowel reduction 113, 114, 127, 139–142, 154, 155, 242, 256, 267, 271–275, 278, 280, 281–282, 284, 287, 289, 385, 393, 397, 410, 411, 413, 445, 447, 450, 467, 472, 473, 480, 549, 676, 700, 743, 745, 750–751, 754, 755, 765, 774, 844, 846, 849, 853, 854, 858, 860–863, 864, 886, 888
 - vowel sequences *cf.* hiatus
 - vowel shift 129, 132, 222, 233, 358, 361–362
 - vowel weakening 150–168, 472
- weakening 90, 345, 347, 349, 379, 418, 547, 614–616, 671, 673, 674, 723, 731, 756, 758, 763, 781, 782, 788–789, 816, 828, 832
- weight 31–32, 50–79, 106, 112–113, 244, 249, 549, 550, 569, 572, 573, 578, 590, 696, 843, 851, 852, 854, 855, 858, 865, 914
- Western Romance 45, 90, 102, 107, 134, 349, 407, 580, 727, 801, 817, 829, 884, 886
- Wolof 167, 283, 476, 477–480, 482
- word stress 257–261, 301, 391, 571, 577, 591, 620, 750, 764–765, 774, 780, 841, 851–853, 858, 859, 860, 861, 870, 871
- word-final consonant 37, 90, 111–112, 114–116, 118, 143, 347, 389, 425, 426, 519, 570, 583, 590, 612, 679, 698, 726, 731, 734, 748, 795
- World Atlas of Language Structures (WALS) *cf.* database
- writing 3–5, 164, 216, 714, 808
- yeísmo* 411, 469, 781, 792
- Yucatecan Maya *cf.* Maya
- zona ladina* 629–630

