

Recent Advances in the Study of Spanish Sociophonetic Perception

Edited by Whitney Chappell

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Recent Advances in the Study of Spanish Sociophonetic Perception

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Volume 21

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Edited by

Whitney Chappell

University of Texas at San Antonio

John Benjamins Publishing Company

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Introduction

Spanish sociophonetic perception: The state of the field

Whitney Chappell

The University of Texas at San Antonio

Let me begin by addressing two critical questions: (1) Why this volume? (2) Why now?

I proposed this volume because Spanish sociophonetic perception is a relatively new area of research that has seen a surge of interest in recent years, but it has not yet been discussed in a unified format. Generally speaking, studies based on production have predominated in Spanish sociophonetics, which use production data to link phonetic variants to specific social groups, e.g., aspirated /s/ to men (e.g., Cedergren, 1973; Cepeda, 1995; Dohotaru, 1998; López Chávez, 1977) or Argentine *sheísmo* to younger speakers (e.g., Chang, 2008; Fontanella de Weinberg, 1978, 1992; Lipski, 1994; Rohena-Madrazo, 2015). Sociophonetic production studies present interesting correlations between linguistic variants and social groups, but they often leave unanswered important questions that could speak to individual or group motivations for employing certain phonetic variants. For instance, *why* is a particular variant used more by working class speakers, women, or younger members of a community? Is the use of an indigenous linguistic feature the result of language transfer or an intentional marker of a speaker's indigenous identity? How is a given variant perceived by in-group and out-group members? Finally, perhaps the simplest question that goes unanswered in production studies is this: *what meanings do phonetic variants carry?* These questions can be more clearly answered by perception studies, which provide a nuanced understanding of a variant's social meanings in context.

Penelope Eckert's (2008) work on the indexical field, based on Silverstein (2003), has reshaped the way linguists view phonetic variation. Eckert argues that "the meanings of variables are not precise or fixed but rather constitute a field of potential meanings – an indexical field, or constellation of ideologically related meanings, any one of which can be activated in the situated use of the variable"

(Eckert, 2008: p. 454). For example, hyperarticulated /t/ release in English has been associated with the speech of nerd girls (Bucholtz, 2001), gay men (Podesva, 2006), and Orthodox Jewish boys (Benor, 2001), and the variant can be employed to index numerous permanent qualities like intelligence, elegance, and articulateness, as well as stances, such as exasperation, annoyance, and politeness, among others. That is, a single phonetic variant can evoke a plethora of social meanings that hinge upon the speaker, the listener, and the context, demonstrating the fluidity of social meaning-making in practice.

Sociophonetic perception studies based on this premise have blossomed over the past two decades, and findings from English consistently show that listeners are adept at perceiving sociophonetic cues, even if they are generally unaware of their keen ability to do so. Listeners are particularly attuned to more salient linguistic variables when identifying speakers' dialects (Clopper & Pisoni, 2004), and English vowels often play prominently in listeners' assumptions (Fridland, Bartlett, & Kreuz, 2004; Plichta & Preston, 2005). In fact, one study showed that listeners could identify speakers as African-American, Hispanic, or Caucasian based only on the word "Hello" with over 80% accuracy (Purnell, Idsardi, & Baugh, 1999), and these speech-based assumptions can have real-world consequences. For example, individuals who sound African-American or Hispanic over the phone tend to be denied the same housing opportunities available to speakers who sound white (Purnell et al., 1999), and students who speak non-standard English are often deprived of access to advanced classes, charter schools, and classroom participation (Chin, 2010). Foreign individuals in the workforce may suffer linguistic discrimination as well, with foreign-accented speech evoking assumptions of lower intelligence, status, and competence (Cargile, 2000; Grossman, 2011), which can impact performance reviews and student evaluations.

In addition to linguistic information, listeners' gender (Ball, 1983; Chappell, 2016a; Gordon, 1997) and regional backgrounds can influence their evaluations (Preston, 1996; Street, Brady, & Putman, 1983), as phonetic variants are interpreted in light of the context, the listeners' expectations, and the listeners' backgrounds. For example, Campbell-Kibler (2009) demonstrated that the alveolar variant of (ING), e.g., *walkin'*, decreased ratings of a speaker's education level and intelligence, but listener ratings were filtered through preexisting beliefs about the speaker. If a speaker was already perceived as working class, the alveolar variant amplified assumptions of lower intelligence and education levels, but the alveolar variant did not alter evaluations of intelligence and status for speakers perceived as belonging to a higher social class. These results show that listeners do not perceive linguistic information in a vacuum, but rather interpret it through the contextual and social information available to them.

Sociophonetic perception research on the Spanish language has been scarcer, but recent work has precipitated interest in the field. Perhaps the clearest and simplest way to demonstrate the increased interest in sociophonetic perception studies is to analyze recent trends in academic conferences. Prestigious conferences within the past years have featured presentations and even entire panels on Spanish sociophonetic perception, including The 8th International Workshop on Spanish Sociolinguistics (see Baird, Rohena-Madrado, Balderston, & Cating, 2016a; Evans-Sago, 2016), New Ways of Analyzing Variation (see Baird, Rohena-Madrado, Balderston, & Cating, 2016b; Callesano & Carter, 2016; Chappell, 2016b; Díaz-Campos, Amaral, Delgado, & Galarza, 2016), and The Hispanic Linguistics Symposium (see Bolyanatz, 2016; Ortiz López & Martínez Pedraza, 2016), among many others. The recent surge of interest in Spanish sociophonetic perception studies in high-profile conferences points to Hispanic scholars' increasing interest in the nuanced complexities of creating and negotiating social meaning through phonetic variants.

While research delving into Spanish sociophonetic perception is relatively limited, important strides have been made in the past decade. Recent work has shown that exposure to variation is necessary to perceive and form indexical fields related to phonetic variants, as a lack of exposure to variation decreases perceptual accuracy (Schmidt, 2013), and language dominance can also change how variants are perceived (Ramírez & Simonet, 2017). As with research conducted on other languages, it has been shown that the manipulation of a single phone can alter listeners' perceptions of a speaker. For example, Barnes (2015) found that Asturian Spanish morphophonological variants [u] and [es], e.g., *perru* and *les cases* rather than *perro* 'dog' and *las casas* 'the houses', were evaluated as more rural than Spanish [o] and [as], but only the (o) variable was linked with evaluations of status.

Spanish consonants exhibit more variation than Spanish vowels throughout the Spanish-speaking world, and /s/ articulation is a particularly salient shibboleth and social marker. Coda /s/ aspiration has been associated with lower status (Chappell, 2019; Walker, García, Cortés, & Campbell-Kibler, 2014) and higher evaluations of Caribbeanness, even with Mexican voices (Chappell, 2019). Additionally, realizations of /s/ seem to be a salient indicator of heteronormativity, as /s/ reduction is rated as more heteronormative than /s/ retention by both Puerto Rican and Mexican listeners (Walker et al., 2014). Similarly, Puerto Rican speakers were viewed as younger and more gay-sounding when listeners were presented with a fronted, dentalized, or especially high-frequency /s/ (Mack & Munson, 2012). In Costa Rica, intervocalic /s/ voicing has been shown to evoke lower evaluations of status for all speakers and higher evaluations of niceness, confidence, localness, and masculinity for male speakers (Chappell, 2016a), showing that speaker gender can also alter how variants are perceived.

In addition to elucidating the complexity involved in constructing and interpreting social meaning, sociophonetic perception studies help advance linguistic theory by analyzing linguistic variation through a new lens. For instance, Chappell (2016a) contends that men and women's differential access to the indexical field of intervocalic [z] provides a satisfying resolution to the gender paradox (Labov, 2001: pp. 261–293). That is, women's ability to access the social meanings associated with a phonetic variant can explain why they would choose to employ or eschew certain nonstandard variants. When access to positive social meaning is unobstructed, women are more likely to employ an innovative phonetic variant, but they will opt for the more conservative variant if no positive social gains can be made from the innovative variant's use. The sociophonetic perception studies included in this volume produce similar theoretical advances, leading to a better understanding of how social evaluations of synchronic variation ultimately result in diachronic change.

So, why now? Given the burgeoning state of the field, the present volume provides an exciting opportunity to bring together a group of renowned scholars working on sociophonetic perception from different perspectives to paint a more holistic picture of variation in the Spanish-speaking world. In doing so, the volume provides a summary of the state of the field of sociophonetic perception in the Spanish language, presents new and innovative scholarship in the field, and also proposes directions for future research. As the first unified reference on Spanish sociophonetic perception, this volume will be useful in graduate and undergraduate classrooms, in libraries, and on the bookshelf of any scholar interested in Spanish sociophonetics.

The volume is organized by geographic zone, and the first section explores sociophonetic perceptions in Spain. In Chapter 1, "The role of social cues in the perception of final vowel contrasts in Asturian Spanish," Sonia Barnes explores how visual cues influence linguistic perception. Building on previous research that found an association between Asturian /-u/ and evaluations of lower status and more rural identities (Barnes, 2015), Barnes presented three groups of listeners with no picture, a picture of a rural speaker, and a picture of an urban speaker, respectively. Participants heard gradient vowel realizations ranging from Spanish [o] to Asturian [u] and identified the vowel they perceived in a binary forced-choice task. The presence of social cues significantly influenced some participants' vowel identifications: Realizations presented with the urban picture were more likely to be associated with Spanish /-o/ but only among listeners who supported the co-official status of the Asturian language. This chapter highlights the relationship among social information, linguistic information, and listener attitudes. It is well established that phonetic variants color listeners' social perceptions of a speaker, but Barnes shows that visual cues can alter the way listeners with different language attitudes perceive the same linguistic stimuli.

Chapter 2, “Covert and overt attitudes towards Catalanian Spanish laterals and intervocalic fricatives” by Justin Davidson, explores a different contact situation in Spain. Davidson investigates the implicit and explicit attitudes of Catalan-Spanish bilinguals and Spanish monolinguals towards /l/ velarization and intervocalic /s/ voicing, both common variants of bilingual Spanish in Catalonia. He finds different evaluations of [ɫ] and [z] along the dimensions of solidarity, power, accent, rurality, and bilingualism from in-group members of the Catalan-Spanish bilingual community and outsiders. Additionally, explicit commentary points to the sociolinguistic salience of velarized /l/, which received high evaluations of rurality and incorrect Spanish, whereas listeners were not overtly aware of intervocalic [z]. Davidson concludes that broader linguistic attitudes towards varieties of Spanish are composed of an aggregate set of individual speech variants and the unique social values assigned to each of them.

The final contribution on sociophonetic perceptions in Spain comes from Brendan Regan (Chapter 3). In his chapter, “Dialectology meets sociophonetics: The social evaluation of *ceceo* and *distinción* in Lepe, Spain,” Regan shows that guises with the national norm, *distinción*, are evaluated as more urban, more formal, more educated, and higher status than guises with the traditional local norm, *ceceo*. These ratings demonstrate that even more rural communities are susceptible to the pressure of the national standard, which is reflected in the community’s changing attitudes towards *ceceo*. Crucially, years lived away from Lepe served as a significant predictor of listeners’ evaluations, which suggests that greater geographic mobility may drive different language attitudes and, as a result, language change.

The second section of the volume delves into sociophonetic perception in South America. In “Regional identity in Highland Ecuador: Social evaluation of intervocalic /s/ voicing” (Chapter 4), Christina García explores the perceptions of listeners from Loja, Cuenca, Quito, and the coast of Ecuador toward intervocalic [z]. The social perceptions of listeners from different regions are particularly interesting in this context, as the voicing of word-final, intervocalic [z] is a phonological process in Cuenca and Quito, whereas its production is phonetically gradient in other areas of the country. The results of García’s matched-guise test showed that [z] is associated with pleasantness, status, and age for female speakers, but male speakers’ use of [z] did not evoke similar evaluations. Additionally, while all the speakers were from Loja, listeners were “fooled” into thinking the speakers were from Quito or Cuenca when presented with intervocalic [z], suggesting that intervocalic [z] serves as a salient marker of highland identity. García concludes that linguistic variables and language attitudes are moving targets dependent upon local norms and contact between regional varieties, highlighting the multifaceted interaction among language, gender, and regional identity.

John Lipski's chapter (Chapter 5) explores perception in Palenquero, an Afro-Colombian creole language for which Spanish is a historical lexifier. In "Spanish and Palenquero: Language identification through phonological correspondences," Lipski conducts three experiments, including a single-word language identification task, an online rapid language identification task, and a processing task in which participants identify language transitions between Spanish and Palenquero. His results suggest that Palenquero-Spanish phonological predictability plays a key role in language identification, with greater importance for the younger L2 Palenquero speakers. Crucially, these findings show that sociophonetic awareness assists in bootstrapping emergent grammatical competence in a speaker's non-dominant language, which has implications for language revitalization efforts.

Chapter 6, "The role of social networks in cross-dialectal variation in the perception of the Rioplatense assimilated pre-palatal [ʃ] by Lauren Schmidt, analyzes cross-dialectal perceptual categorization of [ʃ], a Rioplatense feature. Two groups of participants that differed in their degree of exposure to Rioplatense Spanish participated in an identification task that required the categorization of [ʃ] in Spanish pseudowords. The contact group from La Rioja successfully associated [ʃ] with orthographic <y, ll>, while the non-contact group from Bogotá exhibited a tendency to categorize [ʃ] as orthographic <ch>. Schmidt's findings suggest that social contact between groups (or lack thereof) can account for differences in linguistic perception.

The last chapter of the South American section, "The social perception of intervocalic /k/ voicing in Chilean Spanish," comes from Mariška Bolyanatz Brown and Brandon Rogers. Bolyanatz Brown and Rogers investigate implicit attitudes towards an emerging phenomenon in Chile: intervocalic /k/ reduction. Previous studies have found that young Chilean speakers employ two different reduction strategies, with young women more likely to reduce by voicing intervocalic /k/ and young men exhibiting a tendency to spirantize intervocalic /k/ (Rogers, 2017; Rogers & Mirisis, 2018). However, listeners in their matched-guise study did not associate voiced intervocalic /k/ with youth or femininity. In fact, listeners perceived voiced /k/ as a marker of Chilean identity, but only in male voices, resulting in a mismatch between production and perception. The authors posit that this mismatch is due to the nascent status and low sociolinguistic salience of the reduction. As such, listeners do not yet link voiced /k/ with the speakers who produce it most: young women.

The final geographic zone explored in this volume is North America. In Chapter 8, Whitney Chappell explores "The sociophonetic perception of heritage Spanish speakers in the United States: Reactions to labiodentalized <v> in the speech of late immigrant and U.S.-born voices." Using labiodentalization of orthographic <v> as her variant of interest, Chappell conducts a matched-guise

test in which English-dominant heritage Spanish speakers evaluated a bilabial and labiodental guise. The results show that [v] is associated with higher status, older age, and more confident Hispanic identities in the speech of women, whereas [ʋ] evokes more negative attitudes in the speech of men. Chappell concludes that English-dominant Spanish speakers in the United States do discern social information through phonetic variants and their judgments largely align with those of monolingual Mexican Spanish listeners (Chappell, forthcoming), a finding that attests to heritage speakers' rich implicit knowledge of the social meaning indexed by phonetic variants in their home language.

Next, Mariela López and Miquel Simonet contribute Chapter 9, which is entitled "Spoken word recognition and *shesheo* in Northwestern Mexico: A preliminary investigation into the effects of sociophonetic variability on auditory lexical access." The authors explored listeners' processing of <ch>, which can be variably realized in Northwestern Mexico as an affricate [tʃ], or as a fricative, [ʃ]. Auditory primes were presented to listeners with a matching variant, e.g., [tʃ] and [tʃ], a mismatching variant, e.g., [tʃ] and [ʃ], or an unrelated prime. The results show that listeners accept words produced with either variant, and both variants led to equally effective priming for word recognition. Finally, listeners recognized [tʃ] more quickly than [ʃ], and it follows that the standard [tʃ] is privileged over the local [ʃ] at some level of representation. López and Simonet conclude that speakers of a speech community can store more than one phonetic variant in their mental representations, but one variant tends to take precedence over the other, which suggests that individual experience with phonetic variants can impact a speaker's mental representation.

Chapter 10, the final chapter in this section, also explores the Spanish spoken in Northwestern Mexico. In Natalia Mazzaro and Raquel González de Anda's chapter, "The perception-production connection: /tʃ/ deaffrication and rhotic asibilization in Chihuahua Spanish," participants completed both a production and perception task to better understand how the perception of two local variants informs their production. The authors find similar overall production rates of [ɾ] and [ʃ] but very different levels of metalinguistic awareness. Listeners exhibited much greater metalinguistic awareness of [ʃ], and the authors find a closer relationship between the production and perception of the salient [ʃ] than the less salient [ɾ]. Mazzaro and González de Anda conclude that the production-perception relationship is variable-specific and depends on numerous factors, such as frequency, phonological context, and sociolinguistic salience of a variable to a particular speech community.

The concluding section of the volume discusses future directions. In Chapter 11, Sara Mack provides a reflection on methodological considerations in sociophonetic perception research. "Of intersectionality, replicability, and holistic

perspectives: Methodological considerations in Spanish sociophonetic perception studies” stresses the importance of intersectional approaches, on the one hand, and replication studies, on the other. First, Mack explains that intersectionality theoretic approaches should be employed in sociophonetic research, as they recognize that evaluations of education level, class, race/ethnicity, gender/sexuality, region of origin, and myriad other social qualities are not static nor are they separated in listeners’ minds. Speakers draw on these underlying social relationships together, as do listeners, and researchers should not ignore that individual stylistic elements combine with others in the construction of social meaning. Second, Mack contends that replication studies must be more thoroughly integrated into the field to increase its legitimacy and the validity of our findings, but an overhaul of administrative priorities is needed to begin to value replication studies over novel experiments. Mack concludes that, as a blossoming field, we are well positioned to embrace a holistic approach to more effectively address questions of language variation and change.

Nicholas Henriksen provides the final contribution to the volume. In the epilogue, Henriksen includes both a synthesis of the volume’s contents, considering the shared themes and methodologies among the chapters, and a series of recommendations for topics, methodologies, and theoretical considerations for future studies exploring Spanish sociophonetic perception. In addition to a more in-depth analysis of vocalic and prosodic variation, Henriksen encourages an exploration of individual speakers’ production and perception, and, more specifically, an investigation of their intersection in relation to social and cognitive factors. Such an approach will expand upon our current understanding of the social meanings associated with linguistic variants, contributing to the intersectional approaches highlighted by Mack and furthering linguistic theory, painting a clearer picture of the non-linguistic motivations behind sound change.

While the path to fully understanding sociophonetic perception across varieties of Spanish is long, this volume represents an important first step. It is my hope that our readers are inspired to build upon the foundation provided here, an endeavor that will continue to shed light on how sociophonetic perception influences synchronic variation and diachronic change in the Spanish language.

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Spain

The role of social cues in the perception of final vowel contrasts in Asturian Spanish

Sonia Barnes

Marquette University

Influenced by the minority language of the region, speakers of Asturian Spanish vary in their production of word-final back vowels in the masculine singular morpheme, with realizations that range from Spanish [o] (/pero/) to Asturian [u] (/peru/). Previous research has found that listeners' social judgements of speakers are affected by whether [-o] or [-u] are used. This study explores how social cues about the speakers affect the listeners' perception of these vowels. The results of a binary forced-choice identification task combined with sociolinguistic priming show that productions paired with visuals of urban status were more likely to be identified as Spanish /-o/, but only when listeners were in favor of Asturian attaining co-official status. The results contribute to our understanding of the role that explicit stigmatization and overt language attitudes have on phonetic representation.

1. Introduction

Current research on sociolinguistic perception suggests that the link that exists between social information and linguistic forms is bidirectional; i.e. social information can influence speech perception and linguistic detail can affect social evaluations. As many of the studies in this volume show, as well as research conducted on English (Callier & Baptiste, 2015; Campbell-Kibler, 2007, 2008, 2009; Levon, 2007; Podesva, Reynolds, Levon, & Buchstaller, 2015; among others), listeners use linguistic information to evaluate the identity of speakers. Conversely, social information about the speakers has been shown to influence the processing of linguistic signals (Drager, 2005a; Warren, Hay & Thomas, 2007; Hay, Warren, & Drager, 2006b; Niedzielski, 1999; Strand, 1999; Staum Casasanto, 2010; among others). Work in the latter area has employed experimental techniques to investigate how information about a speaker's social attributes introduced into the listening context, such as age, ethnicity, gender and social class, can influence

speech perception, especially when the linguistic input is ambiguous. The majority of studies investigating the impact of social information on linguistic perception have focused on varieties of English and on phenomena of phonetic variation.

In this chapter, I explore the role that social information has on the processing of phonetic variants that originate in a situation of language contact, that of Spanish and Asturian in the Northwestern Spanish region of Asturias. Particularly, I examine the perceptions of Asturian word-final /u/ (/peru/) and Spanish /o/ (/pero/) ('dog') in the masculine singular morpheme in the city of Gijón, the largest urban area in the region. Speakers from this community vary in their production of the morpheme, with realizations that range from [o] to [u] (Barnes, 2016a, forthcoming). Furthermore, listeners use the presence of these variants in speech to evaluate the social identity of the speakers that employ them (Barnes, 2015). An experiment that uses visual clues to examine the opposite relationship will allow us to better understand the complex nature of the social meaning attached to these variants.

The chapter is organized as follows. In Section 2, I review previous studies that explore the relationship between social information and language processing and that connect sociolinguistic perception to exemplar theory. I also provide the necessary background on the use of final back vowels in Asturian Spanish. In Section 3, I describe the experiment, the participants and the statistical tools employed in the study. In Section 4, I review the results, and, in Section 5, I discuss the relevance of these results to our understanding of social indexing in situations of linguistic variation. Concluding remarks are included in Section 6.

2. Background

2.1 Social information and language processing

Recent work in sociolinguistics reflects an increasing interest in unveiling the cognitive mechanisms that connect social information to linguistic signals. While the majority of this work has focused on the effects of particular linguistic variants on social evaluations, in recent years there has been an increase in the number of studies that examine the inverse relationship. As a result, there is now a growing body of literature that analyzes how social expectations about a speaker influence speech processing, particularly in cases of phonetic variation.

In these studies, different methods have been used to introduce social information about a speaker while listeners evaluated a speech signal attributed to that speaker. Niedzielski (1999), for instance, presented participants with written information about the speaker's origin (Canada vs. Detroit) in a task in which

listeners had to choose which resynthesized vowels best matched those heard in a recording of a speaker from Detroit. The author found that participants from Michigan were more likely to choose a raised diphthong – a variant that is present in both varieties but that speakers from Detroit stereotypically associate with Canadian speech – if the Canadian label was used, but not if they believed the speaker was from Michigan. In another study, Drager (2005a) tested the effect that apparent age, as perceived from the speech signal, had on the perception of New Zealand vowels undergoing a chain shift. Using a digitized vowel continuum that went from a TRAP- to a DRESS-like vowel, she found that TRAP was more likely to be selected for the voice that was judged as being younger. This was consistent with production data showing that younger speakers are more likely to raise TRAP vowels. In both of these studies, then, participants shifted their responses according to their expectations regarding the speakers' linguistic variety.

Some studies have found that listeners do not necessarily need to believe the experiment's social priming for it to affect how speakers' utterances are perceived. For instance, Hay, Nolan, and Drager (2006a) tested the effect that the presence of a "New Zealander" or "Australian" label had on the perception of the realizations of /ɪ/ by a speaker from New Zealand. Nearly all participants in the experiment said that they knew they were listening to a New Zealander. Despite the listeners' awareness of the origin of the speaker, those that had the "Australian" label were significantly more likely to hear a higher and more fronted vowel, the variant that characterizes Australian speech. In fact, Hay and Drager (2010) found that even the presence of a stuffed koala or kangaroo had an equivalent effect on the perception of the same vowel.

Other studies in this line of research have employed photographs to introduce social information into the listening context. Hay, Warren, and Drager (2006b), for instance, used photos to manipulate the perceived age and socio-economic class of the speaker in a binary forced-choice identification task that tested perceptions of NEAR and SQUARE diphthongs, which are undergoing a merger in New Zealand English. In their study, they found that the presence of any photo significantly reduced the likelihood of error in the completion of the task. The visual manipulation of the age and socio-economic class of the speaker also had an effect on the participants' accuracy. Participants made fewer errors when they believed they were listening to an older speaker, who was expected to keep the diphthongs unmerged. In addition, whenever the perceived social class of the speaker was incompatible with the degree of distinction maintained by the voice participants heard, error rates increased. Finally, Staum Casasanto (2010) employed pictures of African American and Caucasian speakers in a lexical disambiguation task, in order to explore whether the ethnicity of the speaker affected the perception of word-final /t/ and /d/ deletion, a linguistic variant more frequently exhibited by

African American speakers. She found that participants who were shown a photograph of an African American speaker were significantly more likely to believe that the final consonant had been deleted.

The studies summarized above collectively show that, whenever participants are primed with different types of social information about the speaker (whether it be via written labels, objects, or photographs), linguistic perception shifts toward listeners' expectations about the speech of a particular social group. However, social priming is not the only factor that can affect linguistic perception. Characteristics related to the listener can also have an effect on sociolinguistic perception, with some groups of participants being more sensitive to sociolinguistic priming than others. For instance, in another experiment testing the perceptions of TRAP- and DRESS-like vowels, Drager (2011) found that male and female participants responded differently to male and female speakers. While women identified more tokens as TRAP when listening to female speakers, the opposite was true for men, who identified more tokens as TRAP in stimuli recorded by male speakers. In their experiment, Hay et al. (2006b) found that speakers who distinguished between the diphthongs in a same-different task were more sensitive to social priming than those who did not.

To summarize, the findings of the research reviewed in this section clearly show that listeners use different types of social information to classify the linguistic forms they encounter. While these studies have covered linguistic variables that have different degrees of social salience in the communities examined, they have focused primarily on monolingual varieties of English, and the present study expands upon this sociolinguistic perception work in a language variety different from English. Additionally, by examining linguistic variants that originate in a situation of language contact, this study investigates the perception of features that are explicitly stigmatized, allowing us to better understand how existing language attitudes and ideologies affect lower-level sociolinguistic perception of phonetic detail.

2.2 Exemplar theory

The evidence gathered in sociolinguistic perception research has been used to support an exemplar-theoretic approach to sociolinguistic indexing (Docherty & Foulkes, 2014; Foulkes & Docherty, 2006; Goldinger, 1996, 1998; Johnson, 2006; Pierrehumbert, 2001). Because social information has been shown to affect speech processing, a model of speech perception that includes this type of information is necessary. Exemplar theory maintains that speakers store individual tokens of the lexical items they experience. Since each collection of exemplars, or clusters, is formed by individual manifestations of words, they contain information about

inherent linguistic variability. This model is supported by research showing that individuals have detailed memories of the speech they have experienced and that specific characteristics of encountered words are retained in memory (Goldinger, 1996).

Proponents of exemplar-theoretic approaches to social indexing maintain that exemplars index not only phonetic detail, but also social information about the person who uttered them and the context in which they were produced. Speakers, then, create generalizations and analogies based on the particular representations they have of each item. During perception, when listeners hear a new utterance, stored exemplars are activated to different degrees, depending on the acoustic and social similarity to the incoming signal. The activation of a particular social characteristic – via images of the speaker or another method of social priming – biases perception toward linguistic variants that are linked to the perceived social traits of the speaker (Drager, 2011; Hay et al., 2006a; Hay et al., 2006b, Warren et al., 2007).

Exemplars also have different degrees of resting activation in different individuals. For listeners that are familiar with a particular social group, there is a stronger link between specific exemplars and the appropriate social category. This, in turn, might lead to a raised activation level for those memories. In contrast, for listeners that have more sparse exemplars for a social group, social information might not be sufficient to activate the exemplar and, as a result, these participants may rely more on the linguistic signal to categorize it (Hay et al., 2006a, 2006b).

More recent models of linguistic representation have incorporated exemplar weighting. Sumner, Kim, King, and McGowan (2014), for instance, put forward a mechanism that they refer to as “socially weighted encoding.” According to the authors, linguistic representation is not based solely on frequency. Instead, differences in social salience play a fundamental role in the encoding process. Tokens that are socially salient (such as atypical idealized words, words uttered in a formal context or in careful speech, etc.) are afforded more attention, and, as a consequence, carry more weight than the equivalent experience with a typical or non-idealized token. According to the authors, “The result of social weighting is a sparse, high-resolution episodic cluster, which is as easily accessible during lexical access as a dense, low-resolution cluster” (Sumner et al., 2014: p. 8).

Drager (2011) and Drager and Kirtley (2016) suggest that differing weights can also be present in the relationship between a linguistic variable and a social representation. When individuals are more aware of these indices, they receive more weight, resulting in varying degrees of activation when social information is primed. As the authors explain, “When a social exemplar is activated, activation spreads most quickly to phonetic exemplars for which the index has the greatest weights, and vice versa” (Drager & Kirtley, 2016: p. 13). Thus, this model predicts that individuals who are more aware of a sociolinguistic variable or who have

more experience with the variation will be more sensitive to social priming in perception tasks. Drager and Kirtley point out that awareness of a sociolinguistic variable can arise in different ways, including through the salience of a particular form, the existence of sociolinguistic stereotypes, and metalinguistic commentary.

2.3 Final vowels in Asturian Spanish

Asturian and Spanish have been in contact in the Northwestern Spanish region of Asturias since the 14th Century. Although Asturian and Spanish are separate languages (D'Andrés, 2002a; García Arias, 1982; González-Quevedo, 2001; Konvalinka, 1985; Viejo Fernández, 2004), unlike other languages spoken in Spain (such as Basque, Galician and Catalan), Asturian does not have co-official status in the region. In addition, the traditional use of Spanish as the language of the administration, the education system and the media, resulted in its expansion to more communicative contexts, while Asturian became quickly associated with rural life and the social characteristics attached to it. Today, in places like Gijón, the largest city in Asturias and focus of this study, the great majority of speakers are dominant in Spanish.

The traditional stigmatization of Asturian contrasts with the recent development of more positive attitudes toward the language, and the increase in linguistic activism aimed at attaining co-official status. This change was driven primarily by the language normalization efforts that began at the end of the 20th century, including the creation of the Asturian Language Academy in 1980 as the entity in charge of linguistic planning (Viejo Fernández, 2004). Many Asturians today consider the use of Asturian and the incorporation of features from this language an important resource in the construction of regional identity. As compared to a prior survey from 2002, the most recent sociolinguistic survey conducted by Llera Ramo (2017) reports that a higher percentage of Asturians (88%) disagree with the statement that speaking Asturian is speaking incorrectly. In addition, 53% of the people interviewed advocate for the co-official status of the language, a process that would slow down what is otherwise seen as inevitable language death. While public opinion remains divided on this issue, an increased optimism about the future of Asturian has developed in the last decade, with 52% of speakers believing language maintenance is possible.

Asturian Spanish, especially the variety spoken by those who reside in urban areas, is characterized by the variable incorporation of features from the regional language. Among these forms, there are a number of elements that are frequently employed even by speakers that show minimal transfer from the minority language. This study focuses on one of these features, the use of the Asturian masculine singular morpheme /u/.

Asturian /u/ alternates with the Spanish equivalent /o/ in this region, as exemplified in (1) (D'Andrés, 2002b: 25):

- (1) *el perru* (Ast.)
el perro (Spn.) ‘the dog’

The use of the Asturian variant in the urban varieties of the language is a consequence of the borrowing of the corresponding Asturian morpheme; however, it does not occur categorically. Instead, inter-speaker and intra-speaker variation between the Asturian and Spanish morphemes exists. In Barnes (2016a) I examined the distribution of the two final vowels in the speech of 24 speakers from Gijón. I found that, in addition to being constrained by linguistic factors, the alternation between Asturian /u/ and Spanish /o/ was correlated with social variables. The results of a quantitative analysis showed that male speakers were significantly more likely to use the Asturian variant. In addition, speakers who had lower education levels and whose occupation had low prestige also used [u] significantly more than speakers in other education levels and with higher occupational prestige. Finally, among male speakers with low educational levels, the use of the Asturian variant was more likely when they had a first-order social tie with their interlocutor.

In a later study (Barnes, forthcoming), I found that social variables constrain not only the rates of usage of Asturian final [u] in the variety under study, but also the acoustic properties of the two possible final back vowels and the configuration of their respective clusters in the vowel space. The results of this study revealed that younger speakers and women were significantly more likely to produce merged realizations of the two vowels than older speakers, suggesting that these groups of speakers are opting for a realization of a stigmatized variant that is less distinct from [o] and less marked as Asturian. In sum, the analyses of production data revealed that both the alternation between Asturian /u/ and Spanish /o/ and the acoustic properties of these vowels in word-final position are socially constrained.

Using a matched-guise experiment (Barnes, 2015), I tested whether listeners evaluate the social identity of speakers based on the presence of Asturian /u/ or Spanish /o/. The results of this study indicated that there exists a robust association between the use of /o/ or /u/ and urban status. Guises that contained the Asturian variant were given a significantly lower urban score than those that contained the Spanish equivalent. Although significant, weaker effects were found between the manipulation of the variant and other social traits, such as the perceived social status of the speaker, masculinity, and age.

The association of Asturian features with rural status was also apparent in the participants' descriptions of their own speech and in metalinguistic comments made by speakers from Gijón during sociolinguistic interviews. Labels like rural (“de pueblo”, “pueblerino”) and urban (“de ciudad”) were frequently employed in

these characterizations. Finally, despite the evident connection to rural speech, speakers of Asturian Spanish also recognized the solidarity value of using Asturian features to index regional pride. While this position is not generalizable to all speakers, there is a sector of the population in Gijón that adopts Asturian as a way of differentiating themselves from people from outside of the region (Barnes, 2016b). Taken together, these observations support the idea that the use of these variants is strongly connected with locality and the construction of complex place-based identities.

Given the aforementioned results from production and perception data along with the evidence supporting a bidirectional link between social and linguistic information in perceptual research on other linguistic varieties, it is relevant to investigate whether the presence of social information about the speaker conditions final-vowel categorization in Asturian Spanish. Based on the variable's strong connection to urban status, the present study analyzes whether believing that a speaker is from a rural or an urban area affects vowel discrimination. This type of analysis can unveil processes of sociolinguistic indexing that might be overlooked by only considering one side of the bidirectional relationship between social and linguistic information.

3. Methodology

3.1 Experiment design

In order to examine how social priming affects language processing in this particular linguistic variety, I employed a binary, forced-choice identification task. In the experiment, which was distributed online using Qualtrics, participants listened to synthesized productions on a 7-step continuum that ranged from [o] to [u] of the word /gato/, /gatu/ ('cat'). The stimuli were recorded using a Sennheiser HMD280-XQ dual-sided closed-back dynamic headset. The speaker was a 28-year-old male from Gijón, whose speech is representative of the linguistic variety spoken in urban areas of the region, characterized by the alternation between Asturian and Spanish features. The vowel continuum was created using the Akustyk plug-in for Praat (Plichta, 2012). In this process, the first (F1) and second (F2) formant trajectories between [o] and [u] were automatically estimated and resynthesized in 7 steps. The resulting vowel tokens were manipulated so that all vowels had the same duration and, to the extent that it was possible, formant values were equally spaced between steps. Other formant values and the fundamental frequency were kept stable across the 7 steps. Finally, resynthesized vowels were also normalized for peak intensity.

All participants were presented with the same set of auditory stimuli from only one speaker. Written instructions were provided in Spanish, since people from Gijón most frequently identify as speakers of this language.¹ Participants were asked to use headphones, but they did not have to report whether they had used them or not. After reading the instructions and consenting to the experiment, respondents listened to 5 repetitions of each step in the continuum, totaling 35 stimuli that were presented in a different randomized order for each participant. For each audio file, participants were asked to respond to whether they had heard [gato] or [gatu]. Because the manipulation of the final vowel did not alter the semantic properties of the word, standard orthographic representations of the lexical items in Asturian and Spanish were used. The placement of the two buttons on the screen was kept the same throughout the experiment and across participants. A screenshot of the question employed in the identification task is included in Figure 1.

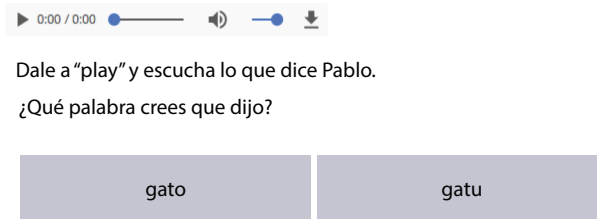


Figure 1. Binary-forced identification task sample question

At the end of the survey, participants responded to a short questionnaire in which they were asked to provide information about their age, gender, education level, their own speech variety, and whether they supported the co-official status of Asturian.

Even though all respondents were presented with the same auditory stimuli, the visual information that they saw varied, using photographs of two men that were in either a rural or an urban setting. Participants were randomly assigned to one of three groups. The first group did not receive any information about the social characteristics of the speaker. For the second group, a photograph of an urban speaker, included in Figure 2, was introduced into the listening context. The third group was presented with a photograph of a rural speaker, included in Figure 3.

1. The exclusive use of Spanish in the instructions could have biased the results, and an experiment that alternates between the two languages would be necessary to determine the extent of this effect.



Figure 2. Photograph of urban speaker



Figure 3. Photograph of rural speaker

The photographs were selected based on my experience as a member of the community under study. In order to assess to what extent the manipulation of urban and rural status via the selected images was successful, a group of 90 participants rated the two photographs in an independent survey, with each participant evaluating only one of the pictures. This group of listeners only rated the pictures and did not participate in the binary-forced identification task. Based on the photographs, respondents were asked to provide an urban status and a masculinity rating on a 1-to-6 Likert scale. They also indicated the perceived age, education level, and place of origin of the person depicted in the photograph.

A total of 44 participants rated the rural photograph while 46 evaluated the urban one. The results of a t-test revealed that respondents rated the person in the urban photograph as significantly more urban (4.70) than the person in the rural photograph (2.43) ($t = -6.80$, $df = 86.79$, $p\text{-value} < 0.01$). However, masculinity ratings (3.39 vs. 3.73) and average perceived age (25.38 vs. 26.84) were not significantly different between the two images. Education levels were transformed into a numeric scale from 1 to 5. The difference in perceived education level between the two photographs was statistically significant, with the person in the urban setting receiving a higher education score (3.85) than the person in the rural image (2.82) ($t = -4.14$, $df = 87.95$, $p\text{-value} < 0.01$). This difference was expected, since there exists an association between rural status and access to education. Finally, the distribution of the assigned place of origin for each photograph shows that the person in the rural image is most frequently perceived as being from a village or from one of the mining areas in the region. In contrast, the perceived origin of the person in the urban photograph is more likely to be one of the two main cities, Gijón or Oviedo.

The results of this independent analysis confirm that the two pictures successfully index urban status and place of origin, in addition to education level, which cannot be untangled from urban status. However, it is important to note that the two photographs depict different individuals and that other factors related to the particular appearance of each person and not tested in this part of the experiment could also have an effect on perception. For instance, McGuire and Babel (2015) found that perceived attractiveness influenced response times in speech processing, but only when the speaker was female.

3.2 Participants

Participants were recruited through local Facebook groups. Respondents that were from Gijón but had moved away more than 10 years ago and those that were from outside of Gijón and had lived in the city for less than 20 years were excluded from participation. A total of 156 participants, 117 women and 39 men whose ages ranged from 18 to 74 years old, participated in the experiment. The majority of participants (140) were from Gijón and were currently living in the same city. One of them was not from Gijón but had resided there for more than 20 years. Finally, 15 participants were from Gijón and had been living elsewhere for 10 years or less. Of all the participants, 49 (31.41%) had a college degree, while 107 (68.59%) did not. Listeners were also asked how they would describe their own linguistic variety: 137 (87.82%) reported to speak either Spanish or a variety that was mainly Spanish with occasional incorporation of Asturian features; 12 (7.69%) of them characterized their speech as half Asturian and half Spanish, and

only 7 (5.49%) self-identified as speaking Asturian or mainly Asturian with occasional incorporation of features from Spanish. Despite the fact that the majority of participants clearly identified their linguistic variety as Spanish, their opinions regarding the co-official status of the regional language were more evenly split. While 73 (46.79%) of them were in favor of Asturian attaining co-official status, 83 (53.21%) were against it. Even though respondents were assigned a category for self-reported speech, the distribution of the data in this variable was too imbalanced to be included in the analysis, so it will not be discussed further. While participant gender was included in the analysis, 75% of the participants were women. Because gender has been found to have an effect on the production and perception of the variable under study, we should bear in mind this imbalance when interpreting any effects of this variable.

Participants were randomly assigned to one of the three groups in order to ensure that not all members of a Facebook group were assigned to the same condition. As a result, the distribution of participants across condition was uneven: 64 listeners responded to the stimuli in the control condition (without any photograph present), 50 were presented with a photograph of a rural speaker, and 45 with an image of an urban speaker. Tables 1, 2 and 3 represent the distribution of participants in the three conditions by age, gender and education, self-reported speech and position toward the co-official status of Asturian, respectively.

Table 1. Distribution of participants in the control condition by age, gender, and college degree, self-reported speech, and position toward co-official status

		18–35		35–50		50 and up		Total
		Women	Men	Women	Men	Women	Men	
College degree	Yes	5	0	11	2	1	1	20 (31.25%)
	No	11	2	19	6	1	5	44 (68.75%)
Total		16	2	30	8	2	6	64
Self-reported speech	Mostly Spanish	13	2	28	6	2	6	57 (89.06%)
	Half and half	1	0	1	1	0	0	3 (4.69%)
	Mostly Asturian	2	0	1	1	0	0	4 (6.25%)
Total		16	2	30	8	2	6	64
Co-official status	In favor	8	1	13	4	2	4	32 (50%)
	Against	8	1	17	4	0	2	32 (50%)
Total		16	2	30	8	2	6	64

Table 2. Distribution of participants in the rural condition by age, gender, and college degree, self-reported speech, and position toward co-official status

		18–35		35–50		50 and up		Total
		Women	Men	Women	Men	Women	Men	
College degree	Yes	6	0	6	1	4	1	18 (36%)
	No	8	4	11	4	4	1	32 (64%)
Total		14	4	17	5	8	2	50
Self-reported speech	Mostly Spanish	13	4	15	5	7	2	46 (92%)
	Half and half	0	0	2	0	1	0	12 (24%)
	Mostly Asturian	1	0	0	0	0	0	7 (14%)
Total		14	4	17	5	8	2	50
Co-official status	In favor	4	2	7	1	3	1	20 (40%)
	Against	10	2	10	4	5	1	30 (60%)
Total		14	4	17	5	8	2	50

Table 3. Distribution of participants in the urban condition by age, gender, and college degree, self-reported speech, and position toward co-official status

		18–35		35–50		50 and up		Total
		Women	Men	Women	Men	Women	Men	
College degree	Yes	5	0	3	3	0	0	11 (26.19%)
	No	6	4	16	2	0	3	31 (73.81%)
Total		41	10	66	18	0	11	42
Self-reported speech	Mostly Spanish	9	4	15	4	0	2	34 (80.95%)
	Half and half	2	0	2	1	0	1	6 (14.29%)
	Mostly Asturian	0	0	2	0	0	0	2 (4.76%)
Total		11	4	19	5	0	3	42
Co-official status	In favor	6	4	7	2	0	1	21 (50%)
	Against	5	0	12	3	0	2	21 (50%)
Total		11	4	19	5	0	3	42

3.3 Statistical analysis

The statistical analysis consisted of a mixed-effects logistic regression model fitted to the responses to the stimuli, built using the *lme4* package (Bates et al., 2016) in R (R Core Team, 2017). The dependent variable was the proportion of /u/ responses by selecting the word *gatu* in the binary-forced identification task, and the independent variables were the following:

- Stimuli: the 7-step continuum from [-o] to [-u], treated as a numeric variable.
- Group: whether the participant was shown a photo of an urban speaker, a rural speaker or no image was introduced into the listening context.
- Gender: gender of the participant.
- Age: Age of the participant, divided into three categories: 18 to 35, 35 to 50, and 50 and up.
- Co-official status: Whether the participant was in favor or against the co-official status of Asturian in the region.
- College degree: Whether the participant had a college degree or not.

In addition to main effects, all two- and three-way interactions were tested. Participant was included as a random intercept.

A random forest was developed using the *party* package (Hothorn et al., 2015) in *R* to evaluate the relative importance of the possible predictors of the dependent variable (Tagliamonte & Baayen, 2012). Once the relevance of the predictors was established, the independent variables were added to the regression model following a stepwise procedure based on the output of the random forest, and nested models were compared using ANOVA.

4. Results

The graph in Figure 4 shows the overall distribution of the responses by stimulus and group. The graph shows a rather clear categorization of the ends of the continuum for all three groups. We can see that step 1 is categorized as /o/ more than 90% of the time and that step 7 is classified as /u/ more than 75% of the time. In general, we also observe that the percentage of /u/ responses is higher in the rural group than in the control group, while a lower percentage of /u/ responses is found in the urban group. Finally, the largest differences in vowel categorization between the groups are observed in steps 4 and 5.

The results of the random forest are included in Figure 5. In the graph, the value on the horizontal axis (variable importance) indicates the impact that each independent variable has in predicting the dependent variable as compared to the rest of the predictors. The output shows that stimulus, group and the participant's position toward co-official status are the most relevant predictors of the choice between *gato* and *gatu*, followed by the respondent's age, whether or not they had a college degree, and gender.

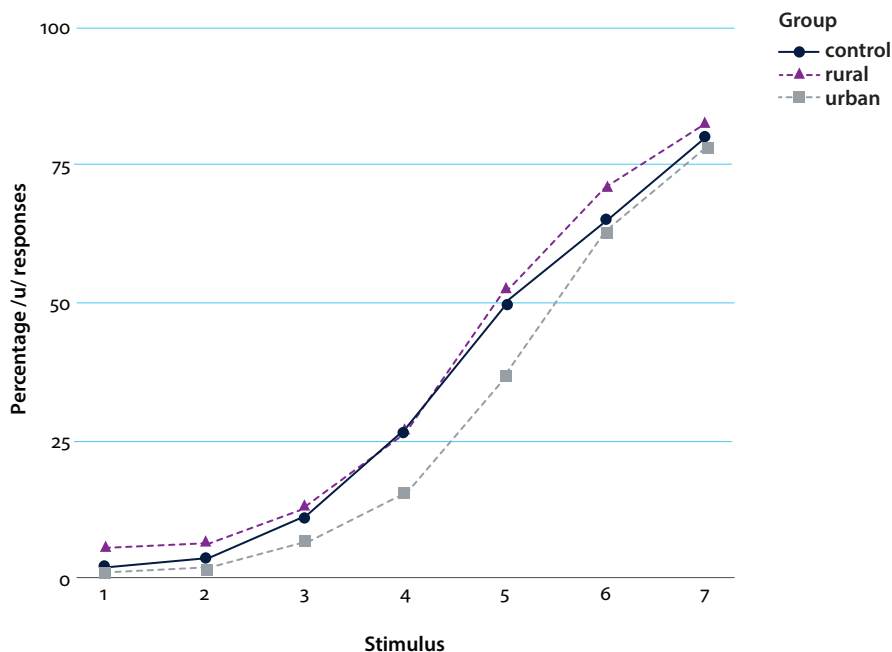


Figure 4. Percentage of /u/ (*gatu*) responses by continuum step and group

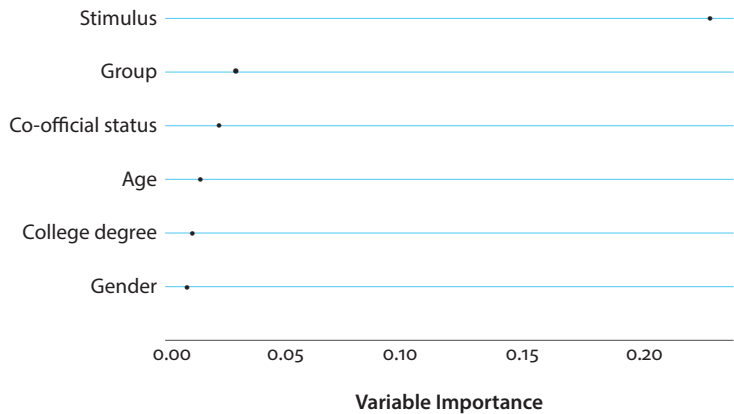


Figure 5. Random forest with predictors of /u/ responses

The mixed-effects logistic regression model yielded a significant main effect of stimulus, and a significant interaction between group and co-official status. The results are included in Table 4. In the model the choice of *gato* (i.e. the identification of the final vowel as /o/) was set as the reference level of the dependent variable. Thus, positive estimates indicate a higher probability of the participant

choosing *gatu* (and identifying the final vowel as /u/) in a particular factor level. The table also includes standard errors (SE), *z* values and *p* values.²

Table 4. Best-fit mixed-effects model of listener responses to the stimuli. Significant factor levels are bolded

	Estimate	SE	z-value	p-value
(Intercept)	-10.67	0.68	-15.77	<0.01
Stimulus	1.88	0.06	30.59	<0.01
Group = rural	0.80	0.85	0.94	0.35
Group = urban	0.95	0.94	1.02	0.31
Co-official status = in favor	1.49	0.83	1.79	0.07
Group = rural : Co-official status = in favor	-0.43	1.27	-0.34	0.74
Group = urban : Co-official status = in favor	-3.24	1.33	-2.45	0.01

The results summarized in Table 4 show that, as expected, the higher the stimulus (the closer to [u]) the more likely participants were to choose *gatu* (and identify the final vowel as /u/). They also show that respondents that were shown a photograph of an urban speaker were significantly less likely to choose *gatu* than those who did not see any visual information during the task. However, this effect was only observed in the group of participants that reported to be in favor of the co-official status of Asturian in the region.

The differential effect that the presence of the urban photograph has on the responses from participants that are in favor of co-official status and the responses from those that are against it is shown in the graphs in Figure 6.

The graph on the left side, which represents the responses given by those that were against the co-official status of Asturian, reveals a similar pattern for the two groups that were presented with a photo during the task. This contrasts with what we see in the graph on the right side, which represents the distribution of the responses provided by those that reported to be in favor of co-official status. In this case, the group that saw an image of an urban speaker elected a lower percentage of /u/ responses for all stimuli.

2. Standard errors (SE) indicate the precision of each coefficient estimate – the smaller the SE the more precise the estimate. The *z* values are the regression coefficient estimate divided by the SE. *Z* values higher than 2 (positive or negative) normally indicate that the regression coefficient is significantly different from 0 and, as a result, the particular variable matters. Coefficients with *p* values lower than 0.05 were interpreted as significant.

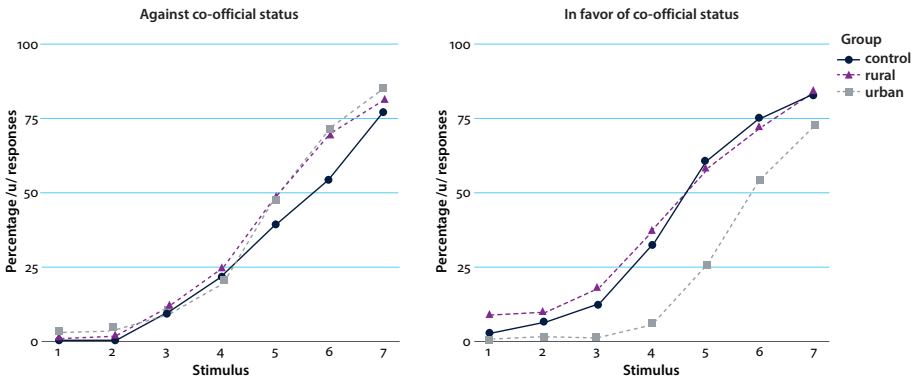


Figure 6. Percentage of /u/ (*gatu*) responses by stimulus, group and position toward the co-official status of Asturian

5. Discussion

Taken together, the results from the random forest and the logistic regression model show that the social information provided about the speaker had a significant effect on the categorization of the vowels examined in this study. As Figure 6 indicates, this effect was mainly observed in cases in which the linguistic signal was ambiguous, but also closer to the [u] than to the [o] end of the continuum. It is expected that listeners rely more heavily on social information when the use of linguistic cues to categorize the sound is not sufficient. Similar observations have been made in previous studies. Drager (2005a), for instance, found the largest differences in vowel classification between groups when the stimulus was ambiguous. In these cases, vowel discrimination depended on the perceived age of the speaker. The same token, step 7 in a 10-step continuum that went from *bad* to *bed*, was classified as *bed* for older male voices and as *bad* for younger ones. This result was consistent with the fact that in the linguistic variety under study young male speakers lead in the raising of TRAP-like vowels. Similarly, in the present experiment, the largest differences between participant groups were observed in tokens 4 and 5, located at the center of the vowel continuum.

The photograph's effect on participants' perception of the stimuli was not identical for all respondents. Rather, it appears that only those who reported to be in favor of Asturian attaining co-official status in the region were sensitive to social priming. The question arises as to why vowel categorization is more likely to be affected by social information for this particular group of participants. In what follows I present possible explanations for the pattern observed.

While 70% of the Asturians interviewed in Llera Ramo (2017) agreed that Asturian or Asturian and Spanish are the languages of the region, only 53% supported the co-official status of Asturian. In this study, the percentage of

participants that are in favor of the co-official status of Asturian is even lower (46.8%). This position normally aligns with more positive attitudes toward the regional language and is frequently held by those speakers that identify the use of the minority language as an important part of Asturian identity. Because for these speakers Asturian has covert prestige, they might be more likely to incorporate Asturian features into their speech. Some studies in sociolinguistic perception have observed that the participants' own production of a linguistic variable affects how they perceive those forms. For example, in their investigation of the perceptions of the merger-in-progress of the NEAR and SQUARE diphthongs in New Zealand English, Hay et al. (2006b) found that the performance of participants who claimed to make a distinction between the two diphthongs was more likely to be affected by the social factors attributed to the speakers they listened to. In their experiment, respondents listened to lexical items that contained the target vowels produced by four speakers that maintained the distinction between the diphthongs, and then selected what word they had heard from the two alternatives presented. The authors found that the group of participants that differentiated between the diphthongs attended more to the distinction when they believed they were listening to an older speaker than when they thought the speaker was young. As a result, they performed more accurately on the task in the former context. However, other studies have noted that production and perception do not always align. Sumner and Samuel (2009), for instance, found that speakers from a particular dialectal variety were capable of processing linguistic variants that were not present in their own production.

If we assume that those who are in favor of Asturian attaining co-official status are more likely to employ word-final [u] (and other Asturian features), we could link their increased sensitivity to the existence of a more robust association between the two vowels and the relevant social categories. However, a significant correlation between the position toward co-official status and self-reported speech (using more Spanish or more Asturian) was not found in the data collected in the experiment. Furthermore, in Barnes (2016a) no correlation was found between the use of Asturian word-final [u] and the position toward the co-official status of the language.³

Instead of attributing this result to differences in the rate of use of [u], the effect may instead arise as an outcome of attitudes toward the status of Asturian and the salience of the contrast between Spanish /o/ and Asturian /u/. In the model of linguistic representation proposed by Drager and Kirtley (2016), the concepts of

3. To determine if there truly is a relationship between the use of Asturian /u/ and the sensitivity to social priming in the perception of the final vowel in this study, it would be necessary to examine the participants' vowel production.

salience and awareness are used to explain why some listeners are more sensitive to social information than others. They explain that, for some individuals, the relationship between social information and phonetic variants might be more salient; i.e. some listeners might be more explicitly aware that certain groups of speakers use a particular linguistic form more frequently. In the case of the population sampled in this study, those who are in favor of co-official status tend to have a more sophisticated understanding of Asturian as a language distinct from Spanish. Consequently, for listeners who are able to identify /u/ as an Asturian feature and /o/ as a Spanish one, the link between the two linguistic forms and the relevant social categories (rural and urban, respectively) might be more salient, making them more aware of the social distribution of this particular phonetic variable. In contrast, people who are against co-official status are more prone to characterize the incorporation of Asturian forms, such as /u/, as mistakes or an incorrect use of Spanish. Listeners who do not connect the presence of word-final /u/ to the influence of the regional language might have a weaker association between the two vowels and urban/rural status. As a result, the latter group of listeners would be more likely rely more on the linguistic signal than on the social information when categorizing the auditory stimuli.

While the exact mechanisms by which they influence linguistic representation are not clear (Drager & Kirtley, 2016), previous studies have shown that attitudes have an effect on phonetic production. For instance, Drager, Hay, and Walker (2010) discovered that, when primed with positive or negative facts about Australia, New Zealanders shifted their vocalic realizations. Thus, in the present study it is possible that the mere existence of positive attitudes toward the use of Asturian features influences perception. One possible explanation is that the existence of negative or positive attitudes toward co-official status may affect the activation or inhibition of phonetic representations indexed as rural or urban.⁴

The results of the experiment also revealed that the effect of social information was only significant when the photograph presented was that of the urban speaker. In contrast, when the stimuli were accompanied by a photograph of a rural speaker, the categorization of the vowel tokens did not significantly differ from the control condition. This result could be attributed to the fact that all the participants in the study were from an urban area. Previous studies have found that social information about the speaker has a stronger effect on linguistic perception when the speaker and the listener belong to the same social group. For

4. It is not clear whether the effect observed in this study should be attributed to a positive attitude toward the Asturian variant or a negative one toward the use of Spanish /-o/ by urban speakers. Further research would be necessary to tease apart these effects and to fully understand the role attitudes play in an exemplar model of sociolinguistic representation.

instance, Hay et al. (2006b) found that participants with a higher socio-economic status performed less accurately on the task when they were presented with the middle-class photograph than when a lower-class image was used. This contrasts with the results obtained for the group of participants with lower socio-economic status, who reported more unmerged diphthongs as the social class of the speaker presented in the pictures increased. The authors attribute this to the fact that, while lower social class individuals are exposed to speech from a variety of social classes through the media, the opposite is not true; i.e. higher-class participants are not equally exposed to the speech of groups with a lower socio-economic status. As a result, for those participants, “speech from a lower class speaker does not provide a sufficient set of appropriately indexed exemplars to perform the task” (Hay et al., 2006b: p. 480). Similarly, in another perception experiment, Drager (2005b [cited in Hay et al., 2006b]) found that working-class participants had faster response times when the stimuli were presented with a working-class photo. Given the results obtained in previous research and the predictions made by exemplar approaches to social indexing, it is not surprising that vowel categorization was affected by social priming when the speaker was from the same background as the participants. In contrast, their exemplars of rural speech might be too sparse for the rural photo to bias perception, leading listeners to rely more on the acoustic signal to categorize the linguistic input.

What is surprising, however, is that the responses of participants in the control condition patterned like those of respondents in the rural group. Since all the participants were from Gijón and the stimuli were recorded by a native speaker from the same city, we would expect respondents in the control condition to assume that the person they heard was from an urban area. Nevertheless, the simple presence or absence of a photograph has been shown to influence perception, which could explain why responses in the control condition differed from the urban condition. For instance, Hay et al. (2006b) observed that the participants’ accuracy in the perception of merged and unmerged diphthongs in New Zealand English improved when a photograph of the speaker was present. Thus, it is possible that the presence of the urban photograph triggered the activation of socially appropriate exemplars (i.e., *gato*) faster than when no social information about the speaker was present, and that, as a result, its presence influenced the perception of the vowels – even if respondents also identified the stimuli in the control condition as uttered by an urban speaker. Another possibility is that the social salience of Asturian /-u/ for this group of participants inhibits the activation of other phonetic cues unless listeners are presented with an urban photograph, which decreases their expectations of the Asturian variant. An analysis that takes into consideration reaction times would be necessary to distinguish between these two possible effects.

6. Conclusions

The results of the experiment presented in this chapter suggest that the social characteristics of the speaker and the listener can affect vowel perception, especially when the phonetic information is ambiguous. In a situation in which historical contact between two languages has led to alternation between variants from each linguistic system, and to their respective association with urban and rural status, the introduction of place-related characteristics into the listening context affects the perception of these forms. The findings offer support for a model of linguistic representation that is experience-based and that directly links social and linguistic information.

This chapter raises important questions regarding the role that linguistic attitudes play in phonetic perception, given that participants that had a favorable position toward Asturian attaining co-official status were also more sensitive to social priming. I argue that this effect is related to differences in the participants' awareness of the link between the two linguistic variants and specific social categories. The observed behavior supports models of linguistic representation that incorporate socially weighted encoding and that take into consideration the effects that salience and awareness have on exemplar activation.

Investigating the sociolinguistic perception of contact variants that are explicitly stigmatized allows us to focus on the role that overt language attitudes have in linguistic representation. While further research is necessary to have a clearer picture of the influence that ideology has in mental representations of linguistic variants and social information, this paper constitutes a first step in that direction.

Despite these contributions, there are some clear limitations that should be acknowledged. The first of them is that participants were only exposed to one condition (one speaker). Future research would need to test whether the effects observed in this study are consistent across different voices and types of speakers, in order to further generalize the results obtained in this experiment. Another drawback is that there was a strong gender imbalance in the distribution of participants. Thus, it is possible that the absence of gender effects was due to the distribution of the data. Finally, while it is clear that the two photographs indexed rural and urban status, because they depicted different individuals, other characteristics might have influenced the respondents' perceptions. A follow-up experiment that tests the effects of attributes like attractiveness and likeability would be necessary to corroborate the results of this study.

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Covert and overt attitudes towards Catalonian Spanish laterals and intervocalic fricatives

Justin Davidson

University of California, Berkeley

Building off a series of matched guise studies focused on attitudes toward native-like (L1) and accented (L2) Spanish and Catalan in Catalonia, Spain (Woolard, 1984, 1989, 2009, 2011; Woolard & Gahng, 1990), this study explores covert and overt attitudes toward two specific phonetic features of Catalanian Spanish, namely lateral velarization and intervocalic /s/ voicing. Catalan-Spanish Barcelonan bilinguals and Madrid Spanish monolinguals (N = 54) completed a matched guise task eliciting covert judgments toward each phenomenon independently. Results from the matched guise, in combination with elicited overt attitudes from sociolinguistic interviews, demonstrate how broader linguistic attitudes and ideologies toward the Spanish language can be comprised from an aggregate set of individual speech variants and the distinct social values afforded to each of them.

1. Introduction

This investigation examines covert and overt attitudes towards the Spanish of Catalonia, a unique variety of Spanish whose history of intense contact with Catalan provides an ideal case study for exploring the confluence of language use, linguistic ideologies, and ultimately, language variation and change in a multilingual community. Sociolinguistic treatments of Catalan-Spanish bilingualism traditionally center either on the contact features present in each language (cf. Arnal, 2011; Boix i Fuster & Vila i Moreno, 1998; Seib, 2001; Vann, 2001; Wesch, 1997) or on speakers' negotiation of Spanish and Catalan identities through language use and attitudes toward them (cf. Newman, 2011; Newman, Trenchs-Parera, & Ng, 2008; Trenchs-Parera & Newman, 2009; Vann, 1999, 2000, 2002; Woolard, 1984, 1989, 2009, 2011; Woolard & Gahng, 1990). I build upon these lines of investigation, combining frameworks of dialectology and linguistic anthropology respectively,

by empirically linking language attitudes towards specific linguistic features of Catalanian Spanish, and in so doing I demonstrate how broader linguistic attitudes and ideologies (i.e., towards languages) can be comprised from an aggregate set of individual speech variants and the social values afforded to each of these variants.

Adopting an expanded form of the Matched Guise Technique (cf. Lambert, 1967; Lambert, Hodgson, Gardner, & Fillenbaum, 1960), I empirically analyze covert attitudes towards variants of two of the most renowned phonetic variables of Catalanian Spanish (Casanovas Català, 1995: p. 56), both ascribed to Catalan influence, that are likely differentiated by degree of explicit awareness and may index distinct social meanings. The first, namely the velarization of alveolar /l/ to dark [ɫ] (e.g., *al parque* [aɫ.pár.ke] ‘to the park’), was characterized by Sinner (2002, p. 163) as the only phonetic feature of Catalans’ Spanish that speakers outside of Catalonia had explicit awareness of, whereas the second, namely the voicing of intervocalic voiceless /s/ to [z] (e.g., *los años* [lo.zá.ɲos] ‘the years’), showed no such overt awareness outside of Catalonia. By combining covert attitudinal data with overt metalinguistic commentary on these speech features and Catalanian Spanish as a whole, I argue that velarized [ɫ] and intervocalic [z] respectively evidence a linguistic stereotype and indicator (cf. Labov, 2001), and propose that the distinct social values associated with each variant can account for their differential use and evaluation in the diverse community of Spanish-Catalan bilinguals in Catalonia.

This paper is structured as follows: Section 2 consists of a review of research concerning the evolution of linguistic attitudes of the Catalan-Spanish community and the phonetic variables presently under examination. Section 3 discusses my research questions and hypotheses with respect to the analysis of covert and overt attitudes towards Spanish [ɫ] and intervocalic [z]. Section 4 details the experimental methodology and test instruments. Section 5 discusses data analysis techniques and results from data collection. Section 6 offers a discussion of the results of the present study. Lastly, I conclude in Section 7 by offering directions for future study.

2. Linguistic attitudes and speech features in Catalonia

2.1 Matched guise studies in Catalonia

In order to contextualize the study of linguistic attitudes in the Catalan-Spanish community, it is necessary to briefly detail the history of each language’s presence and status there, which can generally be organized into four periods of unique language dynamics. First, until the union between Catalanoaragonese and Castilian kingdoms in 1469, Catalan was the common and by all practical considerations, the only and national language of the former’s territories (Vallverdú, 1984: p. 19).

The second period, from the formation of the Spanish Crown in 1469 and until the early 20th century, is marked by a very gradual introduction of diglossia and eventual Catalan-Spanish bilingualism in society, with Spanish being acquired initially only by ruling classes and intellectuals, and the popular classes and bourgeoisie remaining effectively monolingual in Catalan (Vallverdú, 1984: p. 20). Spanish only began to assume the role of the H language¹ (cf. Ferguson, 1959; Fishman, 1967) after the 1714 Ordinance of New Plant, legislation that suppressed all institutions and privileges of territories formerly part of the Catalanoaragonese Kingdom, and saw considerably accelerated and more widespread societal acquisition after the Moyano Law of 1857, which imposed compulsory public education in Spanish (Vila-Pujol, 2007: pp. 62–63). The period from 1914 to 1975 is marked by considerable shifts in language status, with Catalan at first reclaiming its H status during nationalist political uprisings (*Mancomunitat* from 1914 to 1925 and *Generalitat* from 1931 to 1939) that brought about a powerful cultural revival of Catalan (Turell Julià, 2000: pp. 46–47). The end of the Spanish Civil War in 1939, however, marked the start of a brutal subjugation of Catalan, which was stripped of official status and publicly outlawed under the fascist and oppressive military regime of General Francisco Franco until his death in 1975. The final and current period of Spanish democracy, marked by the restoration of the Catalan Generalitat in 1977 and a national Constitution in 1978, is one in which Spanish is notably the only official national language of Spain, whereas Catalan, Basque, and Galician are permitted to be co-official alongside Spanish in the particular Autonomous Communities that choose to grant them co-officiality (Vila-Pujol, 2007: p. 68). Linguistic census data from 2013 shows that efforts to revitalize Catalan in Catalonia have been largely successful, with estimates of capacity for understanding, speaking, reading, and writing Catalan at over 94%, 80%, 82%, and 60% respectively, and more than 600,000 L1-Spanish speakers reporting Catalan as their habitual language (Institut d'Estadística de Catalunya, 2014).

Shortly after the reinstatement of the Generalitat in 1977, when the acquisition of Catalan by non-native speakers was still in its incipient stages,² Woolard (1989: pp. 38–39, as cited in Vann, 2007: pp. 254–255) argues that the creation and expression of Catalan or Spanish identity was principally mediated (i.e., alongside

1. 'High' (H) language varieties are those that are afforded greater social prestige or linguistic capital than 'low' (L) varieties, which exemplify a more oral vernacular used in less formal settings.

2. More than two million non-Catalonian immigrants moved to Catalonia between the years of 1950 to 1975, such that by the late 1970s, over 42% of the population of Catalonia ages 6 and older were Spanish immigrants (Arnal, 2011: p. 13, p. 23; Gifreu, 1983: p. 298; Strubell i Trueta, 1984: p. 92; Woolard & Gahng, 1990: p. 314). Fewer than half of all non-Catalonian immigrants learned to speak or write in Catalan after 1950 as a result of the prohibition of Catalan until Franco's death in 1975 (Vallverdú, 1991: p. 21).

birthplace, descent, and sentiment) by language use: “As a Catalan is one whose native and habitual language is Catalan, so a Castilian is a person whose native and habitual language is Castilian.” The emphasis on habitual language use and indeed the mere ability to speak Catalan as foundations of Catalanian identity, reflect a real linguistic divide in the Catalan-Spanish community during the 20th century: “[w]hereas almost all Catalan speakers are bilingual in Castilian, the majority of Castilian speakers in Catalonia at the time of autonomy were monolingual or only passively bilingual” (Woolard & Gahng, 1990: p. 314). Accordingly, attitudes toward language use in the early 1980s were found to reflect this stark boundary between Spanish and Catalan identities.

Woolard (1984, 1989) conducted a matched guise experiment in Barcelona in 1980, repeated seven years later by Woolard & Gahng (1990), and repeated yet again in 2007 (Woolard, 2009, 2011) in which hundreds of high school students evaluated target guises, half dominant in Spanish and half dominant in Catalan, reading a mathematics text in Spanish and Catalan. With respect to solidarity attributes including “likeable,” “amusing,” “has a sense of humor,” “open,” “attractive,” and “generous,” in 1980 “...listeners rewarded linguistically identifiable co-members of their ethnolinguistic group for using their own language, and penalized them with significantly lower solidarity ratings when they used the out-group language” (Woolard, 2009: p. 133). In other words, as all listeners could detect which guises were Spanish-dominant and which were Catalan-dominant (presumably based on salient auditory cues in Catalan-accented Spanish and Spanish-accented Catalan), Spanish-dominant listeners preferred the Spanish-dominant guises speaking in Spanish over Catalan, whereas Catalan-dominant listeners preferred Catalan-dominant guises speaking in Catalan over Spanish. This result can be understood as a preference for hearing unaccented or native-like Spanish or Catalan over L2- (accented) Spanish or Catalan. While neither listener group showed considerable differences in ratings between the languages of out-group guises (i.e., Catalan-listeners were unaffected by which language they heard Spanish-dominant speakers use, and Spanish-dominant listeners were unaffected by which language they heard Catalan-dominant speakers use), it was additionally noted that Spanish-dominant listeners particularly disapproved of Spanish-dominant guises speaking in Catalan, interpreted as a kind of ethnolinguistic group betrayal (Newman et al., 2008: p. 309; Woolard & Gahng, 1990: p. 315).³

3. Newman et al. (2008: p. 309) argue that this ‘linguistic betrayal’ was only available for Spanish-dominant listeners as a reflection of the asymmetric bilingualism in society. Since most Spanish-speakers were monolingual, their use of Catalan implied a shift from monolingualism to bilingualism. The same could not be said for Catalan-speakers, who were already bilingual in Catalan and Spanish.

By 1987, however, although the preference for unaccented speech was still found for both listener groups, two noticeable differences in solidarity trends were found. First and foremost, Spanish-dominant listeners no longer severely penalized Spanish-dominant guises for speaking in Catalan. Second, Catalan-dominant listeners were no longer indifferent to the language production by Spanish-dominant guises, and awarded higher solidarity ratings for the (L2) Catalan usage. These changes were interpreted as the beginning of a breakdown of the ethnolinguistic boundary that had previously discouraged Catalan usage by Spanish-dominant speakers as reflected in the poor solidarity ratings by Spanish-dominant listeners and the ambivalent ratings by Catalan-dominant listeners (Woolard, 2009: p. 133; Wooland & Gahng, 1990: p. 315). In other words, by 1987, the use of Catalan by Spanish-dominant speakers was no longer ostracized by Spanish-dominant listeners, and was in fact favorably perceived by Catalan-dominant listeners, suggesting that the adoption of Catalan in habitual use by Spanish-dominant speakers was at last perceived positively in the (youth) community.⁴

In 2007, solidarity scores between the two languages were not distinct for any of the listener groups. In other words, the use of Catalan or Spanish no longer affected how listeners assigned solidarity attributes for each guise, suggesting that listeners no longer preferred guises to use one language instead of the other. The lack of a preference (or perhaps more importantly, the lack of a penalty) for a speaker to use Catalan or Spanish represents the final stage in the loosening of the link between language and ethnolinguistic identity, as the use of Spanish or Catalan is no longer viewed as a fixed or nonflexible component of one's ethnolinguistic identity: "The division in Catalan versus Spanish identities and ideologies is [no longer] based on habitual choice of language" (Vann, 2007: p. 264). The results across all three studies are perhaps best summarized succinctly by Woolard (2009: p. 147):

Language affiliations are viewed by these young people even more than those in past years as the exercise of options, as stylistic choices that individuals can and do make, rather than as enduring essential characteristics. [...] Overall, these findings show that there is increased bilingualism, a broadened acceptance of the Catalan language, and an accompanying expansion of Catalan identity among these young people compared to their counterparts of twenty years ago.

4. Shortly thereafter, Sanz i Alcalà (1991: p. 125, pp. 134–135) obtained corroborating results for a similar matched guise study on Spanish with Barcelonan youth (ages 17–18) speakers, in that nearly half of listeners (49%) could not tell the difference between the Catalan-dominant and Spanish-dominant guises in Spanish, although Catalan-dominant listeners awarded higher solidarity scores to the Catalan-dominant guises.

Given the current state of widespread bilingualism in Catalonia as evidenced in the aforementioned linguistic census statistics, which substantiate Arnal's (2011: p. 15) claim that "...Catalan ha[s] ceased to be a language reserved exclusively for internal use by the group of native Catalan speakers, and ha[s] been adopted for habitual use at work or with friends by some speakers whose first language [i]s Spanish," it follows that the absence of disdain for L2- (accented) speech found in Woolard's 2007 study can be interpreted as indicative of the acceptance of active Catalan-Spanish bilingualism. In fact, using a similar matched guise methodology in 2006, Newman et al. (2008) found that non-native guises (i.e., Spanish-dominant speakers using Catalan and Catalan-dominant speakers using Spanish) were rated higher in solidarity attributes than native guises. Newman et al. (2008), Trenchs-Parera & Newman (2009), and Newman (2011) describe this preference as *linguistic cosmopolitanism*, linking it to a modern ideology supportive of bilingualism and language transfer: "Linguistic Cosmopolitans support multilingualism as a marker of acceptance of the ethnolinguistically heterogeneous society that they value. For people holding this ideology, the in-group/out-group dynamic breaks down because they do not see group membership as a proper motive for assessing social attractiveness" (Newman, 2011: p. 41). Accordingly, the acceptance of (and even the preference for) active bilingualism by both native speakers of Catalan and native speakers of Spanish underpins one of the more modern and currently prevalent linguistic ideologies in Barcelona and Catalonia more generally.

As previously mentioned, in all of these matched guise research lines, the dominant language of particular target guises was presumably ascertained on the part of participants by the presence of L1-like or L2-like acoustic features in each of Spanish and Catalan. While this broader focus on an aggregate presence of speech features more closely approximates natural Spanish and Catalan speech, it cannot link participants' attitudes towards specific speech variants, which may be differentially evaluated despite their persistent co-occurrence in real speech. For example, while Catalan-accented Spanish may be generally evaluated positively within the Catalan-Spanish community, it may be the case that these evaluations are more strongly associated with certain speech variants more than others, or that while some (or even a majority) a speech features are judged positively, others nonetheless are evaluated negatively. Moreover, it is unclear which particular speech features are salient and overtly recognizable by speakers and which remain beneath conscious or explicit awareness. In order to answer these questions, which shed light on the relationship between individual speech features and the evaluation of their aggregate whole (i.e., a linguistic variety), in the present study I more narrowly focus on attitudes towards the specific speech variants of two phonetic variables, which I detail in the following subsection.

2.2 Laterals and intervocalic fricatives in Spanish and Catalan

Two Spanish phonetic features frequently ascribed to contact with Catalan are the velarization of the voiced alveolar lateral /l/ to dark [ɫ] and the voicing of the voiceless alveolar fricative /s/ to voiced [z] in intervocalic contexts (Badia i Margarit, 1964: p. 152; Pieras, 1999: pp. 212–213; Serrano Vázquez, 1996: pp. 378–379; Vann, 2001: p. 124; Wesch, 1997: p. 296, p. 298). Prescriptive characterizations of (monolingual) Spanish and Catalan, with respect to alveolar lateral production, distinguish the former as exclusively exhibiting a non-velarized or light (or clear) [l], articulated by creating a tongue-tip occlusion at the alveolar ridge while maintaining a non-obstructed airstream around the side(s) of the tongue (Dalbor, 1997: p. 251; Hualde, 2014: pp. 177–178; Morgan, 2010: p. 331; Navarro Tomás, 1918: p. 88; Schwegler, Kempff, & Ameal-Guerra, 2010: pp. 297–299). Catalan, on the other hand, is characterized as exclusively exhibiting a velarized or dark [ɫ], articulated with an additional constriction of the tongue body toward the velum (Badia i Margarit, 1984: pp. 103–104; Hualde, 1992: p. 373, p. 396, 2014: p. 178; Prieto, 2004: p. 204; Wheeler, 2005: p. 34).

With regard to intervocalic fricative production, prescriptive characterizations of (monolingual) Northern-Central Peninsular Spanish note the exclusive presence of voiceless apical-alveolar [s] (from a single voiceless alveolar fricative phoneme /s/), articulated with a gesture of the tongue-tip toward the alveolar ridge (Dalbor, 1997: p. 225; Hualde, 2014: pp. 147–148, p. 155; Martínez Celdrán & Fernández Planas, 2007: p. 110; Morgan, 2010: p. 248; Navarro Tomás, 1918: p. 83; Schwegler et al., 2010: p. 171). Catalan, on the other hand, is claimed to feature voiced apical-alveolar [z] in intervocalic contexts: syllable-initially, /s/ and /z/ contrast phonemically, resulting in minimal pairs such as *pesar* [pə.zá] ‘to weigh’ and *passar* [pə.sá] ‘to pass,’ whereas word-finally, these phonemes neutralize and yield voiced [z] via regressive voicing assimilation, as evidenced by *gos* [gós] ‘dog’ and *gos aquí* [gó.zə.kí] ‘dog here’ (Bonet & Lloret, 1998: pp. 118–119; Hualde, 1992: pp. 371–372, pp. 393–394; Prieto, 2004: p. 208; Wheeler, 2005: pp. 147–149, p. 162).⁵

The selection of these particular speech features, beyond their characterization as “*los dos rasgos más sobresalientes de las producciones fonéticas en el español de un catalanohablante* (the two most prominent features of the phonetic production of Spanish by a speaker of Catalan)” (Casanovas Català, 1995: p. 56), is additionally motivated by a likely difference in their social evaluation and degree

5. Word-final intervocalic fricative voicing in Catalan can produce some minimal pair phrases, such as *les oques* [lə.zó.kəs] ‘the geese’ and *les soques* [lə.só.kəs] ‘the logs’ (Arnal, 2011: p. 19), and *les ales* [lə.zá.ɫəs] ‘the wings’ and *la sales* [lə.sá.ɫəs] ‘2.sg. salt it’.

of overt awareness. Sinner (2002) conducted 52 interviews with Barcelonan Catalan-Spanish bilinguals and Madrid Spanish monolinguals regarding phonetic, morphological, and syntactic features of Catalanized Spanish of which they were aware, as well as their opinions on the Spanish of Catalan speakers. In contrast to [z], only named by Barcelonan bilinguals, both Madrid monolinguals and Barcelonan bilinguals named [ɸ], one of only two features (the other being the use of definite articles such as *el* or *la* before given names [e.g., *la Sofía, el Marcos*]) of which speakers were overtly aware outside of Catalonia. Madrid speakers reported knowledge of [ɸ] from television and radio shows that parodied Catalans and their Spanish. Moreover, Madrid interviewees commented that Catalans use less Spanish vocabulary than other Spaniards, and that their Spanish is of a poorer quality than that of other Spaniards, describing it as “*muy de pueblo, muy raro*” ‘much like from the countryside, very strange,’ “*una pronunciación dura, áspera*” ‘a harsh, rough pronunciation,’ and “*feo, nada bonito, muy agresivo, [sin] la gracia que tiene el español de aquí*” ‘ugly, not pretty at all, very aggressive, without the elegance of the Spanish here’ (Sinner, 2002: p. 165). Barcelonan interviewees admitted to feeling an overt obligation to correct or adjust their Spanish pronunciation when speaking in public, and described Catalans’ Spanish as “*rústico*” ‘rustic’ (Sinner, 2002: p. 166).

It is possible that the aforementioned negative evaluations of Catalans’ Spanish, at least on the part of Madrid interviewees, principally reflect the use of [ɸ], since this was the only pronunciation that they overtly named. Such a hypothesis finds corroboration in characterizations of [ɸ] in the Spanish of Palma de Majorca as a linguistic stereotype, in that youth and female speakers were found to avoid [ɸ] in comparison to older and male speakers, accounted for by an overt stigma associated with [ɸ] as indexing rurality, old age, and low social class (Pieras, 1999; Simonet, 2010a, 2010b). The present study shall resolve this question with attitudinal data targeting each of [ɸ] and [z] individually, and provide insight as to whether or not explicit awareness of these features and attitudes towards Catalans’ Spanish in general have changed since Sinner’s (2002) earlier work, especially as related to linguistic cosmopolitanism (cf. Newman, 2011; Newman et al., 2008; Trenchs-Parera & Newman, 2009).

3. Research questions and hypotheses concerning Catalans’ Spanish [ɸ] and [z]

In order to assess attitudes toward Catalanian Spanish and specific phonetic features that comprise it, this study puts forth the following three research questions:

- RQ1 What covert attitudes are linked to the production of Catalanian Spanish /l/ as either [l] or [ɫ]?
- RQ2 What covert attitudes are linked to the production of Catalanian Spanish intervocalic /s/ as either [s] or [z]?
- RQ3 What overt attitudes are linked to Catalanian Spanish /l/ production, /s/ production, and Catalanian Spanish as a whole?

Sinner (2002: pp. 165–166) reported that attitudes towards Catalanian Spanish were generally negative, and thus I may find that both [ɫ] and [z] are disfavored over [l] and [s], with the former variants indexing uneducated, rural, incorrect, or generally unpleasant-sounding speech. However, since lateral production (as [ɫ]) was the only phonetic feature of Catalanian Spanish identified by speakers within and outside of Catalonia, it is possible that negative evaluations of [z] production may simply be absent altogether, or if present, be exclusively covert, whereas (negative) evaluations of [ɫ] may be both covert and overt.

Alternatively, at least with respect to the attitudes of Catalan-Spanish bilinguals, it is possible that neither [ɫ] nor [z] production is afforded negative social value, and instead is even evaluated positively. Matched guise research by Woolard (2009, 2011), Newman et al. (2008), Trenchs-Parera & Newman (2009), and Newman (2011) suggest that Catalan-accented Spanish is nowadays esteemed favorably by Catalan-Spanish bilinguals, indicative of a preference for active bilingualism or linguistic cosmopolitanism in which language transfer phenomena index a modern, communal bilingual identity. Accordingly, attitudes towards [ɫ], [z], and Catalanian Spanish in general may vary according to the bilingual status of the listener, resulting in (more) favorable judgments by Catalan-Spanish bilinguals and less favorable evaluations by monolingual outsiders from Madrid. Furthermore, it is also possible for positive evaluations of Catalanian Spanish to exist alongside negative evaluations towards specific speech features of Catalanian Spanish (such as [ɫ]), which would suggest that global attitudes towards speech varieties reflect a complex amalgamate of feature-by-feature attitudes.

4. Experimental methodology

4.1 Matched guise

In order to indirectly elicit social evaluations of [ɫ] and intervocalic [z] in Catalanian Spanish, I implemented a matched guise experiment (cf. Lambert, 1967; Lambert et al., 1960) that targeted each phonetic variable (/l/ and /s/) individually, allowing for comparisons between the two. As will be detailed, participants heard two pairs

of target guises, namely one with exclusively [ɫ] and one with exclusively [l], as well as one with exclusively [z] and one with exclusively [s]. The lateral pair of guises (i.e., [ɫ] vs. [l]) had no tokens of word-final intervocalic /s/, and in parallel the fricative pair of guises (i.e., [z] vs. [s]) contained no laterals whatsoever, permitting a more independent evaluation of the covert social values afforded to the variants of each variable. Notably, this appropriation of the matched guise technique (following Campbell-Kibler [2007] and Barnes [2015]) elicits attitudes specifically towards variants of /l/ and /s/, in contrast with previous studies in Catalonia (cf. Newman, 2011; Newman et al., 2008; Woolard, 1984, 1989, 2009, 2011; Woolard & Gahng, 1990) that focused on attitudes towards monolingual-like Spanish and Catalanian (or Catalan-accented) Spanish more globally, without reference to any particular speech feature. Moreover, with respect to the exclusive focus on word-final intervocalic contexts for /s/, the rationale is two-fold. First, since lateral velarization is strictly phonetic, the word-final context for intervocalic /s/ allows for a more uniform comparison of phonetic phenomena, since the syllable-initial context for intervocalic /s/ is a site of phonemic contrast in Catalan. Second, [z] production outside of the word-final intervocalic context has been shown to be extremely infrequent if not categorically absent in Catalanian Spanish compared to the word-final intervocalic context (e.g., 42% word-finally vs. 0% syllable-initially [Davidson, 2015: p. 135]), and thus a focus on word-final contexts more accurately represents natural speech.

4.1.1 *Guise stimuli*

Two target reading passages (see Appendix A) were created, namely a lateral passage and a fricative passage, respectively featuring 10 instances of /l/ or word-final intervocalic /s/ and 0 instances of word-final intervocalic /s/ or /l/. The passages were of uniform length (respectively 80 and 78 words long), were roughly 29 seconds long when read aloud, featured the target phoneme as roughly 3% of the total phonemes in each, and were neutrally themed. Though /l/ (in the lateral passage) and intervocalic /s/ (in the fricative passage) each appear in a variety of unique linguistic contexts, approximating their actual (heterogeneous) distribution in more natural speech, the majority of lateral and intervocalic fricative tokens nonetheless appear in linguistic contexts that have been found to favor (respectively) velarization and voicing, so that the eventual use of exclusively [ɫ] or [z] in each passage could more closely approximate natural speech (i.e., even if a half-minute of natural speech does not typically exhibit exclusively [ɫ], the most probable occurrence of a string of exclusively [ɫ] realizations of /l/ would be one with phonological contexts that condition velarization the most). To this end, following Davidson (2012, 2014, 2015), at least half of the laterals (in the lateral passage) appear word-finally and in the context of a preceding non-front vowel

and following velar consonant or pause, whereas at least half of the word-final intervocalic fricatives (in the fricative passage) appear in the context of at least one unstressed adjacent vowel.

The two target reading passages were spoken by a trained, Catalan-Spanish bilingual female phonetician (L1-Catalan) in her twenties, instructed to read each as naturally (i.e., casually) as possible while adhering as much as possible to standard Spanish, monolingual-like norms, in an audiometric soundproof booth.⁶ These two recordings, henceforth referred to as the lateral and fricative templates, served as the base recordings onto which uniformly velarized or non-velarized and uniformly voiced or voiceless target phones would be spliced, creating two identical lateral passages except for the ten /l/ tokens spliced in, and two identical fricative passages except for the ten /s/ tokens spliced in. Accordingly, the goal was to obtain template passages of /l/ and intervocalic /s/ that, ignoring these two features, exhibited as few (if any) features of Catalan-accented speech as naturally possible, such that ideally only differences in /l/ and /s/ production would substantiate different covert judgments for each guise on the part of listeners.

In order to obtain tokens of [ɫ], [l], [z], and [s] to splice onto the lateral and fricative templates, the lateral passage and fricative passage were read aloud several more times as monolingual-like as possible and as Catalan-accented as possible. Ten tokens each of [ɫ] and [z] were sought out in the Catalan-accented renditions, whereas tokens each of [l] and [s] were sought out in the monolingual-like renditions and individually segmented out in Praat (Boersma & Weenink, 2018), taking additional care to select tokens that appeared in words and phrases with pitch contours that were maximally similar to those in the template recordings in order to best facilitate natural-sounding splicing.

The identification of discretely velarized or non-velarized laterals, as well as discretely voiced or voiceless fricatives, is a somewhat complicated endeavor. Both lateral velarization and fricative voicing are most often considered gradient

6. The first decision to be made regarding speech stimuli in any matched guise task is whether to record spontaneous speech or record speech read from a text designed by the researcher, as is traditionally done in matched guise research. The former option avoids confounds of read vs. natural speech (pertaining to discernable differences in prosody, speech rate, length and placement of pauses in read speech [Campbell-Kibler, 2006: p. 83]), whereas the latter option allows the researcher to have substantially greater control over the contexts in which linguistic variables occur, eliminate differences in word-choice and passage length between guises, and incorporate neutral, non-topically-biased speech content. Ultimately, my decision to record read speech reflected the need to ensure that the linguistic phenomena under study were mutually exclusive in guise stimuli. Moreover, the stimuli were first presented to 5 native, non-linguist speakers of Spanish to elicit comments on their naturalness, none of whom remarked that any sounded unnatural or strictly read.

phenomena, measured respectively on a continuous scale of second formant (F2) values (inversely related to velarization degree) or a continuous scale of percentage of segment duration with voicing (cf. Chappell & García, 2017; Gradoville, 2011; Recasens, 2004, 2012; Recasens & Espinosa, 2005; Recasens, Fontdevila, & Pallarès, 1995; Romero, 1999; Simonet, 2010a, 2010b; Torreira & Ernestus, 2012). Still, velarization and voicing thresholds have been reported with some frequency in the literature, likely reflective of a speaker's categorical (and cross-linguistic) perception of a lateral as either light or dark or of a fricative as either voiced or voiceless (Proctor, 2009: p. 62). For laterals, by far the most common threshold reported (calculated from Central Catalan and Spanish laterals) is that of approximately 1500hz, such that the F2 of a prototypical [ɫ] is below 1500hz, whereas the F2 of a prototypical [l] is above 1500hz (Martínez Celdrán & Fernández Planas, 2007: p. 136; Quilis, 1981: p. 276; Recasens, 1986: p. 95, 102; 1996: p. 65; 2004: p. 600; 2014: p. 178; Recasens & Espinosa, 2005: p. 3, p. 6; Recasens et al., 1995: p. 42). Other characterizations of light and dark laterals in Catalan and Spanish do not stray particularly far from this 1500hz threshold. For instance, Pieras (1999: p. 220) and Recasens (1991: p. 306, 2012, p. 369) both characterize [l] as exhibiting an F2 of at least 1500hz, whereas [ɫ] typically exhibits an F2 of roughly 1000 to 1200hz. These F2 boundaries were in fact found to accurately reflect Spanish alveolar lateral production by Barcelonan bilinguals in Davidson (2014, p. 232), wherein F2 values were most commonly either above 1500hz or below 1200hz. Accordingly, for the present methodology, individual /l/ tokens were identified as light or dark (as a relative opposition, akin to 'lighter' [l] and 'darker' [ɫ]) if they exhibited an F2 value greater than 1500hz or less than 1200hz, respectively. The average F2 of the 10 selected [l] tokens was 1681hz, whereas the average F2 of the 10 selected [ɫ] tokens was 1048hz. This constitutes an average difference in F2 (between what I am considering as dark and light laterals) of over 600hz, or more than double the 300hz distance reported in the aforementioned Catalan and Spanish research. Accordingly, though I am not presently claiming a categorical threshold between [ɫ] and [l], the laterals I shall henceforth consider as [ɫ] or [l] show a substantial average F2 difference between them, more than enough to be perceived as acoustically distinct by listeners and thus treated by them as discrete examples of a dark [ɫ] and a light [l].

In parallel, for Spanish fricatives, voicing thresholds to distinguish [z] from [s] are relatively common in the literature. Campos-Astorkiza (2014: pp. 21–23) found that the majority of Spanish /s/ productions observed exhibited voicing durations of either less than 20% ([s]) or greater than 90% ([z]) of the segment's duration, whereas Davidson (2015: p. 131) observed the majority of /s/ productions produced by Catalan-Spanish bilinguals to exhibit voicing durations of less than 30% or greater than 60%. Others, such as Schmidt & Willis (2011: p. 6) and

Escalante (2016: p. 34), have identified fixed thresholds of 60% voicing duration and 50% respectively, whereas Hualde and Prieto (2014: p. 8), Torreira and Ernestus (2012: p. 136), and Chappell and García (2017: p. 17) focus on tokens with 100% voicing duration, namely irrefutable cases of Spanish (and/or Catalan) [z]. Though I applied the threshold of 30% and 60% observed for Catalan-Spanish data by Davidson (2015) for the present identification of [z] and [s] productions, it should be noted that the average voicing duration of the 10 selected [s] tokens was 11% in comparison to the average voicing duration of the 10 selected [z] tokens, which was invariably 100%. This constitutes an average difference in voiced segment duration between /s/ tokens considered to be voiceless and voiced of nearly 90%, consistent with all of the previously reported thresholds and more than enough to be perceived as acoustically distinct by listeners and treated by them as examples of a voiced [z] and a voiceless [s].

Once the 40 fricatives and laterals (10 of each type) were identified and removed from their original contexts, they were spliced onto the templates to create the four target guises (i.e., one with 10 [ɬ] tokens vs. one with 10 [l] tokens, and one with 10 [z] tokens vs. one with 10 [s] tokens). As for the splicing of laterals, following Campbell-Kibler (2006, pp. 88–89), I identified boundary points by using an adjacent pause, stop closure, or stable point in a sonorant. As for the splicing of fricatives, I manually marked left and right boundaries for each /s/ segment by using both the waveform and spectrogram to respectively find the zero-intercept in the waveform closest to the first and last signs of aperiodic noise in the spectrogram (cf. Campos-Astorkiza, 2014: p. 21; Erker, 2012: pp. 56–57; File-Muriel & Brown, 2011: pp. 227–228; Schmidt & Willis, 2011: p. 6). For all splices, audible changes in intensity, segment duration, and/or pitch (in comparison with the original /l/ and /s/ productions of the templates themselves) were manually adjusted to restore natural sounding speech. Beyond these global adjustments, two additional modifications were performed. First, for laterals, a minority of spliced [l] tokens and a majority of spliced [ɬ] tokens were unable to be directly inserted into the template and remain natural-sounding due to a lack of a natural vocalic transition. In other words, as suggested in Recasens (1986, 1991, 2004, 2012, 2014), Recasens & Espinosa (2005), Recasens et al. (1995), and Vann (2001), the vowel preceding /l/ is colored by the lateral's degree of velarization, such that a formant transition from a vowel originally preceding a light [l] to a spliced dark [ɬ] is extremely unnatural-sounding. Because of this complication, the affected lateral tokens were instead spliced out with their preceding vowel into the template passage. Thus, in order to maximize the naturalness of the guises, I was forced to forgo a strict synthesis of minimal pair recordings for lateral guises, differing strictly exclusively in /l/ segments, in favor of a synthesis of /l/ guises differing in either the combination of lateral segments and vowel + lateral sequences (i.e., spliced

rhymes) or lateral segments (i.e., spliced /l/). Second, for fricatives, in light of the frequently attested cross-linguistic finding of a negative correlation between voicing degree and length of fricative segment (cf. Gradoville, 2011; Hualde & Prieto, 2014; Rivas, 2006; Schmidt & Willis, 2011; Stevens, Blumstein, Glicksman, Burton, & Kurowski, 1992; Torreira & Ernestus, 2012), the segment length of spliced [z] tokens in the voiced guise was not adjusted to match the duration of the equivalent [s] token in the voiceless guise, and instead reflected the original proportion of segment duration between [s] and [z] prior to insertion into the templates, such that on average, [z] tokens were one-third shorter in overall duration than their [s] equivalent tokens in the voiceless guise. Below, in Figures 1 and 2, I present examples of the spectrograms of synthesized [l], [ɫ], [s], and [z] tokens for a given

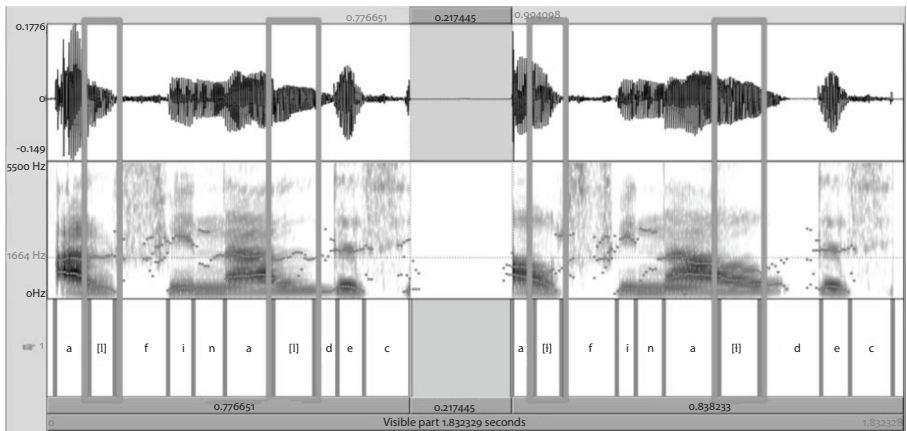


Figure 1. Spectrogram analysis of [l] (~ 1664hz) and [ɫ] (~ 1100hz) in *al final decidí*.

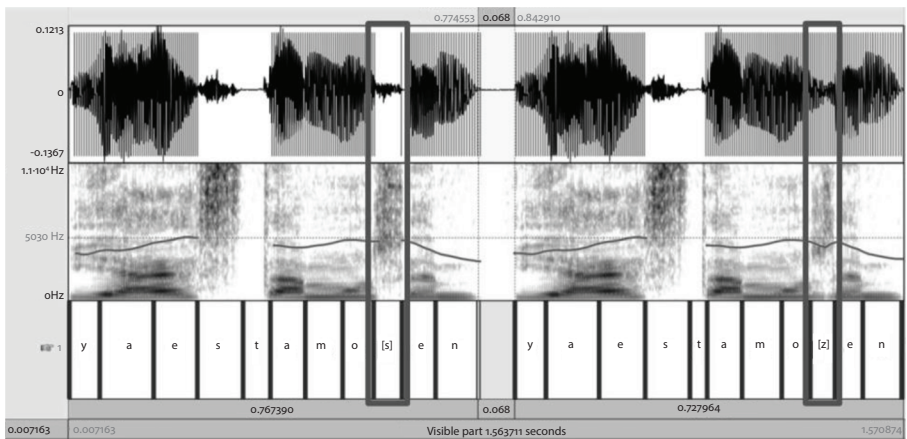


Figure 2. Spectrogram analysis of [s] (~ 9% voiced) and [z] (100% voiced) in *ya estamos en*.

excerpt of each target guise. For ease of visual comparison, each figure displays a horizontal juxtaposition of parallel /l/ and /s/ tokens, with a highlighted separation of silence in the middle.

4.1.2 Presentation of guise stimuli

Given the increased opportunity for listeners to realize that target guises were produced by the same speaker, as each guise pair differed in only a set of 10 isolated sound segments, a set of four filler passages (see Appendix A) was created, each with a word length (~ 80 word), duration (~ 29 seconds), and neutrally-themed content parallel to the four target guises. To maximally mask the target guises' repeated voice, the four filler passages (in which /s/ and /l/ appeared simultaneously across various linguistic contexts, since it was infeasible to construct passages lacking both /s/ and /l/) were recorded by a total of eight native speakers of Spanish (two speakers per filler passage) representing a wide range of non-Catalonian Spanish dialects (e.g., Argentinean Spanish, Puerto Rican Spanish, Colombian Spanish, Andalusian Spanish, Mexican Spanish, Basque Spanish, Galician Spanish, and Venezuelan Spanish). Thus, listeners would hear six unique passages (e.g., lateral passage, fricative passage, first filler, second filler, third filler, fourth filler), each appearing twice (i.e., [ɬ] target guise \sim [l] target guise, [z] target guise \sim [s] target guise, first filler speaker 2 \sim first filler speaker 3, second filler speaker 4 \sim second filler speaker 5, third filler speaker 6 \sim third filler speaker 7, fourth filler speaker 8 \sim fourth filler speaker 9), constituting a total of 12 audio files to be evaluated per listener. To further reduce the possibility for a listener to identify the four target guises as a single repeated voice, the filler and target guises were maximally distanced from one another in the sequence of twelve recordings and additionally separated into two rounds of six recordings. Listeners would complete the first sequence of six recordings, then fill out a socio-demographic questionnaire (allowing time to forget voices and passages), and finally complete the second round

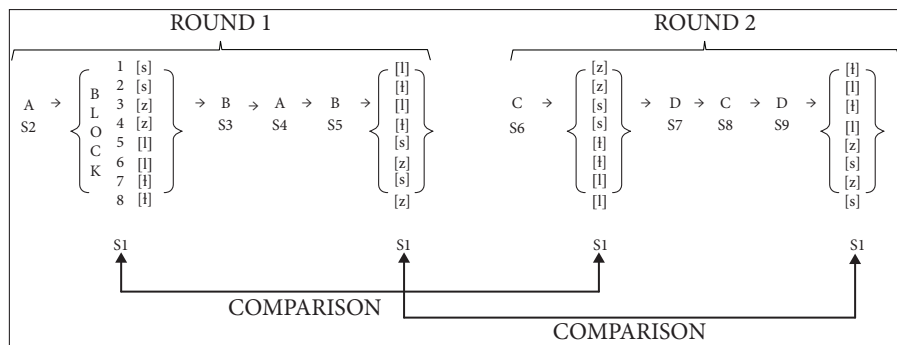


Figure 3. Presentation of matched guise stimuli

of remaining six recordings. Moreover, the order of target guise presentation was balanced amongst eight blocks to eliminate priming as a possible confound. The presentation of matched guise stimuli is presented visually in Figure 3 below, with S denoting unique speakers, A/B/C/D denoting each of the four filler passages, and block orders of target guises appearing in horizontal rows.

4.1.3 Matched guise questionnaire

Listeners indicated covert judgments of matched guise stimuli according to a series of Likert and semantic-differential scales from 1 to 7, each preceding *Pienso que esta persona (es) ...* ‘I think that this person (is) ...’ (see Appendix B). These test items were selected in accordance with prior work concerning attitudes towards Catalanian Spanish (cf. Newman et al., 2008; Sinner, 2002; Woolard, 1984, 1989, 2009, 2011; Woolard & Gahng, 1990), and covered the following set of five attributes: (1) solidarity (i.e., social attractiveness as related to being amusing, likeable, physically attractive, sensitive, generous, and open [Newman, 2011: p. 40]), via *simpático-antipático* ‘nice/mean,’ *agradable de escuchar-desagradable de escuchar* ‘pleasant/unpleasant to listen to,’ and *sería mi amigo fácilmente-no sería mi amigo fácilmente* ‘would/would not easily be my friend’; (2) power (i.e., a level of respect as related to being intelligent, cultured, self-confident, hardworking, a leader, and trustworthy [Newman, 2011: p. 40]), via *tiene estudios-no tiene estudios* ‘educated/uneducated,’ *tiene un trabajo que le pagan bien-tiene un trabajo que le pagan mal* ‘has a high-/low-paying job,’ and *fiable-dudoso* ‘trustworthy/untrustworthy’; (3) accent (i.e., prescriptive evaluation of how correct or proper the speaker’s Spanish is) via *sabe hablar castellano bien-no sabe hablar castellano bien* ‘knows/doesn’t know how to speak Spanish well’ and *tiene un acento bonito-tiene un acento feo* ‘has a pretty/ugly accent’; (4) rurality (i.e., judgment of the speaker as hailing from an urban center vs. a rural village) via *de la ciudad-del campo* ‘from the city/countryside’; and (5) bilingualism (i.e., judgment of the speaker’s status as a speaker of Catalan) via *también habla catalán-sólo habla castellano* ‘also speaks Catalan/only speaks Spanish.’ Additional filler items for the speaker’s status as bilingual in Spanish and another language (like Basque, etc.) were additionally used to lessen the perceived emphasis of the investigation as pertaining to Catalanian Spanish.

4.2 Debriefing interview

The final test instrument, used to elicit overt attitudes towards /l/ production, intervocalic /s/ production, and Catalanian Spanish overall, was a debriefing interview of approximately 10 minutes conducted by the investigator using an H4N Zoom microphone after completion of the matched guise. Participants were asked to articulate any strategies they used to justify their responses on the

matched guise (for example, ‘Did you think any of the voices you heard came from a speaker of Catalan? How could you tell?’), discuss features or characteristics of Catalan-accented Spanish of which they are aware (for example, ‘What does the Spanish of a Catalan speaker sound like? Can you think of any obvious features of their accent that give it away?’), and elaborate on the status of Catalanian Spanish (for example, ‘How would you react if someone told you that they could tell you spoke Catalan based on your Spanish?’ Do you think you speak Spanish with a Catalan accent? Do you think it’s ok to speak Spanish with a Catalan accent within Catalonia? What about outside of Catalonia?). In total, these experimental tasks took approximately 35 minutes to complete, per participant.

4.3 Subject population

The total of 54 participants were recruited in 2012 in two principal testing sites, namely Barcelona and Madrid, mirroring Sinner (2002). The former was divided into three groups based on profiles of language dominance and a city/village divide, whereas the latter served as a smaller control group that permitted a comparison of attitudes of the Catalan-Spanish community with those of an outsider monolingual Spanish community. Bilingual participants were classified into listener groups based on reported usage of Catalan and Spanish in their daily lives and familial upbringing, though notably, as generalized bilingualism is a widespread feature of Catalanian society, all bilingual speakers tested display a fully functional command of both languages. Though all Barcelona participants are from the Barcelona Metropolitan Area (BMA), those from the urban capital (population = 1,573,318 [Institut d’Estadística de Catalunya, 2011]) are contrasted with those from smaller, Catalan-prevalent villages (average population = 7,419 [Institut d’Estadística de Catalunya, 2011]) on the outskirts of the BMA, capturing potential differences in attitudes reflecting the urban/rural divide noted in Sinner (2002). All speakers were recruited as paid participants via flyer advertisements displayed in each testing location, and had minimally completed secondary education. Table 1, below, visualizes the four profiles of listeners, displaying relevant descriptive statistics for each group (note that listener gender was equally balanced across all groups, and the limitation of a smaller sample size for the control group of Madrid monolinguals).

Table 1. Subject population and listener profile groups

Listener group	Participant count (mean age)	Home language /native language / Parent native language	Daily Spanish use	2013 linguistic census data for city-wide Catalan competencies (understand / speak / read / write)*
A – Catalan-dominant, Village (bilingual)	16 (25; SD = 8.5)	Catalan	7% (SD = 5.8)	98% / 88% / 88% / 70%
B – Catalan-dominant, City (bilingual)	16 (23; SD = 9.8)	Catalan	10% (SD = 6.9)	95% / 72% / 79% / 53%
C – Spanish-dominant, City (bilingual)	16 (26; SD = 9.2)	Spanish	77% (SD = 10.8)	
D – Madrid (mono-lingual)	6 (23; SD = 5.1)	Spanish	100% (SD = 0)	N/A

*Source: Institut d’Estadística de Catalunya, 2014

5. Data analysis methods and results

5.1 Data analysis

Covert attitudes towards /l/ production and intervocalic /s/ production were elicited using the matched guise, whereas overt attitudes towards these phenomena and Catalanian Spanish overall were elicited in the debriefing interview. Since the former utilized Likert and semantic-differential scales, these quantitative data were normalized by converting individual responses into z-scores, combining responses across items that pertained to the same attitudinal category. In contrast, interview data were analyzed qualitatively, though select counts (such as the number of participants that identified either [l] or intervocalic [z] as a feature of Catalanian Spanish) were calculated and assessed using a proportion analysis.

5.2 Matched guise results (Covert attitudes)

Normalized (z-score) matched guise responses for each of the five attitudinal categories (solidarity, power, accent, rurality, bilingualism) were assessed individually for each of the target guise pairs (e.g., laterals and fricatives). For each of these analyses, I employed a pair of mixed-effects linear regression in R (R Core Team, 2018) using each attitudinal category score as the dependent variable (i.e., one

model using responses for the lateral guises and one model using responses for the fricative guises). Independent variables (i.e., guise type and listener profile group) remained constant, whereby I tested for a main effect of the particular guise in question (for lateral models, [ɫ] vs. [l], and for fricative models, [z] vs. [s]) and an interaction effect between guise and listener profile group (group A vs. B vs. C vs. D) in order to verify if a significant difference in attitudinal score between the guises was consistent both in presence and/or magnitude across the four listener groups.⁷ Additionally, individual listener was incorporated as a random effect. Note that all subsequent figures visualizing the reported results, for ease of interpretation, use raw responses on the aforementioned 1–7 scale. Moreover, in all subsequent figures, listener groups will appear combined when they exhibit, in parallel, either a statistically significant effect of equal magnitude and direction, or a lack of statistically significant effect. Accordingly, separate visualizations of scores for listener profile groups reflect a statistically significant difference with respect to the presence or absence of an effect, the magnitude of an effect, and/or the direction of an effect, across these groups.

5.2.1 *Solidarity scores*

With respect to evaluations of solidarity for the lateral guises, the results of the aforementioned linear mixed-effects regression appear below in Table 2 (note that negative β coefficients indicate lower solidarity ratings [i.e., less nice, less pleasant, less friendly] compared to the reference level). The ANOVA table generated from the mixed-effects model returned a significant main effect of guise ($F[1,50] = 99.37$, $p < .0001$) and a significant interaction between guise and listener profile group ($F[3,50] = 66.98$, $p < .0001$).

Post-hoc analyses for the significant interaction effect (with Bonferroni correction [α level = 0.0125]) revealed that all three bilingual groups (A, B, and C) attributed equally significantly higher solidarity scores to the dark guise over the light guise (for all, $p < .0001$), whereas the Madrid listeners (D) uniquely afforded significantly higher solidarity scores to the light guise over the dark guise ($p < .0001$). These findings are visualized below in Figure 4.

7. The only statistical comparisons of relevance to my research questions are those concerned with whether or not each group of listeners differentiated each of the target guises ([ɫ] vs. [l], and [z] vs. [s]) by attitudinal category, namely a main effect of guise and/or an interaction effect between guise and listener profile group. Accordingly, I limit my reporting and discussion of results to these two effects. Any potential main effect of listener profile group would reflect non-substantive comparisons of averaged lateral ratings or averaged fricative ratings by group (i.e., there is no meaningful interpretation of the average solidarity rating for /l/ or /s/, rather, it is the possible difference in evaluation between [ɫ] and [l] or [z] and [s] that is of consequence).

Table 2. Summary of mixed-effects linear regression model fitted to /l/ solidarity scores

	β	t	p
(Intercept)*	0.8954	6.349	<.0001
Group B	-0.2012	-1.009	0.3165
Group C	-.05263	-2.638	0.0102
Group D	-2.3836	-8.826	<.0001
Light Guise	-1.2073	-9.968	<.0001
Group B : Light Guise	-0.1238	-0.723	0.4731
Group C : Light Guise	0.2786	1.627	0.1101
Group D : Light Guise	2.9821	12.859	<.0001

*The reference levels are Group A listeners and the dark guise. The estimated variance of the random effect of listener is 0.2009.

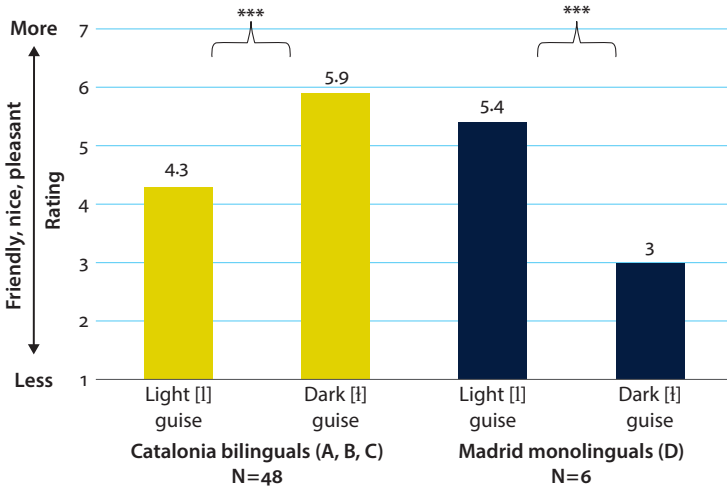


Figure 4. Solidarity score differences for light and dark /l/ guises

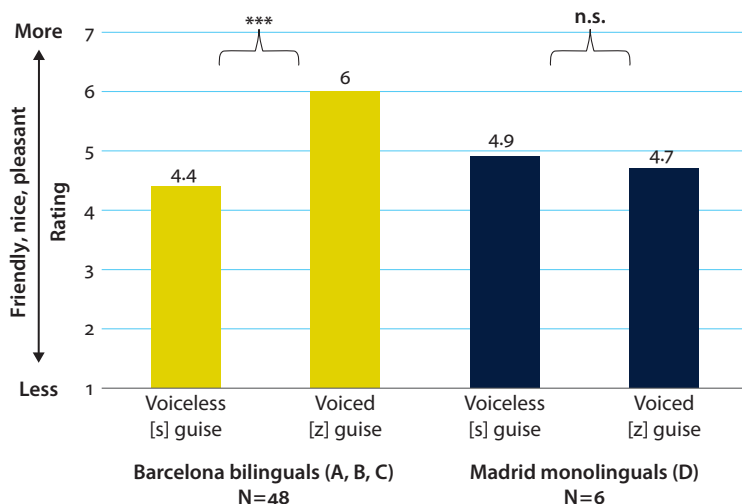
With respect to evaluations of solidarity for the fricative guises, the results of the aforementioned linear mixed-effects regression appear below in Table 3 (recall that negative β coefficients indicate lower solidarity ratings [i.e., less nice, less pleasant, less friendly] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned a significant main effect of guise ($F[1,50] = 78.41, p < .0001$) and a significant interaction between guise and listener profile group ($F[3,50] = 12.44, p < .0001$).

Post-hoc analyses of the significant interaction effect (with Bonferroni correction [alpha level = 0.0125]) revealed that all three bilingual groups (A, B, and C) attributed equally significantly higher solidarity scores to the voiced guise over the voiceless guise (for all, $p < .0001$), whereas the Madrid listeners uniquely rated the two guises equally ($p = .45$). These findings are visualized below in Figure 5.

Table 3. Summary of mixed-effects linear regression model fitted to intervocalic /s/ solidarity scores

	β	t	p
(Intercept)*	0.72252	4.686	<.0001
Group B	-0.14136	-0.648	0.51885
Group C	0.25131	1.153	0.25291
Group D	-0.93195	-3.156	0.00233
Voiceless Guise	-1.19373	-8.855	<.0001
Group B : Voiceless Guise	-0.01571	-0.082	0.93467
Group C : Voiceless Guise	-0.14136	-0.741	0.46188
Group D : Voiceless Guise	1.36128	5.273	<.0001

*The reference levels are group A listeners and the voiced guise. The estimated variance of the random effect of listener is 0.235.

**Figure 5.** Solidarity score differences for voiceless and voiced /s/ guises

5.2.2 Power scores

With respect to evaluations of power for the lateral guises, the results of the aforementioned linear mixed-effects regression appear below in Table 4 (note that negative β coefficients indicate lower power ratings [i.e., less educated, less likely to have a high-paying job, less trustworthy] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned no significant effect of guise ($F[1,50] = 0.35$, $p = .56$) and there was no significant interaction between guise and listener profile group ($F[3,50] = 0.15$, $p = .93$). As visualized

below in Figure 6, no listener group differentially evaluates Barcelonan Spanish laterals with respect to power.

Table 4. Summary of mixed-effects linear regression model fitted to /l/ power scores

	β	t	p
(Intercept)*	-.4662	-3.053	0.00349
Group B	0.0986	0.458	0.64863
Group C	-0.03959	-0.183	0.85526
Group D	0.05278	0.18	0.85744
Light Guise	0.03959	0.591	0.55709
Group B : Light Guise	-0.00001	0	1
Group C : Light Guise	-0.01979	-0.209	0.8353
Group D : Light Guise	0.06598	0.515	0.60915

*The reference levels are group A listeners and the dark guise. The estimated variance of the random effect of listener is 0.33734.

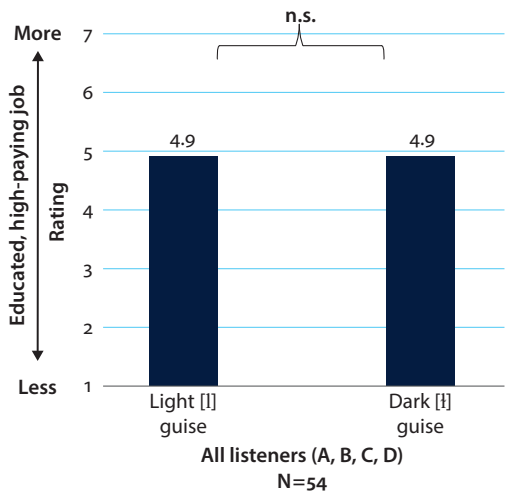


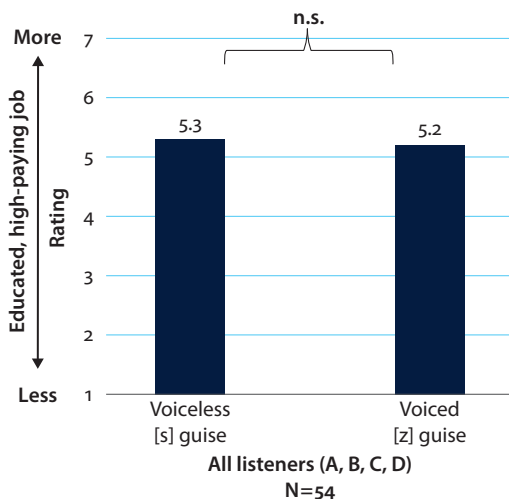
Figure 6. Power score differences for light and dark /l/ guises

With respect to evaluations of power for the fricative guises, the results of the aforementioned linear mixed-effects regression appear below in Table 5 (recall that negative β coefficients indicate lower power ratings [i.e., less educated, less likely to have a high-paying job, less trustworthy] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned no significant effect of guise ($F[1,50] = 0.18, p = .67$) and there was no significant interaction between guise and listener profile group ($F[3,50] = 0.68, p = .57$). Accordingly, no listener group differentially evaluates Barcelonan Spanish fricatives with respect to power, as visualized below in Figure 7.

Table 5. Summary of mixed-effects linear regression model fitted to intervocalic /s/ power scores

	β	t	p
(Intercept)*	-0.30877	-2.067	0.04323
Group B	0.05299	0.251	0.80287
Group C	0.63585	3.009	0.00386
Group D	0.73005	2.552	0.01336
Voiceless Guise	0.03532	0.427	0.67151
Group B : Voiceless Guise	0.10597	0.905	0.36983
Group C : Voiceless Guise	-0.05299	-0.452	0.65289
Group D : Voiceless Guise	-0.03532	-0.223	0.82461

*The reference levels are group A listeners rating the voiced guise. The estimated variance of the random effect of listener is 0.30231.

**Figure 7.** Power score differences for voiceless and voiced /s/ guises

5.2.3 Accent scores

With respect to evaluations of accent for the lateral guises, the results of the aforementioned linear mixed-effects regression appear below in Table 6 (note that negative β coefficients indicate lower accent ratings [i.e., spoke Spanish less well, had a less pretty accent] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned a significant main effect of guise ($F[1,50] = 126.87$, $p < .0001$), such that more positive accent ratings (i.e., prettier accent, better spoken Spanish) were attributed to the light guise over the dark guise. As no significant effect was found for the interaction between guise

and listener profile group ($F[3,50] = 2.52, p = .07$), this differential evaluation of laterals was uniform across all listener groups, visualized below in Figure 8.

Table 6. Summary of mixed-effects linear regression model fitted to /l/ accent scores

	β	t	p
(Intercept)*	-0.66484	-4.562	<.0001
Group B	0.22415	1.088	0.2805
Group C	-0.05604	-0.272	0.7865
Group D	0.13076	0.469	0.6409
Light Guise	1.34491	11.264	<.0001
Group B : Light Guise	-0.02154	-0.152	0.7553
Group C : Light Guise	-0.01868	-0.111	0.9124
Group D : Light Guise	-0.14943	-0.654	0.5164

*The reference levels are group A listeners and the dark guise. The estimated variance of the random effect of listener is 0.2258.

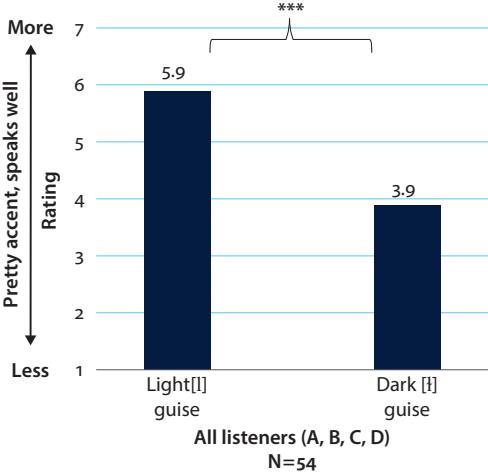


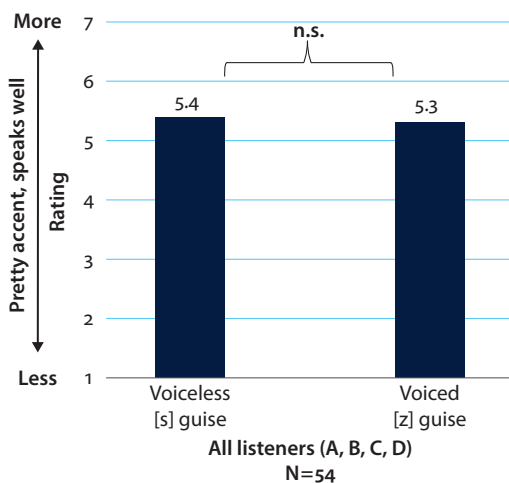
Figure 8. Accent score differences for light and dark /l/ guises

With respect to evaluations of accent for the fricative guises, the results of the aforementioned linear mixed-effects regression appear below in Table 7 (note that negative β coefficients indicate lower accent ratings [i.e., spoke Spanish less well, had a less pretty accent] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned no significant effect of guise ($F[1,50] = 0.61, p = .44$) and there was no significant interaction between guise and listener profile group ($F[3,50] = 0.75, p = .53$). Accordingly, no listener group differentially evaluates Barcelonan Spanish fricatives with respect to accent, as visualized below in Figure 9.

Table 7. Summary of mixed-effects linear regression model fitted to intervocalic /s/ accent scores

	β	t	p
(Intercept)*	-0.40144	-2.284	0.026
Group B	0.36618	1.473	0.1461
Group C	0.6103	2.456	0.0171
Group D	0.84628	2.515	0.0147
Voiceless Guise	-0.07324	-0.778	0.4401
Group B : Voiceless Guise	0.17088	1.284	0.2051
Group C : Voiceless Guise	.017088	1.284	0.2051
Group D : Voiceless Guise	0.07324	0.406	0.6862

*The reference levels are group A listeners and the voiced guise. The estimated variance of the random effect of listener is 0.42323.

**Figure 9.** Accent score differences for voiceless and voiced /s/ guises

5.2.4 *Rurality scores*

With respect to evaluations of rurality for the lateral guises, the results of the aforementioned linear mixed-effects regression appear below in Table 8 (note that negative β coefficients indicate higher rurality ratings [i.e., more likely to be from a village] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned a significant main effect of guise ($F[1,50] = 150.72$, $p < .0001$) and a significant interaction between guise and listener profile group ($F[3,50] = 6.23$, $p = .001$).

Table 8. Summary of mixed-effects linear regression model fitted to /l/ rurality scores

	β	t	p
(Intercept)*	-1.3294	-9.546	<.0001
Group B	0.4341	2.204	0.0302
Group C	0.9015	4.577	<.0001
Group D	1.7251	6.469	<.0001
Light Guise	1.8698	12.277	<.0001
Group B : Light Guise	-0.3673	-1.705	0.0944
Group C : Light Guise	-0.4675	-2.17	0.0348
Group D : Light Guise	-1.2465	-4.274	<.0001

*The reference levels are group A listeners and the dark guise. The estimated variance of the random effect of listener is 0.1247.

Post-hoc analyses of the significant interaction effect (with Bonferroni correction [alpha level = 0.0125]) revealed that all three bilingual groups (A, B, and C) attributed equally significantly higher rurality scores (i.e., less likely to be from the city) to the dark guise over the light guise (for all, $p < .0001$). This effect, while in the same direction for the Madrid listeners, failed to achieve statistical significance ($p = .015$). These findings suggest that dark laterals index speaker rurality or non-urban background within the Catalan-Spanish community, whereas for Madrid listeners, this association is either wholly absent or considerably weaker. These results are visualized below in Figure 10.

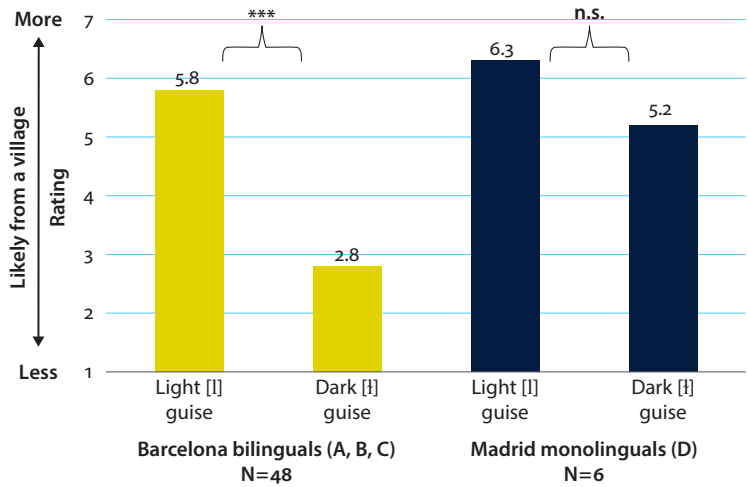


Figure 10. Rurality score differences for light and dark /l/ guises

With respect to evaluations of accent for the fricative guises, the results of the aforementioned linear mixed-effects regression appear below in Table 9 (note that

negative β coefficients indicate higher rurality ratings [i.e., more likely to be from a village] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned no significant effect of guise ($F[1,50] = 1.01$, $p = .32$) and there was no significant interaction between guise and listener profile group ($F[3,50] = 0.28$, $p = .84$). Accordingly, no listener group differentially evaluates Barcelonan Spanish fricatives with respect to rurality, as visualized below in Figure 11.

Table 9. Summary of mixed-effects linear regression model fitted to intervocalic /s/ rurality scores

	β	t	p
(Intercept)*	-0.5779	-2.373	0.0212
Group B	0.7673	2.228	0.03
Group C	0.8185	2.377	0.021
Group D	0.6309	1.353	0.1816
Voiceless Guise	0.1023	1.007	0.3189
Group B : Voiceless Guise	-0.1023	-0.712	0.4799
Group C : Voiceless Guise	-0.00001	0	1
Group D : Voiceless Guise	0.0341	0.175	0.8616

*The reference levels are group A listeners and the voiced guise. The estimated variance of the random effect of listeners is 0.86587.

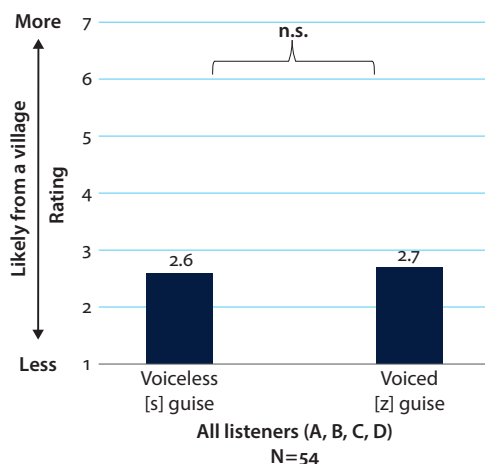


Figure 11. Rurality score differences for voiceless and voiced /s/ guises

5.2.5 Bilingualism scores

With respect to evaluations of bilingualism for the lateral guises, the results of the aforementioned linear mixed-effects regression appear below in Table 10 (note that

negative β coefficients indicate lower accent ratings [i.e., less likely to be a Catalan speaker] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned a significant main effect of guise ($F[1,50] = 20.54$, $p < .0001$), such that higher bilingualism ratings (i.e., more likely to be a Catalan speaker) were attributed to the dark guise over the light guise. As no significant effect was found for the interaction between guise and listener profile group ($F[3,50] = 1.17$, $p = .33$), this differential evaluation of laterals was uniform across all listener groups, visualized below in Figure 12.

Table 10. Summary of mixed-effects linear regression model fitted to /l/ bilingualism scores

	β	t	p
(Intercept)*	0.71267	3.606	0.000488
Group B	-0.07127	-0.255	0.799277
Group C	-0.2138	-0.765	0.446143
Group D	-0.09502	-0.251	0.802277
Light Guise	-1.24718	-4.532	<.0001
Group B : Light Guise	0.1069	0.275	0.784689
Group C : Light Guise	0.2138	0.549	0.585195
Group D : Light Guise	-0.74831	-1.42	0.161788

*The reference levels are group A listeners and the dark guise. The estimated variance of the random effect of listener is 0.01923.

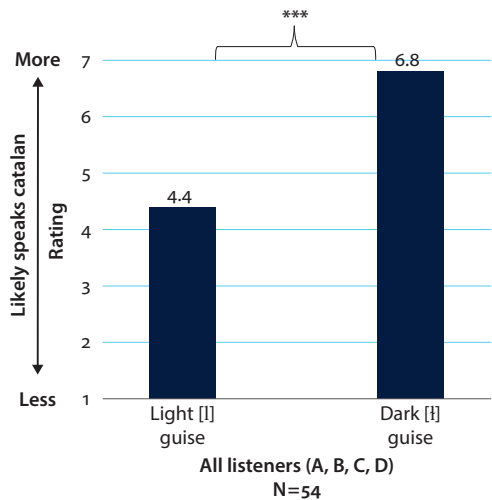


Figure 12. Bilingualism score differences for light and dark /l/ guises

With respect to evaluations of bilingualism for the fricative guises, the results of the aforementioned linear mixed-effects regression appear below in Table 11 (note that

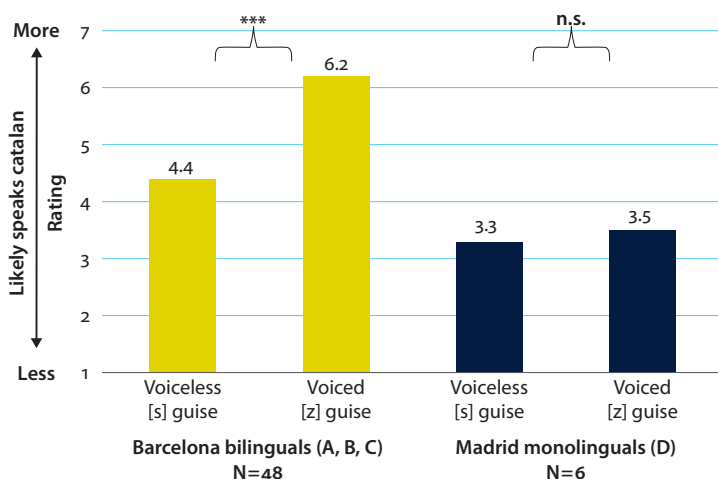
Table 11. Summary of mixed-effects linear regression model fitted to intervocalic /s/ bilingualism scores

	β	t	p
(Intercept)*	0.8698	4.174	<.0001
Group B	-0.3753	-1.273	0.2069
Group C	-0.5316	-1.804	0.0753
Group D	-1.6574	-4.154	<.0001
Voiceless Guise	-0.8131	-4.309	<.0001
Group B : Voiceless Guise	-0.5003	-1.875	0.0666
Group C : Voiceless Guise	0.1564	0.586	0.5605
Group D : Voiceless Guise	0.7297	2.02	0.0488

*The reference levels are group A listeners and the voiced guise. The estimated variance of the random effect of listener is 0.4099.

negative β coefficients indicate lower accent ratings [i.e., less likely to be a Catalan speaker] compared to the reference levels). The ANOVA table generated from the mixed-effects model returned a significant main effect of guise ($F[1,50] = 18.57$, $p < .0001$) and a significant interaction between guise and listener profile group ($F[3,50] = 4.43$, $p = .008$).

Post-hoc analyses of the significant interaction effect (with Bonferroni correction [alpha level = 0.0125]) revealed that all three bilingual groups (A, B, and C) attributed significantly higher bilingualism scores to the voiced guise over the voiceless guise (for A and B, $p < .0001$; for C, $p = .001$), whereas the Madrid listeners uniquely rated the two guises equally ($p = .788$). These findings are visualized below in Figure 13.

**Figure 13.** Bilingualism score differences for voiceless and voiced /s/ guises

5.3 Debriefing interview results (overt attitudes)

In order to assess the relative salience of /l/ and intervocalic /s/ as recognized features of Catalanian Spanish, listeners (the majority of which hail from Barcelona) were asked to explicitly name all phonetic features of Catalanian Spanish of which they were aware. A total of five Catalanian Spanish features⁸ were named, and the frequencies with which each was mentioned were analyzed as proportions and submitted to a Chi-square test. The results, shown below in Table 12 and Figure 14, reveal that the proportion of overt awareness was not equally distributed across the named features ($\chi^2 = 63.555$, $df = 4$, $p < .0001$ [with Yates’ correction]). Post-hoc cell-wise comparisons (for each, $p < .001$) revealed that the proportion of awareness was equally significantly higher for velarized [ɫ] and non-standard vowels and equally significantly lower for the lack of /θ/ and intervocalic /s/-voicing.

Table 12. Counts of explicit awareness for phonetic features of CCS

	Velarized [ɫ]	Vowels ([ə], [ɛ], [ɔ])	Devoiced Final Stops	Lack of /θ/	Intervocalic /s/-voicing	TOTAL
Named Feature	35	32	13	7	4	91
Did Not Name Feature	19	22	41	47	50	179
TOTAL	54	54	54	54	54	270

Given the widespread (~ 65%) awareness of [ɫ] as a hallmark feature of Catalans’ Spanish, it is unsurprising that the majority of participants were readily able to offer explicit commentary concerning their attitudes toward *la ele catalana* ‘the Catalan /l/.’ While the predominant commentary involved an explicit understanding of Spanish [ɫ] as poor Spanish and warranting correction, Catalan-dominant bilinguals (listener groups A and B) discussed this social expectation in terms of their own violation of it, whereas Spanish-dominant bilinguals (listener group C) framed it in terms of their successful ability to adhere to it:

- (1) “*Bueno, la ele catalana, sí... yo intento no usarla cuando hablo castellano, porque quiero hablarlo bien, pero bueno, me sale como me sale* [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]”
(Subject 12, Group A);

8. In addition to [ɫ] and intervocalic [z], additional features were the use of Catalan-like vowels (i.e., the central vowel [ə] in words like *vaca* ‘cow’ [bá.kə] vs. standard Castilian [bá.ka]), devoiced final stops (i.e., the application of a Catalan phonotactic devoicing rule in Spanish that realizes word-final /d/ as [t̪] in words like *amistad* ‘friendship’ [a.mis.t̪át̪] vs. standard Castilian [a.mis. táð]), and the absence of the interdental voiceless fricative phoneme /θ/, foreign to Catalan, in words like *zapato* ‘shoe’ [sa.pá.ʈo] vs. standard Castilian [θa.pá.ʈo]).

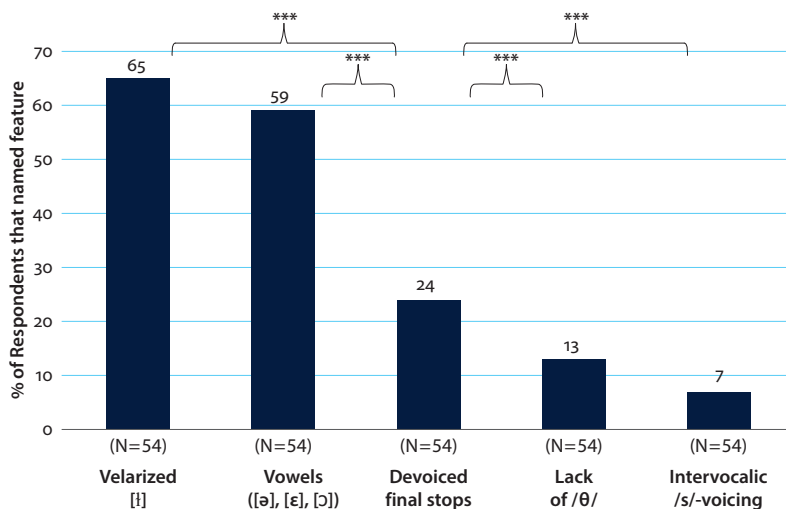


Figure 14. Percentages of awareness for phonetic features of Catalanian Spanish

- (2) “Mira, supuestamente las eles no las debemos hacer tan catalanas, pero soy catalán y hablo catalán, entonces claro que voy a tener algunos dejes así cuando hablo en castellano, es inevitable [Look, supposedly we shouldn’t make the /l/s so Catalan-like, but I’m Catalan and I speak Catalan, so of course I’m going to have some accent features like this when I speak in Spanish, it’s inevitable]” (Subject 19, Group B);
- (3) “No no, yo 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. [No no, 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/]” (Subject 42, Group C).

In spite of the recognition of prescriptive norms precluding [ɫ] from ‘correct’ or ‘proper’ Spanish, an equally common notion expressed across all listener groups, bilingual and monolingual alike, was one of ambivalence or neutral acceptance of the *ele catalana* as a somewhat natural and inconsequential product of bilingualism:

- (4) “Si hago las eles muy catalanas, ¿qué más da? Todos aquí hablamos así, es normal [If I make my /l/s very Catalan-like, what does it matter? Everybody here speaks like this, it’s normal]” (Subject 5, Group A);
- (5) “La ele catalana, las vocales catalanas, mira – mucho deje puedes tener en tu castellano, pero tampoco no importa mucho, se entiende igual, ¿sabes? [The Catalan /l/, Catalan vowels, look – you can have a lot of Catalan accent in your Spanish, but it doesn’t matter much, it’s understandable just the same, you know?]” (Subject 20, Group B);

- (6) “Yo no creo que haga las eles así, muy catalanas, pero ... no sé, si las hiciera muy catalanas, no importaría mucho. No sé, está bien, no pasa nada [I don’t think I do the /l/s this way, very Catalan-like, but ... I don’t know, if I did them very Catalan-like, it wouldn’t matter much. I don’t know, it’s ok, it doesn’t matter]” (Subject 44, Group C);
- (7) “No es nada malo, de hecho lo veo bastante natural. Si hablan el catalán como primera lengua, obviamente van a tener la ele catalana en su castellano [It’s nothing bad, in fact I see it as rather natural. If they speak Catalan as a first language, obviously they’re going to have the Catalan /l/ in their Spanish]” (Subject 51, Group D).

As for attitudes towards the use of intervocalic [z] in Catalanian Spanish, given its relative scarcity of overt awareness (~ 7%) as a feature of Catalanian Spanish, no explicit commentary towards [z] was offered. Unlike [ɫ], whose notoriety is captured in its renowned label as *la ele catalana* for Catalanian listeners and Madrid listeners alike, no parallel term (as could be, for example, *la ese catalana* ‘the Catalan /s/) was employed by the few listeners that were aware of [z], who instead referred to it by using the sound in an example phrase like *lo[z] amigos* ‘the friends.’ The lack of overt awareness of intervocalic [z] is perhaps best exemplified by one particular group A listener, who after being explicitly prompted to hypothesize about some possible ‘Catalanized’ way of pronouncing the phrase *mis amigos* ‘my friends,’ repeated *mis amigos* aloud to herself using [z], and ironically still could not identify [z] as a trait of Catalanian Spanish. Figure 15 below shows the spectral analysis of the word-final prevocalic /s/ in *mis amigos* as the participant was thinking aloud:

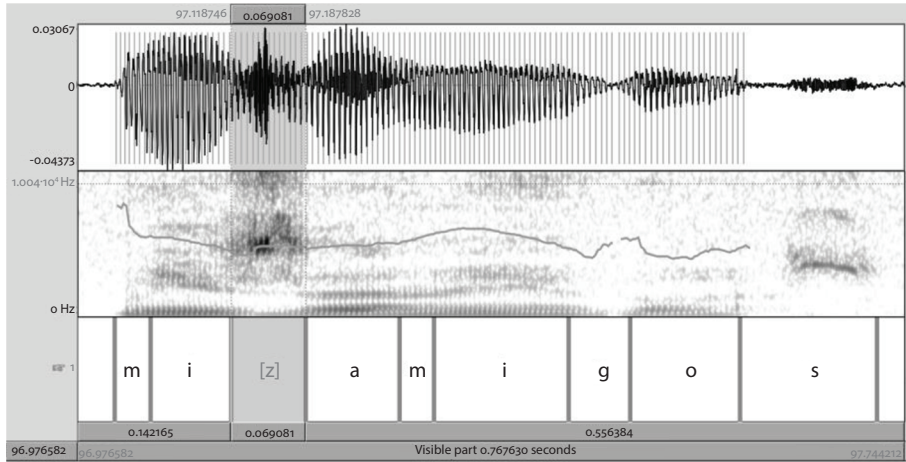


Figure 15. Explicit rendition of *mis amigos* ‘my friends’ (100% voiced /s/)

- (8) “*Mis amigos’ ... No sé, es que como yo siempre me oigo a mí, bueno, sabes ... no ... no lo sé* [‘My friends’... I don’t know, it’s that since I always hear myself, well, you know ... no ... I don’t know]” (Subject 11, Group A).

With respect to attitudes on ‘Catalanized’ Spanish in general, commentary was commonly positive (i.e., favorable opinions toward the variety) amongst bilingual groups, while somewhat ambivalent for the Madrid speakers. A frequent explanation for why bilinguals felt an affinity toward Catalan-accented Spanish was because it reminded them of the Catalan language and of Catalan speakers. However, within the commentaries of Catalan-dominant speakers, negative commentary involving social ridicule appeared frequently, specifically with respect to an overly ‘Catalanized’ accent:

- (9) “*Bueno, sí, me gusta. Me da un poco de envidia porque se nota que es una persona que habla bien el catalán, y yo no considero que hablo muy bien el catalán ... pero sí, entre la gente de aquí, está bien visto* [Well, yes, I like it. It makes me a little jealous because you can tell it’s someone that speaks Catalan well, and I don’t believe I speak Catalan very well ... but yes, amongst the people from here, it’s viewed favorably]” (Subject 38, Group C);
- (10) “*Pienso que es de mi país, que es catalán, que es como yo. Claro, es como simpatía, es como patriota. Como persona, me transmite cosas positivas, más que un andaluz, por ejemplo ... pero no me gusta que la gente se ría de mi acento súper-catalán* [I think that s/he is from my country, that s/he is Catalan, that s/he is like me. Of course, it’s like solidarity, it’s like a compatriot. As a person, s/he transmits positive things to me, more than an Andalusian, for example ... but I don’t like that people laugh at my super-Catalan accent]” (Subject 26, Group B);
- (11) “*No está mal, es un acento más, es como los andaluces, ¿no? Tienen su acento ... pues lo mismo con nosotros, ¿no? Claro, intento que no sea tan exagerado, pero me cuesta. Porque mucha gente, cuando hablo castellano, me lo ha dicho, que tengo mucho acento de catalán, entonces intento que no se note tanto* [It’s not bad, it’s just another accent, it’s like the Andalusians, no? They have their accent ... well the same with us, no? Of course, I try to make it not so exaggerated, but it’s hard for me. Because a lot of people, when I speak Spanish, have told me so, that I have a strong Catalan accent, so I try to make it so it’s not as noticeable]” (Subject 15, Group C);
- (12) “*No está mal, simplemente es otro castellano. O sea cada región tiene su acento, ¿no? Aquí en Madrid tenemos nuestro acento, pues allí en Cataluña tienen el suyo, igual que en Andalucía el suyo. No es cuestión de mejor o peor, sino acentos diferentes. Todos son la misma lengua* [It’s not bad, it’s simply

another Spanish. In other words every region has its accent, no? Here in Madrid we have our accent, so there in Catalonia they have theirs, just like in Andalusia theirs. It's not a matter of better or worse, but rather different accents. They're all the same language]" (Subject 50, Group D).

6. Discussion

The matched guise and debriefing interview respectively elicited covert and overt attitudes concerning /l/ and intervocalic /s/ production in Catalanian Spanish. Five main attitudinal categories were considered, namely solidarity, power, accent, rurality, and bilingualism, all of which save power were found to be associated with one or both phenomena. Solidarity judgments, for each of /l/ and /s/ production, were differential across bilingual (Barcelona) and monolingual (Madrid) listeners. The bilingual listeners afforded higher solidarity to the Catalanian Spanish variants ([ɫ] and [z]), whereas Madrid listeners rated standard Spanish [l] higher than [ɫ], and did not evaluate fricative variants distinctly. These increased solidarity judgments for Catalanian Spanish variants on the part of Catalanian listeners demonstrate a certain affinity toward [ɫ] and [z] that likely relates to their association with Catalanian identity and prominent use in the Spanish of Catalonia, since Catalanian listeners also covertly linked each of these variants to Catalan-Spanish bilingualism. Madrid listeners, on the other hand, only associated [ɫ] with Catalan-Spanish bilingualism. Overt attitudes corroborate these covert judgments inasmuch as the majority of (all) listeners explicitly described *la ele catalana* as a plainly recognizable feature of Catalans' Spanish, mirroring the results reported in Sinner (2002), who also found that [ɫ] was the only phonetic feature of Catalan-accented Spanish overtly recognized by speakers within and outside of the Catalan-speaking community. The relative lack of overt awareness of [z], particularly amongst Catalanian listeners that covertly afforded [z] high solidarity and bilingualism scores, combined with prior production evidence showing a robust usage of [z] by Catalan-Spanish bilinguals and in particular those with greatest exposure to and usage of Catalan (Davidson, 2014: pp. 233–235, 2015: pp. 132–134), suggests that [z] likely functions as a sociolinguistic indicator (cf. Labov, 2001) of Catalanian Spanish within the Catalanian speech community, indexing Catalan-Spanish bilingual membership while lacking any considerable degree of generalized conscious awareness.

Judgments of accent and rurality regarding [ɫ] reveal additional nuances of the social status of lateral velarization in Catalanian Spanish. Covert associations of [ɫ] with incorrect and/or non-pretty-sounding Spanish were found for all listeners, whereas additional links to increased perception of rurality for [ɫ] were only

found for bilingual listeners. Intervocalic /s/ voicing, in contrast, was not covertly associated with accent nor rurality for any listener group.⁹ Accordingly, explicit commentary regarding speaking ‘good’ Spanish appeared most often with respect to the prescriptive avoidance of [ɫ] with Catalan-dominant speakers acknowledging, as if defeatedly, their futility of avoiding [ɫ] in Spanish, and Spanish-dominant speakers conversely claiming a sense of accomplishment in their capacity to restrict [ɫ] to Catalan (see [1], [2], and [3] in Section 5.3). This sense of linguistic purism, namely the notion that ‘proper’ Spanish shows no signs of contact influence from another language, can relegate contact phenomena such as the present case of Spanish dark [ɫ] to a position of inferiority and potentially even outright disdain within and outside of the bilingual speech community, as evidenced by bilingual listeners’ anecdotes of being made fun of for speaking Spanish with too strong of a Catalan accent. It would seem most probable that Spanish [ɫ] exists as a linguistic stereotype (cf. Labov, 2001) of the Catalan-Spanish community, indexing membership in this bilingual community while being the subject of overt, negative commentary and to a degree being expressly suppressed (though not necessarily successfully) in the Spanish of Catalan speakers in an effort to speak, in their opinion, ‘better’ Spanish. Additionally, though collected in a different Catalan-Spanish community, the present attitudinal findings provide corroboration for the production trends noted for dark [ɫ] in Majorcan Spanish (cf. Pieras, 1999; Simonet, 2010a, 2010b), for which the active avoidance of darker laterals on behalf of youth female speakers was interpreted as part of a change from above (cf. Labov, 2001) motivated by the negative social value afforded to dark laterals.

Though Sinner’s (2002) interviews with Barcelona and Madrid speakers took place well over a decade ago, their overt commentary concerning [ɫ] and Catalanian Spanish as generally unpleasant, flawed, and/or country-like in comparison to the Peninsular standard norm, was, to a degree, faithfully corroborated in the present study in the form of both covert attitudes (i.e., matched guise scores for accent and rurality attributes for [ɫ]) and overt attitudes (i.e., interview commentary about desires to limit individual use of Spanish [ɫ] and heavily Catalan-accented Spanish). These results furthermore echo those of matched guise studies carried out in Barcelona in the late 20th century (cf. Woolard, 1984, 1989; Woolard &

9. Following Barnes (2015: pp. 232–233), the greater degree of social indexation afforded to lateral production over fricative production, as manifested in the former’s greater number of covert associations with attitudinal categories and overt links to prescriptive norms of standard Spanish, suggests that laterals are more ‘sociolinguistically salient’ than alveolar fricatives in Catalanian Spanish. As listeners also demonstrated more overt awareness of differences in laterals than in fricatives, it is likely that laterals are also more phonetically or acoustically salient than fricatives as well, which logically would contribute to the former’s greater propensity for social indexation.

Gahng, 1990) that found L2-accented Spanish and Catalan to be dispreferred over more native-sounding speech. However, the present study additionally uncovered both covert and overt positive esteem toward Catalanian Spanish and indeed even dark [ɫ] inasmuch as solidarity attributes were concerned, in line with what Newman (2011), Newman et al. (2008), and Trenchs-Parera and Newman (2009) proclaim as an emerging shift in the linguistic ideologies of Catalonia toward linguistic cosmopolitanism, or the erosion of a prior in-group/out-group opposition between native speakers and non-native speakers, replaced by one between bilingual speakers and monolingual (Spanish) speakers.

Ultimately, we are left with somewhat of an ideological paradox when it comes to Catalanian Spanish and its more sociolinguistically salient features (e.g., [ɫ]), in that listeners simultaneously project positive esteem, via solidarity attributes, alongside negative stigma, principally via accent attributes. This paradox, reminiscent of Ryan's (1979, as cited in Labov, 2001: p. 263) conjecture, "why do low-prestige language varieties persist?", highlights the conflict between speakers' consensus regarding what variants are considered standard and speakers' use of non-standard, prescriptively stigmatized forms in apparent disregard of the aforementioned standard norm. The positive social value afforded to non-standard and even stigmatized variants, deemed *covert prestige* (cf. Trudgill, 1972), is readily attested for the present data, in that bilingual listeners afforded higher solidarity scores to Catalanian Spanish variants over standard [l] and [s], and moreover speakers explicitly discussed their affinity to 'Catalanized' Spanish inasmuch as it readily indexes a shared or in-group bilingual identity. Indeed, the co-occurrence of negative, prescriptivist stereotypes alongside positive solidarity affirmations is readily predicted in vernacular or folk dialectology: "Areas of great linguistic security find the status dimension strongest; prejudiced-against areas take comfort in solidarity" (Niedzielski & Preston, 1999: p. 366). However, there seems to be an apparent limit when it comes to the social gain of covert solidarity prestige, as Catalan-dominant listeners noted explicit social ridicule for using exaggerated or somehow overly 'Catalanized' Spanish (see [10] in Section 5.3). It appears that so long as one's Spanish isn't 'too Catalanized,' it is not subject to chastising within the bilingual speech community and instead is viewed favorably (i.e., covert prestige). Given the observed notoriety of *la ele catalana*, especially when contrasted with the lack of overt awareness of intervocalic [z], it seems reasonable to conclude that Catalanian Spanish [ɫ] is one variant for which the negative social value afforded to it can outweigh its covert prestige in the community.

In studying covert and overt attitudes towards specific speech variants in conjunction with overt attitudes toward Catalanian Spanish overall, it becomes clear that the broader linguistic ideologies regarding Catalanian Spanish are an aggregate product of the individual social values afforded to each and every

linguistic variant that comprises it. This is to say that a speaker's evaluation of a language variety as, for example, 'beautiful,' is a generalization made across individual evaluations of 'beauty' for each of its variants, some of which indeed will be judged to be 'beautiful,' while others will be judged to be 'ugly,' and others still will not be associated with 'beauty' either way. For the present data, broader language-level ideologies, such as linguistic cosmopolitanism, are useful for understanding how speakers situate themselves and others with respect to the use of Catalanian Spanish. However, by additionally examining the attitudes speakers hold with respect to individual linguistic variants of Catalanian Spanish, such as [ɫ] and [z], we see that language- or variety-level ideologies can overlook complex dynamics of social evaluation of, and ultimately use of, discrete linguistic variants. In particular, I have found that the positive esteem toward Catalanian Spanish espoused by linguistic cosmopolitanism is not equally distributed across the set of its variants, such that dark [ɫ] (and surely other variants which I have not investigated presently) is associated with an overly exaggerated and improper 'Catalanized' Spanish, resulting in practical, real-world consequences (i.e., public chastising, linguistic insecurity) that could not be otherwise accounted for under a broader-level study of attitudes and ideologies that generalizes across all linguistic variants. Crucially, the negative stigma afforded to [ɫ] in the present dataset does not invalidate or run counter to a broader linguistic ideology like linguistic cosmopolitanism. Rather, it is simply the case that broader language ideologies reflect a quantitative majority of language attitudes towards linguistic variants, which accounts for the presently-observed reality of speakers attributing positive evaluations to Catalanian Spanish while simultaneously attributing strongly negative evaluations to select variants that nonetheless comprise Catalanian Spanish.

7. Conclusion

The present study has sought to examine covert and overt attitudes towards lateral velarization, intervocalic fricative voicing, and Catalanian Spanish using an application of the matched guise methodology that focuses on specific linguistic variants. Reconciling prior attitudinal research on Catalanian Spanish that found, on the one hand, explicit negative associations of Catalanian Spanish with rurality and improper Spanish, and on the other hand, positive evaluations of Catalanian Spanish as part of a linguistic ideology that values bilingualism and language contact effects, I have shown that individual variants of Catalanian Spanish are evaluated uniquely and independently by speakers within and outside of the Catalan-Spanish bilingual community, thus warranting the aforementioned duality of positive and negative evaluations of the variety as a whole. I have presented

attitudinal evidence consistent with classifying velarized [ɫ] as a linguistic stereotype and intervocalic [z] as an indicator (cf. Labov, 2001) on the basis of perceptions of solidarity, power, accent, rurality, and bilingualism.

In future work, these analyses can be further validated by examining production patterns of /l/ and intervocalic /s/ in Catalanian Spanish with the expectation that their distribution and usage patterns throughout the Catalan-Spanish community be consistent with production patterns typical of sociolinguistic stereotypes and indicators, respectively. Additionally, given the phonetically continuous nature of both phenomena in question, an insightful line of future investigation could entail assessing attitudes towards a series of gradiently darker and lighter laterals and a series of gradiently more or less voiced /s/ productions, facilitating an acoustic pinpointing of how dark or how voiced an /l/ or /s/ (respectively) need to be before listeners perceive them as properly Catalanian, and whether or not these acoustic thresholds (with social consequences) vary by listener group. Finally, it is important to acknowledge that since the Madrid monolingual control group was smaller in size than the rest of the bilingual listener groups, the majority of presented findings reflect the latter group, and accordingly comparisons between Barcelonan bilinguals and Madrid monolinguals could be further validated with an expanded, and crucially more balanced, sample size.

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Appendix A. Guise Passages

/I/ – *Ayer, no tenía ganas de despertarme para nada. Sonó mi despertador y vi que el sol todavía no había aparecido. Después de ir al baño, me preparé un café y también algo de comer. Sonó mi móvil mientras caminaba al comedor – era un amigo mío. Me dijo que el jueves quería ir con alguien a ver un concierto donde iba a tocar nuestra amiga. Pensaba que estaría muy triste si no fuéramos. Al final, decidí ir, entonces fuimos juntos.*

‘Yesterday, I didn’t feel like waking up at all. My alarm clock went off, and I saw that the sun still had not appeared. After going to the bathroom, I made myself a coffee and also something to eat. My cell phone rang while I was walking to the dining room – it was a friend of mine. He told me that on Thursday he wanted to go with somebody to see a concert where our friend was going to play. He thought she would be really sad if we didn’t go. In the end, I decided to go, so we went together.’

/s/ – *Hoy es un día bonito. Después de un invierno muy frío, ya estamos en primavera. Si vas afuera, notarás en seguida que nadie tiene puesto un abrigo. Dentro de poco, voy con unos amigos a tomar un café, que ya hace mucho que no nos hemos visto todos juntos. Aunque típicamente vamos a un sitio aquí cerca, esta vez queremos encontrar otro por ahí. Como he dicho, hoy tenemos un día perfecto para ir a andar un poco.*

‘Today is a beautiful day. After a very cold winter, it is finally spring. If you go outside, you’ll immediately notice that nobody is wearing a coat. In a little bit, I am going with some friends for a coffee; it’s been a while since we’ve last seen each other all together. Although we typically go to a place here nearby, this time we want to find another one around there. As I said, today we have a perfect day for going to walk a bit.’

Filler A – *Un día, estaba caminando por el parque cuando empezó a llover. No había traído mi paraguas, entonces no tenía más remedio que ponerme al lado de un árbol grande, bajo las ramas y las hojas. Por suerte, dejó de llover después de unos diez minutos y no estaba tan empapado/a. Volví a pasear, y al poco salió el sol y hacía buen tiempo. Decidí regresar a casa a pie, aprovechando el tiempo tan agradable.*

‘One day, I was walking through the park when it started to rain. I hadn’t brought my umbrella, so I didn’t have any other option other than to put myself next to a big tree, under the branches and leaves. Luckily, it stopped raining after about 10 minutes and I wasn’t so soaked. I returned to my walk, and soon the sun came out and the weather was nice. I decided to go home on foot to enjoy the really nice weather.’

Filler B – *A veces cuando quiero relajarme, me gusta ir a la playa. Me encanta caminar por la arena y descansar bajo el sol. Si hace mucho calor, me meto en el agua por un rato. Muchas veces voy a una playa específica con un grupo de amigos, donde pasamos unas horas relajándonos, pero a veces cuando quiero un poco más de paz, voy a otra playa donde no suele haber mucha gente. Siempre me quita todo el estrés.*

‘Sometimes when I want to relax, I like to go to the beach. I love walking along the sand and relaxing under the sun. If it’s really hot, I hop in the water for a bit. I often go to a specific beach with a group of friends, where we spend hours relaxing, but sometimes when I want a little more peace, I go to another beach where there usually aren’t many people. It always gets rid of all my stress.’

Filler C – *Recuerdo que el otro día necesitaba comprar unas manzanas rojas en el supermercado. Como siempre tienen manzanas, no había pensado ir a comprarlas hasta la tarde. Así, a las cuatro salí de casa y fui al supermercado. Fui directamente a la sección de fruta y, vaya sorpresa;*

¡no tenían ninguna! Busqué durante unos cinco minutos antes de admitir que realmente se les habían acabado. Decidí ir a otro supermercado un poco más lejos, y no llegué a casa hasta las seis.

'I remember that the other day I needed to buy some red apples at the supermarket. Since they always have apples, I didn't think to go buy them until the afternoon. So, at 4 I left my house and went to the supermarket. I went directly to the fruit section and, go figure; they didn't have any! I looked for about 5 minutes before admitting that they really had run out of them. I decided to go to another supermarket a little farther away, and I didn't arrive back at home until 6.'

Filler D – *El otro día, tuve una muy mala experiencia en un restaurante. Primero, cuando llegué, el sitio estaba tan lleno de gente que no había espacio para esperar adentro, entonces esperé afuera donde hacía bastante calor. Luego, cuando pedí mi plato favorito, me dijo el camarero que se les habían acabado los ingredientes, entonces tuve que pedir otro. Después, debido a algún problema con la estufa en la cocina, tardaron media hora para traer la comida. Qué mala suerte, ¿no?*

'The other day, I had a really bad experience at a restaurant. First, when I arrived, the place was so full of people that there wasn't room to wait inside, so I waited outside where it was pretty hot. Later, when I ordered my favorite dish, the waiter told me that they had run out of the ingredients, so I had to order another one. Later, because of some problem with the stove in the kitchen, they took 30 minutes to bring the food. What bad luck, right?'

Appendix B. Matched Guise Questionnaire

Instrucciones: A continuación vas a escuchar a una serie de personas diferentes que no conoces hablando en castellano. Verás una lista de características que tendrás que atribuir a una y cada persona que escuches. Basándote en la escala del 1 al 7, indica tu opinión acerca de la persona que escuches.

Instructions: You are about to listen to a series of individuals who you have never met before speak in Spanish. Below is a list of several characteristics that you will attribute to the speaker you hear. Using the 1–7 scale, indicate your opinion about the person you hear.'

Por ejemplo, si después de escuchar a la persona piensas que es simpática, indica con un círculo el número "7" que marca "simpática." Si por el contrario piensas que la persona es antipática, indica un "1" que marca "antipática." Utiliza el número "4" si no tienes ninguna opinión si esta persona es simpática o antipática.

'For example, if after listening to the person you think that s/he is nice, circle the number 7 that indicates 'nice.' If, on the other hand, you think that the person is mean, circle the number 1 that indicates 'mean.' Use the number 4 if you don't have an opinion about if the person is nice or mean.'

<i>Pienso que esta persona (es)....</i>		'I think that this person (is)....'	
1) SOLIDARITY		7) RURALITY	
<i>antipática</i>		<i>simpática</i>	<i>de la ciudad</i>
'mean'		'nice'	'from the city'
1	2 3 4 5 6 7	1	2 3 4 5 6 7
2) POWER		8) BILINGUALISM	
<i>tiene estudios</i>		<i>no tiene estudios</i>	<i>también habla</i>
'educated'		'uneducated'	<i>sólo habla</i>
1	2 3 4 5 6 7	1	2 3 4 5 6 7
3) ACCENT		<i>catalán</i>	<i>castellano</i>
<i>sabe hablar</i>		'also speaks Catalan'	'only speaks Spanish'
<i>castellano bien</i>			
'speaks Spanish well'			
1	2 3 4 5 6 7	1	2 3 4 5 6 7
4) [filler]		9) SOLIDARITY	
<i>sólo habla</i>		<i>desagradable de</i>	<i>agradable de</i>
<i>castellano</i>		<i>escuchar</i>	<i>escuchar</i>
'only speaks Spanish'		'unpleasant to listen to'	'pleasant to listen to'
1	2 3 4 5 6 7	1	2 3 4 5 6 7
5) SOLIDARITY		10) POWER	
<i>no sería mi</i>		<i>fiable</i>	<i>dudosa</i>
<i>amigo/a fácilmente</i>		'trustworthy'	'untrustworthy'
'would not easily be my friend'			
1	2 3 4 5 6 7	1	2 3 4 5 6 7
6) POWER		11) ACCENT	
<i>tiene un trabajo</i>		<i>tiene un</i>	<i>tiene un</i>
<i>que le paga bien</i>		<i>acento bonito</i>	<i>acento feo</i>
'has a high-paying job'		'has a pretty accent'	'has an ugly accent'
1	2 3 4 5 6 7	1	2 3 4 5 6 7
7) [filler]		12) [filler]	
<i>sólo habla</i>		<i>sólo habla</i>	<i>también habla</i>
<i>castellano</i>		<i>castellano</i>	<i>gallego</i>
'only speaks Spanish'		'only speaks Spanish'	'also speaks Galician'
1	2 3 4 5 6 7	1	2 3 4 5 6 7

Dialectology meets sociophonetics

The social evaluation of *ceceo* and *distinción* in Lepe, Spain

Brendan Regan

Texas Tech University

This article analyzes the social perceptions of *ceceo* and *distinción* in the town of Lepe, Spain using a matched-guise experiment created by digitally manipulating spontaneous speech from twelve speakers, varying only in realizations of syllable initial coronal fricatives. Based on an analysis of 92 listeners' evaluations, the speaker guises with *distinción* are rated as higher status, more educated, more urban, and more formal and are assigned more occupational prestige than those with *ceceo*. Additionally, listeners with more years lived away from Lepe perceived these differences more so than those with little to no years lived away from Lepe. The implications are three-fold: (i) listeners in Lepe evaluate the national standard feature of *distinción* as more prestigious than the traditional dialect feature of *ceceo*; (ii) it can be suggested that time away from Lepe impacts listeners' social evaluations of *ceceo* and *distinción*; and, (iii) even smaller non-urban communities are susceptible to changing language attitudes. Such differences in the perceived social value of these phonetic norms likely contribute to the ongoing dialect convergence of *ceceo* to *distinción* in Lepe.

1. Introduction

Recently there has been a great deal of interest in listeners' social perception of linguistic variation. Many of these studies have utilized and expanded upon the matched-guise technique (Lambert et al., 1960) to assess listeners' social evaluations of allophonic or phonemic variation. Specifically, several studies have manipulated a single phonetic variable between guises (Barnes, 2015; Chappell, 2016, 2019; Drager, 2010; Fridland et al., 2004; Plichta & Preston, 2005; Szakay, 2008; Walker, 2007; Walker et al., 2014) and have demonstrated that listeners evaluate these guises differently. These studies suggest that a single phonetic manipulation is ample information for listeners to change their social evaluations. Furthermore,

studies have shown that linguistic information can influence social perception, and in turn that social information can also influence linguistic perception (Campbell-Kibler, 2007, 2009; Squires, 2013; Walker et al., 2014), demonstrating a bidirectional relationship between social and linguistic information.

While these recent studies have illuminated the importance of examining listeners' social evaluations of variants, much remains to be done. First, the majority of previous studies have focused on English vowels, and thus, much is still to be understood about non-English languages and/or consonantal variation. Secondly, many previous studies examine listeners from a wide geographical area such as a region or country. While these results have demonstrated significant findings, there is a lack of studies that look at specific communities, especially rural or non-urban communities. Finally, most studies¹ have included listeners from a young age range who normally have high levels of formal education. The current study aims to address these gaps by analyzing consonantal variation, examining a specific non-urban speech community, and including listeners from a wide array of socio-demographic backgrounds.

Building on previous sociophonetic perception studies, the principle aim of the current study is to quantify listeners' social evaluations of two phonetic norms (*ceceo*, *distinción*) in the specific community of Lepe, Spain. To this end, Section 2 reviews pertinent background information surrounding the urban–rural divide, the linguistic variable, and previous studies throughout Andalucía. Section 3 explains the methodologies, and Section 4 presents the results. Finally, Section 5 discusses the findings, and Section 6 concludes the study.

2. Background

2.1 “Rural” traditional dialectology to “urban” variationist sociolinguistics

The lack of rural, or non-urban, community specific perception studies is most likely due to the fact that contemporary variationist studies² focus almost exclusively on large urban communities. Since Labov's (1966) New York City study, there has been an “urban turn” in dialectology and sociolinguistics (Britain, 2009). This move from rural to urban communities is due in large part to outdated methodologies of traditional dialectology. The focus of traditional dialectology was rural areas as it was assumed one could find more vernacular and historical forms in such places, particularly among non-mobile older rural males (Chambers &

1. See Barnes (2015) for an exception.

2. Particularly variationist production studies.

Trudgill, 1998; Trudgill, 1986). Traditional dialectology typically comprised of rigid questions, either isolated words or short phrases, and at times would only include one older male speaker per speech community. Thus, the move to urban variationist studies was in large part a reaction to the limitations of dialectology methodologies (Britain, 2009, 2013).

While there is nothing particularly linguistic, or scientific, about the terms *urban* and *rural* (Britain, 2009), they continue to pervade scholarly and popular notions of language variation and change. By and large, it is assumed that urban areas are sites of dialect/language contact and linguistic change, while rural areas are timeless carriers of traditional dialects. Recently, Britain (2009, 2010a, 2010b, 2012a, 2012b, 2013) has thoroughly examined the rural–urban dichotomy within variationist sociolinguistics. In terms of language variation and change in an urban or rural environment, Britain argues, “there are in fact no absolute differences between them- *there are not causal social processes which affect urban areas but not rural or vice versa*” (2009: p. 224). While dialect contact may occur more frequently in large cities and lead to dialect leveling (or koineization), these processes may occur in rural areas as well, resulting in similar changes that may only differ in terms of rate of change. What should be more important to scholars of language variation and change is focusing on *dialect contact* (or isolation) and *mobility* as opposed to idealized terminology of urban versus rural (Britain, 2009, 2012a).

Traditional dialectology assumed non-mobility, or focused on non-mobile speakers, but the contemporary speech community is far from non-mobile. The mobility and contact in the last half century is unprecedented due to increased urbanization, counterurbanization, migration, transportation, and number of students moving away for higher education (Britain, 2010a: pp. 197–199). It is important to note that although there is increased mobility, that mobility in itself is socially stratified (Britain, 2012b, 2013). This increase in mobility has led to an increase of weak ties³ in Western society (Urry, 2007: pp. 211–229). As previous social networks studies (Milroy & Milroy, 1985, 1992) indicate, weak ties generally lead to more susceptibility to language change. Thus, such unprecedented large-scale societal shifts allow for linguistic change in both rural and urban environments.

2.2 The linguistic variable

Throughout Andalucía there exist three idealized norms⁴ of coronal fricative realizations: *ceceo*, *seseo*, and *distinción*. That is, the graphemes <s>, <z>, <ci>, and

3. As one reviewer pointed out, the level of weak ties varies greatly per community.

4. Here the term *phonetic norm* is used to describe *ceceo* and *distinción*, as both *ceceo* and *distinción* are idealized phonetic patterns in which inter- and intra-personal variation exist.

<ce> are variously realized as [s] and [θ]. Standard Castilian Spanish follows the norm of *distinción*, where speakers distinguish the voiceless interdental fricative [θ] from the voiceless (apico-) alveolar⁵ fricative [s] giving rise to minimal pairs such as *masa-maza* ‘mass/dough-club/mace’. Specifically, the Castilian norm of *distinción* follows a one-to-one phoneme-to-grapheme relationship where orthographic <s> is realized as [s] while orthographic <z>, <ci>, or <ce> is realized as [θ] (see Table 1).

Table 1. Realizations per phonetic norm of minimal pair *masa-maza*

	<i>masa</i> ‘mass/dough’	<i>maza</i> ‘club/mace’
<i>Distinción</i>	[ˈma.sa]	[ˈma.θa]
<i>Ceceo</i>	[ˈma.s ^θ a]	[ˈma.s ^θ a]
<i>Seseo</i>	[ˈma.sa]	[ˈma.sa]

Different from standard Castilian Spanish, Andalusian Spanish presents *ceceo* and *seseo*. *Ceceo* is defined as the complete merger of the four medieval Spanish sibilants⁶ into a voiceless dental fricative, represented as /θ/, /s^θ/, or /θ^s/ as it can vary from a post-dental realization all the way to an interdental realization (Hualde, 2005; Penny, 2000, 2002). Thus, [θ] or [s^θ] is produced in both orthographic environments, <s> and <z, ci, ce>. *Seseo*, in turn, is defined as the complete merger of the four medieval sibilants into the realization of an alveolar /s/. Thus, [s] is produced in both orthographic environments, <s> and <z, ci, ce>. While these norms suggest a categorical realization, there are speakers that demonstrate intrapersonal variation.⁷ However, as the current study is not analyzing production, but rather controlled perception, here the experimental stimuli present categorical *ceceo* versus categorical *distinción*.

5. Andalusian speakers that follow *distinción* generally realize an alveolar /s/ as opposed to the apico-alveolar Castilian /s/. However, northern regions, especially in Eastern Andalucía, realize a more Castilian apico-alveolar /s/ realization (see Narbona Jiménez et al. [1998] for all allophonic variations). As the /s/ is alveolar, Andalusian *distinción* is referred to as *distinción meridional* ‘southern distinction’ (Villena Ponsoda, 2001) as opposed to *distinción septentrional* ‘northern distinction’.

6. See Penny (2002) for a diachronic account of sibilant merger.

7. Some speakers demonstrate a great deal of intrapersonal variation in which they may realize the same word with two different coronal fricatives, commonly referred to as *seceo*, such that they pronounce the word *casa* ‘house’ as [ˈka.sa] as well as [ˈka.θa] (Dalbor, 1980; Morillo Velarde, 1997; Sawoff, 1980; Villena Ponsoda, 2001).

2.3 Previous studies on coronal fricatives

The mergers of *ceceo* and *seseo* were documented extensively in traditional dialectology. The seminal works of Navarro Tomás et al. (1933) and Alvar et al. (1973) provided a geographical vision of the phenomena throughout Andalucía, in which *ceceo* and *seseo* dominated most of Andalucía. Specifically, *ceceo* was prominent along coastal territories, *seseo* was prominent in the interior of many provinces, and finally, *distinción*, was common in the northern parts of provinces in contact with other autonomous communities.

Although current popular stereotypes continue to indicate a vast predominance of either *ceceo* or *seseo*, almost a third of Andalucía, if not more, follows the norm of *distinción* (Narbona Jiménez et al., 1998: p. 156). According to Narbona Jiménez et al. (1998: pp. 155–160), *distinción* is not native to mid and southern Andalucía, but has been brought into existence by dialect contact. In fact, since the 1980s, many sociolinguistic studies have demonstrated a large change from above (Labov, 2001) in many of these communities. Studies of Eastern Andalusian Spanish in the cities of Granada (Melguizo Moreno, 2007, 2009a, 2009b; Moya Corral & García Wiedemann, 1995; Salvador, 1980) and Málaga (Ávila Muñoz, 1994; Lasarte Cervantes, 2010; Villena Ponsoda, 1996, 2001, 2005, 2007; Villena Ponsoda et al., 1995; Villena Ponsoda & Requena Santos, 1996; Villena Ponsoda & Ávila Muñoz, 2014; Villena Ponsoda & Vida Castro, 2012) have demonstrated that *ceceo* is giving way to the norm of *distinción*. On the contrary, earlier studies of Western Andalusian Spanish (Carbonero Cano, 1982, 1985, 2003; Carbonero Cano et al., 1992; Dalbor, 1980; Lamíquiz Ibañez & Carbonero Cano, 1987; Mendoza Abreu, 1985; Sawoff, 1980) demonstrated the maintenance of *ceceo* and *seseo*. These Eastern-Western differences have been attributed to the centuries-old influence of the nearby prestige variety of Sevilla, particularly the local prestige norm of *seseo*. This *norma sevillana* (Hernández Campoy & Villena Ponsoda, 2009; Villena Ponsoda, 2008; Villena Ponsoda & Ávila Muñoz, 2014; Villena Ponsoda & Vida Castro, 2012) has supposedly limited the influence of *distinción* in Western Andalucía. However, more recent studies of Western Andalusian Spanish in Jerez de la Frontera⁸ (García Amaya, 2008), Huelva (Regan, 2017a, 2017b), the peripheral towns around the city of Huelva (de las Heras et al., 1996), and Lepe (Regan, 2017b) have demonstrated that *ceceo* is converging to *distinción*, similar to Eastern Andalucía. Also, other studies in Sevilla (Gylfadottir, 2018; Santana Marrero, 2016, 2019), Málaga (Villena Ponsoda & Requena Santos, 1996), and Granada (Moya Corral & Sosiński, 2015)

8. Of note in Jerez is the most recent study by Harjus (2018: p. 152); of 18 speakers, many of them maintain *ceceo*, including speakers with more formal education, while other speakers opt for *distinción*, indicating that perhaps *ceceo* is not losing ground to *distinción* in Jerez.

have demonstrated that *seseo*, at least among certain parts of the population, is also giving way to *distinción*. Thus, these recent studies have demonstrated dialect convergence towards *distinción* in both Eastern and Western Andalucía.

While the vast majority of studies have analyzed the production of coronal fricative variation, a few perception studies⁹ have examined the social evaluations of such variation. Most recently, Harjus (2017, 2018) conducted a perceptual variety linguistics analysis with speakers from Jerez. Aiming to understand the metalinguistic knowledge of the participants, task one involved thirty *jerezanos* drawing regions of different Andalusian varieties on a blank map. Task two involved listeners evaluating fourteen recordings on both geographic area and social strata. One finding was that *jerezano* speakers identified *ceceo* with their own locale, and differing from studies in Sevilla (Ropero Núñez, 2001) and Granada (Moya Corral & García Wiedemann, 1995), *ceceo* was not linked to a lower social stratum in Jerez. These studies indicate that in the speech community of Jerez, *ceceo* does not lack prestige.

In Granada, Moya Corral and García Wiedemann (1995) conducted a matched-guise experiment with one speaker producing four variants: (i) *seseo* and affricate [tʃ] for <ch>; (ii) *distinción* and affricate [tʃ] for <ch>; (iii) *ceceo* and affricate [tʃ] for <ch>; and finally, (iv) *seseo* and fricative [ʃ] for <ch>.¹⁰ Listeners were asked to match these recordings with four different professions: bank director, bank teller, taxi driver, and doorman. The majority of speakers assigned the bank director *distinción*, the bank teller *seseo*, the taxi driver *seseo* and fricative [ʃ] for <ch>, and finally, the doorman at a building lobby *ceceo*. These results were supported by García Wiedemann's (1997) follow up perception study in Granada, in which listeners consistently rated *distinción* as the most prestigious norm, followed by *seseo*, and lastly either *ceceo* or *seseo* and [ʃ]. In a similar matched-guise experiment in Granada, Martínez and Moya Corrales (2000) recorded several speakers with three norms: (i) *distinción*; (ii) *seseo*; and (iii) *seseo* and fricative [ʃ] for <ch>. They found that *distinción* was evaluated as more prestigious, followed by *seseo*, and then *seseo* and [ʃ]. These studies indicate that in the speech community of

9. For the sake of space, here we only focus on sociolinguistic perception studies that specifically examine coronal fricative variation. However, there have been perceptual linguistic attitude surveys both written (Ropero Núñez & Pérez Santamaría, 1998) and oral (Santana Marrero, 2018) analyzing Andalusian Spanish as a variety in comparison to other Spanish varieties. See also Lasarte Cervantes (2012) for a binary forced-choice minimal pair identification perception study based on intensity (dB) modification of coronal fricatives in Málaga.

10. The variation between affricate [tʃ] and fricative [ʃ] for orthographic <ch> is a dialectal feature common throughout Andalucía conditioned by several social factors (Villena Ponsoda, 2005, 2008).

Granada, *distinción* carries the most overt prestige, followed by *seseo*, while *ceceo* lacks overt prestige.

The speech community of Lepe has mostly been analyzed within traditional dialectology. Navarro-Tomás et al. (1933: p. 234) labeled Lepe as one of the strongholds of *ceceo* within the province of Huelva. In a Lepe-specific study, Mendoza Abreu (1985) claims that Lepe is categorically *ceceante* without a /s/ phoneme. However, more recently, Regan (2017b), acoustically analyzed the coronal fricatives of 40 speakers from Lepe and found that while *ceceo* is perhaps more present in Lepe than in the nearby capital city of Huelva, there is a change-from-above in which *ceceo* is demerging to *distinción* as demonstrated through the dependent measures of center of gravity (Hz) and mean intensity (dB). The leaders of this change are women, younger speakers, those with more formal instruction, and those with more professional occupations. As Regan (2017b) found that only *ceceo* and *distinción* were the two norms in Lepe and that there was no mention of *seseo* by Mendoza Abreu (1985), the present study therefore only compares *ceceo* to *distinción* in order to focus the listeners' responses on the two norms present and in competition in their own community.

2.4 The speech community of Lepe

As of 2011, Lepe had a population of 26,538 people (*Instituto Nacional de Estadística* [INE], 2011 Census), making it the second most populated municipality in its province, second only to Huelva capital. While in many Western nations this would be considered a more rural population, in Andalucía this can be considered a large town. Given the lack of consensus of delineating urban from rural in Andalucía (Morillo Rodríguez & Susino Arbucias, 2009: p. 287), here it will be referred to as a *non-urban* locale, as it is not the smaller rural town it once was, but still maintains its small-town agricultural spirit. The population has significantly increased since 1950, when the population was 9,285 people (*Instituto de Estadística y Cartografía de Andalucía*, 2015). While Lepe is known today for its agriculture, historically it has been a fishing and agricultural hub of the province. However, *El Puerto de El Terrón*, the local port previously known for commercial fishing, now serves a more recreational purpose. The modern economy is mainly comprised of agriculture (29.72%) and service (53.95%), as well as manufacturing/construction¹¹ (16.33%) (INE, 2011). While Lepe maintains its agricultural sector, it is increasingly relying on service and professional occupations.

11. Prior to 2008, a significant portion of the economy was based on construction, but since the world economic crisis of 2008, construction in this area is almost non-existent. Thus, this percent might even be smaller today as compared to 2011.

There have also been significant changes in educational attainment in Lepe. As the 1950 INE census only obtained specific educational levels for municipalities with a population of over 10,000 inhabitants, there is no reported education data of Lepe until 1960. In 1960 (INE), 78.23% of inhabitants had either no studies or basic reading/writing skills, 20.99% had primary studies, 0.72% had secondary/professional studies, and 0.06% had university studies. In contrast, in 2011 (INE), 14.34% of inhabitants had no studies, 20.7% had primary studies, 61.81% had secondary/professional studies, and 3.15% had university studies.

It is apparent that since the time of previous traditional dialectology studies, there have been significant socioeconomic and cultural changes in the town of Lepe, including a larger population, changes in types of employment, and an increase in formal education. While the production data of Regan (2017b) allows us to make inferences from correlations between social factors and linguistic variants, a perception test may shed more light on the listeners' evaluations and beliefs of the two phonetic norms. Therefore, the aims of the current study are two-fold: (i) to understand the social evaluations of *ceceo* and *distinción* in the specific community of Lepe; (ii) to examine how these evaluations vary by speaker and listener characteristics; and (iii) to explore the relationship between time away from the community and language attitudes. In doing so, this study elucidates the social motivation for the ongoing dialect convergence from *ceceo* to *distinción* (i.e. demerger of *ceceo*) in Lepe. Based on previous studies, it is hypothesized that listeners will more positively evaluate *distinción* guises as compared to *ceceo* guises.

3. Methodology

3.1 Stimuli

A matched-guise experiment (Lambert et al., 1960) was created in order to examine the social perception of *ceceo* versus *distinción*. Following previous studies (Campbell-Kibler, 2007, 2009), the stimuli were taken from informal sociolinguistic interviews conducted by the author during the summers of 2015 and 2016. As Campbell-Kibler (2007: p. 34) indicates, while spontaneous speech sacrifices some control over the specific content of the excerpts, it allows for a more natural sociolinguistic perception of speech, as read and spontaneous speech can differ substantially.

Participants were recorded with a solid-state digital recorder Marantz PMD660 wearing a Shure WH20XLR Headworn Dynamic Microphone with a sampling rate of 44.1 kHz (16-bit digitization). There were 12 different speakers included ranging from 23–53 years of age ($M: 33.58$, $SD: 9.71$), balanced and divided by

speech community: 6 speakers (3 men, 3 women) from Lepe (age: *M*: 33.17, *SD*: 9.38) and 6 speakers (3 men, 3 women) from Huelva capital (age: *M*: 34.0, *SD*: 10.9). The extracted stimuli included one short clip between 2 to 6 seconds of spontaneous speech from each participant. In order to ensure that listeners would hear the coronal fricative realizations, recordings were selected based on the following criteria: (i) each audio clip had a minimum of two <s> tokens and one <z, ci, ce> token; (ii) there was never more <z, ci, ce> tokens than <s> tokens (an equal number was allowed); and, (iii) clips had between a minimum of three to a maximum of six coronal fricatives. While the overall number of coronal fricatives varied per participant, the total number per gender was balanced so that there was a total of 28 coronal fricatives for men as well as for women. Specifically, women had 17 <s> and 11 <z, ci, ce> tokens in total with a mean of 2.33 tokens per female speaker (*SD*: 0.89) while men had 18 <s> and 10 <z, ci, ce> tokens in total with a mean of 2.33 tokens per male speaker (*SD*: 0.98). Additionally, as previous literature has shown correlations of either *ceceo* or *distinción* with other traditional Andalusian dialectal features (Villena Ponsoda, 2005, 2007, 2008), the recordings selected avoided the following features: (i) <ch>, which can be realized as [tʃ] or [ʃ]; (ii) word internal coda <l> which may be realized as [ɾ] or [l]; and (iii) <ll>, which may be realized as [j] or [ʎ] in Lepe. As this variety demonstrates an almost categorical aspiration or elision of coda /s/, any recording that contained a realization of [s] for coda /s/, as opposed to [h] or [Ø], was also excluded. Finally, while content itself could not be controlled, any type of specific “place” reference was also excluded; see Appendix A for the twelve audio recordings.

For each of the twelve recordings, a guise was created by digitally manipulating *distinción* guises into *ceceo* guises (see details below). In order to be able to digitally manipulate guises, each speaker included had to demonstrate more than one type of coronal fricative realization. Thus, some speakers demonstrate canonical *distinción* with alveolar [s] for <s> and a fully interdental [θ] for <z, ci, ce>, while other speakers demonstrate variable [s] and either a fully interdental [θ] or a more dental [s^θ], common of speakers with the full merger of *ceceo*, but perceptually similar to [θ] (see Penny, 2000; Regan, 2017b). First, an original recording was saved, which was almost always canonical *distinción*. Second, this original guise was manipulated to create a guise (almost always the *ceceo* guise), which was created by selecting a desired intervocalic¹² coronal fricative from another segment of

12. While effort was made to use the same phonetic context (previous and following vowels) for each spliced fricative in order to match F2 transitions, it was not always possible. While F2 transitions have been shown to distinguish between [s] and [ʃ] in English (Jongman et al., 2000; Mann & Repp, 1980) and between other places of articulation such as [f] vs. [x] vs. [s, θ], it has not been shown to be a significant factor in distinguishing [s] and [θ] (Jongman et al., 2000;

the same participant's speech. All intervocalic [s] or [θ] were segmented following the guidelines of Jongman et al. (2000: p. 1255).¹³ Following Styler (2017: p. 31), the desired tokens were spliced using Praat (Boersma & Weeknik, 2015).

Before pasting the new sound, the intensity (dB) of the newly selected fricative was adjusted to match the original fricative (i.e., the one it would replace) to avoid any unnatural intensity differences within a word. Also, all efforts were made to only splice fricatives that had a very similar duration (ms) to the original fricative. Once the new fricative was highlighted, both the start and end of selection were moved to nearest zero crossing. At this point, the segment was copied. Before pasting it into the desired location, the cursor was moved to the nearest zero crossing at the start of the frication of the original fricative. Then the original coronal fricative was highlighted, the start and end of selection were moved to nearest zero crossing and the segment was then deleted. Following Styler, splicing the segment at the zero crossing avoids loud clicks or pops in the new file.

Finally, using Praat, each final spliced sound file (the entire recording) was normalized for intensity (*Modify > Scale Intensity*) in order to bring all sound files to an overall range between 62 and 70 dB so that listeners would not have to change the volume. However, in order to protect the original sound as much as possible, no audio clip was adjusted more than 3 dB. The rationale for not normalizing all data to one single dB point such as 65 dB or 70 dB is that intensity (dB) is a major acoustic cue for distinguishing between [s] and [θ] (Behrens & Blumstein, 1988; Hedrick & Ohde, 1993; Jongman et al., 2000; Lasarte Cervantes, 2010, 2012; Martínez Celdrán & Fernández Planas, 2007; Regan, 2017b). Thus, each of the twelve speakers had one *ceceo* guise, with [s^θ] or [θ] for both orthographic <s> and <z, ci, ce> and one *distinción* guise, with [s] for <s> and [θ] for <z, ci, ce>, creating 24 total guises; see Example (1).

- (1) *Utterance:* Yo no sé, hace poco, ahora unos cinco seis años antes de la crisis ...
 ‘I don’t know, a short while ago, now some five or six years before the crisis ...’

Maniwa et al., 2009). Specifically in Spanish, Martínez Celdrán and Fernández Planas (2007) indicate that F2 transitions are not a reliable cue in distinguishing alveolar and (inter-)dental fricatives.

13. Specifically, following Jongman et al. (2000: p. 1255) the start point of the frication noise was marked at the point in which high frequency energy appears on the spectrogram and where the aperiodic zero crossings increases dramatically. Likewise, the end point of the frication noise was marked prior to the end of the aperiodic noise end before the rise of the periodicity of the following vowel.

<i>distinción</i> :	yo no [s]é, ha[θ]e poco, ahora unos [θ]inco [s]eis años antes de la cri[s]is
<i>ceceo</i> :	yo no [θ]é, ha[θ]e poco, ahora unos [θ]inco [θ]eis años antes de la cri[θ]is

The resulting stimuli were checked by two native Andalusian speakers with training in phonetics. Both agreed that each one of the final stimuli sounded natural and they were easily able to identify *ceceo* versus *distinción* guises. They were not told until after the evaluation that half of the stimuli had been digitally manipulated, further validating the naturalness of the sounds.

3.2 Experimental design

The spliced and original recordings were uploaded and organized into an online survey using the survey program Qualtrics (2005–2019). As mentioned previously, there were two guises (*ceceo*, *distinción*) for each of the twelve speakers. These were divided into two separate surveys with a balance of speaker gender, origin, and variable for each version of the survey. Following Barnes (2015), these two versions were branched so that each participant would be randomly assigned to one version or the other. In this way, each listener heard each voice only once. The rationale for splitting the experiment into two surveys was due to the use of spontaneous speech. While read speech or a map task allows for listeners to hear the same speaker several times without much risk of voice or phrase recognition, each utterance in this experiment was quite unique. Consequently, it was hypothesized that listeners would recognize the same voice given each person's unique utterance, which would create an undesired confound.

There were 12 different distractors placed into each survey version so that speakers would not recognize the variable of interest, that is, *ceceo* versus *distinción*. In these distractor recordings, there was no inclusion of syllable initial coronal fricatives, and each version was balanced by guise type and speaker gender. Within each version of the survey, participants were divided into four blocks of six recordings (three coronal fricative guises, three distractor guises). While the order of the blocks was the same for each experiment, the recordings within each block were randomized. The rationale for having blocks was to ensure that certain listeners did not have a great deal of *ceceo* or *distinción* guises back-to-back.

Upon consenting, the instructions indicated that recent social psychology studies have demonstrated that one can infer much about a person only by hearing how they speak. Participants were told that they would hear 24 different recordings (one person per recording) and that each recording would last between 2–6 seconds. They were permitted to listen to each recording as many times as

they chose and then had to respond to a series of questions. They were also asked to wear headphones and listen to the recordings in a quiet place.

After listening to each recording, the listeners had to rate each speaker on nine different questions. The first six questions were a set of social characteristics based on a six-point Likert scale. Following previous studies (Barnes, 2015; Chappell, 2016; Walker et al., 2014), the scale included an even number to avoid neutral responses. For these social characteristics, they were asked “*Esta persona suena ...*” ‘This person sounds ...’: (i) *de nivel socioeconómico bajo/de nivel socioeconómico alto* ‘of low socioeconomic level’/‘of high socioeconomic level’; (ii) *con menos estudios/con más estudios* ‘with less studies’/‘with more studies’; (iii) *menos masculina/más masculina* ‘less masculine/more masculine’ for male voices and *más femenina/menos femenina* ‘more feminine/less feminine’ for female voices; (iv) *menos simpática/más simpática*, ‘less nice/more nice’; (v) *más rural/más urbana* ‘more rural/more urban’; (vi) and *informal/formal*. Then there were three multiple-choice questions about the perceived occupation, perceived age, and perceived origin¹⁴ of the speaker. The origin options included Huelva capital, Lepe, or *otro sitio* ‘another place’. A sample of one speaker block can be seen in Appendix B. Finally, after completing all 24 evaluations (12 guises, 12 distractors), participants then answered basic demographic questions about themselves, including gender, age, number of years lived away from Lepe, and their level of education.

3.3 Implementation and participants

The survey was implemented online in order to increase participation, and participants were given a link to the survey. This link was sent in spring 2018 to the author’s social networks in Lepe as well as various Lepe Facebook pages (*No Eres de Lepe si no, Leperos en Facebook, Amo a Lepe, Leperos por Lepe, Leperos por el Facebook*, and *Ayuntamiento de Lepe*). Additionally, *El Diario de Huelva*, a major newspaper of the region, kindly promoted the study on their online edition. Upon clicking the link, potential participants were asked to consent to the terms of the study and confirm that they were both from Lepe (or had at least lived half of their life in Lepe) and were at least 18 years old. Those who consented and confirmed their eligibility were allowed to continue, and skip logic took ineligible participants

14. As pointed out by a reviewer, the majority of the questions here focus on indirect *linguistic attitudes*, while the two questions surrounding urban versus rural as well as origin deal with listeners’ direct *metalinguistic knowledge*. Although this distinction is greatly important within perceptual dialectology (Harjus, 2017, 2018; Postlep, 2012), incorporating both linguistic attitude and metalinguistic knowledge questions in a single survey is common in recent variationist matched-guise studies (e.g., Barnes, 2015).

to the end of the survey, which prevented their participation. Once a participant began, responses to each question were obligatory in order to move onto the next recording. Only completed surveys were considered for analysis.

A total of 101 speakers from Lepe participated in the study. However, nine participants' data were excluded from the final analysis for two reasons. First, some participants confused the direction of the scales, e.g., they might select “*médico/abogado*” ‘doctor/lawyer’ as a likely profession for a particular guise but would then give the lowest rating (1) of socioeconomic status and educational level. Conversely, they might choose “*trabaja en el campo*” ‘works in the field’ as a likely occupation and provide the highest rating (6) of socioeconomic status and educational level. Second, some participants selected the same number for all or many participants for each six-point scale, which suggests that they were not truly evaluating each guise. Once these participants were excluded, there was a total of 92 participants from Lepe with an age range from 18 to 61 years (*M*: 35.48, *SD*: 10.76). As the two versions of the survey were branched¹⁵ and participants were randomly assigned, there were a total of 51 participants in Version A and 41 participants in Version B. Table 2 shows the distribution of participants by gender and education as well as years lived away by educational group. The lack of balance for gender is a limitation, as social evaluations can vary significantly by gender.¹⁶

Table 2. Participants by gender and education & years lived away by education

	Men	Women	Total	Mean years lived away per educational group
Primary education	4	3	7	4.57
Secondary education	1	10	11	2.55
Bachillerato	4	8	12	1.50
Professional training	5	8	13	3.38
Univ. undergraduate degree	11	26	37	6.46
Univ. graduate degree	4	8	12	7.67
Total	29	63	92	Mean: 4.92; Median 3.5 [Range: 0–23]

15. While branching was set up to send every other participant to a different page of the study, this unfortunately included participants who started the survey but did not finish or did not agree to the consent form, subsequently ending their participation. For this reason, the numbers within each version of the survey are not equal.

16. See Harjus (2018) for gender differences in attitudes towards Andalusian coronal fricative variation.

3.4 Statistical analysis

Following Barnes (2015), perceived occupation was converted into a five-point scale based on occupational prestige (Carabaña Morales & Gómez Bueno, 1996), and perceived age was converted into a five-point scale. The social characteristics were already on a six-point scale.¹⁷ For each of the aforementioned dependent measures a separate mixed effects linear regression model was created using the *lmer* function (Bates et al., 2015) and *lmerTest* (Kuznetsova et al., 2014) in R (R Core Team, 2017) with two random factors of speaker and participant (listener). The independent variables tested in the various models included the following:

1. Variant: *ceceo*, *distinción*
2. Speaker Gender: male, female
3. Listener Gender: male, female
4. Listener Age: continuous (18–61)
5. Listener Years¹⁸ lived away from Lepe: continuous (0–23)

All independent variables were tested in model construction, but non-significant main effects and interactions were taken out of each model.

As the dependent measure of origin was a categorical variable, a separate multinomial logistic regression model was fitted to the listeners' evaluations of speaker origin using the *multinom* function in the *nnet* package (Venables & Ripley, 2002). Z-scores and *p*-values were then calculated manually. In this model, the dependent variable was origin (Huelva capital, Lepe, *otro sitio*) with the independent variable of variant (*distinción*, *ceceo*).

4. Results

The statistical analyses demonstrate a significant main effect for variant (*ceceo* vs. *distinción*) and in some cases significant interactions between variant and other independent factors for the dependent measures of Perceived Socioeconomic Status, Perceived Educational Level, Perceived Masculinity/Femininity, Perceived

17. While previous matched-guises have subjected these social characteristics to a factor analysis, the current study opted against this option as the social characteristics selected did not directly overlap.

18. It should be noted that this independent variable serves as a limited proxy for geographic mobility. One can assume that years lived away from Lepe would put speakers into contact with other dialects, but given that only the number of years away was collected, and not the specific location(s) during those years, such implications between dialect contact and years away are speculative at best.

Urban-ness, Perceived Formality, Perceived Occupational Prestige, and Perceived Origin. This indicates that listeners' evaluations of the speakers were significantly different when the speaker produced *distinción* versus *ceceo*. There were no significant main effects for variant or interactions for the dependent measures of Perceived Niceness or Perceived Age, and these attributes will not be discussed further.

The results for each model in which the dependent measure was significantly conditioned by variant are presented in Tables 3–9 with *ceceo* as the reference level for variant and female as the reference level for speaker gender. Each mixed effects linear regression model displays the estimate, standard error, *t*-value, and *p*-value. Positive estimates indicate a higher evaluation, while negative estimates indicate a lower evaluation. Larger estimates in either direction from zero indicate a stronger effect of the main effect or interaction. The following subsections review the results of the models fitted to each dependent measure independently.

4.1 Socioeconomic status

The best-fit mixed effects linear regression model for perceived socioeconomic status is shown in Table 3, with *ceceo* as the reference level for variant and female as the reference level for speaker and listener gender. The model demonstrates a main effect of variant, in which speakers with *distinción* guises were perceived to be of higher socioeconomic status than speakers with *ceceo* guises, as visualized in Figure 1. A significant interaction of variant by speaker gender demonstrates that male and female speakers were rated equally low for *ceceo* guises, but that male speakers were rated higher than female speakers for *distinción* guises, shown in Figure 2. In all the boxplots below, six represents the highest socioeconomic status and one the lowest.

Table 3. Best-fit mixed effects linear regression model for perceived socioeconomic status

	Estimate	SE	<i>t</i> -value	<i>p</i> -value
(Intercept)	2.75	0.22	12.44	< .001
Variant = <i>distinción</i>	0.73	0.19	3.84	< .001
SpeakerGender = male	0.3	0.17	1.76	0.103
ListenerAge	0.01	0.005	2.58	< .05
ListenerYearsAway	−0.02	0.01	−2.47	< .05
Variant = <i>distinción</i> : SpeakerGender = male	−0.23	0.1	−2.2	< .05
Variant = <i>distinción</i> : ListenerAge	−0.001	0.005	−0.28	0.78
Variant = <i>distinción</i> : ListenerYearsAway	0.02	0.009	2.24	< .05

Note: Significant predictors are bolded. *n* = 1,104.

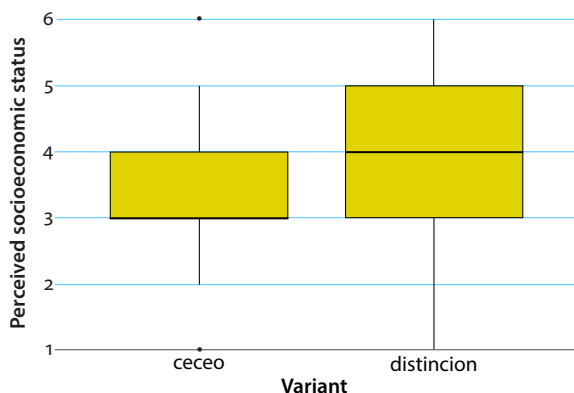


Figure 1. Boxplot of main effect of variant for evaluations of perceived socioeconomic status

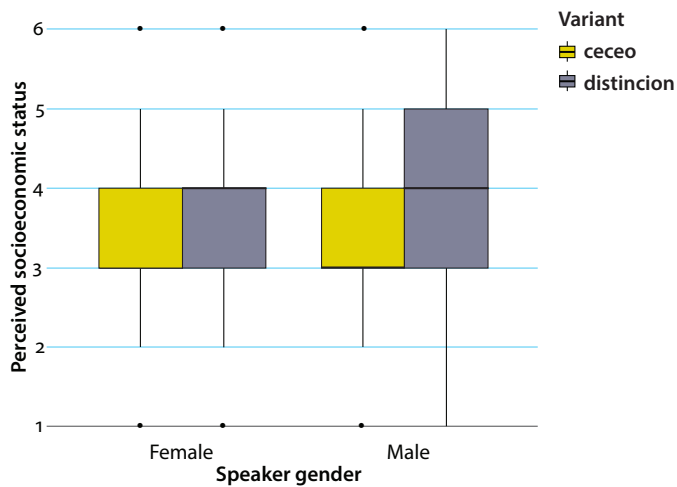


Figure 2. Boxplot of variant by speaker gender interaction for evaluations of perceived socioeconomic status

There was also a significant main effect for listener age in which older speakers evaluated all guises significantly higher than younger speakers. The interaction of variant and listener age, however, was not significant. There was a main effect for listener years away in which speakers that have lived more years away from Lepe evaluated all guises lower than those that had never left Lepe. More importantly, the significant interaction between listener years away and variant suggests that speakers that have lived more years away from Lepe evaluate *distinción* guises higher as well as *ceceo* guises lower than speakers that have not lived away from Lepe; see Figure 3.

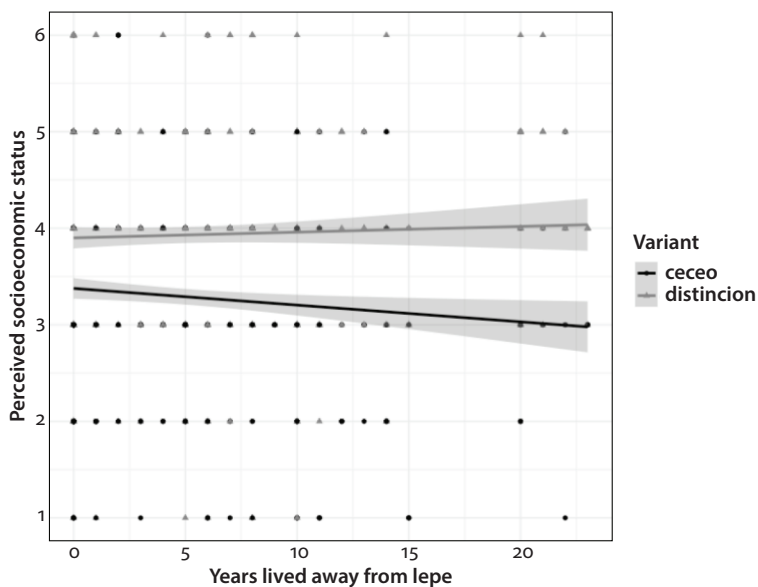


Figure 3. Scatterplot of the interaction between variant and listener years away from Lepe for evaluations of perceived socioeconomic status

4.2 Education

The best-fit mixed effects linear regression model for perceived educational level is shown in Table 4. The model demonstrates a main effect of variant, in which speakers with *distinción* guises were perceived to have higher educational levels than speakers with *ceceo* guises; see Figure 4.

Table 4. Best-fit mixed effects linear regression model for perceived educational level

	Estimate	SE	<i>t</i> -value	<i>p</i> -value
(Intercept)	3.15	0.15	20.86	< .001
Variant = <i>distinción</i>	0.98	0.06	15.96	< .001

Note: Significant predictors are bolded. *n* = 1,104.

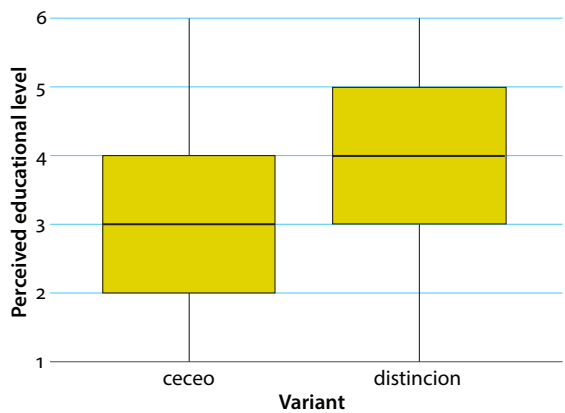


Figure 4. Boxplot of main effect of variant for evaluations of perceived educational level

4.3 Masculinity/Femininity

Before explaining the results of the best-fit mixed effects model fitted to perceived masculinity/femininity, a brief explanation is warranted on this particular scale. In the experimental design, this scale was inverted based on the gender of the speaker. That is, each male voice received a 1–6 scale from *menos masculina* ‘less masculine’ to *más masculina* ‘more masculine’, while each female voice received a 1–6 scale from *más femenina* ‘more feminine’ to *menos femenina* ‘less feminine’ (see Appendix B), which allows for a more comparable analysis of gendered evaluations in the model construction.

The best-fit mixed effects linear regression model for perceived masculinity/femininity is shown in Table 5. Given the importance of speaker gender in the directionality of the scales, only the interaction of variant and speaker gender is analyzed. The model demonstrates a significant interaction between variant and speaker gender indicating that male speakers with *distinción* guises were rated as more masculine than male speakers with *ceceo* guises. On the other hand, female speakers with *ceceo* guises were rated as less feminine than female speakers with *distinción* guises; see Figure 5.

Table 5. Best-fit mixed effects linear regression model for perceived masculinity/femininity

	Estimate	SE	t-value	p-value
(Intercept)	2.59	0.10	25.53	< .001
Variant = <i>distinción</i>	−0.22	0.10	−2.12	< .05
SpeakerGender = male	1.98	0.13	14.98	< .001
Variant = <i>distinción</i> : SpeakerGender = male	0.40	0.14	2.72	< .01

Note: Significant predictors are bolded. *n* = 1,104.

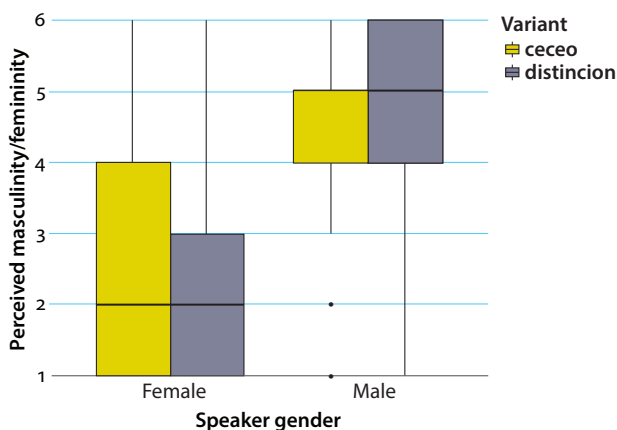


Figure 5. Boxplot of variant by speaker gender interaction for evaluations of perceived masculinity/femininity (6 = more masculine/ less feminine, 1 = less masculine/ more feminine)

4.4 Urban-ness/Rural-ness

The best-fit mixed effects linear regression model for perceived urban-ness is shown in Table 6. The model demonstrates a main effect of variant, in which speakers with *distinción* guises were perceived as more urban than speakers with *ceceo* guises; see Figure 6. There was a main effect for listener age in which older speakers rated all guises as more urban than younger speakers. Finally, there was also a main effect for listener years away in which listeners that have lived more years away from Lepe rated all guises less urban (or more rural) than listeners that had lived fewer years away from Lepe. In Figure 6, 6 is the most urban and 1 is the most rural.

Table 6. Best-fit mixed effects linear regression model for perceived urban-ness

	Estimate	SE	t-value	p-value
(Intercept)	2.45	0.26	9.45	< .001
Variant = <i>distinción</i>	1.23	0.26	4.80	< .001
ListenerAge	0.01	0.007	2.16	< .05
ListenerYearsAway	−0.03	0.01	−2.39	< .05
Variant = <i>distinción</i> : ListenerAge	−0.001	0.007	−0.14	0.89
Variant = <i>distinción</i> : ListenerYearsAway	0.009	0.01	0.72	0.47

Note: Significant predictors are bolded. $n = 1,104$.

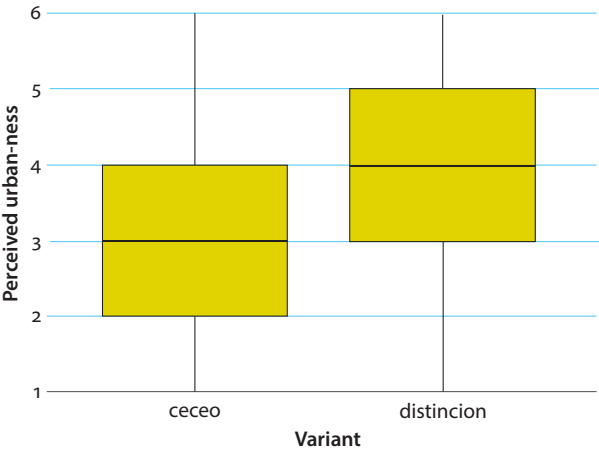


Figure 6. Boxplot of main effect of variant for evaluations of perceived urban-ness

4.5 Formality

The best-fit mixed effects linear regression model for perceived formality is shown in Table 7. The model demonstrates a main effect of variant, in which speakers with *distinción* guises were rated as being more formal than speakers with *ceceo* guises; see Figure 7. There was also a significant interaction between variant and speaker gender; see Figure 8. Specifically, the difference in formality rating of female speakers with *ceceo* (M : 2.96, SD : 1.38) versus those with *distinción* guises (M : 3.95, SD : 1.32) was larger than the difference between male speakers with *ceceo* guises (M : 3.04, SD : 1.31) versus those with *distinción* guises (M : 3.78, SD : 1.30) as seen in the mean (not the median) values in Figure 8. In Figures 7–10, 6 is the most formal and 1 is most informal.

Table 7. Best-fit mixed effects linear regression model for perceived formality

	Estimate	SE	t-value	p-value
(Intercept)	2.18	0.32	6.87	< .001
Variant = <i>distinción</i>	1.50	0.25	6.12	< .001
SpeakerGender = male	0.09	0.26	0.35	0.74
ListenerAge	0.03	0.008	3.60	< .001
ListenerYearsAway	−0.04	0.01	−3.15	< .01
Variant = <i>distinción</i> : SpeakerGender = male	−0.27	0.14	−1.97	< .05
Variant = <i>distinción</i> : ListenerAge	−0.02	0.007	−2.77	< .01
Variant = <i>distinción</i> : ListenerYearsAway	0.04	0.01	3.37	< .001

Note: Significant predictors are bolded. $n = 1,104$.

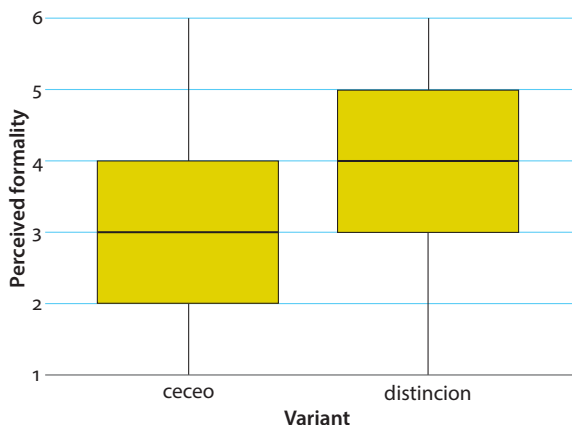


Figure 7. Boxplot of main effect of variant for evaluations of perceived formality

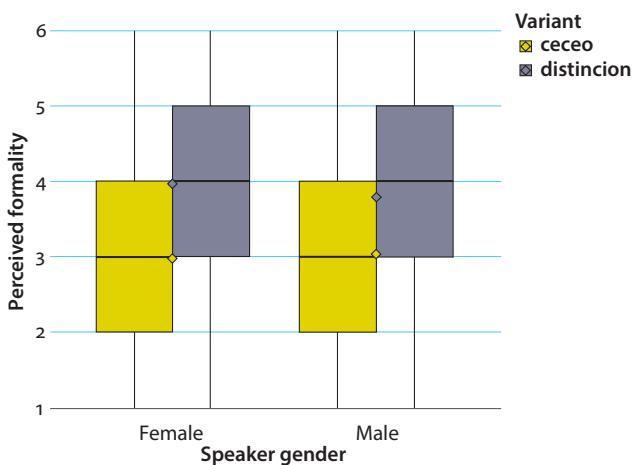


Figure 8. Boxplot of variant by speaker gender interaction for evaluations of perceived formality

There was a main effect for listener age in which older speakers rated all guises as more formal than younger speakers. More importantly, the significant interaction between listener age and variant indicates that there is a larger difference in perceived formality between the *ceceo* and *distinción* guises among younger speakers than among older speakers; see Figure 9.

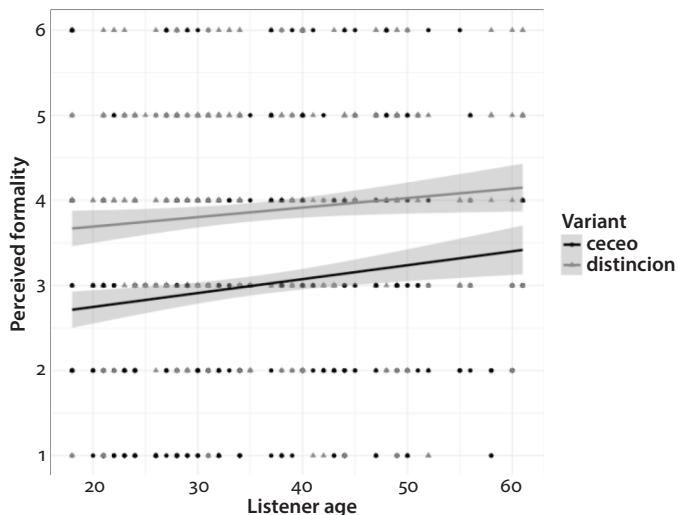


Figure 9. Scatterplot of variant by listener age for evaluations of perceived formality

Finally, there was a significant main effect for listener years away from Lepe in which listeners that have lived more years away ranked all guises significantly lower. The significant interaction between listener years away and variant indicates that listeners with more years lived away rank *distinción* guises as more formal than those listeners with fewer years lived away. Similarly, listeners with more years lived away rank *ceceo* guises as less formal than those with fewer years lived away; see Figure 10.

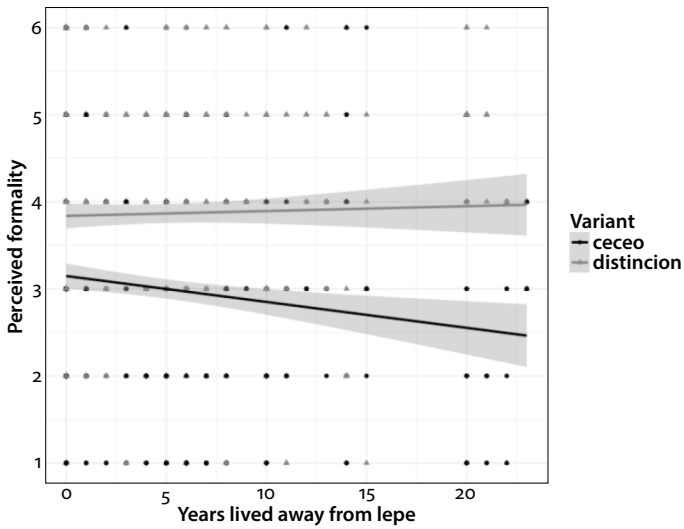


Figure 10. Scatterplot of variant by listener years lived away from Lepe for evaluations of perceived formality

4.6 Occupational prestige

The best-fit mixed effects linear regression model for perceived occupational prestige is shown in Table 8. The model demonstrates a main effect of variant, in which speakers with *distinción* guises were rated as having more occupational prestige than speakers with *ceceo* guises; see Figure 11. There was also a significant interaction between variant and listener gender. Specifically, while both male and female listeners evaluated *distinción* guises fairly similarly in terms of occupational prestige, female listeners evaluated speakers with *ceceo* guises as having less occupational prestige than their male counterparts; see Figure 12. In Figures 11 and 12, 5 is the highest occupational prestige and 1 is the lowest.

Table 8. Best-fit mixed effects linear regression model for perceived occupational prestige

	Estimate	SE	<i>t</i> -value	<i>p</i> -value
(Intercept)	2.12	0.18	11.47	< .0001
Variant = <i>distinción</i>	0.77	0.11	6.88	< .0001
ListenerGender = male	−0.12	0.10	−1.24	0.22
Variant = <i>distinción</i> : ListenerGender = male	0.28	0.14	2.01	< .05

Note: Significant predictors are bolded. *n* = 1,104.

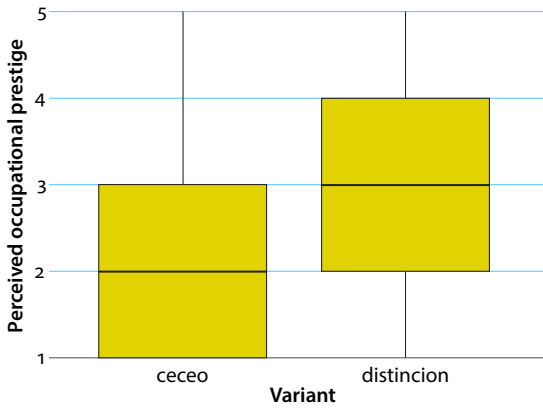


Figure 11. Boxplot of main effect of variant for evaluations of perceived occupational prestige level

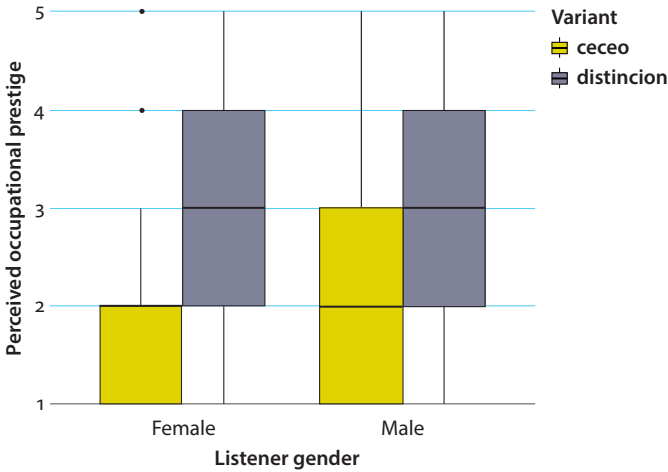


Figure 12. Boxplot of variant by listener gender interaction for evaluations of perceived occupational prestige

4.7 Origin

The best-fit multinomial logistic regression model for perceived origin is shown in Table 9. The model demonstrates that variant is a significant predictor for perceived origin, in which speakers with *ceceo* guises were more likely to be perceived as being from Lepe than Huelva capital (or *otro sitio* ‘another place’). On the other hand, while not as strong, speakers with a *distinción* guise were more likely to be perceived as being from Huelva capital as compared to Lepe (or *otro sitio*). Figure 13 presents a mosaic plot, that is, a visualization of a contingency table, which demonstrates that perceived origin¹⁹ changes significantly given the variant.

Table 9. Best-fit multinomial logistic regression model fitted to evaluations of perceived speaker origin based on variant

	Coefficients		SE		z-score		p-value	
Perceived Origin (ref. = Huelva)	(Int.)	Variant = <i>Distinción</i>	(Int.)	Variant = <i>Distinción</i>	(Int.)	Variant = <i>Distinción</i>	(Int.)	Variant = <i>Distinción</i>
Lepe	2.05	−2.36	0.14	0.16	15.09	−14.55	0.00	< .0001
otro sitio	−1.34	−0.84	0.28	0.33	−4.77	−2.50	1.89	< 0.05

Note: Significant predictors are bolded. *n* = 1,104.

19. As already noted, this particular question required more direct *metalinguistic knowledge* on behalf of the listeners, as opposed to the previous questions, which relied on more indirect *language attitudes*.

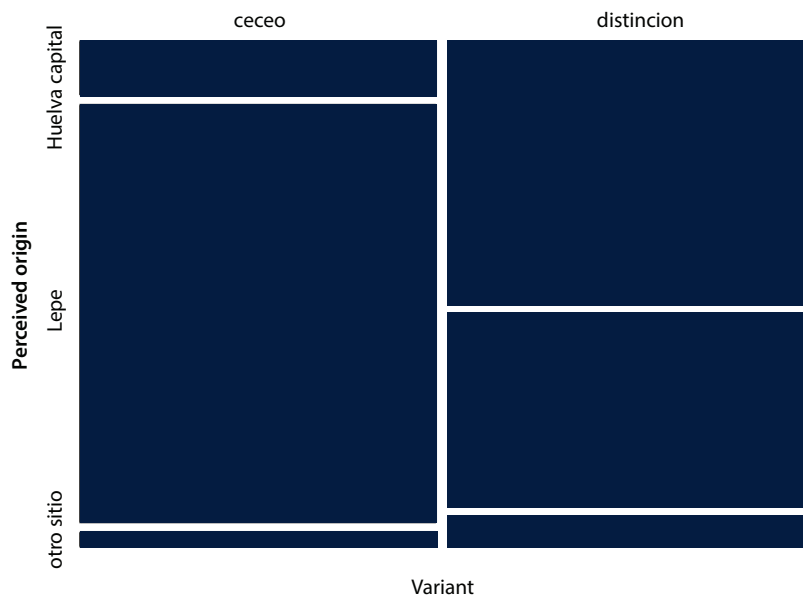


Figure 13. Mosaic plot of listeners' perception of speaker origin by variant

5. Discussion

The manipulation of the coronal fricatives used in the stimuli, *ceceo* or *distinción*, had a significant effect on how listeners perceived the speakers' social characteristics. Here we will first review the main effect of variant across the various dependent measures, followed by the interactions of variant with social factors such as listener and speaker gender, listener years lived away from Lepe, and listener age. Finally, we will review the results from perceived origin.

Variant. The main effect of variant for Perceived Socioeconomic Status, Perceived Educational Level, Perceived Urban-ness, Perceived Formality, and Perceived Occupational Prestige indicates that *distinción* is associated with more overt prestige than *ceceo*. These results directly support the findings of the previous matched-guises of *ceceo* and *distinción* in Granada (García Wiedemann, 1997; Moya Corral & García Wiedemann, 1995). These results also support previous production studies on coronal fricative variation throughout Andalucía (Ávila Muñoz, 1994; García Amaya, 2008; Lasarte Cervantes, 2010; Melguizo Moreno, 2007, 2009a, 2009b; Moya Corral & García Wiedemann, 1995; Regan, 2017a, 2017b; Salvador, 1980; Villena Ponsoda, 1996, 2001, 2005, 2007; Villena Ponsoda et al., 1995; Villena Ponsoda & Ávila Muñoz, 2014; Villena Ponsoda & Requena Santos, 1996; Villena Ponsoda & Vida Castro, 2012) in which speakers

from higher socioeconomic and educational levels, more urban areas, and more professional occupations favor *distinción* over *ceceo*, particularly in more formal speaking styles. However, these results stand in contrast to the qualitative findings of Harjus (2017: p. 11) in which speakers in Jerez did not associate *ceceo* with lower socioeconomic status, perhaps reflecting a difference in language attitudes between speech communities. In the current study, at least in terms of overt institutional prestige, *distinción* is evaluated as significantly more prestigious on various social characteristics than *ceceo* in the community of Lepe.

These results shed light on the influence of language attitudes on dialect convergence. It has been proposed that Western Andalusian Spanish remains a divergent variety due to the centuries-old influence of the nearby prestige variety of Sevilla (*la norma sevillana*), particularly the presence of the regional norm of *seseo* (Hernández Campoy & Villena Ponsoda, 2009; Villena Ponsoda, 2008; Villena Ponsoda & Ávila Muñoz, 2014; Villena Ponsoda & Vida Castro, 2012). However, the current results suggest that this part of Western Andalucía highly values the prestigious national standard of *distinción*,²⁰ which could potentially indicate greater convergence towards national norms at the expense of regional norms, in line with previous work (García Amaya, 2008: p. 65; Harjus, 2017: p. 12, 2018: p. 194; Regan, 2017a: pp. 151–152, 2017b: pp. 238–239; Samper-Padilla, 2011: p. 116). The current study can only speak towards attitudes of Andalusian coronal fricatives in Western Andalucía contributing to dialect convergence. Future studies should examine social evaluations of other traditional dialect features.

Gender by Variant. The present study also found an interaction of speaker or listener gender and variant across several dependent measures.²¹ Specifically, the interaction between variant and speaker gender in the Perceived Socioeconomic Status dimension demonstrates that while both female and male speakers are given lower evaluations for *ceceo*, male voices are rated more highly than their female counterparts when using *distinción*. That is, while both male and female speakers are rated positively when using *distinción*, male voices are rated as belonging to an even higher socioeconomic class²² than female voices with *distinción*. These

20. *Seseo* was not included in this perception study as it was not found by Regan (2017b) to be a norm in the community and would only distract listeners from comparing the two predominant norms, *ceceo* and *distinción*. Thus, future work should include *seseo* to provide a more direct assessment of the influence of the *norma sevillana* in Western Andalucía.

21. Due to the imbalance between male and female participants in the study, these results should be interpreted with caution.

22. Another explanation is that this could reflect listeners' internalized understanding of the gender wage-gap as opposed to a true interaction of gender and variant.

results suggest that male speakers stand to gain more in terms of social status than female speakers by using *distinción*, whereas both groups are evaluated equally negatively for using *ceceo*.

For Perceived Masculinity/Femininity, the interaction between variant and speaker gender demonstrates that men who use *distinción* are rated as more masculine than those that use *ceceo*, while women who use *distinción* are rated as more feminine than those who use *ceceo*. Following Trudgill's (1972) hypothesis that non-standard linguistic features may have a connection to masculinity, one might assume that men with *ceceo* would be rated as more masculine. While women were rated as less feminine for using *ceceo*, interestingly, the male voices were rated as less masculine with *ceceo*, the local dialectal feature. It is possible that this result is due to the question being difficult as scales of masculinity/femininity are not as common for the general public as scales of education or social class.

Finally, the interaction between variant and listener gender in the model fitted to evaluations of Perceived Occupational Prestige indicates that although both male and female listeners evaluate speakers with *ceceo* as having less occupational prestige than speakers with *distinción*, female listeners rate *ceceo* as even less occupationally prestigious than their male counterparts. This perhaps demonstrates embedded ideologies of the linguistic market (Bourdieu, 1991; Bourdieu & Boltanski, 1975; Sankoff & Laberge, 1978) within women. In other words, certain occupations give more linguistic capital to a more standard form of speech (in this case, the use of *distinción*) than other occupations. In the speech community of Lepe, a higher percent of all women (as compared to men) work in either service or professional occupations where the linguistic market may devalue traditional dialect features. As of the most recent census (INE, 2011), 66.87% of women in Lepe were employed in the service industry (which includes service and professional occupations), while only 42.57% of all men were employed in the same industry. On the other hand, the agriculture, manufacturing, and construction industries, where the linguistic market holds less weight, only employs 33.06% of all women versus 57.36% of all men in Lepe. In this sense, it is perhaps not surprising that female listeners would associate *ceceo* with less occupational prestige than *distinción*.

The current perception results align nicely with previous production studies on coronal fricatives, nearly all of which support Labov's *Gender Pattern* that "in linguistic change from above, women adopt prestige forms at a higher rate than men" (Labov, 1990: p. 213, 2001: p. 274). The current results indicate that women (*listeners* in this study) internalize more negative attitudes toward the less prestigious feature than their male counterparts, which may motivate their decision to adopt the prestige form at a higher rate than men.

Years Away by Variant. The interaction between years lived away and variant shows that speakers who spend time away from Lepe evaluate these two

phonetic norms differently from those who spend less, or no, time away from Lepe. If mobility is increasing both in large urban centers as well as smaller towns as indicated by Britain (2010b: pp. 197–199), the social values of these variants in Lepe may also change as members of its community become more mobile.²³ For both Perceived Socioeconomic Status and Perceived Formality, listeners who have lived more years away from Lepe evaluated speakers with *distinción* as being of higher socioeconomic status and more formal than listeners who have not left Lepe. Similarly, listeners with more years lived-away evaluated speakers with *ceceo* as being of lower socioeconomic status and less formal than listeners with fewer years lived away. Thus, listeners²⁴ who have left Lepe evaluate the norms of *ceceo* and *distinción* differently from those who have not left Lepe. This could perhaps be one of several factors contributing to the ongoing demerger of *ceceo* in Lepe. As more *leperos* spend time away from Lepe, either in contact with a different dialect and/or a different social context, they return with different social evaluations of *ceceo* and *distinción* as compared to their counterparts who have not lived elsewhere. These results support the findings of Melguizo Moreno (2007, 2009a, 2009b), in which speakers from the rural town of Pinos Puente (where *ceceo* is dominant) who immigrated to Granada capital (where *distinción* is dominant) were more likely to acquire *distinción* than their counterparts who remained in Pinos Puente.

Age by Variant. The interaction between age and variant for Perceived Formality indicates that older speakers evaluate all speakers as more formal than younger speakers, but that younger speakers have a larger difference between their evaluations of *ceceo* and *distinción*. That is, younger speakers provide more extreme evaluations of formality based on guise than their older counterparts. These results reflect previous apparent-time production data (Regan, 2017b; Villena Ponsoda, 2007) in which younger generations are more likely to produce *distinción* than older generations as well as perception data (Lasarte Cervantes, 2012) in which younger listeners were more able to distinguish coronal fricative stimuli than older listeners. Complementing these previous studies, the current study shows that younger listeners are more adept at assigning formality differences between the two norms.

23. Again, the proxy of years lived away for geographic mobility is limited, as we do not know where these speakers went. More in-depth data is needed in order to make stronger inferences.

24. As mobility in itself is socially stratified (Britain, 2012b, 2013), in the current study listeners with post-secondary studies have spent more time away from Lepe than those without post-secondary education; see Table 2. As educational attainment levels have increased in Lepe, this suggests a potential increase in geographic mobility.

Origin. Finally, the results of Perceived Origin demonstrate that listeners are more likely to perceive speakers with *ceceo* guises as being from Lepe. On the contrary, listeners are more likely to perceive speakers with *distinción* guises as being from Huelva capital. Of note, however, is that Figure 13 still demonstrates that many listeners perceived the *distinción* guises as pertaining to Lepe. These evaluations may be based in language ideologies of the rural–urban dichotomy in which more traditional dialectal features are associated with rural²⁵ areas. Alternatively, they may reflect listeners’ observations that while *ceceo* is native to both Huelva capital and Lepe, the change-in-progress from *ceceo* to *distinción* is occurring faster in Huelva capital than in Lepe (Regan, 2017b). Consequently, although *ceceo* is demerging to *distinción* in both communities, *ceceo* continues to be more common in Lepe than in Huelva capital.

Large-scale societal changes have occurred in Lepe, changing what appears to be both the linguistic production of coronal fricatives (Regan, 2017b) as well as the language attitudes towards the traditional dialect feature of *ceceo*. Having more mobile speakers can begin to change the entire community. Milroy (2002a, 2002b) argues that when members of a previously close-knit community become more mobile, then linguistic leveling and simplification are likely to occur causing localized features to disappear. Similarly, Chambers (2002) also claims that mobility is the strongest catalyst of dialect leveling.

Although much of sound change can be attributed to language internal change, the results from the current study suggest that the language attitudes of some *leperos* may be a factor in the convergence of the dialect feature of *ceceo* towards the national standard *distinción*. While all listeners consistently rated *ceceo* as less prestigious than *distinción* on the various dependent measures, those that had spent time away from Lepe rated *distinción* more positively and *ceceo* more negatively than listeners who had spent no to less time away. Consequently, the social evaluations here demonstrate a potential social motivation for the ongoing split of *ceceo* into *distinción*.

6. Conclusion

The results of the study demonstrate that listeners evaluate *distinción* and *ceceo* quite differently on several social attributes. Specifically, guises with *distinción* are evaluated as higher socioeconomic status, more educated, more urban, more formal, and of more occupational prestige than those with *ceceo*. Thus, in the

25. This language attitude has been observed in perceptual dialectology in Andalucía (Harjus, 2017).

community of Lepe, *distinción* enjoys overt prestige, while *ceceo* appears to lack such prestige. These evaluations are subject to the gender of the speaker in which men appear to gain more social status than women in utilizing *distinción*. On the other hand, these evaluations are also subject to the demographics of the listeners. That is, younger listeners perceive a larger difference in formality between guises than older listeners. Also, women listeners evaluated *ceceo* more negatively than men in terms of occupational prestige. Finally, spending time away from Lepe, whether in a different dialect area and/or social context, appears to have a significant effect on listeners' social evaluations.

While the findings are noteworthy, this study is not without limitations. One limitation is the discrepancy between male and female participants. Future studies should look to recruit more male listeners in order to confirm gender effects in this particular community. The number of participants could also be increased as well. Perhaps the largest shortcoming of the current study is its limited view of mobility, that is, years lived away from Lepe. As this was an online study, participants only gave the number of years that they had lived away from Lepe, not the location during those years. Thus, participants who lived in Madrid or Salamanca may have acquired different linguistic attitudes and been exposed to different types of dialect contact as compared to those that had spent time in Huelva capital, Sevilla, or Cádiz. In this sense, simply asking for years lived away is a limited independent variable. However, in spite of these limitations, the results demonstrated that years away (even without knowing the exact location) had an effect on listeners' attitudes compared to those that had not been away. Additionally, future work should look to compare speech communities. As the social histories of each community, even neighboring communities, differ, so too may the language attitudes toward the same linguistic variable.

The implications are three-fold: (i) listeners in Lepe evaluate the national standard feature of *distinción* as more prestigious than the local traditional dialect feature of *ceceo*; (ii) time away from Lepe impacts listeners' social evaluations of *ceceo* and *distinción*; and, (iii) even smaller non-urban communities are susceptible to changing language attitudes. Consequently, these differences in social evaluations of these phonetic norms likely contribute to the ongoing dialect convergence of *ceceo* to *distinción* (i.e., demerger of *ceceo*) in Lepe. Future sociolinguistic studies should continue to investigate smaller non-urban communities, as they are not simply timeless carriers of traditional dialects, but rather communities subject to ongoing societal changes, which can impact both language attitudes and language use.

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Appendix A. The spontaneous speech sentences with syllable initial coronal fricatives underlined and bolded

1. Si es un sitio que está muy bien para jóvenes para hacer cosas
2. Y es muy complicado responder a eso, porque te dan ganas de decir, venga, esto no sirve para nada
3. impresionante, es preciosa, una ciudad preciosa y una vida que tiene
4. pues toda esa avenida, donde está el cuartel de la Guardia Civil, todo eso todo eso
5. No solamente con la gente que conoci al nivel internacional, sino
6. Yo no sé, hace poco ahora unos cinco seis años antes de la crisis

7. empezaron a hablar de mí y decían cosas que son las cosas que yo les digo
8. y a veces noticias que salen y que se equivocan
9. es por la adoración a la virgen, pero aquí no se esta adorando a nadie porque la mayoría va a hacer eso, de fiesta
10. también pueden hacer cosas más grandes, eso puede invertir económicamente, aquí es más, se puede hacer cosas, pero ...
11. eso es lo que dice la gente, también la gente no sabe
12. y se estaba construyendo, se estaba empezando a construir y la gente y las casas estaban baratísimas, entonces

Appendix B. Questionnaire used in the perception experiment (one speaker block)

Esta persona suena ...

De nivel socioeconómico bajo 1 2 3 4 5 6 De nivel socioeconómico alto

Con menos estudios 1 2 3 4 5 6 Con más estudios

Menos masculina 1 2 3 4 5 6 Más masculina (*for male voices*)

Más femenina 1 2 3 4 5 6 Menos femenina (*for female voices*)

Menos simpática 1 2 3 4 5 6 Más simpática

Más rural 1 2 3 4 5 6 Más urbana

Informal 1 2 3 4 5 6 Formal

¿A qué crees que se dedica esta persona?

Trabaja en un bar/restaurante

Trabaja en la construcción

Trabaja en una tienda

Trabaja en el campo

Es administrativo

Es maestro

Es médico/ abogado

¿Qué edad crees que tiene?

Menos de 30

Entre 30 y 40

Entre 40 y 50

Entre 50 y 60

Más de 60

¿De dónde crees que es?

Huelva capital

Lepe

Otro sitio (indica dónde) _____

¿Algo más que se te ocurre de esta persona?

South America

Regional identity in Highland Ecuador

Social evaluation of intervocalic /s/ voicing

Christina García

Saint Louis University

Of considerable interest to linguists recently is the variable voicing of intervocalic /s/, which has been attested in dialects as diverse as Ecuadorian (Chappell, 2011; García, 2015; among others) and Catalanian Spanish (Davidson, 2014; McKinnon, 2012), among others. While our knowledge of the production of this variable has advanced, the question remains of how /s/ voicing is evaluated socially (although see Chappell, 2016). This chapter details a matched-guise experiment comparing the evaluation of intervocalic [s] and [z] in one coastal and three highland Ecuadorian cities. The results show that this variable is a regional marker within the highlands, and that it is also associated with status, pleasantness, and age, but only for female speakers. In contrast to other studies on social meaning, it is only females' use of intervocalic [z] that is socially-charged, whereas males' use is not strongly associated with any of the social characteristics examined.

1. Introduction

Research in the past few decades in the area of sociolinguistic perception has sought to disentangle the ways in which social and linguistic information contribute to speaker perception. These studies largely indicate a bidirectional relationship between the two, in which the linguistic signal influences social perception, and any social information available to the listener conditions what is heard or how it is perceived (see Campbell-Kibler, 2010). For example, Walker, García, Cortés, and Campbell-Kibler (2014) show that both speaker and listeners' origin influences the social evaluation of /s/ aspiration in Spanish. Additionally, Chappell (2019) finds that hearing sibilant or aspirated /s/ affects whether a given speaker is heard as Mexican or Puerto Rican. At the same time, scholars working in perceptual dialectology have found that dialect categorization is dependent on many signal and listener variables. For instance, Clopper and Pisoni (2004) contend

that speaker evaluations are formed based on a small set of salient variables, and also show that listeners are generally more accurate at categorizing variation that is present in their own dialect, something that is also corroborated by Schmidt (2013). Furthermore, a large body of work in this field suggests that listeners tend to favor their own variety over others, except in the case of linguistic insecurity (see Preston, 1999, for an overview).

Building on Walker et al. (2014) and Chappell (2019), the present study looks at the intersection of these two related fields (sociolinguistic perception and perceptual dialectology) by comparing the language attitudes of listeners from four Ecuadorian cities. The language attitudes examined here concern intervocalic /s/ voicing, a variable process in which intervocalic /s/ in word-initial (*la sopa* [la. 'zo.pa] 'the soup'), word-medial (*casa* ['ka.za] 'house'), or word-final (*las alas* [la. 'za.las] 'the wings') position is realized as [z]. Using the matched-guise technique (Lambert, Hodgson, Gardner, & Fillenbaum, 1960), this variable is manipulated in the speech of two male and two female speakers from Loja, Ecuador, and ratings are compared between the [s] and [z] guises. I show that the social meanings of intervocalic [z] in Ecuadorian Spanish are somewhat more limited than those of Costa Rican Spanish (Chappell, 2016), and that gender and regional origin intersect in interesting ways in the evaluation of this variable.

2. Literature review

2.1 Ecuadorian Spanish

Scholars working on Ecuadorian Spanish generally agree that this macrodialect can be broken up into three major sub-dialects: Coast, Highlands, and Amazon (Toscano Mateus, 1953; Boyd-Bowman, 1953; Lipski, 1994; among others), observable in the map in Figure 1. Although the present study focuses on phonetic variation, there are differences between these sub-dialects at all linguistic levels. For instance, Highland Ecuadorian Spanish (HES) is easily distinguished from Coastal Ecuadorian Spanish (CES) due to the lexical and grammatical influence of Kichwa and other indigenous languages (see Haboud, 1998). Besides /s/, which is discussed in the next section, the production of /j/-/ʎ/ and /r/ are the most salient phonetic features that distinguish HES and CES. On the one hand, CES is typically described as exhibiting *yeísmo* (/j/ and /ʎ/ have merged to one phoneme) and a normative alveolar trill /r/, whereas *lleísmo* (maintenance of /j/ and /ʎ/ as separate phonemes) and assibilated /r/ are variably present in HES. For the Amazonian region, Lipski (1994) affirms that a distinct "Amazonian Ecuadorian Spanish" has not yet emerged because most of its population are transplants from adjacent

highland provinces, although this claim merits further investigation since it was made over twenty years ago.¹



Figure 1. Map of Ecuador with linguistic regions according to Lipski (1994)

HES is generally further divided into smaller sub-dialects, as seen in Figure 1. Gómez (2003) and Lipski (1994) agree that the delateralization of /ʎ/ and assibilation of /r/ serve as isoglosses, demarcating Loja, Cañar/Azuay (typified by the city of Cuenca), and the Central Highlands (from Quito to the border of Cañar). Lojano and Cuencano traditionally exhibit palatal lateral /ʎ/, which is realized as a pre-palatal sibilant fricative in the Central Highlands (*malla* ['ma.ʒa] 'net'). As for /r/, it is realized as a normative trill in Lojano and assibilated in Cuencano and the Central Highlands, although to different degrees. As will be seen, these are the three regions that have been differentiated in the production of intervocalic /s/ as well.

2.2 Intervocalic /s/ voicing

In modern dialects of Spanish, /s/ is arguably the sound that varies the most and is most studied by linguists. There are two main threads of research pertaining to

1. Adapted from <<http://www.luventicus.org/mapas/ecuador/esmeraldas.html>>.

Spanish /s/: weakening² and voicing. The former, the variable production of /s/ as [h] (aspiration) or a phonetic zero (ø), is dependent on various linguistic and social factors, and in Ecuador, is only found systematically in CES (King, 1953). The latter can be split into studies that examine the pre-consonantal assimilation of /s/ (Schmidt & Willis, 2011; A. García, 2013; Campos-Astorkiza, 2014; among others) and those that concern the voicing of intervocalic /s/. The variable voicing of intervocalic /s/ has been documented in the Spanish of the following places: Catalonia (McKinnon, 2012; Davidson, 2014), Madrid (Torreira & Ernestus, 2012; Hualde & Prieto, 2014), Central Spain (Torreblanca, 1986), Northern Spain (Bárkányi, 2014), Highland Ecuador (Calle, 2010; Chappell, 2011; García, 2015; Lipski, 1989; Robinson, 1979; Schmidt, 2016; Strycharczuk, Van'T Veer, Bruil, & Linke, 2014), and Costa Rica (Chappell & García, 2017).

The realization of intervocalic /s/ varies greatly between dialects, as do the conditioning factors. The linguistic factor most consistently found important is position within the word: the majority of studies find highest rates of voicing in word-final context (Robinson, 1979; Lipski, 1989; Calle, 2010; Chappell, 2011; Torreira & Ernestus, 2012; McKinnon, 2012; Strycharczuk et al., 2014; Davidson, 2014; Schmidt, 2016; Chappell & García, 2017), although Hualde and Prieto (2014) and García (2015) find most voicing in word-final *and* word-initial contexts. Several studies concur that intervocalic /s/ voicing is a reduction process, since it is favored at higher speech rates and between unstressed vowels (Torreira & Ernestus, 2012; García, 2015; Chappell & García, 2017). Results for word class and frequency are inconclusive, with some showing an effect on voicing (Chappell, 2011; Davidson, 2014), and others no effect (Torreira & Ernestus, 2012). For preceding/following segment, Chappell (2011) finds more voicing before a low vowel, while García (2015) finds more voicing before non-high vowels.

Social factors also condition this variable. Overwhelmingly, when gender is considered, studies find more voicing in males' speech (García, 2015; Schmidt, 2016; Chappell & García, 2017; among others), although McKinnon (2012) finds the opposite. Whether this is due to anatomical or social gender differences has been debated (see Chappell & García, 2017, for a complete discussion). Calle (2010) and García (2015) find opposite effects of speaker age on this variation: older speakers voicing more in the former and younger speakers voicing more in the latter. Many previous studies of intervocalic /s/ voicing also find considerable interspeaker variation. Finally, studies in Catalonia consider the effect of bilingualism (McKinnon, 2012; Davidson, 2014), exhibiting conflicting results as to whether bilingual, Catalan-dominant, or Spanish-dominant speakers voice the most.

2. "Weakening" has also been used to describe the voicing of intervocalic /s/, but this term here refers to the production of /s/ as [h] or (ø).

Not only do rates of /s/ voicing differ between sub-dialects of HES, but the nature of the phenomenon does as well. Intervocalic /s/ voicing in Quiteño (Central Highlands) and Cuencano is generally characterized as categorical or *almost* categorical in word-final position (Robinson, 1979; Lipski, 1989; Chappell, 2011). Nevertheless, Strycharczuk et al. (2014) and Schmidt (2016) find that some Quiteño participants do not voice categorically. These studies agree, however, that there is negligible voicing in word-medial and initial contexts in Quiteño. Robinson (1979) adds that Cuencano also voices /s/ categorically at word-medial morpheme boundaries (e.g., *bisabuelo* ‘great-grandfather’). In comparison, the voicing in Lojano is a gradient, variable process, and considerable voicing is found in all three positions (García, 2015). Importantly, although not studied empirically, it is assumed that CES does not exhibit intervocalic /s/ voicing, because some of these cases of /s/ are variably aspirated in CES (King, 1953).

2.3 Perception of /s/

The “third wave” of sociolinguistics (Eckert, 2012) is increasingly concerned with not just what speakers produce, but what speakers *do* with language. Most relevant to the present study is the relationship between sounds and social meaning. It has been shown that several features contribute to the differentiation of dialects of Ecuadorian Spanish, but which of these features are socially salient to naïve native speakers remains unknown. For the perception of Spanish /s/, there are two main veins of previous research: those concerned with dialect/sound classification, and those investigating the social meaning of /s/.

In the first, studies show that previous linguistic experience influences how variation, specifically /s/ aspiration, is categorized. Boomershteyn (2006) demonstrates differences between Mexican and Puerto Rican participants, although both groups display slower processing for coda /s/ than other variables, due to the vast amount of variation present for coda /s/. Schmidt (2013) finds parallel results: Argentine participants (who are more exposed to /s/ aspiration) correctly identified stimuli with coda [h] as words containing /s/ almost twice as often as (highland) Colombian participants.

Similarly, dialect (and thus exposure) has an important influence on the social meaning of /s/ aspiration. Walker et al. (2014) show that listener and speaker dialect only affects some social dimensions: Mexican and Puerto Rican listeners rate Puerto Rican speakers using coda [h] less severely than Mexican speakers on measures of status; however, heteronormativity (‘masculine-ness’ and ‘sexuality’ combined) ratings do not exhibit dialect sensitivity. Their results for heteronormativity mirror those of Mack (2009): male speakers are heard as more masculine/heteronormative with coda [h] than sibilant [s]. These social meanings are further

explored by Chappell (2019), who finds that whether [s] or [h] is heard can override other linguistic information in influencing where Mexican listeners think a speaker is from.

Few studies have looked specifically at the perception of intervocalic /s/ voicing. García (2015) and Chappell (2017) both compare the perception of [s]-[z] to other allophonic distinctions. The results of both studies suggest that Lojano and Costa Rican participants do perceive the [s]-[z] distinction, however, less consistently than other allophonic pairs. Chappell (2016) goes further to look at the social perception of intervocalic /s/ voicing in Costa Rica, finding that intervocalic [z] is associated with lower status for all speakers and also with solidarity measures for male speakers.

To date, no study has systematically looked at the social perception of intervocalic /s/ voicing in HES. Given the differences between /s/ voicing in HES and Costa Rican Spanish, it is likely that the social perception of this variable in HES is not identical to what Chappell (2016) finds. Most notably, /s/ voicing in Costa Rica is a gradient, phonetic process (Chappell & García, 2017), while /s/ voicing in HES has been shown to be either gradient or categorical depending on region. Walker et al. (2014) find that some social meanings are more universal, while others are more local, which suggests that HES may share some of the associations found in Costa Rican Spanish, while also exhibiting others. The present study addresses the following research questions by investigating the perception of listeners from four regions of Ecuador:

1. What social characteristics are associated with intervocalic /s/ voicing in Ecuadorian Spanish?
2. Do these social meanings differ between the coastal and highland regions of Ecuador, and within the sub-dialects of the highlands?

3. Methodology

3.1 Stimuli

The stimuli for this experiment come from a corpus of sociolinguistic interviews collected in Loja (García, 2015). Speakers with considerable variation in intervocalic /s/ production were chosen so that there would be several options for splicing both [s] and [z] into other samples of their own speech, in order to create the stimuli. Two female and two male speakers were chosen, all natives of Loja, with ages ranging from 20 to 47 years (mean age: 30 years old). The stimuli material was taken from the portion of the interview in which the speakers were talking about their hometown, both for consistency between speakers and since speakers were theoretically most comfortable as it was the last portion of the interviews.

This method was used as opposed to making new recordings in which the speakers are asked to purposefully produce [z] (cf. Walker et al. 2014) because it is unlikely that speakers would be able to reliably and naturally produce [z] on command.

From each speaker, two sentences were extracted that contained 4–6 tokens of intervocalic /s/, with at least one token in each of the three word positions: word-initial, word-medial, and word-final. I made two versions of each sentence: one with spliced³ voiceless [s] and one with spliced voiced [z] for all tokens of intervocalic /s/. Tokens of /s/ in non-intervocalic contexts were not manipulated. The productions of [s] and [z] that were spliced in came from the same speaker, but a different section of the interview. The duration of the spliced /s/ was altered in some cases and a very small portion of the preceding/following vowel was also spliced in to improve naturalness. After splicing, the amplitude was equated across each stimulus so that the spliced portion would not stand out. These initial sixteen stimuli were checked impressionistically by two non-native trained linguists, one native trained linguist, and two naïve native Spanish speakers. Both naïve natives and linguists were used to ensure that any inconsistencies noted by linguists were not due to hyper-sensitive ears. Per speaker, the stimulus pair that was rated as most natural sounding and most easily distinguishable (as [s] or [z]) was chosen for use in the experiment, resulting in eight total target stimuli. A full list of the stimuli can be found in the Appendix. It is fair to assume that all stimuli are heard as representative of HES given the abundance of other HES features, such as lexicon and intonation. However, there was only one case of /r/ and no cases of /ʝ/ in the chosen stimuli. Since these two sounds are the main shibboleths differentiating sub-dialects of HES, it is assumed that the speakers could be interpreted as being from any part of the highland region.

3.2 Experiment design

The experiment was built and hosted online on Qualtrics (Provo, UT) and targeted native speakers of Ecuadorian Spanish from several regions. To ensure that participants would complete the whole survey, it was relatively brief. Upon consent, participants answered a series of basic demographic questions: their age, regional background, gender, which languages they speak, and whether they used speakers or headphones in the experiment. In addition to the eight target stimuli, there were eight fillers that serve as the targets for a different study.⁴ I created two experimental lists of the stimuli (see Appendix) and each participant received one

3. The process of splicing involves delineating the original token of /s/, deleting it from the audio, and copying and pasting a different token of /s/ in its place.

4. The fillers were made from different speakers in the same corpus, but varied assimilated and alveolar trill /r/ instead of [s]-[z].

of the two lists. These lists were designed so that participants heard one guise of each of the four speakers (e.g., [s]) before hearing the alternate guise (e.g., [z]) of any of the speakers. Within each list, the stimuli were pseudo-randomly organized to allow for maximal distance between the two guises of a particular speaker. The two lists differ in that List 1 presents Guise A of a given speaker in the first half whereas List 2 presents Guise B of that speaker first. This was done so that the first half of the results could be used if it were determined that the participants recognized the speaker repetition. The participants were told that they would listen to sixteen speakers and each stimulus was presented with a different name in hopes of distracting participants from the repetition.

Before the full data analysis was completed, the effect of list was examined and it was determined significant for two of the eight social characteristics rated. Additionally, 26 of the 219 participants explicitly commented on the repetition. For these reasons, I suspected that the second time they heard a given speaker, the participants were not rating that speaker based on the audio stimulus itself, but rather repeating the ratings they had already given that speaker. Accordingly, the dataset was halved so that only the first eight responses were used from each participant.

Following the design of Walker et al. (2014), participants were asked to evaluate each stimulus on a six-point scale for these social characteristics: *poco/muy femenina/masculino*⁵ ('not very/very feminine/masculine'), *antipático/simpático* (roughly 'unpleasant/pleasant'), *inseguro/seguro de sí mismo* ('unsure/sure of himself/herself'), *de clase baja/de clase alta* ('low class/high class'), and *de pueblo/de ciudad* ('from a town/city'). An even number scale was used to avoid neutral responses. Participants were also asked to evaluate the speakers' origin from the following options: 'Quito,' 'Cuenca,' 'Loja,' and 'Other/I don't know.' These fixed options were given because these three highland cities represent the main sub-dialects of HES, as described in Section 2.1. Finally, participants were asked to evaluate the speakers' education level and age on five-point scales,⁶ answer a free-response question regarding the speakers' ethnicity, and optionally leave additional thoughts about the speaker. On the final page of the survey, participants were able to leave any additional comments.

3.3 Participants

Participants were targeted in one coastal and three highland cities: Guayaquil, Quito, Cuenca, and Loja. Recruitment happened in person or through an email

5. 'Femenino' appeared on the scale for female speakers and 'masculino' for male speakers.

6. Five-point scales were used for these two qualities because there are not six potential age groups or education levels that would make sense for the population of interest.

sent out to friends and colleagues in these four locations, asking them to forward to interested participants. This email specified that participants must be at least 18 years old, be a native speaker of Ecuadorian Spanish, and have not lived outside of Ecuador for more than three years, to ensure recent exposure to local language attitude norms. Any participant who did not meet these requirements or did not complete at least half of the survey was excluded from the analysis. Participants were compensated with a \$5 cell phone credit upon survey completion.

A total of 219 people completed the survey. Table 1 presents a summary of the listeners' demographic information. As a result of the recruitment contacts, the vast majority of listeners are undergraduate students, but all have little or no linguistic training. Regional origin was asked as a free-response question to allow for maximally detailed information; however, the listeners were categorized into the four target regions after the fact. Listeners from towns or cities other than Guayaquil, Quito, Cuenca, and Loja were combined with the nearest category within the regional boundaries described in Section 2.1. All listeners from the coast were put into the same category for practical and linguistic reasons. The listeners responded to the language background question with the number of years they had studied English and I used this number to place them in four rough English proficiency categories: none, beginner, intermediate, and advanced. 'Beginner' is equivalent to 1–2 years of English instruction, 'Intermediate' to 3–5 years, and 'Advanced' to 6 or more years. English proficiency is examined given that /s/ and /z/ are phonemic categories in English, which could influence advanced learners' perception of these sounds. A few reported also having studied French, Kichwa, Portuguese, German, Italian, Chinese, Hebrew, and Romanian, most for fewer years than they have studied English, except in the case of two Spanish-Kichwa bilinguals.

Table 1. Listener demographics

	Listener's information
Median age (range), years	24 (18–64)
Male:female, <i>n</i>	92:127
Regional origin, <i>n</i>	Coast: 49, Quito: 39, Cuenca: 55, Loja: 76
English proficiency	none: 75, beginner: 35, intermediate: 65, advanced: 44
Total listeners	219

3.4 Statistical analysis

The data analysis follows that of Walker et al. (2014), Barnes (2015), and Chappell (2016). Responses on the scales were transformed to numerical values – 1 to 6 for masculinity/femininity, pleasantness, confidence, class, and urban-ness ratings,

and 1 to 5 for education and age ratings. Perceived speaker origin was left as a categorical variable and perceived speaker ethnicity was not included in the analysis.⁷ Ratings for femininity ('less feminine – very feminine') were inverted so that the scale would match those used for masculinity ('less masculine – very masculine'), assuming that 'less feminine' is equivalent to 'more masculine'. Since both six and five-point scales were used, all ratings were centered and standardized to make the scales comparable. In the results, zero should be understood as the central point, with positive numbers indicating more pleasant, older, etc., and negative numbers indicating less pleasant, younger, etc.

Since it seemed probable that some of the social characteristics are correlated, I performed factor analysis using the *factanal* function in R (R Core Team, 2014) with *varimax* rotation. Following Weatherholtz, Campbell-Kibler, and Jaeger (2014), 0.4 was used as the cutoff point in determining whether a given characteristic should be included in the aggregate factor. The results of the factor analysis suggest only one combined factor, corresponding to "status" (class, education, urban-ness, and confidence). The second factor is composed of only 'pleasantness,' the third factor of only 'age,' and 'masculinity/femininity' does not load onto any factor. Thus, these three factors were analyzed independently.

I modeled the aggregate and lone factors separately using mixed-effects linear regression with the *lmer* function (Bates, Maechler, Bolker, & Walker, 2014). The only categorical dependent predictor, perceived speaker origin, was modeled separately using multinomial logistic regression with the *multinom* function in the *nnet* package (Venables & Ripley, 2002). Participant was included in each model as a random effect,⁸ along with the following independent variables:⁹

1. Variant (binary: [s] or [z])
2. Listener age (continuous)
3. Listener gender (binary: male or female)
4. Listener regional origin (categorical: Coast, Quito, Cuenca, Loja)¹⁰

7. Several participants commented that they did not know how to interpret the question about speakers' ethnicity. Additionally, ethnicity ratings are largely homogenous, with roughly 82% of responses being *mestizo/a* 'mixed race'.

8. Speaker was not included as a random effect since there are only four speakers and so few levels is not appropriate for a random effect (see, for example, the explanation in Gelman and Hill, 2006).

9. Listener gender and English knowledge were not selected as significant in any of the statistical models and thus are not mentioned in the results section.

10. These four categories were collapsed to Highland vs. Coast, but there were no significant differences between the analyses with four or two categories, so the more nuanced categories were used.

5. Listener English knowledge (ordinal: none, beginner, intermediate, advanced)
6. Speaker gender (binary: male or female)
7. Perceived speaker origin (only for models where it is not the dependent variable; categorical: Quito, Cuenca, Loja, 'Other')

Treatment contrasts were used for categorical predictors and the corresponding reference levels are indicated in the results. In each regression model, independent variables were added one at a time in a stepwise procedure and nested models were compared using ANOVA, following Gries' (2013) approach of determining the "minimal adequate model." Interactions between main effects were tested and only significant interactions are retained in the models.

4. Results

The results of the statistical analyses show a significant effect of variant ([s] vs. [z]) in ratings of status, pleasantness, age, and perceived speaker origin, as well as effects of other independent variables. In the following tables, positive estimates for categorical variables indicate a higher rating as compared to the reference level (e.g., higher status), and negative estimates indicate a lower rating. In the case of perceived speaker origin (non-binary, categorical variable), the model with reference level as Loja is presented unless otherwise noted and results of re-leveling are mentioned where relevant. For continuous variables, positive estimates designate a positive correlation between the dependent and independent variables. The tables also include standard errors, *t* values, and *p* values (calculated from *t* values using the *lmerTest* package (Kuznetsova, Brockhoff, & Christensen, 2015)). The alpha value was set at 0.05. In the following boxplots, the diamond points denote the means for each group examined, while the line through each box represents the median. The box itself shows the middle 50% of all ratings, and the lines that extend above and below the box represent the highest and lowest 25% of all ratings, respectively.

4.1 Status factor

The best model for the combined status factor (class, education, urban-ness, and confidence) in Table 2 shows a main effect of variant, speaker gender, listener age, and perceived speaker origin, and an interaction between variant and speaker gender. There is an inverse relationship between listener age and status ratings such that younger listeners globally rate speakers as higher status than older listeners do. In comparison to speakers perceived as Lojano, speakers that are perceived

Table 2. Summary of best mixed-effects model for status factor (N = 876)

	Estimate	SE	t value	p-value
(Intercept)	0.57	0.11	5.01	<0.001
Variant = [z]	-0.15	0.06	-2.30	0.02
Speaker gender = male	-0.60	0.07	-9.12	<0.001
Listener age	-0.009	0.004	-2.33	0.02
Perceived speaker origin = Cuenca	-0.17	0.08	-2.24	0.03
Perceived speaker origin = Quito	0.16	0.06	2.54	0.01
Perceived speaker origin = Other	-0.27	0.07	-3.97	<0.001
Variant = [z]: Speaker gender = male	0.21	0.09	2.20	0.03

as Cuencano or ‘Other’ receive significantly lower status ratings, while those perceived as Quiteño receive higher status ratings, independent of variant.

The more crucial results from Table 2 concern variant and speaker gender, whereby [z] is heard as lower status, and male speakers are heard as lower status than female speakers. The interaction shows, however, that variant only has a significant effect for female speakers, which is illustrated in Figure 2. The mean status rating for female speakers in the [s] guise is significantly higher than in the [z] guise. Post-hoc analysis (with Tukey correction) shows that the comparison between [s] and [z] is not significant for male speakers.

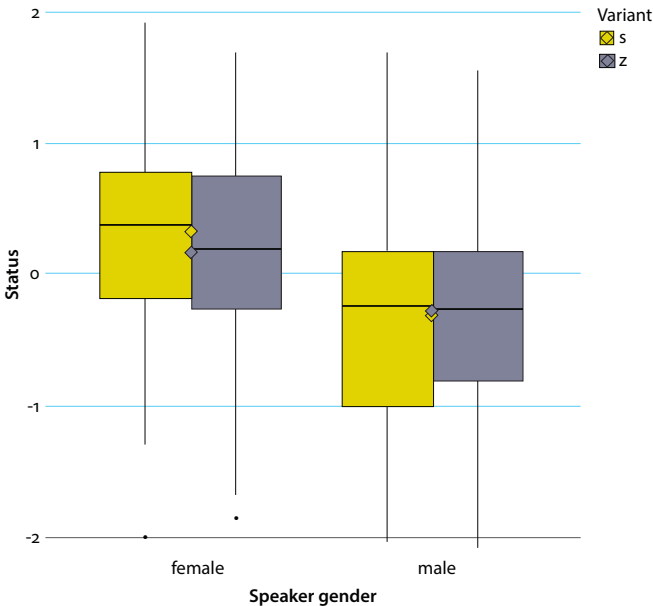


Figure 2. Boxplot of perceived status for [s] and [z] by speaker gender

4.2 Pleasantness

Table 3 shows the best model for pleasantness (*‘simpatía’*) ratings, with significant main effects of variant and speaker gender, and an interaction between variant and speaker gender that is approaching significance.¹¹ Speakers are heard as less pleasant with the [z] variant than the [s] variant, and male speakers are rated as less pleasant than female speakers. Again, the interaction shows that the particular effect of variant differs between male and female speakers. As seen in Figure 3,

Table 3. Summary of best mixed-effects model for pleasantness (*‘simpatía’*) (N = 876)

	Estimate	SE	t value	p-value
(Intercept)	0.11	0.07	1.63	0.10
Variant = [z]	−0.28	0.09	−3.07	0.002
Speaker gender = male	−0.18	0.09	−2.05	0.04
Variant = [z]: Speaker gender = male	0.24	0.13	1.90	0.06

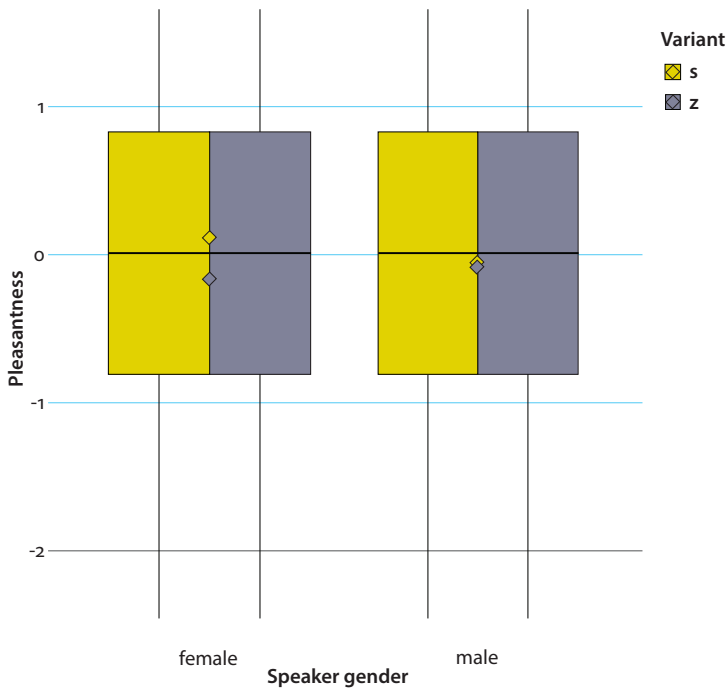


Figure 3. Boxplot of perceived pleasantness (*‘simpatía’*) for [s] and [z] by speaker gender

11. Although not significant, the interaction was left in the model because the effect of speaker gender is no longer significant when the interaction is taken out, and as seen in Figure 3, the interaction helps to illustrate the effect of variant.

the mean pleasantness rating for females is significantly higher for the [s] guise than for the [z] guise, whereas the means for both variants are quite similar for male speakers, and post-hoc analysis (with Tukey correction) confirms the effect of variant is not significant for male speakers.

4.3 Age

The best model fit to perceived speaker age is shown in Table 4. This model includes main effects of variant, speaker gender, listener age and regional origin, perceived speaker origin, and the interaction between variant and speaker gender. A direct correlation exists between listener age and perceived speaker age in which older listeners hear speakers as significantly older than younger listeners do. Listeners from Cuenca and Loja hear speakers as significantly younger than listeners from Quito do. There is no significant difference in age ratings between listeners from the Coast and any other region. Perceived speaker origin also affects age ratings such that speakers perceived as Cuencano or Quiteño are heard as older than speakers perceived as Lojano.

Table 4. Summary of the best mixed-effects model for perceived speaker age (N = 876)

	Estimate	SE	t value	p-value
(Intercept)	−0.29	0.18	−1.62	0.11
Variant = [z]	−0.31	0.09	−3.50	<0.001
Speaker gender = male	0.18	0.09	2.04	0.04
Listener age	0.01	0.005	2.79	0.005
Listener region = Cuenca	−0.23	0.10	−2.37	0.02
Listener region = Loja	−0.23	0.10	−2.32	0.02
Listener region = Coast	−0.08	0.11	−0.71	0.48
Perceived speaker origin = Cuenca	0.23	0.10	2.32	0.02
Perceived speaker origin = Quito	−0.19	0.08	−2.32	0.02
Perceived speaker origin = Other	−0.01	0.09	−0.12	0.92
Variant = [z]: Speaker gender = male	0.36	0.13	2.86	0.004

Most interesting are the effects of variant, speaker gender, and the interaction between the two. Overall speakers are rated as younger in the [z] guise as compared to the [s] guise, and male speakers are rated as older than female speakers. The interaction between these two factors is seen in Figure 4. With the interaction, it becomes clear that the effect of variant is only significant for female speakers, who are heard as younger in the [z] guise as opposed to the [s] guise. Post-hoc analysis (with Tukey correction) shows no significant effect of variant on age ratings for male speakers.

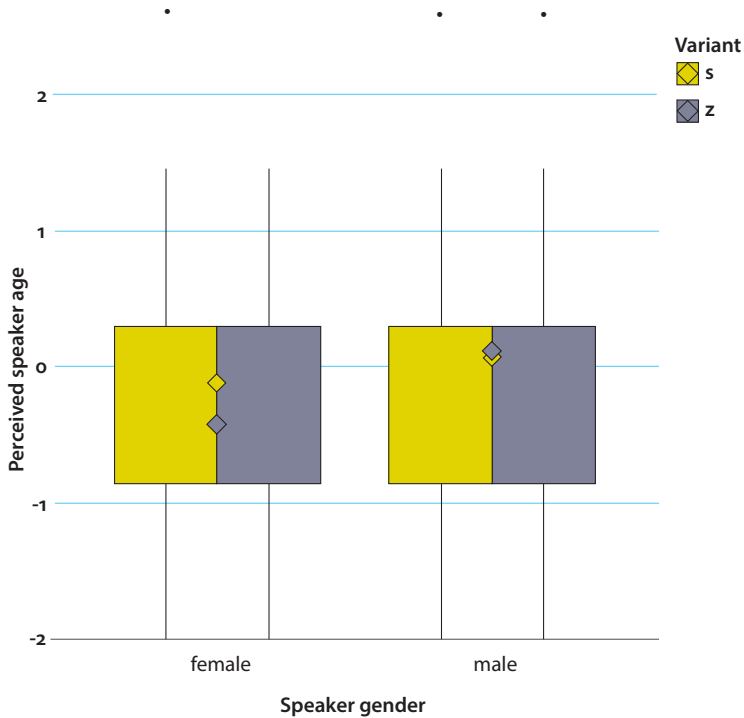


Figure 4. Boxplot of perceived speaker age for [s] and [z] by speaker gender

4.4 Masculinity/femininity

As an initial check, separate masculinity/femininity models were fit for female and male speakers, with the raw ratings before transformation. These models did not differ greatly from the best model with female and male speakers' data combined, and in none of the three models was variant a significant predictor. Thus, the results presented in Table 5 are those of the combined dataset, in which responses to female speakers have been inverted and all responses have been centered and scaled. These results show that male speakers are globally rated as more masculine than female speakers. That is, listeners seem to be concentrating their responses on different portions of the masculinity scale for male and female speakers. Also, when perceived as Cuencano, speakers are rated as significantly more masculine than when perceived as Lojano. These effects are independent of variant. While not significant, there is a trend seen in which the [z] guise is rated on average as more masculine/less feminine than the [s] guise.

Table 5. Summary of best mixed-effects model for masculinity (N = 876)

	Estimate	SE	t value	p-value
(Intercept)	−0.55	0.06	−9.04	<0.001
Speaker gender = male	1.10	0.06	18.47	<0.001
Perceived speaker origin = Cuenca	0.24	0.09	2.74	0.006
Perceived speaker origin = Quito	−0.08	0.08	−1.03	0.30
Perceived speaker origin = Other	−0.008	0.08	−0.10	0.92

4.5 Regional origin

A multinomial logistic regression model was fit to the ratings of perceived speaker origin in order to examine the effect of the independent variables on the choice between ‘Loja,’ ‘Quito,’ ‘Cuenca,’ and ‘Other/I don’t know,’ following Chappell (2019). As is typical of multinomial logistic regression, I made four different models, each time varying the reference level of the dependent predictor (perceived speaker origin). This allows us to observe comparisons between each of the four origin categories. The first model was built with the reference level as Loja and there were no important differences between this model and the subsequent three, which had Quito, Cuenca, and ‘Other’ as the reference level. Thus, the first model is presented here (reference level = Loja.) Due to page width limitations, the results are split into two tables and discussed separately. Table 6 shows the first part of the results of the best model for perceived speaker origin, which includes main effects of variant and speaker gender, with an interaction between the two. In this table and the following one, positive coefficients indicate that the speakers were perceived more often as from the listed origin category (Cuenca, Quito, ‘Other’) than from Loja. Negative coefficients indicate the opposite – that is, speakers are heard more often as Lojano than the other origin being compared. For variant, speakers are heard significantly less frequently as Lojano in the [z] guise, and thus, are heard more as Cuencano, Quiteño, or ‘Other,’ in comparison to the [s] guise. For speaker gender, male speakers are heard less often as Cuencano or Quiteño than female speakers. The comparison between Loja and ‘Other’ is not significant.

The significant interaction between variant and speaker gender in Table 6 is better understood by examining the mosaic plots in Figure 5. In this figure, the perception of female speakers is on the left and that of male speakers is on the right. Variant is along the x-axis and the y-axis shows the percentage of responses for each of the four origin categories. These plots show that the effect of variant is much more robust for female speakers than male speakers. Female speakers are heard as less Lojana in the [z] guise, which subsequently leads to an increase in their perception as Quiteña or Cuencana. Conversely, there is not much difference

Table 6. Summary of the best multinomial logistic regression model for perceived speaker origin, Part 1 (N = 876)

	Coefficients			SE		p-Value		
	(Int.)	Variant = [z]	Speaker = male	[z] : male	(Int.)	Variant = [z]	Speaker = male	[z] : male
Perceived origin (ref. = Loja)								
Cuenca	-1.66	1.27	-0.52	-1.38	0.27	0.30	0.31	0.45
Quito	-0.71	0.90	-0.67	-1.002	0.21	0.26	0.25	0.37
Other/unknown	-1.67	0.81	0.35	-0.56	0.26	0.33	0.29	0.41

between the perceived origin of male speakers in the two guises, although male speakers are heard more as being from another/unknown place in the [z] guise.

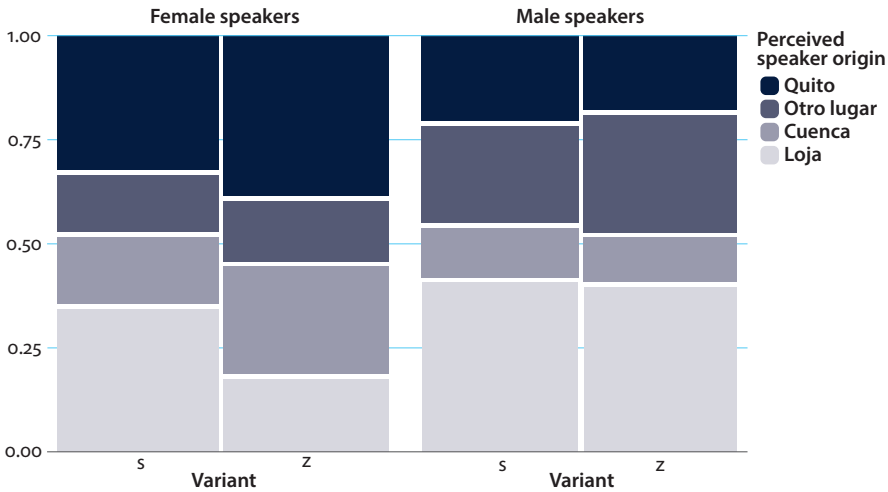


Figure 5. Mosaic plot of perceived speaker origin for [s] and [z] by speaker gender

Continuing the same model, Table 7 displays the second part of the best model for perceived speaker origin, demonstrating the effect of listener regional origin. In comparison to Lojano listeners (the reference level for “listener regional origin”), Cuencano listeners hear speakers more often as being from anywhere besides Loja, and in particular they evaluate speakers as sounding Cuencano. The positive coefficients for Quiteño listeners show a similar trend, although the only significant comparison here is in their evaluation of a speaker as Lojano versus Quiteño – favoring the latter in their evaluations. Finally, Costeño listeners evaluate speakers as sounding more Cuencano, Quiteño, or ‘Other’ in comparison to Lojano listeners. The interaction between listener regional origin and variant is not included in this model because it is only significant for one of the comparisons and ANOVA suggests the simpler model is a better fit. This demonstrates a trend in which listeners from different regions treat the evaluation of intervocalic [z] differently, however, it is not robust enough to be statistically significant.

The mosaic plot in Figure 6 gives a clearer picture of these results. The width of each column correlates with how many responses come from each of the four regions. The overall pattern is that listeners hear speakers as being more from their own region than from elsewhere, with the exception of Costeño listeners since ‘Coast’ was not one of the four options. Lojanos perceive the speakers overall as more Lojano than any other listener group. Interestingly, Cuencano and Quiteño listeners are “fooled” into thinking the speakers could be from their same place of origin, when really all the speakers are Lojano. The perception of Costeño listeners

Table 7. Summary of the best multinomial regression model for perceived speaker origin, Part 2 (dependent variable = perceived speaker origin; independent variable = listener regional origin = ‘Reg.’; N = 876)

	Coefficients				SE				p-Value			
	(Int.)	Reg. = Cuenca	Reg. = Quito	Reg. = Coast	(Int.)	Reg. = Cuenca	Reg. = Quito	Reg. = Coast	(Int.)	Reg. = Cuenca	Reg. = Quito	Reg. = Coast
Perceived origin (ref. = Loja)												
Cuenca	-1.66	2.08	0.52	1.04	0.27	0.28	0.34	0.32	0.05	<0.001	0.13	0.001
Quito	-0.71	1.30	0.87	1.01	0.21	0.25	0.25	0.26	0.22	<0.001	<0.001	<0.001
Other/unknown	-1.67	1.15	0.55	1.62	0.26	0.28	0.29	0.26	0.85	<0.001	0.06	<0.001

is more mixed between all four categories (including many ‘Other’ responses), showing that perhaps their perception of the differences between the highland regions is not as nuanced as that of highlanders. This finding supports research showing that the amount of exposure to a particular dialect influences the accuracy of its identification (Clopper & Pisoni, 2004).

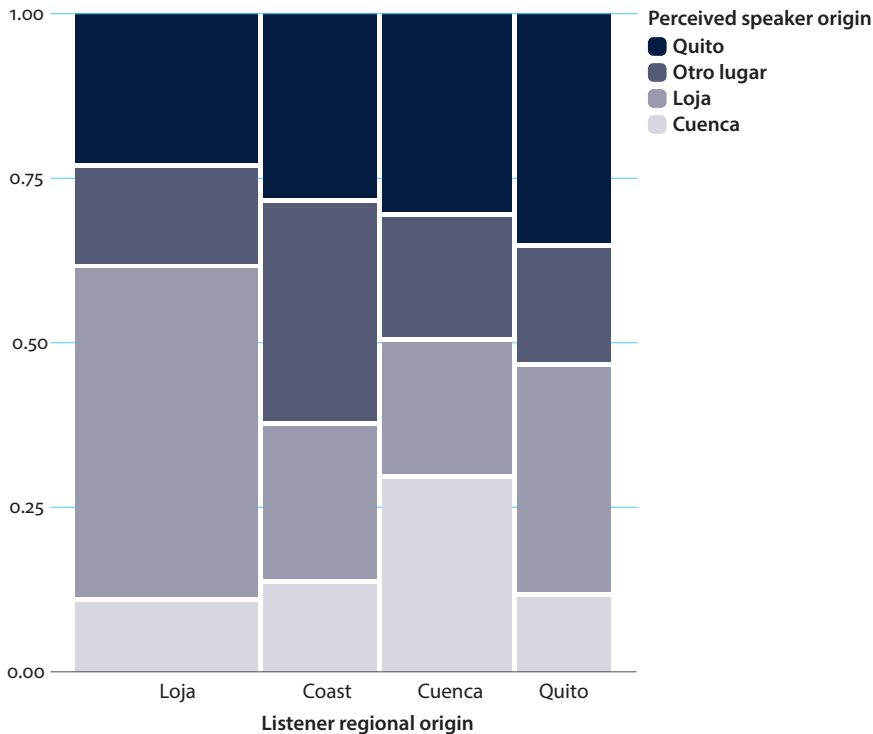


Figure 6. Mosaic plot of perceived speaker origin by listener regional origin

5. Discussion and conclusion

5.1 Interaction of gender in social perception

The perception of intervocalic /s/ voicing in HES differs greatly between male and female speakers. Intervocalic [z] is associated with lower status, less pleasant-sounding speech, and younger speakers; however, these effects are only significant for female speakers. Given that several studies have found male speakers of HES to voice more than female speakers (Strycharczuk et al., 2014; García, 2015; Schmidt, 2016; among others), it seems logical that this feature would be more “marked” for female speakers. That is, due to the preponderance of voicing in males’ speech,

whether a male speaker produces [s] or [z] does not greatly affect whether he is perceived as high or low status, pleasant or unpleasant, etc. On the other hand, since voicing is less “expected” for female speakers, it is noted as something exceptional that potentially carries information about the female speaker’s status, pleasantness, age, and regional origin.

This mirrors somewhat Chappell (2016), who finds that while both male and female Costa Rican speakers are rated as lower status when producing [z], only male speakers enjoy the covert prestige that [z] affords them (more pleasant, confident, Costa Rican, and masculine). However, in the case of voicing in HES, neither male nor female speakers are perceived as more confident or pleasant when using [z] (measures of covert prestige), although regional identity is important, as discussed in the next section.

Surprisingly, despite the greater frequency with which Ecuadorians would be exposed to voicing in male speech, there is no significant difference between masculinity ratings for [s] and [z] guises. Since male speakers of HES voice more than females, one might suspect that [z] would make male speakers sound more masculine and female speakers sound less feminine, respectively. As discussed in section 4.4, this trend is seen in the data but fails to reach significance. It remains to be seen whether this trend would be borne out with more data.

5.2 Intervocalic /s/ voicing as a regional marker and potential change in progress

Apart from the social characteristics already discussed, ratings of age and perceived speaker origin are also dependent on variant. These two factors considered together can be understood under the umbrella of social and linguistic changes happening in the Ecuadorian highlands. First, for perceived speaker origin, speakers in the [z] guise are heard as significantly more Cuencano or Quiteño than in the [s] guise, and this is especially true for female speakers. Since Cuencano and Quiteño Spanish exhibit more robust, at times categorical, voicing of intervocalic /s/ (Robinson, 1979; Chappell, 2011; among others), it follows that voicing would be associated with these dialects. Voicing in Lojano Spanish, conversely, is much more variable (García, 2015). Thus, when the Lojano speakers in this experiment “put on” fully voiced intervocalic [z], it makes them sound less Lojano and more Cuencano or Quiteño. This effect also sheds light on the results for status, since Lojano Spanish is typically considered the most “conservative” of the highland dialects (see Toscano Mateus, 1953). If indeed Quiteño and Cuencano Spanish enjoy relatively less prestige than Lojano Spanish, an idea that merits further corroboration, then a feature that is associated with Quiteño and Cuencano may consequently be heard as less standard.

Additionally, there is an effect of variant on age ratings such that female speakers sound younger in the [z] guise than the [s] guise, which parallels previous age results in production data in Lojano Spanish. García (2015) finds a significant effect of age whereby younger speakers of both genders voice more than older speakers. She is cautious to claim a change in progress given the relatively small number of speakers ($N = 31$ total speakers), but signals that social changes such as increased communication with other highland towns might support the idea of a change in progress. Here we see that voicing is also associated with younger generations, which gives more fuel to this argument. Voicing is associated with the neighboring highland dialects where it is found more consistently, but as it makes its way into Lojano Spanish through increased contact with these dialects, it becomes associated with the young speakers who are leading this change. Nevertheless, this is a preliminary hypothesis that needs to be further corroborated with more data. Interestingly, we see again that voicing is normal or expected for male speakers, whereas it marks youngness for female speakers.

While the results of this study suggest that intervocalic /s/ voicing is a regional marker used to distinguish someone from Quito, Cuenca, or Loja, it is important to highlight how it differs from other features. As stated previously, Gómez (2003) rightfully claims that assibilation of /r/ and delateralization of /ʎ/ serve as the major isoglosses distinguishing sub-dialects of HES. The realization of /r/ and /ʎ/-/ʎ/, however, are much more salient and commented on by naïve native speakers. There is only one mention of the “pronunciation of s’s” in all of the discursive comments in the present study and naïve native speakers do not mention voicing in their descriptions of HES. Thus, intervocalic /s/ voicing contributes to the formation of highland identity, but in a more subtle way than other features. Now that it has been established as a regional marker within HES, future studies should tease apart how each feature contributes to regional identity, which could be understood under the idea of “bricolage” (Campbell-Kibler, 2010), whereby each variable adds an additional “layer” to the perception of regional identity.

One unpredicted result of the present study is that listener origin does not have a significant effect on the treatment of [s] vs. [z], even when collapsed to two, simpler categories (Coast vs. Highlands). The only place where we see an effect of listener origin is in perceived speaker origin, but this is independent of variant. While it has not been empirically studied, it is fair to assume that intervocalic /s/ voicing is not present in CES based on the fact that coastal speakers typically aspirate coda /s/, which eliminates at least one (word-final) of the three potential sites of voicing. Therefore, we might expect that coastal listeners would not have any particular social associations due to less exposure or that their social associations would differ, but instead they have the same associations that highland listeners do. It is possible that the lack of an effect of listener origin is due to the small

number of listeners per region and that with more data, we would see more of the pattern of Walker et al. (2014), who show different variable treatment between Mexican and Puerto Rican listeners.

The differences between the results here and those of Chappell (2016) show that some of the social meanings of intervocalic /s/ voicing are local and that the indexical field (Eckert, 2008) of this variable in HES is more limited and attenuated than in Costa Rica. Chappell (2016) argues that the indexical field for intervocalic [z] includes ‘uneducated,’ ‘low class,’ ‘nice,’ ‘confident,’ ‘masculine,’ and ‘local,’ although female Costa Rican speakers are only able to access the first two of these indexes. While the indexical field of intervocalic [z] in HES does include ‘low status,’ it differs in the other characteristics that are included – namely, ‘unpleasant,’ ‘young,’ and ‘Quiteño/Cuencano.’ This confirms what Walker et al. (2014) and Phrao, Maegaard, Møller, and Kristiansen (2014) find for the indexical field of /s/ aspiration and frontedness; that is, some social meanings are global and shared between dialects, while others are local.

The results here partially uphold the theory of Chappell (2016) that female speakers may avoid nonstandard variants because they have more to lose and less to gain in doing so. Female speakers of HES are heard as lower status and less pleasant when employing intervocalic [z]. However, they are also heard as younger and more Quiteña/Cuencana, which could carry positive or negative valence depending on a myriad of contextual factors (see Giles & Billings, 2004, for studies looking at the effect of context on language attitudes). Consequently, for HES, it is not only that female speakers have more to lose and less to gain, but rather that their use of intervocalic /s/ voicing is socially-charged, whereas males’ use is perceived overall as ordinary and therefore not strongly associated with any of the social characteristics examined. The potentially more complex situation of HES and the consideration of perceived speaker origin allow for an additional layer of information in the social meaning of this variable.

5.3 Conclusion

The results of this study show that intervocalic /s/ voicing in HES is associated with status, pleasantness, age, and regional origin within the highlands. However, for most of these characteristics, this social meaning is only present for female speakers. In the ratings of status, pleasantness, and age, there is no significant effect of variant ([s] vs. [z]) for the male speakers. Thus, males’ use of intervocalic [z] is seen as expected and not carrying any social meaning, whereas females’ use of this variant is heard as lower status, less pleasant, and younger. While no difference in social perceptions was found between listeners from different regions of Ecuador, this study does demonstrate that intervocalic /s/ voicing is a marker of

regional identity within the highlands, such that employing intervocalic [z] makes one sound more Quiteño or Cuencano. Although all of the speakers in this study are actually from Loja, the listeners were “fooled” into thinking they were listening to Quiteños or Cuencanos at times when hearing the voiced variant. While intervocalic [z] is not associated with Lojano speech at the present time, it is not likely to stay that way as the variation takes root in Lojano Spanish.

Indeed, it is important to note that, just like the linguistic variables themselves, the language attitudes explored here are moving targets, particularly in the case of young Lojanos. My own experience and fieldwork in Loja have given me a glimpse into the ever-changing societal and linguistic landscape. Although Lojanos have always been known for being migratory (Paladines, 2006), some young Lojanos are now orienting even more towards outside of Loja for their future dreams and plans. The increased contact between Loja and other highland cities is likely the culprit for the linguistic changes that Lojano Spanish is currently undergoing, while simultaneously affecting how Lojanos view their city, at least in the middle class. Keeping a close eye on Lojano Spanish, and more broadly HES, in the future, therefore, will undoubtedly continue to be fruitful territory for examining the multifaceted interaction between language, gender, and regional identity.

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Appendix

1. Full list of stimuli; instances of intervocalic /s/ that were manipulated are **bolded**

Speaker M1 – male, 23 years old

Físicamente se ha cambiado un poco, o sea han mejorado en ciertos aspectos, las carreteras.

‘It has changed physically somewhat, that is, certain aspects have improved, the highways.’

Speaker M3 – male, 29 years old

Era una sociedad muy pequeña, pero ...además es una ciudad muy barata.

‘It was a very small society, but ...it is also a very cheap city.’

Speaker F6 – female, 47 years old

Sí, o sea, en los últimos años pues ...ha sido muy evidente.

‘Yes, that is, in the last years, well ...it has been very evident.’

Speaker F12 – female, 20 years old

Por eso me encanta, yo quiero ir a un país así, hay más oportunidades.

‘That’s why I love it, I want to go to a country like that, there are more opportunities.’

2. *Experimental lists – stimuli order*

List 1	List 2
1. F6 [s]	1. F6 [z]
2. M3 [z]	2. M3 [s]
3. <i>filler</i>	3. <i>filler</i>
4. F12 [z]	4. <i>filler</i>
5. <i>filler</i>	5. F12 [s]
6. <i>filler</i>	6. <i>filler</i>
7. M1 [s]	7. <i>filler</i>
8. <i>filler</i>	8. M1 [z]
9. F6 [z]	9. F6 [s]
10. M3 [s]	10. M3 [z]
11. F12 [s]	11. <i>filler</i>
12. <i>filler</i>	12. F12 [z]
13. M1 [z]	13. <i>filler</i>
14. <i>filler</i>	14. M1 [s]
15. <i>filler</i>	15. <i>filler</i>
16. <i>filler</i>	16. <i>filler</i>

Spanish and Palenquero

Language identification through phonological correspondences

John M. Lipski

The Pennsylvania State University

The Afro-Colombian creole language Palenquero, spoken in the village of San Basilio de Palenque, has been in contact with its historical lexifier, Spanish, for several centuries. The lexicons of the two languages are more than 90% cognate, including complete identity (based on the local vernacular variety of Spanish) and predictable phonological modifications resulting from the historical development of Palenquero in contact with Kikongo and other Central African languages, in addition to some less predictable correspondences. Previous research has demonstrated that Palenquero-Spanish bilinguals are influenced by key grammatical items in on-line (real-time) identification of the language of an utterance (all-Spanish, all-Palenquero, or mixed). The present study examines the role of regular Palenquero-Spanish phonotactic correspondences in facilitating language identification by Palenquero-Spanish bilinguals. Three experiments provide data: a single-word language identification task, an on-line rapid language identification task, and an on-line processing task in which participants signal points of transition between Palenquero and Spanish. The results point to a subtle but real role for Palenquero-Spanish phonological predictability in language identification, with enhanced importance for young L2 Palenquero speakers. More generally, the observations are relevant to other revitalization efforts that involve a minority language substantially cognate with the dominant language. The data from L2 Palenquero speakers suggest that sociophonetic awareness can aid in bootstrapping emergent grammatical competence in the minority language.

1. Introduction

In the study of bilingualism, it is generally accepted that the mental representations of the languages are not entirely independent of one another (Grosjean,

1989). Moreover, there is a large body of evidence indicating that bilinguals do not completely inhibit the non-target language in production or processing (Hermaans et al., 1998; Kroll, Misra, Bobb, & Guo, 2008; Kroll, Dussias, Bogulski, & Valdés Kroft, 2011; van Heuven, Schriefers, Dijkstra, & Hagoort, 2008). These observations notwithstanding, the natural assumption is that bilinguals know which language they are speaking at a given time, and similarly that they can recognize and distinguish the same languages in processing, but the means by which such acknowledgment and recognition are achieved are not always clear. In many – perhaps most – instances, there are sufficient substantive morphosyntactic, lexical, and phonotactic differences between the languages to ensure quick and unambiguous identification. In other cases, e.g., among closely related regional languages, there may be enough overlap in one or more dimensions to create areas of ambiguity and engender debates as to the qualitative nature of dialect or register mixing.

The present study examines a unique bilingual environment involving two languages – not reducible to dialects or registers of a single language – that share an overwhelming proportion of lexical cognates as well as substantially overlapping macro-syntactic structures. The languages are Spanish and the creole language Palenquero, spoken in the Afro-Colombian village of San Basilio de Palenque. Although in general mutually unintelligible, Spanish and Palenquero overlap in enough ways as to make on-line (real-time) language identification a non-trivial matter. In the following sections the emphasis is on quasi-regular phonological correspondences of cognate lexical items between Spanish and Palenquero, to determine the extent to which (possibly unconscious) awareness of these correspondences aids in rapid language identification by Palenquero-Spanish bilinguals. Three experiments provide data: a single-word language identification task, an on-line task in which participants identify the language of sentence-length stimuli as quickly as possible, and an on-line processing task in which participants signal points of transition between Palenquero and Spanish. In all three experiments the role of predictable Palenquero-Spanish phonological alternation was shown to be significant, to a greater extent among young less proficient Palenquero speakers but even for fluent adult bilinguals. In the rapidly changing sociolinguistic environment of Palenque, propelled by language revitalization efforts and community activism, young L2 Palenquero speakers' implicit knowledge of these sound correspondences partially compensates for less than fully developed grammatical competence, which highlights the contributing role of (often passive) exposure to a minority language.

2. Literature review

2.1 Palenquero (Lengua ri Palenge)

Palenquero is a Spanish-lexified creole language spoken in the village of San Basilio de Palenque, a community of around 3,500 residents some 70 km. to the south of the Caribbean port of Cartagena de Indias, Colombia. Palenquero, known simply as *Lengua ri Palenge* ‘[the] language of Palenque’ by community residents, is a highly restructured Afro-Iberian contact language, which apparently emerged late in the 17th century when enslaved Africans fled from Cartagena and established fortified communities in rural regions to the south (Navarrete, 2008; Schwegler, 2011a; the studies in Schwegler, Kirschen, & Maglia, 2017). In addition to several studies focusing on specific elements, general descriptions are found in Escalante (1954), Bickerton & Escalante (1970), Lewis (1970), Friedemann & Patiño Rosselli (1983), Megenney (1986), Schwegler (1996, 2013a, 2013b), Schwegler & Green (2007), Cásseres Estrada (2005), Pérez Tejedor (2004), Simarra Obeso, Miranda Reyes, & Pérez Tejedor (2008), and Simarra Reyes & Triviño-Doval (2008).

At the macro-syntactic level Spanish and Palenquero share SVO word order, post-nominal adjective placement, head-first subordinate clauses, and prepositional phrases. Morphosyntactic differences that separate Palenquero and Spanish include:

- Lack of grammatical gender; Palenquero adjectives typically derive from the corresponding Spanish masculine singular forms, irrespective of the grammatical gender of cognate Spanish nouns: *muhé bieho* ‘old woman,’ *kumina sabroso* ‘tasty food.’
- Nominal plural marking is effected (when necessary to specify plural) with the prenominal particle *ma* (Moñino, 2007; Schwegler, 2007a, 2007b, 2012): *ma hende* ‘the people,’ *ma pelo* ‘the dogs.’
- Verbs are not inflected for person and number (Schwegler, 1993).
- Overt referential subject pronouns are usually obligatory.
- Palenquero marks tense, mood, and aspect with preverbal particles, including *ta* (imperfective/progressive), *tan* (future/irrealis), *a* (past/imperfective), and *asé* (habitual);
- The negative marker *nu* is usually placed clause-finally, with no stipulated syntactic distance from the main verb (Dieck, 2000; Schwegler, 1991, 2016): *i kelé chitiá ku bo nu* ‘I don’t want to talk to you.’
- Palenquero uses a single set of personal pronouns in subject and object positions; object pronouns are always placed in immediate post-verbal position;
- Palenquero lacks definite articles;

- Palenquero nominal possession is expressed by postposing the possessor to the possessed object (Moñino, 2002): *posá suto* ‘our house,’ *moná mi* ‘my child,’ *ma ngombe Raúl* ‘Raul’s cows.’

According to some documentary sources, Palenquero-Spanish bilingualism may date back at least to the 18th century, although there is contradictory information as to the extent of Spanish-Palenquero bilingualism in previous centuries (Bickerton & Escalante, 1970: p. 255; Escalante, 1954: pp. 229–230; Friedemann & Patiño Rosselli, 1983: p. 45; Morton, 2005: pp. 36–37; Schwegler, 1996, t.1, p. 26; Schwegler, 2011b: p. 463). Monolingual Palenquero speakers may have existed well into the 20th century, but currently all Palenquero speakers also speak Spanish, although not all Spanish speakers in Palenque are fluent in Palenquero.¹

Crucial to the study of cues to language identification in Palenque is the dramatic shift in the use of the Palenquero language that has taken place over the past two decades (Schwegler, 2011c). Having survived for several centuries, the Palenquero language was reduced to an object of ridicule in the early 20th century, as Palenqueros traveled and worked outside of the community (Hernández Cassiani, Guerrero, & Pérez Palomino, 2008: p. 95, p. 112). As a result, many native Palenquero speakers avoided using the language in public and did not teach the language to their children, and Palenquero was considered as endangered by many linguists (Friedemann & Patiño Rosselli, 1983: pp. 189–191; Pfeleiderer, 1998; Moñino, 2003: p. 529; Schwegler, 1996, v. 1, p. 42). Attitudes have changed dramatically in recent years; UNESCO has declared Palenque to be a Masterpiece of the Oral and Intangible Heritage of Humanity, the community receives a constant stream of visitors, ranging from casual tourists to scholars, and Palenquero language classes are found from pre-school through secondary school, taught by a handful of charismatic and activist teachers. Some of the linguistic effects of this language revitalization are explored by Lipski (2011, 2012, 2014), Moñino (2012), and Schwegler (2011c). Despite the enthusiasm found among teachers and young people regarding the ethnoeducation program, at present, Palenquero language classes are held only one day per week and include no metalinguistic

1. . There are no reliable figures as to the proportion of adult and young residents of Palenque who are proficient in the Palenquero language. According to Schwegler (1996, v. 1, 42), an informal survey of school children from ages 12 to 18 conducted in 1993 revealed that only about half had some competence in Palenquero, a view echoed by Moñino (2002: p. 228, fn. 2) and Morton (2005: p. 103f.) for essentially the same time period. The children referred to in those studies are now adults in their 30s and 40s, and the impression of the present author is that more than half of that cohort has reasonable proficiency in Palenquero, perhaps due to the revitalization efforts. Most residents over the age of 50 can speak at least some Palenquero although not all do so routinely. Currently all high school students have at least some working knowledge of Palenquero, although few use the language extensively outside of school settings.

commentary about grammatical structures, concentrating instead on key lexical items and emblematic expressions. Students' oral and written production is not critiqued or corrected; thus there is no reason to expect enhanced awareness of Palenquero grammatical or phonological structures in correlation with the amount of classroom exposure.

Choice of language has always been an important marker of identity in Palenque, and with the enhanced metalinguistic awareness that has accompanied the Palenquero language revitalization efforts, even subtle phonetic differences serve to mark "good," "better," and "best" Palenquero speakers. Although seldom discussed explicitly in the community – unlike comments on lexical and grammatical usage – mastery of Palenquero phonetic and phonological traits is highly valued, and therefore constitutes a key sociophonetic dimension.

2.2 Palenquero-Spanish phonological alternations

The linguistic history of Palenquero is the subject of ongoing research, with the precise time period and geographical location of the emergent creole still being debated. One generally accepted finding is that the only African language borrowings in the Palenquero lexicon come from Kikongo and related Central African Bantu languages (e.g., Schwegler, 2002, 2011a, 2012). The possible influence of an early form of São Tomé creole Portuguese has also been suggested (e.g., Granda, 1970; Megenney, 1983). Common to Spanish >> Palenquero and Portuguese >> São Tomé creole as well as Portuguese borrowings into several Central African Bantu languages and Kikongo itself are: neutralization of /l/, /r/-/r/, /d/ in favor of an allophonically distributed [d]-[l] alternation; prenasalization of voiced stops, especially word-initially; and paragodic vowels added to word-final tonic CV syllables. Found in many L2 approximations to Spanish as well as several Afro-Hispanic dialects is the shift of prevocalic /d/ > [r] (Lipski, 2007, forthcoming), also found in some Palenquero words (cf. Morton, 2003, Chapter 6). Some quasi-regular Palenquero lexical items are: *mbulo* (Sp. *burro*) 'donkey', *pelo* (Sp. *perro*) 'dog', *aló* (Sp. *arroz*) 'rice', *lendro* (Sp. *dentro*) 'inside', *mblelo* (Sp. *bledo*) 'wild amaranth', *lelo* (Sp. *dedo*) 'finger', *mbila* (Sp. *vida*) 'life', *kelá* (Sp. *quedar*) 'to stay', *yulá* (Sp. *ayudar*) 'to help', *ngolo/a* (Sp. *gordo/a*) 'fat', *ngáina* (Sp. *gallina*) 'hen', *ndo* (Sp. *dos*) 'two', etc. There are numerous instances of voicing of post-nasal voiceless stops: *hende* < Sp. *gente* 'people', *tiembo* < Sp. *tiempo* 'time', *Palenge* < Sp. *Palenque*, *monde* < Sp. *monte* 'woods, underbrush' *kuendo* < Sp. *cuento* 'story', *sendá* < Sp. *sentar* 'sit', *kandá* < Sp. *cantar* 'sing', etc. A few instances of word-initial /d/ are realized as [r] (e.g., *ría* < Sp. *día* 'day', *Rió/Rioso* < Sp. *Dios* 'God').

Despite what appear to be very systematic Spanish-Palenquero phonological correspondences there are numerous exceptions, including items that apparently

did not participate in the lexical alternations as well as items with unexpected phonological modifications. Among the latter are *numano/a* (Sp. *hermano/a*) ‘brother/sister’, *kusa* (Sp. *cosa*) ‘thing’, *kumina* (Sp. *comida*) ‘food’, *ngande* (Sp. *grande*) ‘big’, *hirila* (Sp. *herida*) ‘wound’, *nimao* (Sp. *animal*) ‘animal’, *kolao* (Sp. *corral*) ‘barnyard’, *barika* (Sp. *barriga*) ‘belly’, *bitilo* (Sp. *vestido*) ‘dress’, *mini* (Sp. *venir*) ‘come’, *miná* (Sp. *mirar*) ‘look’. As for Palenquero lexical items that do not show regular phonological correspondences with their Spanish cognates, it is not clear whether they are recent borrowings, the result of partial decreolization, or simple lexical exceptions that have been in Palenquero from the outset. The existence of such variation necessarily complicates the study of Palenquero socio-phonetic awareness, while at the same time reflecting the complex diachronic and synchronic linguistic environments responsible for the emergence, expansion, and current use of the Palenquero creole language.

2.3 The psycholinguistic and sociophonetic role of Palenquero-Spanish phonological alternations

In practice the Palenquero-local Spanish interface, which involves a very high proportion of recognizably cognate lexical items and largely congruent phrase structure, results in the consequence that language identification is not always possible by hearing only a single word or even a short sequence, since words and short spans identical to both languages may be involved, e.g., the examples in (1), where variant Palenquero pronunciations are indicated.

- (1) Pal. ku/omo (b)o ta
 how you COP
 Sp. cómo (es)ta(s)
 how COP-2s
 ‘how are you?’
 Pal. ku/omo (b)o amanesé
 how you awake
 Sp. cómo amanece(s)
 how awake-2s
 ‘how are you [this morning]?’
 Pal. i a salí pa Katahena
 I PERF leave for Cartagena
 ‘I left for Cartagena’
 Sp. ya salí pa(ra) Catagena
 already leave-RET-1s for Cartagena
 ‘[I] already left for Cartagena’

This may be partially responsible for observed Spanish-like incursions in spoken Palenquero that have often been regarded as code-switches or Spanish interference, e.g., by Schwegler (1996, v. 1, p. 45f., 1998: pp. 242–243, 2001: p. 414, 2011b), Schwegler and Morton (2003: p. 121).

Previous psycholinguistic research by Lipski (2013, 2015, 2016a, 2016b) has demonstrated that Palenquero-Spanish bilinguals do not always acknowledge language mixture as readily and as accurately as trained linguists who base their judgments on “canonical” descriptions of Palenquero and Spanish. At the same time it was found that some language-specific words (e.g., Palenquero subject pronouns or Spanish irregular verbs) triggered acknowledgement of language switching more consistently than less salient grammatical or lexical features. In translation tasks it was found that some young L2 Palenquero speakers and even a few fluent adult speakers overgeneralized the characteristically Palenquero /r/ > [l] shift by producing “Palenquero” words that do not exhibit this alternation, e.g., Sp. *hombe* ‘man’ > *omble* (Pal. *ombe*), Sp. *arreglar* ‘to arrange’ > *aleglá* (Pal. *areglá*). This is apparently a recent phenomenon, reflecting the pedagogical practice of learning lists of words without explicit mention of phonological correspondences. Some instances of hypercorrect /d/ > [r] were also observed. Neologisms created by community language activists also reflect implicit knowledge of some historical sound changes found in the adaption of Spanish words into Palenquero, e.g., *be-huko ablaró* (Sp. *bejuco hablador*) ‘telephone’ (lit. ‘talking vine’), *Etao/Etaro Hundo* (Sp. *Estados Juntos* ‘states together’) ‘United States’.

Palenquero-Spanish bilingualism therefore provides a unique opportunity for examining the role of the awareness of regular phonological processes in facilitating language identification. The data reported above suggest that phonological awareness may play a role in facilitating language identification, partially counterbalancing the potentially confounding effects of highly cognate lexicons and substantially congruent phrase structure patterns. The present study examines the role of regular Palenquero-Spanish phonological correspondences in language identification. This matter is approached indirectly in three partially overlapping fashions, each forming the basis for a separate interactive experiment conducted in San Basilio de Palenque in 2017. The first approach requires participants to quickly identify individually presented words as belonging to either Spanish or Palenquero. In the second approach, participants rapidly identify presented utterances as either Spanish or Palenquero in order to determine language-specific “trigger” words during on-line sentence processing of spoken language. The third technique utilizes oral presentation of mixed Spanish-Palenquero utterances in order to determine the types of words that trigger recognition of an intra-sentential language shift. In each instance the emphasis is on the relative salience of cognate lexical items that exhibit relatively predictable phonological alternations

as opposed to cognates with unpredictable phonological differences as well as non-cognate lexical items.

Although the experiments to be described below are grounded in psycholinguistic techniques, the sociolinguistic importance of language identification in Palenque cannot be overstated. Considered an endangered and stigmatized language as recently as two decades ago, Palenquero has experienced a remarkable renovation through community activism and educational programs, and most Palenqueros now regard their ancestral language with pride and strive to speak it in the presence of visitors to the community. The ability to speak “good” Palenquero is currently highly valued, but there is no community-wide consensus as what constitutes the “best” variants of many words and grammatical combinations (cf. Moñino, 2012: pp. 248–250). Phonetic variability plays a part in this linguistic shadow-boxing: is it *Palenque* or *Palenge*, *mblelo* or (*m*)*bleo* (Sp. *bledo* ‘wild amaranth’), *barika* or *balika* (Sp. *barriga* ‘belly’)? An examination of Palenquero speakers’ intrinsic perception of phonological variation will provide an external perspective on a topic seldom discussed explicitly by Palenqueros themselves.

2.4 The linguistic ecology of Palenque

Despite the fact that San Basilio de Palenque is a small self-contained village that can be traversed on foot in around fifteen minutes, it embodies a complex speech community together with many challenges for field research, especially experimental tasks. The language revitalization efforts that resulted from changing attitudes have produced tangible effects, such as Palenquero language classes which now span pre-school through high school. Although exposing students to examples of the language, these classes only take place once a week, do not usually include explicit grammatical explanations,² contrasts with Spanish, student production, or correction by teachers, and as a result some young L2 Palenquero speakers exhibit usage patterns that diverge from fluent adult speech (Lipski, 2012, 2014; Moñino, 2012; Schwegler, 2011c). The numerous visits by anthropologists, linguists, and Afro-diaspora activists from around the world have led to an enhanced metalinguistic awareness among many community members, and the emergence of “expert witnesses” who proclaim the superiority of one speaker’s Palenquero usage over another’s (Morton, 2005: p. 164). This widespread verbal jousting in the absence of concrete criteria makes acceptability judgments inherently suspect, while the introduction of interactive experimental protocols encounters other obstacles,

2. . The author has observed secondary-level Palenquero language classes for the past ten years, and with only a few exceptions (most notably due to a recent rotation of teachers at the highest level), no explicit grammar teaching or correction occurs.

including the fact that most potential participants have little or no literacy and are unfamiliar with experimental tasks of any sort. Moreover, in Palenque no doors are closed and children and adults (as well as dogs, chickens, and pigs) freely enter all dwellings and intrude in ongoing conversations, so that research techniques must be adapted accordingly. The author and the author's students have been conducting interactive experiments in Palenque for several years, with nearly two hundred participants, in a mutual learning process that has yielded increasingly reliable results and a genuine spirit of collaboration. The data reported below reflect the reality of linguistic research in Palenque and embody an attempt to portray Palenquero-Spanish bilingualism from the bilingual speakers' perspective. All stimuli used in the experiments are listed in the appendix.

3. Methods

3.1 Experiment 1: Language identification of lexical items

The purpose of this experiment was to determine the extent to which Palenquero-Spanish bilinguals can identify the language of individually presented words, including those that are full or partial cognates in Palenquero and Spanish. Key variables included regular phonological correspondences, e.g., the /r/ ~ /l/ alternation, presence vs. absence of prenasalized word-initial voiced stops, and voicing of post-nasal voiceless stops.

3.1.1 *Participants*

A total of fifty-three Palenquero-Spanish bilinguals participated, thirty-three adult speakers for whom Palenquero was a native language and who had received no formal instruction in Palenquero, and twenty younger participants (ages 18–25), all of whom had received Palenquero language classes. Most of the younger participants can legitimately be classified as L2 Palenquero speakers.

3.1.2 *Materials*

The stimuli consisted of fifty-six digitally recorded individual lexical items, twenty-eight in Palenquero and twenty-eight in Spanish. All were extracted from elicited utterances produced by a fluent adult male Palenquero speaker, and all were judged (by the author and another fluent Palenquero-speaking consultant) to be free of fast-speech or coarticulation effects that would impede recognition in isolation. Of the Palenquero words fourteen represented regular sound correspondences with respect to their Spanish cognates: five with /r/ ~ /l/ (e.g., Pal. *aló*-Sp. *arro(z)* 'rice'); five with voiced-voiceless post-nasal stops (e.g., Pal. *Palenge*-Sp.

Palenque), and four with word-initial prenasalized voiced stops (e.g., Pal. *ndo-Sp. dos* ‘two’). Ten Palenquero words had no regular sound correspondence with Spanish (e.g., *antonces* [Sp. *entonces*] ‘then’), and five were unique to Palenquero with no Spanish cognate (e.g., *piangulí* ‘pig’). Of the Spanish words three had Palenquero cognates with prenasalized stops (e.g., Sp. *gallo*-Pal. *ngayo* ‘rooster’), six had Palenquero cognates with the /ɾ/ > /l/ shift (e.g., Sp. *perro*-Pal. *pelo* ‘dog’), and five had nasal + voiceless stop combinations whose Palenquero cognates had a voiced stop (e.g., Sp. *sentar*-Pal. *sendá* ‘sit’). Ten of the words had no regular sound correspondence with Palenquero (e.g., *madre* [Pal. *mai*] ‘mother’), and five were unique to Spanish with no Palenquero cognates (e.g., *hijo* ‘son’). Finally, the stimulus set contained eight ambiguous words that could be readily interpreted as either Spanish or Palenquero (e.g., *ponchera* ‘large bowl,’ *lengua* ‘language’); four were assigned to the Spanish set and four to the Palenquero set.

3.1.3 Procedure

The stimuli were normalized for intensity in PRAAT (Boersma & Weenink, 1999–2005) and presented on a portable computer using a script written for the PEBL experiment-building platform (Mueller & Piper, 2014), and participants listened with over-the-ear headphones. In a self-paced experiment, after each stimulus item participants pressed either the right shift key (covered with a green dot) if they felt that the word was in Palenquero or the left shift key (covered with a red dot) if the stimulus item was in Spanish. On-screen icons (found in the Appendix) reinforced the instructions: for Spanish a widely circulated photo of the (then, in 2017) Colombian president José Manuel Santos wearing the official Colombian sash (derived from the Colombian flag), and for Palenquero a photo of the status of the presumed founder of Palenque, Benkos Bioho, located in the village plaza. The program recorded responses and reaction times.³

3.1.4 Results and discussion

The results of the language identification task are presented in Table 1.

3. . Reaction times were not significantly different for either Palenquero or Spanish words between phonologically predictable and language-unique items. Reaction to all Palenquero words was significantly faster than to Spanish words by subject *Welch-t*(93.19) = 3.90, $p < .0002$ and by item *Welch-t*(41.08) = 4.23, $p < .0002$. There were no significant differences in reaction time between ambiguous words and Spanish words, but the difference was significant between ambiguous words and Palenquero words by subject *Welch-t*(75.09) = -3.89, $p < .0003$ and by item *Welch-t*(33.75) = -5.88, $p < .0001$. These reaction times are consistent with the lexical asymmetry between Palenquero and Spanish: whereas many unmodified Spanish words and even sentence fragments are routinely produced in spoken Palenquero, Palenquero never intrudes on Spanish.

Table 1. Rate of correct responses to individual word language identification task

	All (N = 53)	Young (N = 20)	Adults (N = 33)
All Spanish words	85.4% (950)	86.4% (363)	84.7% (587)
Spanish words w/alternation	89.2% (189)	81.3% (65)	93.9% (124)
All Spanish words w/out alternation	84.5% (761)	87.6% (298)	82.5% (463)
Uniquely Spanish words	92.7% (442)	93.9% (169)	91.9% (273)
All Palenquero words	97.5% (1654)	97.7% (625)	97.4% (1029)
Palenquero words w/alternation	96.6% (870)	96.5% (328)	96.6% (542)
All Palenquero words w/out alternation	98.6% (784)	99.0% (297)	98.4% (487)
Uniquely Palenquero words	98.6% (784)	99.0% (297)	98.4% (487)
Ambiguous words	61.0% (194)	65.0% (78)	58.6% (116)

The between-language difference in correct identification of all Spanish and all Palenquero words is significant for all participants by subject $Welch-t(81.96) = -7.16$, $p < .0001$ and by item $Welch-t(29.86) = -6.16$, $p < .0001$; for young participants by subject $Welch-t(29.98) = -4.26$, $p < .0002$ and by item $Welch-t(29.51) = -4.58$, $p < .0001$; and for adults by subject $Welch-t(50.50) = 5.69$, $p < .0001$ and by item $Welch-t(30.74) = -5.82$, $p < .0001$. There were no significant differences between adults and young participants for either Spanish or Palenquero words taken together.

Uniquely Spanish words (e.g., conjugated verbs and some lexical items) were correctly identified at a significantly higher by-item (but not by-subject) rate than Spanish words in general; for all participants $Welch-t(27.51) = -2.61$, $p < .02$; for young participants $Welch-t(36.49) = -2.15$, $p < .04$; and for adults $Welch-t(26.79) = -2.15$, $p = .04$. There were no significant differences for any group between uniquely Palenquero lexical items and all Palenquero words.

Between Spanish words that exhibited regular phonological alternations with Palenquero and the uniquely Spanish words, there was no significant difference in correct identification rate when all participants were taken together, due largely to the fact that young participants unexpectedly identified words without phonological alternations at a somewhat higher rate than words with regular alternations, while adult participants exhibited the opposite tendency. For young speakers there was a significant by-item difference: $Welch-t(20.79) = -3.03$, $p < .007$. For adult participants there was a significant difference by subject $Welch-t(58.03) = 4.09$, $p < .0002$ and by item $Welch-t(19.51) = 2.60$, $p < .02$.

Ambiguous words (nearly identical in both Spanish and Palenquero except for possible low-level sub-phonemic differences) differed significantly in correct response rates from both Palenquero and Spanish words. Between ambiguous words and words clearly identifiable as Spanish the difference was

significant for all participants by subject $Welch-t(103.88) = 7.60$, $p < .0001$ and by item $Welch-t(14.91) = 3.33$, $p < .005$; young by subject $Welch-t(37.88) = 4.31$, $p < .0002$ and by item $Welch-t(15.45) = 2.57$, $p < .03$; and adults by subject $Welch-t(64.0) = 6.27$, $p < .0001$ and by item $Welch-t(16.60) = 3.76$, $p < .002$. Between ambiguous words and identifiably Palenquero words there was a significant difference for all participants by subject $Welch-t(80.34) = 16.27$, $p < .0001$ and by item $Welch-t(11.95) = 6.34$, $p < .0001$; young participants by subject $Welch-t(29.01) = 9.31$, $p < .0001$ and by item $Welch-t(12.04) = 4.96$, $p < .0004$; and adults by subject $Welch-t(50.52) = 13.42$, $p < .0001$ and by item $Welch-t(12.5) = 7.34$, $p < .0001$.

In view of the considerable inter-participant variation, which cut across age groups, a general linear (logistic regression) mixed-effects model was fitted in R (R Core Team, 2014, version 3.3.1), with response (correct or incorrect) to the language classification task as the response variable and with participant as random intercept, and with age group (young vs. adult), regular phonological correspondence (binary yes or no), and uniqueness (binary yes or no) as fixed effects (since words unique to a single language cannot be ambiguous but can in principle reflect general phonological alternation), using the lme4 package (Bates et al., 2015). P-values were approximated with the lmerTest (Kuznetsova et al., 2014) and car (Fox & Weisberg, 2011) packages.⁴ In this model, regular phonological correspondence and uniqueness emerged as significant, but age group did not. The lmerTest package revealed the following main effects, both at the $p < .0001$ level for presence/absence of regular phonological alternation, with lack of alternation as reference level ($z = 13.669$; estimate 2.298; std. error 0.168); for uniqueness to a particular language, with non-uniqueness as reference level ($z = 14.735$; estimate 2.6078; std. error 0.177). A likelihood comparison with the null model (no fixed effects) revealed that the model with fixed effects accounted for significantly more of the variance: $\chi^2(3) = 334.47$; $p < .0001$.

These results provide a more fine-grained analysis of the data in Table 1, namely that Palenquero and Spanish words that exhibit regular phonological equivalences provide a bridge between the two languages, and result in identification rates that fall in between words unique to a single language. In the aggregate, Palenquero words were correctly identified at higher rates than Spanish words, which is probably reflective of the asymmetrical relations in language mixing. Many adult

4. . Since the assumption was that that Palenquero and Spanish words with varying degrees of phonological interrelatedness would yield substantially different results and therefore that the variance associated with stimulus would be naturally large, stimulus was not selected as a random intercept. In fact, by incorporating stimulus into a mixed-effects model the eigenvalues were so large that the models failed to converge.

Palenquero speakers incorporate Spanish elements into Palenquero discourse, not as deliberate code-switching but often without full awareness. On the other hand almost no Palenquero elements are introduced into the local variety of Spanish, and without prior knowledge of Palenquero bilingualism, it would be difficult to deduce any language contact from Palenqueros' Spanish (Schwegler & Morton, 2003; Morton, 2005). The lack of significant differences between adult and young Palenquero speakers for the identification of isolated words stands in contrast to the often enormous differences in overall language proficiency, ranging from the most hesitant and Spanish-laden approximations to complete native competence. Young speakers' generally reduced active production abilities are partially offset by the fact that they have received some school training, which while producing little effect on overall fluency in the language, does highlight lexical differences, especially words phonetically divergent from their Spanish counterparts.

3.2 Experiment 2: Language identification through eye movement

The second experiment was designed to probe on-line language identification by means of eye movements linked to mouse tracking. The purpose was to determine the elements most closely linked to identification of an utterance as Spanish or Palenquero, by asking participants to identify the language of the utterance as soon as possible after the onset of the stimulus sentence.

3.2.1 *Participants*

The same participants as in the first experiment performed this experiment at a different time.

3.2.2 *Materials*

Fifty utterances were digitally recorded by a male native Palenquero speaker, twenty-five in Palenquero and twenty-five in Spanish. Based on the first non-ambiguous (i.e., possible in either Spanish or Palenquero) word in the utterance, the Palenquero stimuli contained fourteen utterances whose first language-specific content word exhibited a systematic phonological difference with respect to Spanish: four with the /r/ > /l/ shift (e.g., *aló* [Sp. *arro(z)* 'rice'], two prenasalized stops (e.g., *ndrumí* [Sp. *dormi(r)* 'sleep'], one with the /d/ > [r] shift (*ría* [Sp. *día*] 'day'), and seven with post-nasal voiceless > voiced stops (e.g., *hende* [Sp. *gente*] 'people'). The remaining language-identifiable words were specific to Palenquero. Twelve of the utterances began with Palenquero words (six with Palenquero-specific words and six with predictable phonological variation with their Spanish cognates, and thirteen Palenquero utterances began with non-lexical grammatical elements (combinations of subject pronouns and preverbal tense-mood-aspect

particles) followed by an identifiably Palenquero word (five uniquely Palenquero, eight with predictable phonological alternation). The Spanish sentences, included as a control, all began with identifiably Spanish items (ten finite verb forms, ten nouns, and five subject pronouns). Some examples are in (2):

- (2) WITH PHONOLOGICALLY PREDICTABLE WORD (Pal. *ndrumí* < Sp. *dormir* 'sleep')
 si i keba *ndrumí* má i keba tené má kutú
 if I COND sleep more I COND have more force
 'If I slept more I would be stronger'
 WITH UNIQUELY PALENQUERO WORD (*chochá* 'great quantity')
 un *chochá* ri hende ngande ri Palenge ten teléfono nu
 ART lot of people big of Palenque have telephone NEG
 'A lot of older people in Palenque don't have telephones'
 WITH UNIQUELY SPANISH WORD (*fuiste* 'you went')
fuiste a la casa de tus suegnos ayer
 go-RET-2S to ART house of your in-laws yesterday
 'You went to your in-laws' house yesterday'

3.2.3 Procedure

Participants were seated in front of a Dell Latitude 12 Rugged Extreme laptop computer (necessary for the extreme heat and humidity in Palenque), equipped with an external mouse. The upper left hand corner of the screen contained the previously mentioned icon of Colombian president Santos to represent the Spanish language, and in the upper right hand corner the image of Benkos Bioho to represent the Palenquero language (shown in the Appendix). Behind the screen was located a Canon FS-200 digital camcorder mounted on a secure tripod and facing the participant's face. A Y-adapter was connected to the headphone output of the computer, with one output feeding a pair of over the ear headphones and the other connected to an attenuating audio cable which in turn was fed into the microphone input of the camcorder. The camcorder was set to the highest frame recording rate, 29.97 interlaced frames per second. After a sound test the experiment began with a fixation cross in the middle of the screen. Each utterance was followed by a 500 ms. gap, a 500 ms. beep, and another 500 ms. gap. This sequence was repeated automatically until the end of the experiment. The stimuli were presented in a previously randomized order; each participant heard the stimuli in the same order, to facilitate subsequent analysis.

Participants, seated approximately 50 cm. from the camera, were instructed to place the mouse pointer on the fixation point at the beep, and to move it towards the appropriate icon as soon as they recognized the language of the utterance (Spanish or Palenquero). In pre-experiment testing it was determined that the combination of distance between the camera and the participants' face

and the distance between the on-screen icons resulted in eye movements that could be clearly discerned in the video recordings. Practice with the mouse and a dummy screen image occurred before each trial. The camcorder recorded the participants' eye and face movements in synchrony with the audio stimuli. The stimulus presentation was programmed in the OpenSesame experiment building platform (Mathôt, Schreij, & Theeuwes, 2012). The video and audio files for each participant were then imported into the Elan annotation package (<http://tla.mpi.nl/tools/tla-tools/elan/>; cf. Lausberg & Sloetjes, 2009). A PRAAT text grid was created for the audio file, and copied into each Elan file, where it was manually aligned with the corresponding audio track, using the beeps as alignment anchors. Participants' eye movements were manually coded. This relatively simple and portable eye-tracking system is quite adequate for this type of binary visual-world experiment (cf. Eisenbeiss et al., 2013), and harks back to the original eye-tracking methodologies, e.g., Cooper (1974), also Tanenhaus and Trueswell (2006).

3.2.4 Results and discussion

Starting at the onset of each stimulus, a language annotation was made in ELAN at the point where the participant's eyes clearly fixated on the left upper corner (Spanish) or the right upper corner (Palenquero), and then working backwards another annotation was made at the point where the definitive eye movement began. Since even extremely rapid eye movements embody an inherent delay from the onset of the stimulus, the word immediately preceding the initiation of the eye movement was coded as the response. Stimulus presentations in which participants looked away from the screen, rolled their eyes, touched their face, etc. (behavior not unexpected in the extremely hot and often dusty environment) or where participants waited until the end of the stimulus to respond were not analyzed.

The results are given in Table 2.

Table 2. First identification of stimulus language by directed gaze

	All (N = 53)	Adults (N = 33)	Young (N = 20)
GRAMMATICAL ELEMENT + PREDICTABLE			
grammatical element	65.3% (195)	90.5% (172)	21.4% (23)
phonologically predictable word	26.5% (79)	6.9% (13)	60.6% (66)
immediately following word	8.2% (25)	2.6% (5)	18.0% (20)
GRAMMATICAL ELEMENT + UNIQUE PAL.			
grammatical element	59.3% (119)	78.0% (97)	29.1% (22)
uniquely Palenquero word	24.1% (48)	12.2% (15)	43.0% (33)
immediately following word	16.7% (33)	9.8% (12)	27.9% (21)

(continued)

Table 2. (continued)

	All (N = 53)	Adults (N = 33)	Young (N = 20)
LANGUAGE-IDENTIFIABLE FIRST WORD			
Palenquero: phonologically predictable	69.3 (209)%	73.7% (141)	61.2% (68)
Palenquero: uniquely Palenquero	60.2%	66.7%	48.4%
Spanish: identifiably Spanish words	55.4%	60.4%	46.9%

A series of t-tests revealed significant differences between adult and young participants in utterances beginning with grammatical elements followed by an identifiably Palenquero word, as in (3):

- (3) WITH PHONOLOGICALLY PREDICTABLE WORD (Pal. *ndulá* < Sp. *durar* ‘last’)
i a *ndulá* ría ku noche minando pa riba
I ASP last day and night looking for up
‘I spent day and night looking up’
WITH UNIQUELY PALENQUERO WORD (*chitiá* ‘speak’)
i tan *chitiá* bo un kusa
I FUT speak you one thing
‘I will tell you something’

In the aggregate, adult participants more frequently identified Palenquero utterances as soon as they heard the grammatical items, while younger participants waited at least until hearing the identifiably Palenquero lexical item. For utterances whose Palenquero word was phonologically predictable, the difference between adult and young participants was quite significant by subject *Welch-t*(24.35) = 9.39, $p < .0001$ and by item *Welch-t*(9.51) = 11.11, $p < .0001$. When the initial grammatical item was followed by a uniquely Palenquero word adults and young participants also differed significantly by subject *Welch-t*(42.62) = 6.15, $p < .0001$ and by item *Welch-t*(3.66) = 3.24, $p < .04$. A general linear mixed-effects model fitted with participant and stimulus as random intercepts and accurate language identification on the first (grammatical) vs. second (lexical) item as binary response variable confirms the significant difference of age group as fixed effect (young speakers as reference level): ($p < .0001$, $z = 8.503$; estimate 3.6459; std. error 0.4288). With respect to the null model, this model accounted for more of the variance: $\chi^2(1) = 58.589$; $p < .0001$.

More reflective of the role of phonological predictability in utterances beginning with Palenquero grammatical item + identifiable lexical item is the rate at which language identification was delayed beyond the Palenquero lexical item, typically after the word immediately following the key Palenquero word. Once more adults and young participants differed significantly in the extent to which

they waited until the word following the key Palenquero lexical item to identify the language. For phonologically predictable key items the difference was significant by subject $Welch-t(29.28) = -5.188, p < .0001$ and by item $Welch-t(7.19) = -2.724, p < .03$; and for uniquely Palenquero key items there was a significant difference by subject $Welch-t(39.95) = -2.878, p < .007$; and by item $Welch-t(9.66) = -3.034, p < .02$. The difference between phonologically predictable and uniquely Palenquero key words was also significant in determining the point at which language identification took place for adults by subject $Welch-t(88.89) = -2.057, p < .05$ and by item $Welch-t(7.16) = -2.851, p < .03$ and for young participants by subject $Welch-t(170.10) = -2.007, p < .05$ and by item $Welch-t(34.17) = -2.21, p < .04$. A general linear mixed-effects model with participant and stimulus as random intercepts and language identification point as the binomial response variable (up to the end of the key Palenquero lexical item vs. after the immediately following word) yielded a main effect for age group, with adults as reference level ($p < .0001$; $z = 4.477$; estimate 1.9518; std. error 0.4360) and for phonological predictability, with non-predictability as reference level ($p = .04$; $z = -2.045$; estimate -1.0402 ; std. error 0.5088). With respect to the null model, this model accounted for significantly more of the variance: $\chi^2(2) = 24.61, p < .0001$.

For utterances beginning with an identifiable Palenquero lexical item, there was a small but significant advantage for young people in favor of words with predictable phonological alternation by subject $Welch-t(69.75) = 2.62, p < .02$ and by item $Welch-t(33.19) = 2.30, p < .03$. For adults the results approached significance by subject $Welch-t(49.92) = 1.93, p < .06$ and by-item $Welch-t(46.53) = 2.00, p < .06$. A general linear mixed-effects model with stimulus and participant as random intercepts and (correct) language identification after the key word or after the immediately following word as binary response variable confirmed age group (adults as reference level) as a significant ($p < .003$) fixed effect ($z = 2.998$, estimate 0.8574, std. error 0.2860) as well as a main effect ($p < .02$) for phonological predictability (non-predictability as reference level) ($z = -2.400$, estimate -1.1279 , std. error 0.4701). This model accounted for significantly more of the variance than the null model: $\chi^2(2) = 13.30, p < .002$. By analyzing only young participants the significance of phonological predictability (non-predictability as reference level) rises to $p < .007$ ($z = -2.734$, estimate -1.1381 , std. error 0.4163). However, among adult participants phonological predictability (non-predictability as reference level) falls below significance at $p < .08$ ($z = -1.802$, estimate -1.1062 , std. error 0.6140).

In this experiment adult Palenquero-Spanish bilinguals out-performed young speakers in rapid Palenquero language identification after hearing only the subject pronoun *i* plus a pre-verbal particle rather than waiting until a Palenquero lexical item. For all participants Palenquero lexical items that exhibit regular

phonological alternation with Spanish facilitated language alternation more than uniquely Palenquero words, although this effect was less pronounced among fluent adult speakers. These results suggest that adult Palenquero speakers analyze language in a more holistic fashion while less fluent young speakers rely more heavily on phonologically identifiable lexical items.

3.3 Experiment 3: Identification of language switches through eye movement

The third experiment used the same methodology as in the second experiment, but the stimuli involved an intra-sentential language shift: Spanish to Palenquero or Palenquero to Spanish. The purpose was to determine the point at which participants became aware of a language switch, i.e., the elements that first triggered awareness.

3.3.1 *Participants*

The same participants as in the first and second experiments performed this experiment at a different time.

3.3.2 *Materials*

Thirty utterances were recorded by a fluent male Palenquero speaker. Each contained a language shift (fifteen Palenquero to Spanish and fifteen Spanish to Palenquero) approximately halfway through the utterance. At the transition point, three contained words that exhibit the /ɾ/ ~ /l/ alternation, two exhibit the /ɾ/ ~ /d/ alternation, and two had the post-nasal voiceless ~ voiced stop alternation (4b). In six of the Spanish-to-Palenquero stimuli the switch began with a Palenquero subject pronoun + preverbal particle preceding the key lexical item (of which three exhibited predictable phonological alternation as in 4a, and the others were uniquely Palenquero, as in 4c and 4d).

- (4) A. WITH PHONOLOGICALLY PREDICTABLE WORD (Pal. *nda* < Sp. *dar* ‘give’)
 yo con la edad que yo tengo i ta nda bo un ekplikasió
 I with ART age COMP I have-1s I PROG give you a explanation
 ‘At my age I’m giving you an explanation’
- B. WITH PHONOLOGICALLY PREDICTABLE WORD (Pal. *hende* < Sp. *gente* ‘people’)
 las personas que vienen a visitar no saben qué hende
 ART persons COMP come-3PL to visit NEG know-3PL what people
 ta kombesá
 PROG speak
 ‘The people who come to visit don’t know what [we] are saying’

- C. WITH UNIQUELY PALENQUERO WORD (*bai* 'go')
 Cuando mis padres fallecieron *i a bai* pa Katahena
 when my(pl.) parents die-RET-3PL I PERF go for Cartagena
 'When my parents died I moved to Cartagena'
- D. WITH UNIQUELY PALENQUERO WORD (*ané* 'they')
 Compré un pastel para la fiesta pero *ané* a kume-lo
 buy-RET-1S ART cake for ART party but they PERF eat-it
 'I bought a cake for the party but they ate it'

The remaining switch point items were language-specific words (e.g., Spanish conjugated verbs, Palenquero subject pronouns) not subject to systematic inter-language phonological alternation, as in (5):

- (5) ma muhé bonito siempre *tienen* cabello largo
 PL woman pretty always have-3PL hair long
 'Attractive women always have long hair'

3.3.3 Procedure

The experimental setup and equipment was the same as in Experiment 2; participants were seated in front of a portable computer and stimuli were automatically presented (via an OpenSesame script) one by one, following a 500 ms. fixation point, a 500 ms. beep, and were followed by a 500 ms. interval. The upper left corner of the screen contained an icon with a large blue number 1 surrounded by a white square contained within a red square; the upper right hand corner contained a large red number 2 surrounded by a white square contained within a blue square (shown in the Appendix). Participants were informed that each utterance contained a language switch partway through; they were instructed to place the mouse cursor on the number "1" upon hearing the beep, then move it in the direction of the number "2" as soon as the switch was detected. The stimuli were previously randomized; each participant heard the stimuli in the same order. The tripod-mounted camcorder recorded participants' eye and head movements, and the audio output from the computer headphone jack was simultaneously fed to the headphones and to the microphone input of the camcorder. The resulting audio and video files were subsequently imported into Elan, together with a PRAAT text grid containing the transcribed utterances, and eye movements were manually correlated with the language shifts. As in the language-identification experiment, the point of acknowledgement of a shift was taken to be the word immediately preceding the initiation of the gaze displacement.

3.3.4 Results and discussion

This task proved to be more difficult than the language-identification task, apparently because it was impossible to know in advance the point at which languages would shift in each utterance. This is in contrast to the language-identification experiment, where most responses occurred within the first three words of presented stimuli. For the language-switch experiment, participants frequently waited until the end of the stimulus utterance to respond, or did not respond at all; in all, 64.3% of the responses were usable, as opposed to 92.4% usable responses in the language-identification task. The results for utterances with a single language shift (i.e., no clause-internal language islands) are given in Table 3.

Table 3. First identification of language switch by directed gaze

	All (N = 53)	Adults (N = 33)	Young (N = 20)
GRAMMATICAL ELEMENT + PREDICTABLE			
grammatical element	22.3% (18)	25.7% (13)	16.7% (5)
phonologically predictable word	71.7% (59)	72.4% (37)	70.6% (22)
immediately following word	6.0% (5)	1.9% (1)	12.7% (4)
GRAMMATICAL ELEMENT + UNIQUE PAL.			
grammatical element	15.4% (21)	17.3% (15)	12.5% (6)
uniquely Palenquero word	38.9% (51)	40.9% (33)	35.6% (18)
immediately following word	45.7% (62)	41.9% (36)	51.9% (26)
LANGUAGE-IDENTIFIABLE FIRST WORD			
Palenquero: phonologically predictable	89.9% (73)	88.2% (45)	92.9% (28)
Palenquero: uniquely Palenquero	45.6% (49)	55.6% (36)	30.8% (13)
Spanish: identifiably Spanish words	70.7% (167)	69.2% (98)	72.7% (69)

This task also turned out to be more of an age-group leveler in that there were few differences between adult and young participants, and in no instance did the differences attain statistical significance. There were also fewer identifications of language shifts after Palenquero grammatical items (subject pronoun + preverbal particle) followed immediately by a key Palenquero lexical item, indicative of an overall slower reaction to the language switches.

Phonological predictability of the key Palenquero lexical item was significant in determining whether the language shift was identified immediately after the key item or not until after the following word for adults by subject $Welch-t(35.95) = -6.28$, $p < .0001$ and by item $Welch-t(7.20) = -5.84$, $p < .0006$. For young speakers the difference was significant by subject $Welch-t(35.94) = -3.73$, $p < .0007$ and by item $Welch-t(8.32) = -9.17$, $p < .0001$. A general linear mixed-effects model with

stimulus and participant as random intercepts and switch after the key lexical item vs. the immediately following word as binary response variable showed phonological predictability to be a significant fixed effect, with non-predictability as reference level: ($p < .0001$; $z = -3.986$, estimate -2.929 , std. error 0.7348). This model accounted for significantly more of the variance than the null model: $\chi^2(1) = 8.76$, $p < .003$.

For switches beginning with a key Palenquero lexical item, phonological predictability also emerged as a main effect for adults by subject $Welch-t(62.71) = 4.37$, $p < .0001$ and by item $Welch-t(7.66) = 5.28$, $p < .0009$ and for young speakers by subject $Welch-t(35.71) = 6.38$, $p < .0001$ and by item $Welch-t(3.74) = 6.68$, $p < .004$. The role of phonological predictability was confirmed by a general linear mixed-effects model with stimulus and participant as random intercepts, switch after the key lexical item vs. the immediately following word as binary response variable, and phonological predictability as fixed effect, with non-predictability as reference level ($p < .0001$; $z = -5.203$, estimate -2.455 , std. error 0.4719). With respect to the null model, : $\chi^2(1) = 10.02$, $p < .002$.

As with the language-identification task, the switch-identifying task highlighted the role of key Palenquero lexical items – particularly those with predictable phonological alternation with their Spanish cognates – in triggering awareness of an intra-sentential language shift. Perhaps due to the more open-ended nature of this task – where the point at which a response was to be made was not known in advance – adults demonstrated no advantage over young participants.

4. General discussion

The linguistic features linking Palenquero and Spanish are complex and ever-varying, as young Spanish speakers acquire Palenquero to varying degrees under the influence of activist teachers, and as middle-aged adults increasingly return to a language they had once avoided. In general, morphosyntactic differences between Spanish and Palenquero are substantial enough so that language identification is straightforward after hearing at most a few words. The distinctive Palenquero intonational patterns also reinforce differences in spoken language (e.g., Correa, 2012; Hualde & Schwegler, 2008; Lipski, 2010). The present study has focused on more fine-grained language indicators that are tied as closely as possible to the first moments of language recognition. In this realm differences between fluent adult bilinguals and young speakers are subtle although real, with younger L2 Palenquero speakers relying more on lexical items rather than grammatical structures. Words exhibiting regular phonological correspondences between cognates enjoy a slight edge in facilitating language identification, and

the data from Palenquero-Spanish bilinguals suggest that implicit phonological knowledge can be a bootstrapping aid for language processing under less than ideal conditions. The results of this pilot study are encouraging for the qualitative and quantitative study of the Palenquero language revitalization process as well as for the overall study of Palenquero-Spanish bilingualism. More generally, the nature of the Palenquero-Spanish interface, particularly the very high percentage of lexical cognates, offers the possibility of teasing out the role of phonological correspondences from other – usually more prominent – cues to language identification. While sociophonetic variation plays an important role in many speech communities, the possible contribution of this variation to speech processing is seldom raised. Among Spanish-Palenquero bilinguals this variation represents a limiting case, by actually providing subtle but real cues as to the language being heard. Given the divergent grammatical structures, particularly as regards the verbal system, rapid language identification can result in more efficient language processing. The data from L2 Palenquero speakers suggest that perhaps subliminal awareness of sociophonetic variation between the two languages can actually be a bootstrapping aid when processing the two lexically cognate languages.

The results reported in this study represent a slice in time, and reflect the current state of language awareness among young Palenquero speakers in the ever-changing environment of language revitalization. For a long time, Palenquero language classes have focused primarily on lexical items, and only until the final year or two of secondary education – if at all – are full sentences in Palenquero presented, and with little or no explanation or commentary. This contrasts with the more usual grammar-heavy approach to second-language education, and appears to be directly responsible for the results of the second experiment, in which young speakers typically waited until encountering a key lexical item before identifying Palenquero utterances, even when preceding grammatical elements would have sufficed. A recent (as of mid-2017) rotation of Palenquero language teachers in the final year of secondary education has brought an increased focus on language comprehension and production, with all class activities and student responses conducted in Palenquero. At the lower levels, however, the practice of teaching isolated words and phrases with no student production continues. At the time of writing (July, 2018), it is too early to assess the possible results of shifts in pedagogical practices, but if student fluency in processing and production of Palenquero increases, it is hypothesized that their performance in tasks such as the ones in the present study will more closely approximate those of adult speakers, i.e., with greater attention to grammatical structures and less reliance on key lexical items. This is one of the many reasons that the unique and rapidly evolving sociolinguistic environment of Palenque requires continual updating; the effort will be amply repaid with additional insights into bilingual language processing.

5. Conclusion

The three experiments reported in the preceding sections have focused on the role of sociophonetic variables in a relatively unique bilingual configuration (two languages with disjoint grammars but largely cognate lexicons), but the results have broader implications for language learning and language processing. The high density of phonological cues in naturalistic speech, while usually overshadowed by morphosyntactic and lexical features, can become a powerful language processing aid in limiting cases such as naturalistic second-language acquisition. If, as widely proposed (e.g., Levelt, 1989; Muysken, 2000: p. 37), syntactic structures are projected from the lemma level (and recognition of a word as belonging to a specific language is tied to the accompanying morphosyntactic frame in which it appears), then subtle phonotactic cues rise in importance when dealing with cognate lexicons that project significantly distinct grammars. Fluent bilinguals negotiate the bilingual lexicon with seeming ease, but naïve L2 learners such as those found in Palenque have fewer robust morphosyntactic underpinnings, and may rely more extensively on phonological patterns. This over-reliance on sound patterns may in turn be reflected in L2 speakers' production (not studied here). Data from a cross-section of Palenquero-Spanish bilinguals are illustrative of the possible reinforcing role of sociophonetic variation in language processing, and highlight the complex interaction of community-wide sociolinguistic norms, naturalistic exposure to a minority L2, and level of grammatical attainment.

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Appendix

Words used in experiment #1 (language identification)

PALENQUERO WORDS:

/ɾ/ ~ /l/

aló [arroz]	‘rice’
loyo [arroyo]	‘creek’
kelé [querer]	‘to want’
losa [rosa]	‘farm plot’
semblá [sembrar]	‘to plant’

voiced post-nasal stops

Palenge [Palenque]	‘Palenque’
kandá [cantar]	‘to sing’
sendá [sentar]	‘to sit’
hende [gente]	‘people’
kuendo [cuento]	‘story’

prenasalized voiced stops

ngande [grande]	‘big’
ndo [dos]	‘two’
mboso [bolso]	‘bag’
ndrumí [dormir]	‘to sleep’

Palenquero words with irregular sound correspondence with Spanish

antonse [entonces]	‘then’
yulá [ayudar]	‘to help’
kumé [comer]	‘to eat’
kumina [comida]	‘food’
miná [mirar]	‘to look’
lendro [dentro]	‘inside’
numano [hermano]	‘brother’
kusa [cosa]	‘thing’
maana [mañana]	‘morning, tomorrow’
taabía [todavía]	‘yet, still’

Uniquely Palenquero words

piangulí	‘pig’
kombilesa	‘friend’
guatía	‘to look at’
sarangíá	‘to dance’
chochá	‘a lot of’

SPANISH WORDS**cognate with Palenquero pre-nasalized voiced stops**

gallo [ngayo]	‘rooster’
dos [ndo]	‘two’
bolso [mboso]	‘bag’

cognate with Palenquero /ɾ/ > /l/

arroz [aló]	‘rice’
carro [kalo]	‘car’
perro [pelo]	‘dog’
poder [polé]	‘to be able to’
rosa [losa]	‘farm plot’
sembrar [semlá]	‘to plant’

cognate with Palenquero nasal + voiced stop

sentar [sendá]	‘to sit’
monte [monde]	‘woods, underbrush’
contar [kondá]	‘to relate, count’
gente [hende]	‘people’
cantar [kandá]	‘to sing’

no regular sound correspondence with cognate Palenquero words

madre [mai]	‘mother’
hermano [numano]	‘brother’
comida [kumina]	‘food’
donde [andi]	‘where’
mirar [miná]	‘to look’
entonces [antonse]	‘then’
Dios [Rioso]	‘God’
calle [kaya]	‘street’
mañana [maana]	‘tomorrow, morning’
fogón [fogó]	‘hearth’

uniquely Spanish words

hijo [moná]	‘son’
profesor [piacha]	‘teacher’
amigo [kombilesa]	‘friend’
ropa [chepa]	‘clothing’
padre [tatá]	‘father’

ambiguous words

casa/kasa	‘house’
coco/koko	‘cocoanut’
ponchera	‘large bowl’
lengua	‘language’
ca(r)ne/kanne	‘meat’
pe(s)ka(d)o/pekao	‘fish’
llove(r)/yobé	‘to rain’
culebra/kulebra	‘snake’

Key lexical items for experiment #2: Language identification through eye movement**PALENQUERO WORDS****/r/ > /l/**

loyo [arroyo]	‘creek’
kelé [querer]	‘to want’
aló [arroz]	‘rice’
semblá [sembrar]	‘to plant’

prenasalized voiced stops

ndrumí [dormir]	‘to sleep’
ndulá [durar]	‘to last’

d/ > [r]

ría [día]	‘day’
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post-nasal voiced stops

hende [gente]	‘people’
Palenge [Palenque]	‘Palenque’
sendá [sentar]	‘to sit’
tiembo [tiempo]	‘time’
kandá [cantar]	‘to sing’
kuendo [cuento]	‘story’
lebandá [levantaar]	‘to grow up’

Palenquero-specific words

kombilesa	‘friend’
chochá	‘a lot of’
harochó	‘happy’
kuagro	‘youth group’
moná	‘child’
lungá	‘to die’
chepa	‘clothing’
awé	‘today’
sarangía	‘to dance’
posá	‘house’
tatá	‘father’

SPANISH WORDS**finite verb forms**

fuiste	‘[you] went’
compraríamos	‘[we] would buy’
sugerí	‘[I] suggested’
saldrá	‘[he/she] will leave’
espero	‘[I] hope’
dudo	‘[I] doubt’
nací	‘[I] was born’
conocí	‘[I] met’
pidió	‘[he/she] asked’
iré	‘[I] will go’

nouns

madre	‘mother’
padre	‘father’
cuento	‘story’
hijo	‘son’
amigo	‘friend’
cerdo	‘pig’
hoy	‘today’
mañana	‘morning, tomorrow’
dinero	‘money’
plátanos	‘plantains’

pronouns

nosotros (2)	‘we’
ellos	‘they’
ella	‘she’
tú	‘you’

Key lexical items at language transition point for experiment #3: Identification of language switches through eye movement**/r/ ~ /l/ alternation**

loyo [arroyo]	‘creek’
kelé [querer]	‘to want’
aló [arroz]	‘rice’

/r/ ~ /d/ alternation

ría [día]	‘day’
salurá [saludar]	‘to greet’

post-nasal voiceless ~ voiced stop alternation

nda [dar]	‘to give’
hende [gente]	‘people’

uniquely Palenquero words

posá [casa]	‘house’
kuagriya [no equip.]	‘member of a youth group’

uniquely Spanish words

había [teneba]	‘there was/were’
madre [mai]	‘mother’
tienen [a ten]	‘[they] have’
dice [ablá]	‘[he/she] says’
voy [bai]	‘[I] go’
re(s)pondo [kontettá]	‘[I] answer’
tuvimos [a tené]	‘[we] had’

On-screen icons for language-identification eye-movement experiment



X

On-screen icons for language-switching eye-movement experiment



X

The role of social networks in cross-dialectal variation in the perception of the Rioplatense assibilated pre-palatal [ʃ]

Lauren B. Schmidt
San Diego State University

This chapter presents a quantitative study of cross-dialectal differences in the perceptual categorization of the assibilated pre-palatal (e.g., calle ‘street’ /kaʎe/), a feature of Rioplatense Argentine Spanish. Listeners from two South American varieties of Spanish that varied in degree of contact with Rioplatense speakers completed an Identification Task in which they categorized [ʃ] in Spanish pseudowords. Results revealed that listeners from the contact group (La Rioja, Argentina) identified the phone as the intended phonetic category, orthographic <y ll>, while listeners with limited contact with Rioplatense Spanish (Bogota, Colombia) assigned the phone to a separate category, orthographic <ch>. The study shows how contact with non-local speech varieties may result in changes to perceptual norms, even in the absence of use (production) of these forms.

Introduction

The current study aims to explore how dialect contact through social networks and other forms of exposure results in variation in perceptual norms of sociophonetic variants across Spanish-speaking speech communities. Speech perception, or the process of identifying incoming stimuli as instances of established mental categories, is a language-specific and highly automatized and learned behavior (Strange & Shafer, 2008), shaped early in development (Werker & Curtin, 2005). According to the Native Language Magnet Model (Kuhl, 1992, 1993, 1994), speech perceptual prototypes are developed very early, during the first year of life: “...exposure to language early in life produces a change in perceived distances in the acoustic space underlying phonetic distinctions, and this subsequently alters both the perception of spoken language and its production” (Kuhl & Iverson, 1995: p. 122).

Adult listeners respond to incoming speech sounds differently, according to these early experiences with their native language(s). Indeed, the Perceptual Assimilation Model (PAM) (Best, 1995) and the Speech Learning Model (SLM) (Flege, 1995) propose that listeners perceive foreign and second language speech sounds according to established phonetic categories, and these models allow for predictions to be made on the relative difficulty of perception of non-native speech sounds based on the phonetic or acoustic similarity to sounds in the native language. While these learned and automatic patterns of perceptual processing are not easily modified by later language experience (Strange & Shafer, 2008, p. 156), listeners are still able, however, to attend to phonetic differences in speech sounds even into adulthood, and experience and/or training can result in increased performance in discrimination of non-native contrasts (e.g., Kartushina, Hervais-Adelman, Frauenfelder, & Golestani, 2015).

The current chapter presents a research study that examines how experience with external speech varieties of Spanish may shape perceptual norms of non-native (non-local) sociophonetic variants. This is accomplished through a comparison of categorization patterns of the Rioplatense¹ assibilated pre-palatal [j] variant (e.g., *Yolanda* ‘Yolanda’ [jo.ˈlan̩.da]) by listeners from two South American speech communities that vary in degree of contact with speakers of this variety: those from northwestern Argentina (contact group) vs. Colombia (limited- or no-contact group). While the assibilated palatal is not characteristic of either of these two communities, those speakers from northwestern Argentina have greater ties to speakers from other dialectal regions of Argentina where the variant is used, and, thus, have greater opportunity to adapt perceptual norms of the assibilated phone.

Background

Evidence abounds that listeners perceive speech sounds according to the structure of the surrounding language variety or varieties (e.g., Olson Flanigan & Norris, 2001; Sumner & Samuel, 2009; Walker, 1976). This section begins with a summary of the studies to date that have examined regional variation in the perception of sociophonetic variants in Spanish in particular (Boomershine, 2006; Delgado-Díaz & Galarza, 2015; Díaz-Campos & Morgan, 2002; Paz, 2005; Schmidt, 2013, 2015), and is followed by a discussion of how social networks and other forms of dialect contact may lead to changes in how listeners perceive and process regional variants.

1. Rioplatense Spanish refers to those varieties spoken in the Rio de la Plata basin of Argentina and Uruguay.

Regional variation in speech perception, Spanish

The first study to test regional differences in speech perception of Spanish sounds compared the acoustic cues used to identify Spanish /j/ between native Spanish listeners from /j/-weakening and /j/-non-weakening dialects, as well as English-speaking second language (L2) learners of Spanish (Díaz-Campos & Morgan, 2002). Participants were presented with natural and synthesized targets that had been manipulated in terms of the preceding vowel duration and consonant constriction of Spanish intervocalic /j/. The authors found evidence that listeners from the two different dialect groups relied on different acoustic cues to identify the phone: /j/-weakening speakers (as well as the L2 learners) used cues of vowel length, while non-weakening speakers relied on consonantal constriction.

Next, Paz (2005) investigated differences between two groups of Spanish-speaking listeners, Puerto Rican and Argentine listeners, in their perception of a Puerto Rican variant. The variant under study was the post-nuclear /r/, which is realized as an approximant or an intermediate sound between the tap [ɾ] and the lateral [l] in Puerto Rico. Paz found that while the Puerto Rican listeners could accurately distinguish between the post-nuclear lateralized-/r/ and the /l/ (with 81% accuracy in identification of the lateralized-/r/ as “r”), the Argentine listeners failed to accurately map the lateralized variant to Spanish /r/.

More recently, Delgado-Díaz and Galarza (2015) investigated whether listeners from Puerto Rican and non-Puerto Rican dialects could discriminate between Puerto Rican /h/ and Puerto Rican posterior /r/, which has variable realizations including [x] and [h], potentially leading to confusions in discrimination with the /h/ phone. Participants completed an Identification Task, using picture responses rather than orthographic ones, to identify the variants of Puerto Rican /h/ and posterior /r/. The Puerto Rican listeners were accurate in identification of posterior /r/ in certain phonetic contexts (i.e., in intervocalic position, but not in word-initial position), while the non-Puerto Rican listeners erroneously identified posterior /r/ as /h/ in all contexts, thus, once again, pointing to regional variation in perception of Spanish sociophonetic forms.

Previous studies have not always found clear regional differences in speech perception of Spanish, however. In her study of Mexican and Puerto Rican listeners' perception and processing of three sociolinguistic variables, including regional variants of word-final /n/, syllable-final /s/, and syllable-final /ɾ/, Boomersshine (2006) found several similarities between the two listener groups in their responses to the regionally variable stimuli. Participants completed a Dialect Identification Task, a Speech-Naming Task, and a Lexical Decision Task. The author found that the two dialect groups performed similarly on the Lexical Decision Task (with a bias towards accepting more Mexican than Puerto Rican nonwords as actual

words) and that both dialect groups used the same sociophonetic variants when making dialect identification judgments, with highest accuracy in dialect identifications for stimuli produced with the syllable-final /s/ variable.

Social networks and speech perception

While there is much evidence of perceptual norms varying across language varieties and being dictated by the speech production features in the local speech community, perception of speech sounds, can, in fact, be altered by linguistic experience. Perceptual norms can be modified as a consequence of exposure to non-local dialects: for example, these shifts have been studied in cases of *migration* to new speech communities (Evans & Iverson, 2004; Evans & Iverson, 2007; Scott & Cutler, 1984) and for listeners with *social networks* that include speakers of other varieties (Schmidt, 2015; Sumner & Samuel, 2009).

Evans and Iverson (2004), found, for example, that Northern English adults who had lived in the south of England, for an average of 8.6 years, adjusted best exemplar locations to more southern-like vowels for synthesized vowels embedded in carrier sentences spoken by speakers with a Standard Southern British English accent. Likewise, authors Scott and Cutler (1984) found that British speakers exposed to American English, after living in Chicago for an average of 4.5 years, used American English flapping cues in recognizing syntactic structure to a greater extent than British listeners without American English exposure.

Importantly, speakers need not adopt the use of a particular sociophonetic variant in their own speech (production) for the variant to modify norms in speech perception and processing. In a study of the effects of experience on perception and representation of sociophonetic forms, Sumner and Samuel (2009) found that English r-less forms (present in certain social varieties of New York City English, e.g., *filter* ['fil.tə]) were perceptually equivalent to r-full forms (['fil.tə]) in Form and Semantic Priming Tasks for two different groups of New York City (NYC) listeners, both those who produce the r-less forms and those who do not. The authors observed differences between the two NYC groups, however, in long-term priming of the r-less form, leading the authors to assert that exposure to dialectal forms may affect perception of sounds at the surface level, but exposure alone (without production) does not have long-term effects on representation (pp. 498–499).

Contact with speakers of other dialects has also been found to influence perceptual norms for Spanish-speaking communities (Schmidt, 2015). In an Identification Task of Spanish syllable-final aspirated /s/ in pseudoword stimuli (as in *fosta* ['foh.ta]), listeners from Bogota, Colombia, who do not aspirate syllable-final /s/, varied in categorization of final aspirated /s/ according to their reported

social networks. Those listeners who reported contact with /s/-aspirating speakers had an advantage in categorization of aspirated /s/ as Spanish /s/ over those listeners without aspirating social contacts.

The chapter continues with a description of the sociophonetic variants considered in the current study, the variable articulation of Spanish orthographic <y> and <ll>, which is then followed by a presentation of the research questions.

Variation in articulation of Spanish orthographic <y> and <ll>

Articulation of Spanish orthographic <y> and <ll> is variable across Spanish dialects, and “is realized with a broad range of constriction degrees from glide [j] to fricative [j̞] to stop [j̥] or affricate [tʃ]” (Hualde, 2005: p. 165). In some dialects, the voiced palatal consonant is articulated as a stop or affricate [tʃ], while in others, such as Castilian Spanish, it is more commonly realized as a voiced palatal weak fricative or approximant [j̞] (Hualde, 2005). The two listener groups tested in the current study, from northwestern Argentina (La Rioja) and from central Colombia (Bogota), articulate graphemic <y> and <ll> primarily as a palatal fricative [j] (Lipski, 1994: p. 172, p. 210), as in Figure 1.

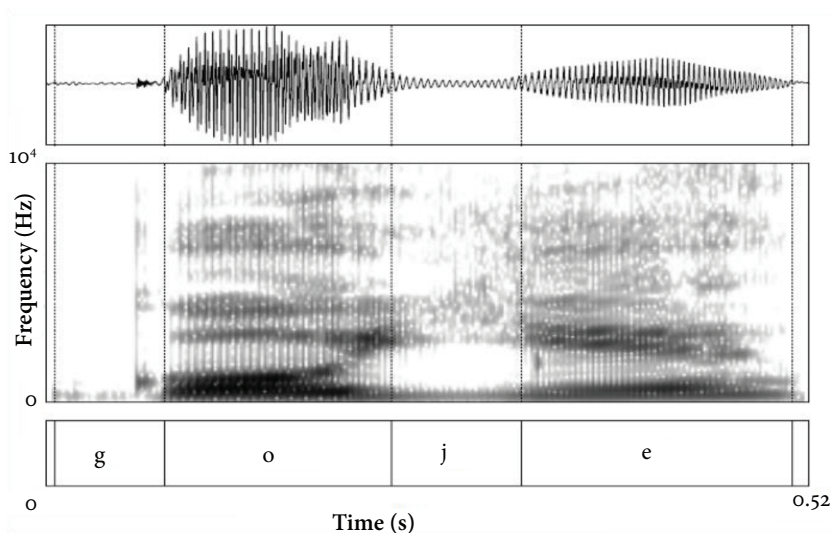


Figure 1. Production of pseudoword *goye* with palatal fricative variant [j], [ˈgo.je]

Along with the majority of other modern varieties of Spanish, the two speech communities under current investigation are *yeísta*: the traditional palatal lateral approximant /ʎ/ (represented orthographically by <ll>) has merged with the palatal fricative /j/ (represented orthographically by <y>), and both are articulated as /j/.

In other regions of Argentina (including Buenos Aires, the southern littoral, the central dialect zone, and parts of northwestern Argentina) and of Uruguay (Montevideo), however, orthographic <y> and <ll> are articulated as an assibilated pre-palatal fricative. This phone was originally voiced ([ʒ]) but now is most commonly voiceless ([ç]) amongst the young generations in Buenos Aires (Chang, 2008; Rohena-Madrado, 2015), see Figure 2.

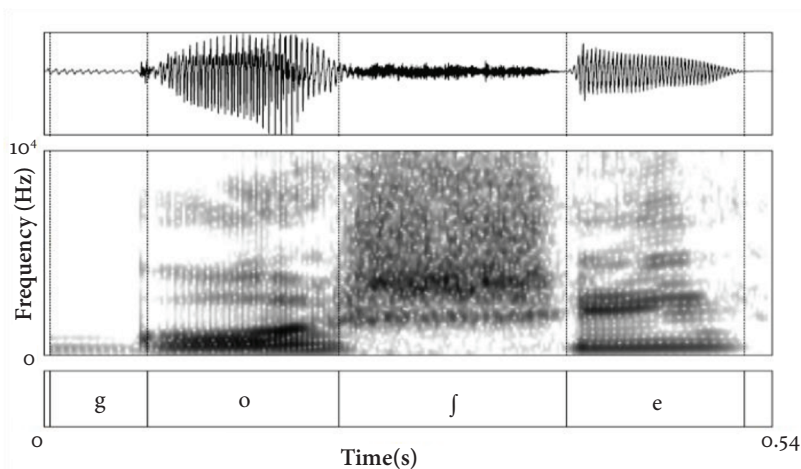


Figure 2. Production of pseudoword *goye* with voiceless assibilated pre-palatal variant [ç], [ˈgo.çe]

The assibilated pre-palatal variant originated in the Argentine capital, Buenos Aires, and is largely recognized as a socially prestigious form (Lipski, 1994), salient to Spanish speakers and associated with Rioplatense varieties.² Speakers of varieties that use the assibilated pre-palatal variants are known as *zheísta* or *sheísta*, as orthographic <y> and <ll> are merged into a single phoneme /ʒ/ (*zheísmo*), or, more recently, /ç/ (*sheísmo*). The assibilated variant has extended throughout much of the country, which Lipski (1994: p. 170) argues is evidence of the prestige attributed to Buenos Aires speech.

Unfortunately, few empirical studies have been conducted to date on the Argentine phonetic variants of <y> and <ll> in areas outside of the littoral (e.g., Buenos Aires) and central (e.g., Córdoba) dialect regions, both of which have been found to be *zheísta/sheísta* (Colantoni, 2005; Lang-Rigal, 2015). The exception is Lang-Rigal's (2015) study, which explored the use of the assibilated

2. Variable assibilation of the palatal fricative /j/ has been reported in other Spanish varieties, including Peninsular (Ruiz Martínez, 2003) and Latin American varieties (Arce, 2015; Zampaulo, 2013).

variants across speaker sex and region, comparing speakers from Buenos Aires, Córdoba, and Tucumán. Tucumán, like La Rioja, is located in the northwestern region of Argentina. Lang-Rigal (2015) found that Tucumán speakers produced the assibilated pre-palatal variants of orthographic <y> and <ll>, and that female speakers preferred the voiceless variant [j], while male speakers used the voiced one [ʒ] (a sex difference that is no longer present in Buenos Aires). The author found the greatest devoicing ([j]) in Buenos Aires, for both female and male speakers, while in Córdoba the voiced variant [ʒ] was highly used by both female and male speakers.

While the assibilated variants are characteristic of specific regions of northwestern Argentina, as seen above in Tucumán, they are not reported to be used, however, in extreme western Argentina (Vidal de Battini, 1964), where the La Rioja Argentine participants of the current study are located. In order to confirm Vidal De Battini's early descriptive accounts (no recent phonetic studies have been conducted in La Rioja, to the author's knowledge), recordings of sociolinguistic interviews conducted with ten speakers from La Rioja were analyzed; while the participants in the interviews were not the same as the participants who completed the perception task in the current study, they were comparable in social background (i.e., region of origin, age, social class, education level), and thus are assumed to share production patterns. It was confirmed through the acoustic analysis of the recordings that the speakers from La Rioja did articulate orthographic <y> and <ll> as a palatal fricative /j/ (*yeísta*) and not as an assibilated pre-palatal.³ Rojas (2000: p. 147) notes that in northwestern Argentina, social class, age, and urban proximity are predictors of *yeísmo* vs. *sheísmo/zheísmo*, with the assibilated forms used by urban, middle and upper-class speakers. This may explain why the assibilated variants are produced in Tucumán (the fifth largest city in the country, and a central point of trade and travel between Buenos Aires and neighboring countries to the Northwest [Lang-Rigal, 2015: p. 164]) and why the palatal fricative is maintained in the small city of La Rioja (population 180,000 [INDEC]).

3. Of the ten speakers, eight categorically realized orthographic <y> and <ll> as the palatal fricative [j] in the interviews. Two speakers displayed different articulations: one male categorically articulated a voiced sibilant variant similar to [ʒ] and one female alternated between voiced [ʒ] and voiceless [j] assibilated pre-palatal articulations. Both speakers had parents from other regions of Argentina: the male speaker's father from San Juan and "other areas" [*sic*], and the female speaker's parents and boyfriend from Córdoba and Buenos Aires, which are *sheísta/zheísta*. Moreover, the female speaker reported a preference for the Córdoba dialect and disfavor of the local La Rioja variety.

Research questions

The following research questions and hypotheses guide the current study:

1. How do Spanish speakers from *yeísta* varieties perceptually categorize the non-local Rioplatense [ʃ] (*sheísta*) variant?
 - Hypothesis 1: Speakers from *yeísta* varieties will categorize the Rioplatense [ʃ] variant according to perceptual norms of their native speech community.
2. Is there regional variation in the perceptual categorization of [ʃ] amongst *yeísta* speakers according to degree of contact with Rioplatense Spanish? Do listeners from a contact group (northwestern Argentina) pattern differently than those from a non-contact group (Colombia)?
 - Hypothesis 2: Listeners from speech communities in contact with Rioplatense Spanish will have an advantage in categorization of the Rioplatense [ʃ] as the intended phonetic category (orthographic <y> and <ll>).

Method

Participants

Participants were recruited from two *yeísta* South American Spanish varieties that differed in degree of contact with Rioplatense Spanish, a non- (or limited-) contact group of listeners from Bogota, Colombia, and a contact group from La Rioja, Argentina. Twenty-seven university students (17 females, 10 males) studying in Bogota, Colombia, aged 18 to 29 years old ($M = 20.0$ years, $SD = 2.7$), made up the first *yeísta* group, the non-contact group. All had resided solely in Bogota, or in a neighboring *yeísta* province, and had limited contact with Rioplatense Spanish. While the Colombians may have some exposure to Rioplatense speakers through Media and cultural venues (such as through Argentine or Uruguayan television, film, or music), opportunities to travel to Rioplatense dialectal regions and for Rioplatense speakers to form part of their social networks are limited. Indeed, in the background questionnaire, no participants from this group reported previous travel to Argentina or Uruguay, and only three reported social contacts from Rioplatense regions.

Seventeen university students (10 females, 7 males) studying in La Rioja, Argentina, aged 18 to 33 years old ($M = 21.8$ years, $SD = 4.4$), made up the contact group. All participants included in the La Rioja group had resided exclusively in La Rioja or in a neighboring (also *yeísta*) province of northwestern Argentina.

Participants in this group have greater exposure to Rioplatense Spanish: through the media (e.g., Rioplatense speakers in national news and commercials), more accessible travel to Rioplatense areas (regions within their country), and increased opportunities for Rioplatense speakers to form part of their social networks. In the background questionnaire, indeed, half of the La Rioja participants ($n = 9$) reported previous travel for a period of two weeks or greater to a *sheísta* region (Buenos Aires or Córdoba, Argentina), and half ($n = 9$) also reported social contacts, including friends, family, and/or colleagues with whom they have regular contact, from Buenos Aires.

Tasks

Identification task

Participants from the two regional groups completed a perceptual Identification Task on individual computer stations using headphones in classrooms on their university campuses. The Identification Task is a common methodological tool used in speech perception studies, in which listeners are presented with a speech stimulus and then are asked to explicitly label, or categorize, what they hear, either via an open response or by choosing one of several response choices provided (Strange & Shafer, 2008). Pseudowords, rather than actual Spanish words, were used as speech stimuli in the task in order to force listeners to use phonetic and phonological knowledge in making their identifications, rather than allowing them to invoke lexical representations of stored real word items. In this way, the task measures how both groups of *yeísta* listeners assimilate the Rioplatense voiceless assibilated palatal [j] phone to internalized phonetic categories, while minimizing the confounding effect of lexical knowledge.

The task consisted of the identification of different consonants and vowels embedded in a total of 158 disyllabic Spanish pseudowords. Of these, 20 stimuli targeted the two regional variants of interest in the current study, the *yeísta* weak palatal fricative [j] ($n = 10$) and the Rioplatense voiceless assibilated pre-palatal [ɟ] ($n = 10$). Two versions of the task were created and administered equally across participants in both listener groups. The two versions were identical except that the pseudowords that housed the target variant [ɟ] in Version A made up the pseudowords that housed the control variant [j] in Version B (and in the same way, the pseudoword carriers of the control variant in Version A made up the pseudoword carriers of the target variant in Version B). This was done to ensure that any differences in identification of the target and control stimuli were due to the actual phonetic realization of the stimuli themselves, and not to the phonetic context in which they were presented (i.e., sounds that preceded or followed the phone).

Table 1 presents examples of the different speech stimuli (see the Appendix for the complete list of target stimuli).

Table 1. Identification Task stimuli (total $n = 158$ Spanish pseudowords)

Stimulus type	n	Word position	Examples
target stimuli [ʃ]	5	word-initial	[ʃedo], [ʃome]
	5	word-internal	[niʃa], [tuʃe]
control stimuli [j]	5	word-initial	[jada], [jepe]
	5	word- internal	[mije], [guja]
distractor stimuli	138	all positions, [CV.CV] [CVC.CV]	[fape], [loste]

The stimuli were created following Spanish phonotactic patterns, with the targeted phone to be categorized, [j] or [ʃ], in syllable-initial position, divided across word-initial or word-internal contexts. The remainder of the pseudoword stimuli targeted other sounds and other positions within the syllable and the word so as to distract the listener from the objective of the task.⁴

A female, university-educated speaker from Buenos Aires produced the speech stimuli for both the [j] or [ʃ] variants. The speaker had lived several years in the United States, in contact with *yeísta* speakers, and was able to produce the speech stimuli with both her native Rioplatense [ʃ] variant, as well as the *yeísta* [j] variant. As the speaker is a native speaker of Buenos Aires Spanish, other regional phonetic features were present in the stimuli, such as aspirated /s/ (as in the pseudoword stimulus *loste* ['loh.te]; see Schmidt, 2015) and regional intonation patterns. There were never any cases, however, of coda-s (where /s/ lenition occurs) in any of the target stimuli tokens realized with the [j] or [ʃ] variants. It is possible, however, that the presence of other regional features in other stimuli may have had an effect on perception for the two groups of listeners: mainly, listeners may have made social judgments about the speaker (such as perceived region of origin) based on different phonetic cues present throughout the task stimuli, and those social judgments could have influenced their categorization of the targeted sounds.⁵

The Identification Task was run and responses recorded using Praat software (Boersma & Weenik, 2009); a screenshot of the task interface is presented in Figure 3. Participants were told that they would hear made-up words in Spanish and that they should choose the best written representation of the word from six

4. See Schmidt (2015) for further detail on the other speech stimuli included in the task.

5. Previous studies have found, for example, that perceptual categorization of regional phones varied when the perceived region of origin of the speaker was manipulated (e.g., Hay & Drager, 2010; Niedzielski, 1999).

options and a “none-of-the-above” choice. Participants had the option of hearing the stimulus one additional time, if desired. For the target [j] and control [j] stimuli, listeners were provided with the following written response options in standard Spanish orthography: “rr” (or “r” for word-initial stimuli), “y”, “f”, “ll”, “s”, “ch”, and “ningún” (“none”). The written response options were not randomized in their visual locations across trials (i.e., the “y” option always appeared in the upper-left corner of the screen). These six particular response options were chosen based on results from a pilot study using an Identification Task with an open-response format, which found these categories as those more frequently reported by Spanish listeners.



Figure 3. Identification Task interface; stimulus *yona/llona* [ˈfo.na]

Language Background and Dialect Contact Questionnaire

Following the Identification Task, participants completed a written Language Background and Dialect Contact Questionnaire. The questionnaire elicited information regarding: (a) background (age, sex, regions lived, and hearing or reading difficulties), (b) linguistic experiences (native language, second languages spoken and level of proficiency), (c) metalinguistic knowledge (awareness of dialectal variation in Spanish pronunciation), and (d) contact with other dialects of Spanish via social contacts, travel for two weeks or more, and media. Social contacts were defined on the questionnaire as friends, family, and/or colleagues from other regions with whom the participant has been in extensive contact within the past five years. For dialect contact through media, participants indicated the frequency with which they were exposed to other Spanish dialects through different forms

of media (television, movies, and music): never, rarely (1–2 times per month), sometimes (3–5 times per month), and frequently (more than 5 times per month).

Data analysis

The responses to target ([ʃ]) and control ([j]) items from the Identification Task were analyzed in terms of (a) identification accuracy and (b) categorization response patterns. First, the stimuli were coded for each participant as accurately identified (value = 1) if the listener categorized the [j] or [ʃ] stimulus as either “y” or “ll”⁶ and inaccurately identified (value = 0) if the listener categorized the stimulus as any other category (including “none”). Mean identification accuracy scores (n correctly identified divided by the total n stimuli) were then calculated for each participant and coded according to the variables: sociophonetic variant ([j] or [ʃ]), position within the word (word-initial or word-internal), and listener group (contact group or non-contact group). To test for statistically significant differences in identification accuracy according to these factors, general linear mixed models with both fixed and random effects were conducted (see the Results Section for further detail).

Second, frequency of categorization responses of the Rioplatense assibilated pre-palatal variant and the *yeísta* palatal fricative variant were tabulated across the six response options (“rr/r”, “s”, “ll”, “ch”, “y”, “f”) and “none” for each listener group to determine how each variant was categorized when not identified as the intended phonetic category, orthographic <y ll>.

Individual variation within listener groups was then explored according to further differences in dialect contact experiences reported in the background questionnaire. Finally, participant responses on the questionnaire regarding explicit metalinguistic knowledge of dialectal differences in pronunciation in Spanish were examined to determine any regional differences in awareness of the non-local assibilated pre-palatal variant [ʃ].

Results

Categorization of Rioplatense pre-palatal by yeísta listeners

First, identification of the two sociophonetic variants is considered with the responses from the two *yeísta* dialect listener groups combined. The mean identification accuracy scores and 95% confidence intervals for the *yeísta* [j] variant

6. It is recalled that in the Spanish varieties tested, there is no phonemic contrast between those sounds represented by orthographic <y> or orthographic <ll>; thus, both response options were coded as correct.

and the *sheísta* (Rioplatense) [j] variant are presented in Figure 4. Clearly, and unsurprisingly, the *yeísta* listeners categorically mapped the [j] phone to Spanish orthographic <y> and <ll> ($M = 98.9\%$, $SD = 3.21$), while the non-local [ʃ] phone was assigned to the same phonetic category less than half of the time and was subject to much greater within-group variability ($M = 37.7\%$, $SD = 41.8$). A mixed model analysis with variant entered as a fixed effect and participant as a random effect found that the difference in identification accuracy of the [j] and [ʃ] variants was, indeed, significant, $F(1, 43) = 95.507$, $p < .001$.

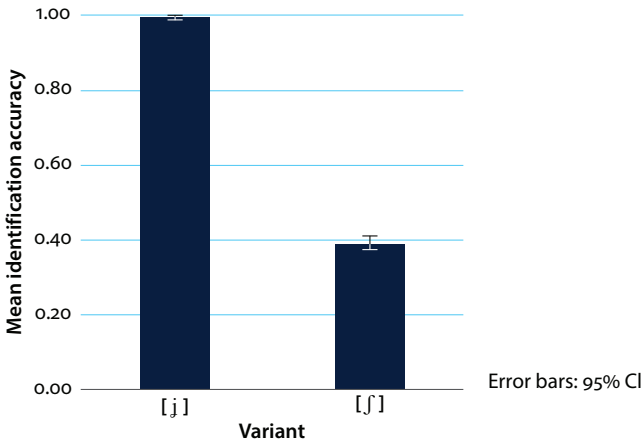


Figure 4. Overall mean identification accuracy for [j] and [ʃ] variants (both listener groups combined)

Possible effects of position of the sociophonetic variants within the word (whether the variant occurred in word-initial or word-internal position, e.g., *llona* vs. *nolla*) were then considered. Figure 5 presents the mean identification accuracies of the variants in word-initial vs. word-internal position. Regional variant, along with word position, were entered as fixed effects in the mixed model to test effects on identification accuracy; subject was again included in the model as a random effect. The model was significant, $F(1, 47) = 433.328$, $p < .001$, again with a significant effect of variant ($p < .001$). Word position, however, was not a significant factor in the model ($p = .426$): no differences in identification of either of the two variants were observed whether the variant was presented in word-initial ($M = 67.3\%$, $SD = 47.0$) or word-medial position ($M = 69.3\%$, $SD = 46.2$). Therefore, the word position variable is removed from the following analyses.

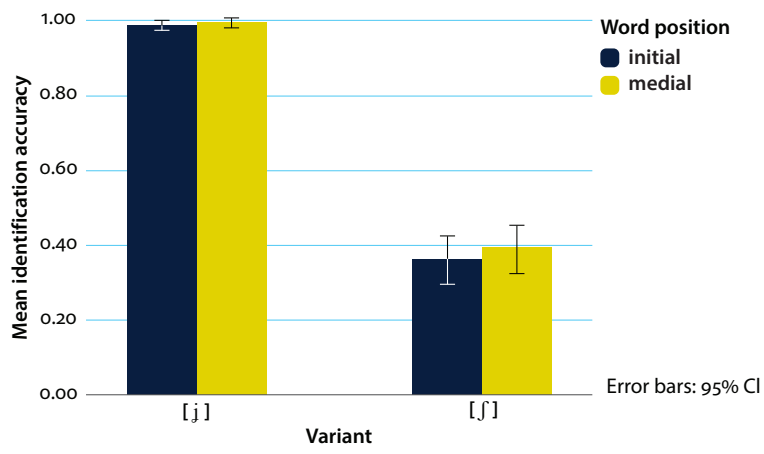


Figure 5. Mean identification accuracy for [j] and [ʝ] variants according to word position (both groups combined)

Regional variation in categorization of [ʝ]

Identification of the two sociophonetic variants of “y ll” was then considered for the *yeísta* listeners according to their degree of contact with Rioplatense Spanish. Figure 6 presents the mean identification accuracy scores for the two variants according to listener group: the Colombian no-contact group vs. the northwestern Argentine contact group

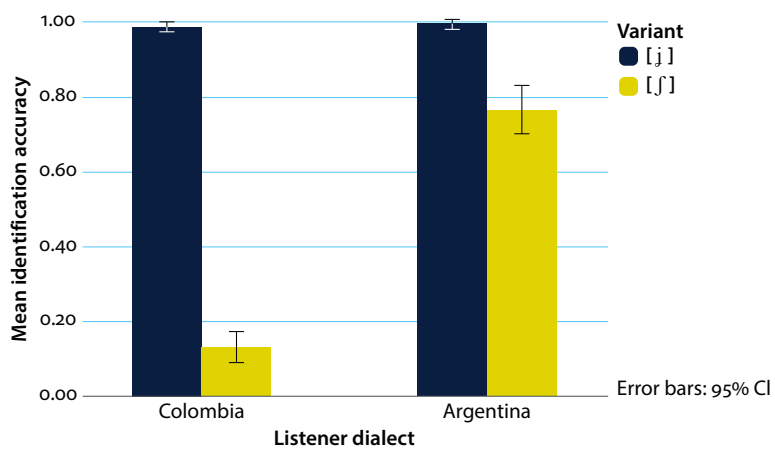


Figure 6. Identification accuracy of the two variants according to listener group

A mixed model was run with identification accuracy as the dependent variable, variant and listener group as fixed effects, and participant and token as random effects. The model was significant, $F(1, 2,604) = 133.834, p < .001$, with variant

($p < .001$) and listener group ($p = .01$) as significant main effects, and a significant interaction between variant and listener group ($p = .01$).

In terms of intergroup variation, the contact La Rioja (Argentina) group scored significantly higher ($p < .001$) in accurate identification of the Rioplatense [j] as “y ll” ($M = 76.5\%$, $SD = 32.2$) than the no-contact Bogota (Colombia) group ($M = 13.3\%$, $SD = 25.6$). However, unsurprisingly, there was no significant difference between listener groups in identification accuracy of the [j] variant, with both the La Rioja group ($M = 99.4\%$, $SD = 2.4$) and the Bogota group ($M = 98.5\%$, $SD = 3.6$) at ceiling levels. Next, considering intragroup variation, within the no-contact Bogota group, the difference in identification accuracy of the two sociophonetic variants was significant ($p < .001$); while within the contact La Rioja group, these differences were not significant (i.e., for this group, both variants were assigned to the intended “y ll” phonetic category).

Next, the categorization responses of the assimilated pre-palatal variant when not identified as the phonetic category “y ll” were explored. In these cases, do listeners associate the phone with another phonetic category, or do they simply reject the phone as any Spanish category (option “none”)?

Table 2 presents the confusion matrices of categorization responses of the sociophonetic variants according to listener group. While the contact Argentine group prefers to categorize [j] as Spanish “y ll” (76.5% of the time), the no-contact Colombian group overwhelmingly maps the [j] variant to Spanish “ch”, the voiceless palato-alveolar affricate /tʃ/ (81.9% of the time). Listeners in the contact Argentine group rarely identify the variant as “ch” (only 7.1% of the time), but do occasionally select “none” (14.1%), preferring not to assign the variant to any of the categories provided. This response was rarely chosen by the no-contact group, only 4.1% of the time.

Table 2. Confusion matrices of categorization responses for the two listener groups

Listener dialect		Categorization response					
		y / ll	ch	rr / r	s	f	none
Bogota, Col.	[j]	98.5%					1.5%
	[ʃ]	13.3%	81.9%		.4%	.4%	4.1%
La Rioja, Arg.	[j]	99.4%					.6%
	[ʃ]	76.5%	7.1%	1.2%	1.2%		14.1%

Individual variation and dialect contact experiences

Next, individual differences in categorization patterns of the regional variant [j] are considered, examining social networks and other forms of exposure to

Rioplatense speech reported in the Language Background and Dialect Contact Questionnaire. Of the 27 Colombian listeners, just two participants consistently identified the assibilated palatal as “y ll” (both at 90% accuracy).⁷ Indeed, one of these two Colombian participants had reported Rioplatense social contacts in the background questionnaire, and both reported frequently listening to music from a variety of dialects, including Argentine music. However, reported exposure to Rioplatense Spanish through social contacts or through media did not always lead to the mapping of the assibilated pre-palatal variant to the “y ll” category: two additional Colombian participants who had reported Rioplatense social contacts did not identify the [j] variant as “y ll”; neither did the nine additional Colombian participants who also reported frequent exposure to Argentine music.

Of the 17 northwestern Argentine listeners, only three failed to identify the [j] variant as Spanish “y ll” the majority of the time (with only 40%, 20%, and 0% identification accuracy). All three had never traveled to the Buenos Aires area, although two did report social contacts from the Rioplatense dialect. Nonetheless, the participant with the lowest identification of [j] as “y ll” from the La Rioja group (at 0% accuracy) also had the least exposure to Rioplatense Spanish of the group: he had never traveled to Buenos Aires nor did he report any social contacts from any regions of Argentina other than the La Rioja province. “None” was the preferred categorization response for [j] for two of the listeners from this subgroup, who reported social contacts from other Spanish-speaking countries, including Spain, Mexico, and Chile or from Colombia and Peru. Only one La Rioja listener preferred to identify the variant as “ch”, who reported social contacts from Spain, Mexico, Chile, and Argentina.

Metalinguistic commentary

Lastly, we consider participant responses to the open-ended question on the Background Questionnaire that asked participants to describe any Spanish dialectal differences in pronunciation. Eleven participants from the contact group (La Rioja, Argentina) of 17 described regional differences within Argentina in the pronunciation of “y ll”, and several participants explicitly associated the [j] variant with speakers from Buenos Aires. Examples of this overt metalinguistic awareness of the [j] phone within speakers in the contact group include the following questionnaire responses: “*En Buenos Aires utilizan mucho la SH para la LL y Y*” ‘In Buenos Aires they use SH a lot for LL or Y’ (Participant A15B), and “*Otras palabras que llevan LL suenan como SH, así que sé que es gente proviene de*

7. Also, three additional Colombian listeners identified the [j] variant as “y ll” to some degree (for 50%, 40%, or 30% of the tokens).

Argentina, más específicamente de Buenos Aires ‘Other words that have LL sound like SH, so I know that they are people from Argentina, specifically from Buenos Aires’ (Participant A13A).

Meanwhile, several participants in the no-contact group (Colombia) also described dialectal differences in pronunciation of “y” or “ll” (7 of the group of 27). However, these participants specifically stated that “y” and “ll” may be pronounced similarly to “ch”: *“La pronunciación de la [y] suena en otros países como [ch]”* ‘The pronunciation of [y] sounds like [ch] in other countries’ (Participant C23B), and *“Depende de la region, hay muchas [diferencias]: llaves = chaves, silla = sicha”* ‘Depending on the region, there are many [differences]: keys [ll] = keys [ch], chair [ll] = chair [ch]’ (Participant C13A). Only three participants in the Colombian group explicitly connected dialectal differences in pronunciation of “y” or “ll” with Argentine Spanish, and, indeed, two of these were in fact the two Colombian participants who accurately categorized the [j] task stimuli as “y ll” (C22A, C7A), explicitly mentioning, for example: *“La pronunciación en personas de Argentina con la Y y LL”* ‘Pronunciation of Y and LL by people from Argentina.’ (Participant C22A).

Thus, those two Colombian participants who performed differently from the rest of the no-contact group members, those who successfully identified the Rioplatense [j] as “y ll”, seemed to have explicit metalinguistic awareness of how this phone is produced in many dialects of Argentine speech and made use of that knowledge in performing the experimental task. Other Colombian listeners did not report explicit knowledge of variation in pronunciation of “y ll” in Argentine speech, and indeed frequently referred to regional differences in pronunciation of Spanish “ch”. These participants did not explicitly associate these differences in pronunciation of “ch” with any particular dialectal regions.

Discussion

Categorization of the sociophonetic variants by the ‘yeísta’ listeners

The current study aimed to determine how *yeísta* listeners from two South American speech communities who varied in degree of contact with an external variety, Rioplatense Spanish, perceptually mapped local (weak palatal [j]) and non-local (assibilated pre-palatal [ʝ]) sociophonetic variants to established phonetic categories. With regards to the perceptual categorization of the weak palatal fricative [j], unsurprisingly both groups categorically assigned the variant to the phonetic category represented by orthographic <y> and <ll>, mirroring native (local) production norms, as this is the variant used in speech production in

both *yeísta* groups tested. There was variation, however, in categorization of the non-local variant, the Rioplatense assibilated pre-palatal, according to degree of contact with Rioplatense speakers, discussed in detail in the following section.

Additionally, overall, the position of the variants (word-initial vs. word-internal) did not have an effect on categorization responses. It is recalled that Delgado-Díaz and Galarza (2015) did find differences in categorization of Puerto Rican posterior-/r/ according to phonetic context, with greater identification accuracy for Puerto Rican listeners in intervocalic (word-internal) position than word-initial position. The authors argue that this contextual effect may be due to the allophonic distribution of posterior /r/ and /h/ (i.e., voicing differences according to phonetic position contributing to a contrast neutralization in certain contexts). However, those phones under investigation in the current study are not subject to allophonic variation according to phonetic context, and the perceptual mappings mirrored the categorical nature of the [j] and [ʃ] productions.

Regional perceptual variation according to degree of dialect contact

While the local palatal fricative variant was similarly identified by both *yeísta* listener groups, there were significant differences between the groups in identification of the non-local Rioplatense assibilated pre-palatal variant. Those listeners from highland Colombia, who had limited or no contact with Rioplatense speakers, clearly did not associate the [ʃ] phone with the phonetic category represented by orthographic <y ll>; in fact, the assibilated pre-palatal was most frequently categorized by the Colombian group as orthographic <ch>, the Spanish voiceless affricate /tʃ/. This result follows projections of perceptual speech models, such as PAM (Best, 1995) and SLM (Flege, 1995), which predict that the perception of non-native sounds is shaped by the native phonology and that new sounds can be mapped onto existing phonetic categories according to the degree of articulatory or acoustic similarity. The voiceless pre-palatal assibilated [ʃ] phone shares articulatory and acoustic similarities with the voiceless pre-palatal affricate [tʃ] (represented by orthographic <ch>), with the only articulatory difference being the lack of initial closure of the affricate. These similarities help explain the Colombian listeners' categorization patterns.

Furthermore, in several varieties of Spanish, the affricate [tʃ] (orthographic <ch>) is lenited to a fricative, resulting from the loss of the initial occlusive element (Hualde, 2005: p. 152), as in *mucho* /mutʃo/ > ['mu.fo]. This deaffrication process is attested in several regions, including northern Mexico, the southwestern United States, Panama, Chile, the Caribbean, and southern Spain (see Casillas, 2013, for a review). Thus, Colombian listeners may have also been exposed to de-affricating speakers, for example from neighboring Panama, further

facilitating the association of the [ʃ] phone with the phonetic category represented by orthographic <ch>.

The contact group, those listeners from northwestern (La Rioja) Argentina, on the other hand, patterned differently. These listeners, who have social ties with Rioplatense speakers, did categorize the assibilated pre-palatal [ʃ] as a variant of the same category as the palatal fricative [ç], represented by orthographic <y ll>. It is argued that this difference between the two *yeísta* groups in perceptual identification of the pre-palatal assibilated [ʃ] is due to the contact of the La Rioja participants with speakers of Rioplatense Spanish: as a consequence of social, political, and cultural ties to speakers of varieties that use the assibilated palatal [ʃ] variant, these *yeísta* speakers have adapted perceptual norms to accept [ʃ] as a variant of “y ll”, even though the phone is not used in their own speech production. This is similar to the New York City r-full speakers in Sumner and Samuel’s (2009) study, who, while they themselves did not produce r-less forms, perceived both r-less and r-full forms as perceptually equivalent forms due to exposure to r-less speakers.

Social networks and speech perception

The current study provides evidence of the effects of social networks, and potentially of other forms of dialect contact (such as media), on the perception of socio-phonetic variants in Spanish. One’s social ties in one’s social network may not only influence norms and values in language use but may also shape perceptual norms and the processing of linguistic forms. The *yeísta* speech community studied here with a higher degree of contact with speakers of Rioplatense Spanish (those from La Rioja, Argentina) accepted both the Rioplatense [ʃ] variant and their own local variant [ç] as forms of the same phonetic category, represented by orthographic <y ll>. As the capital region of Buenos Aires is an important political, economic, and sociocultural hub in the country, it is inevitable that speakers of other varieties in other regions of the country will interact with or be exposed to Rioplatense speech. These social ties seem to result in adaptations in perceptual norms, at least at the superficial level (such as in an Identification Task).

The role of social networks on perceptual identification of the Rioplatense variant was made even more apparent when individual performance within the listener groups was examined in relation to dialect contact experiences reported in the background questionnaire. Specific examples of the role of social networks in how the regional variant was identified include the Colombian participant with high accuracy in identification of the [ʃ] variant as “y ll” who also reported social ties with Rioplatense speakers and the Argentine participant with the lowest accuracy in identification of the [ʃ] variant who reported the least interaction with speakers of Rioplatense Spanish of the La Rioja group.

Contact or “closeness” has also been found to play a role in performance on other types of perceptual tasks, including in identification of speakers’ region of origin (e.g., Baker, Eddington, & Nay 2009; Clopper & Pisoni, 2004) and in perception of sounds at the surface level, but not in long-term representation (Sumner & Samuel, 2009). Future study is needed that incorporates other task types, including speech processing and comprehension tasks, to determine the role of dialect contact and social networks at other levels of language use.

Finally, cross-dialectal variation in perceptual norms, as a result of one’s social network and of the types and degrees of contact with speakers of other varieties, may have various linguistic and social consequences. First, misidentification of sociophonetic variants (as in the case here of the Colombian listeners identifying the [ʃ] forms as “ch”) could lead to increased processing costs (i.e., time and effort in searching the mental lexicon for the intended item) and to miscommunications, particularly in the presence of a lexical opponent (Clopper, Pierrehumbert, & Tamati, 2010; Labov, 1989). For example, will the speech stimulus [es.'tre.ʃa] activate the construct *estrella* ‘star’ or *estrecha* ‘narrow’?

Second, the same phone may be attributed different sociolinguistic values (language attitudes) depending upon how the variant is phonetically categorized and, thus, the social associations attributed to the form, again shaped by one’s linguistic experience. For example, the assimilated pre-palatal [ʃ] variant may be perceived as a prestige form when identified as Spanish “y ll”, and thus associated with Buenos Aires speech (Lipski, 1994), but on the other hand, may be perceived differently when identified as a de-affricativized variant of Spanish “ch”, which could trigger perceptions of credibility or lower competency (Casillas, 2013). Future study is needed to determine how language attitudes toward different sociophonetic variants of Spanish may be shaped by varying linguistic experience with speakers of different speech varieties.

Conclusion

This chapter presented a study of cross-dialectal differences in perception of Spanish sociophonetic variants according to degree of contact with speakers of other varieties. While the current study provides further evidence of cross-dialectal variation in speech perception in Spanish, it also reveals that perceptual norms do not always mirror those linguistic forms produced in the local speech community; rather, one’s social networks and other forms of dialect contact (such as through media sources) can result in adaptations to how speech sounds are perceived. It is still unclear, however, whether such effects of dialect contact extend to other levels of language use, for example in the long-term storage of sociophonetic variants or

in the indexing of social information with linguistic forms. Future study is warranted in these areas, as well as in regard to the perception of other sociophonetic variants found across the Spanish-speaking world.

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Appendix

Version 1		Version 2	
[f]	[j]	[f]	[j]
ni[f]a	mi[j]e	mi[f]e	ni[j]a
da[f]o	na[j]a	na[f]a	da[j]o
me[f]o	de[j]o	de[f]o	me[j]o
go[f]e	to[j]a	to[f]a	go[j]e
tu[f]e	gu[j]a	gu[f]a	tu[j]e
[f]aba	[j]ada	[f]ada	[j]aba
[f]edo	[j]epe	[f]epe	[j]edo
[f]ibo	[j]ite	[f]ite	[j]ibo
[f]ome	[j]ona	[f]ona	[j]ome
[f]uco	[j]uga	[f]uga	[j]uco

The social perception of intervocalic /k/ voicing in Chilean Spanish

Mariška A. Bolyanatz Brown and Brandon M. A. Rogers
Occidental College / Ball State University

In this study, we investigate what social meaning is attributed to a nascent change in progress in Chilean Spanish, examining whether intervocalic voicing of the phonologically voiceless stop /k/ affects listener judgments along several perceptual scales. Eight brief excerpts of spontaneous speech were digitally manipulated to vary only in voicing in tokens of /k/, and thirty listeners responded via an online experiment. We find that listeners are not sensitive to voicing along three of the measured scales and are not sensitive to voicing at all in female speech. We also determined that listeners are only sensitive to intervocalic voicing when assigning values of Chilean identity to male speakers, and that this effect is mitigated by headphone use. Some of listeners' insensitivity matches previous production data in this dialect, while we expected some sensitivity along other measures but found none. We posit that this mismatch is due to the salience of the variable: because listeners may be unfamiliar with intervocalic voicing of /k/, they have not yet indexed voicing of intervocalic /k/ with particular speaker features, aligning with Campbell-Kibler (2009).

1. Introduction

Chile represents a fascinating linguistic laboratory to explore social perceptions, as Chilean Spanish has been described as showing relatively high geographic uniformity with respect to pronunciation (e.g., Lipski, 1994). Sadowsky and Aninao (forthcoming) state that this is a result of a hyper-centralization of political, cultural, economic and social influence and power in the capital city of Santiago. However, while Chile lacks in geographical variation, it shows considerable levels of sociolinguistic complexity. Numerous studies have shown that this variety of Spanish is stratified along the lines of a number of sociolinguistic factors, such as age, gender, and socioeconomic status (e.g., Figueroa, Salamanca, & Nanculeo, 2013; Rogers, 2016; Rogers & Mirisis, 2018; Sadowsky, 2012, 2015; Soto-Barba,

2007). On the other hand, Sadowsky (2015) observes that due to social progress and increased social mobility, especially post-dictatorship, variation is decreasing in some aspects via sociolectal leveling due to increased contact between different social demographics. Thus, this specific variety of Spanish provides an ideal opportunity to study speaker attitudes towards segments that have been shown to have complex and differing relationships with social variables.

Previous research has shown that a single phonetic variable can alter listener judgments of a speaker's social attributes (Chappell, 2016; García, 2015; Rohena-Madrado, 2011; Walker, García, Cortés, & Campbell-Kibler, 2014). While quite a bit of research has been conducted on intervocalic /b, d, g/ lenition in Spanish (e.g., Eddington, 2011; Harris, 1969; Hualde, 2005; Martínez-Celdrán, 1984, 1991; Quilis, 1999; among many others), sociophonetic work on lenition of intervocalic /p t k/ is relatively scarce. Recent production work carried out in the Chilean dialect reveals that intervocalic voicing and spirantization, particularly of /k/, are most frequently realized by younger speakers, with younger females voicing more than their older counterparts, and younger males spirantizing more than older males and all females (Rogers & Mirisís, 2018). Assuming a close connection between individuals' speech production and perception, our aim in this paper is to determine whether listeners are sensitive to voicing of intervocalic /k/, and if so, whether their perceptions align with the variation found in speakers' production.

2. Literature review

2.1 Reduction and voicing as social variables in Spanish

Sibilant variation has been studied more than any other voiceless segment with regards to weakening and voicing, and studies have concluded that these segments are voiced and weakened according to a number of linguistic and social factors. For example, Schmidt and Willis (2011) showed that in Mexican Spanish, male speakers voiced /s/ more than female speakers, similar to how in different dialects males have been shown to reduce and elide /s/ more than females (e.g., Cepeda, 1995; Chappell & García, 2017; Klee & Caravedo, 2006; Valdivieso & Magaña, 1991). In Highland Ecuadorian Spanish, García (2015) found that intervocalic /s/ voicing was more likely in unstressed position, in faster speech, at word boundaries, before non-high vowels, and among young, male participants. In Costa Rican Spanish, Chappell and García (2017) explored whether physiology was better able to predict voicing of intervocalic /s/ than gender. If this were the case, they posit that males would be more prone to gradual than categorical voicing as a result of greater gestural overlap with the surrounding vowels due to anatomical

vocal fold differences. However, they found that female Costa Rican speakers voiced more gradiently than males, concluding that [z] is more socially motivated than the result of physiological differences in male and female vocal tracts in Costa Rican Spanish.

With specific regard to Chilean Spanish, most studies have examined voicing and articulatory reduction, or spirantization, as they relate to the intervocalic voiced stops /b d g/ (e.g., Figueroa & Evans, 2015; Pérez, 2007, Rogers, 2016), and have concluded that heavy articulatory reduction and elision of the voiced stops in intervocalic environments is the norm in Chilean Spanish. Likewise, Rogers (2016) found that voiced stop spirantization in and around the central-southern city of Concepción is primarily driven by young speakers, and to a lesser extent, males. The effects of voicing and spirantization on voiceless stops in Chilean Spanish have been much less studied. Prior to recent years, only Poblete (1992) and Cepeda (1991, 1994, 2001) had examined intervocalic /p t k/ voicing in Chile, in the southern city of Valdivia, with Poblete reporting that /p/ was voiced the most while /t/ was the most resistant to voicing and reduction. She also indicated that age and gender played varying roles in the levels of voicing and spirantization that the voiceless stops underwent and that these processes increased in the middle and lower socioeconomic strata. Likewise, she reported that while older males voiced /p/ and /t/ more than their younger counterparts, younger males voiced /k/ more.

Cepeda (1994) did not examine the social implications of voiceless stop voicing and spirantization but found that /p/ and /k/ both underwent greater voicing than /t/. Cepeda (2001) states that elision of /p/ and /k/ is common in the speech of both the higher and lower SES groupings in Valdivia, although it is most common among speakers of the lower stratum. She claims that in both groups spirantization and elision of /p/ and /k/ is an identity marker due to the flexibility for innovation afforded to both groups. Because lower-class speakers do not have to defend or uphold a “status quo” they are free to innovate. On the other hand, the upper-class speakers are afforded flexibility due to the low probability that their speech will be subject to negative social judgements.

These findings have not been supported by the broadest sociophonetic examination of this variable to date in Rogers (2017) and Rogers and Mirisís (2018). In these studies, researchers measured the voicing and reduction of intervocalic /p t k/ using three metrics: voicing, spirantization, and segmental duration. Voicing was measured as the percent of presence of voicing over the closure period of the obstruents, while spirantization (or articulatory reduction) was measured as the difference in intensity between an intervocalic voiceless stop and its flanking vowels. The researchers reported that primarily age and gender drove the articulatory reduction and voicing of intervocalic /p t k/ in Concepción, with males and

younger speakers spirantizing at higher levels than all other speakers. They found no significant relationship between voicing and socioeconomic stratification.

With specific regard to /k/, among the female speakers, significantly higher levels of voicing were documented among the youngest age group for /k/ when compared to the older female speakers, but there were no differences between age groups based on spirantization or duration of intervocalic /k/. The inverse was true for male speakers. In other words, there were no voicing differences between male speakers based on age, but the younger male speakers spirantized /k/ much more than the older males, demonstrating the most advanced intervocalic /k/ reduction of all speakers. That is, lenition of /k/ is essentially proceeding down two pathways, both led by young speakers: young females voice /k/, while young males spirantize /k/. In examining the sociophonetic perceptions of this variable, we follow Lewis (2001) in viewing lenition as a gradient process affecting these stops that may have multiple unordered outcomes that do not rely on one another. Specifically for this paper, we examine voicing as one step on a path toward lenition, leaving articulatory reduction for future studies.

2.2 Perception of intervocalic voicing in Spanish

Previous work on voicing in Spanish has focused almost exclusively on the voicing of fricatives, and production studies can help establish the diffusion of a change in progress throughout a given population. For instance, Rohena-Madrazo (2011) examined devoicing of /ʒ/ in Buenos Aires Spanish (BAS) and found that younger speakers in the middle-class group fully devoice this fricative, while devoicing in all other social groups remains variable. This finding suggests that devoicing change has reached completion in the younger, middle-class group.

However, production studies cannot speak to a population's awareness of variable voicing phenomena; perception studies are needed to address this question. In Loja, Ecuador, where speakers produce /s/ as [z] more frequently in word-final position, García (2015) conducted an online experiment, asking listeners to participate in a similarity rating task (with listeners rating stimuli as very similar or very different), and a discrimination task (in which participants heard the same pairs as in the first task and reported whether the tokens were the same or different.) García's results demonstrated that listeners were more likely to rate the pairs as most different when the [s] or [z] difference was in final position (as in *las ata*), and least likely to discriminate between [s] and [z] in word-medial position (e.g., *asa*), with word-initial discrimination falling between the two poles (e.g., *la sa*ca). This finding aligned with her production results, providing support for a close connection between speakers' production and perception.

A related question revolves around the relationship between phonetic variant production and the social perception of these variants. Chappell (2016), following the methodology of Campbell-Kibler (2009) and Walker et al. (2014), examined how socially meaningful information is conveyed through intervocalic /s/ voicing for Costa Rican listeners. Chappell found that males were more likely to produce voiced /s/ than women in this dialect, and aimed to determine whether the meaning of [z] differed based on the gender of the speaker or the listener by conducting an online experiment. Listeners were asked to evaluate matched-guise tokens of intervocalic /s/ voicing on scales of social characteristics often associated with /s/ variation. She found that overall, [s] is found to have more social prestige, but she also finds that listeners are more likely to rate [z] use among males more positively along scales of niceness, confidence, localness, and masculinity, demonstrating a covert prestige of [z] use among men not accessible to female speakers. In other words, men's greater production of [z] corresponds to a more populated indexical field (Eckert, 2008) in perception.¹

2.3 The present study

Though previous production research on /p t k/ in Spanish has attested variable voicing of these phonemes in intervocalic position, no study to our knowledge has explored how this voicing may be socially indexed for listeners. Additionally, as mentioned above, we aim to determine whether the results of this perception study will align with those of recent production studies. There is a general assumption that speech production and perception will match (Labov, Karen, & Miller, 1991: p. 36). For instance, Fowler and Galantucci (2005) suggest that the fit between the activities of talking and listening must be close, and that, "in fact, languages could not have arisen and could not serve their functions if the fit were not close" (26). This closeness is often demonstrated via categorical perception, as well as normalization of input from a variety of different speakers (cf. Johnson, 2005). Several instances of mismatch have been demonstrated, in which listeners do not perceive distinctions, but do produce them, termed *near-mergers* (Hall-Lew, 2013; Labov et al., 1991; Yu, 2007). The individuals who participate in these near-mergers, however, are usually isolated participants, rather than a whole group or even a whole population. We might also expect a mismatch in the other direction, or that listeners themselves do not produce a distinction, but

1. However, in a similarity rating and discrimination task, Costa Rican listeners were less successful at discerning the difference between [s] and [z] than other allophonic pairs, suggesting that even the least salient phonetic variants can become associated with social meaning (Chappell, 2017).

do perceive one. This perception may be subconscious, as demonstrated by the phenomenon of phonetic convergence, in which speakers modify their speech over time to align with their interlocutor (e.g., Pardo, 2013), but do not perceive their speech to be shifting.

Additionally, the relationship between production and perception may depend on the variable in question. Campbell-Kibler (2009) examined listeners' evaluations of English gerund (ING) produced either with the velar nasal or the alveolar nasal (*-ing* vs *-in*), and found both more ratings and larger effect sizes than that of another variable she had previously examined: /t/ release (Campbell-Kibler, 2005). She states that this could be due to (ING)'s status as a linguistic stereotype, "a linguistic variable that is culturally acknowledged to the extent of having a specific term to refer to it" (2009: p. 152), as opposed to /t/ release's less conscious cultural capital (2009: p. 152). However, she also notes that this distinction could be due to other, as-yet-unexplained factors.

Given that voicing of /k/ appears to be a nascent trend led by young women, we aim to determine whether this novel allophonic cue is detectible by listeners, and if so, whether listeners' perceptions of voicing of /k/ align with production findings. Therefore, in this paper, we answer the following questions:

1. Are listeners sensitive to differences in voicing in utterance-medial intervocalic position?
2. If so, how do listeners evaluate speakers who voice /k/ in this position along a variety of social measures?
3. Do the perceptual findings align with production findings from this dialect?

3. Experimental design

3.1 Matched-Guise Technique

As we are interested in social evaluations of this particular feature, we chose to utilize a pseudo Matched-Guise Technique (Lambert, Hodgson, Gardner, & Fillenbaum, 1960), following Walker et al. (2014) and Chappell (2016). In this research methodology, listeners hear utterances produced by the same speaker that are altered or manipulated in some way in order to control for anatomical, semantic, or prosodic differences that might cause unintended responses by listeners. Listeners are then asked to provide qualitative judgments about the samples. By using nearly identical utterances that differ according to only one feature, the goal is to tap into listeners' perceptions of one particular acoustic-phonetic cue.

Previous research has shown that even small phonetic differences across stimuli are enough to exert an influence on how listeners perceive social characteristics of the speaker. Listeners have been shown to be sensitive to perceptions of speaker sex (Lass, Almerino, Jordan, & Walsh, 1980; Traunmüller, Eriksson, & Ménard, 2003), ethnicity (Purnell, Idsardi, & Baugh, 1999; Thomas, Lass, & Lass, 2010), social class (Labov, 1966, 2006; Walker, 2007), education levels (Campbell-Kibler, 2005), region of origin (Bezooijen & Gooskens, 1999; Boomershine, 2006; Clopper & Pisoni, 2004; Labov & Ash, 1997; Preston, 1989; Schmidt, 2013; Wolfram, Hazen, & Schilling-Estes, 1999), age (Drager, 2011) and sexual orientation (Mack, 2011; Munson, McDonald, DeBoe, & White, 2006). We therefore aim to determine whether a small phonetic difference of voicing of /k/ in intervocalic position is detectible by listeners, and if so, how this phonetic difference affects how listeners perceive the speaker.

3.2 Stimuli selection and manipulation

In the present study, two to three-word excerpts with intervocalic /k/ were extracted from sociolinguistic interviews with four speakers and were digitally manipulated. In one token per person, the /k/ was the onset of the tonic syllable (as in /la 'kasa/ ⟨la casa⟩ 'the house'), while the other token's /k/ was the onset of a pretonic syllable (as in /la kare'tera/ ⟨la carretera⟩ 'the highway'). The four speakers were young males and females from Santiago (Chile's capital and largest city) between the ages of 18–25, belonging to the low-mid socioeconomic group and mid-mid socioeconomic group (following Sadowsky, 2012), providing a 2 X 2 X 2 experimental paradigm (2 stress patterns, 2 socioeconomic groups, and 2 sexes). Socioeconomic strata were determined using Sadowsky's (2012) modified version of Esomar (Adimark, 2000), which determines an individual's socioeconomic status (SES) specific to Chilean society, based on two factors that have historically been shown to play strong roles in sociolinguistic variation: level of formal education and profession.

In total, 8 utterances were extracted from the sociolinguistic interviews, as seen in Table 1.

The stimuli were manipulated to include a voiced /k/ guise and a voiceless /k/ guise. In contrast with previous studies that have spliced in the experimental sound or morpheme recorded in isolation by each stimuli speaker (cf. Chappell, 2016; Walker et al., 2014), we conducted our manipulations within the utterances themselves so as to control for the many cues potentially contained within an utterance. That is, we aimed to manipulate solely the voicing of the /k/, which enabled cues such as vowel transitions into and out of the intervocalic /k/, pitch of the surrounding vowels, intonation across the entire utterance, and intensity

Table 1. Content of stimuli utterances according to gender and SES of the speaker and prosodic position

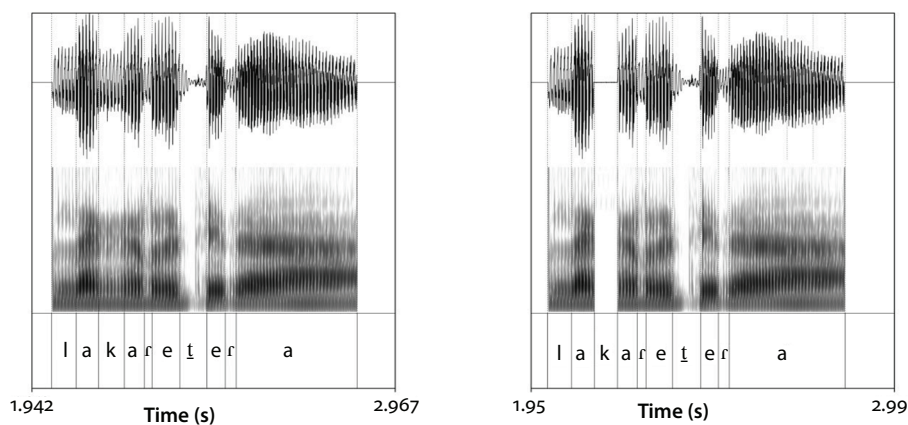
	Male		Female	
	Stressed	Unstressed	Stressed	Unstressed
Lower-Middle	la calle	la carretera	la casa	la carretera
Middle-Middle	nuestra casa	se casaban	como cosa	se casaron

to remain the same across both guises in order to ensure that only the voicing of the segments differed between guises. We acknowledge that use of spontaneous (sociolinguistic interview) speech for a Matched-Guise Task is slightly atypical. However, similarly to Campbell-Kibler (2007), we chose to sacrifice some control over the utterance content itself (which was then entered into the statistical models as a random effect) for the ability to utilize more naturalistic utterances that are more likely to approximate speech that listeners might hear on a daily basis. Additionally, as Campbell-Kibler (2009: p. 34) states, using this type of speech still enables us to answer our central question, since each listener will hear each stimulus twice, once per variant.

We also took potential duration differences into account. In English, voiced segments have been shown to be intrinsically shorter in duration than their voiceless counterparts (Klatt, 1976; Lehiste, 1970), and while to our knowledge no similar study exists in Spanish, we aimed to ensure that differences in duration would not be confounded with voicing. To do so, we first examined Rogers and Mirisis’ (2018) data from Concepción to determine average duration of voiceless tokens of /k/, following Campos-Astorkiza’s (2014) classification of voicing into 3 categories of 0–20% voiced, 20–90% voiced, and 100% voiced. Their data included a measure of voicing drawn from a modified version of Pablo Arantes’ intensity measuring script (available at: <<https://code.google.com/archive/p/praat-tools/downloads>>). Of the 1,516 onset intervocalic /k/s in their data, only 182 of them were between 0–20% voiced (that is, considered voiceless according to Campos-Astorkiza’s work). The mean duration of these 182 tokens was 67 milliseconds, with a standard deviation of 25 milliseconds. Therefore, all tokens of intervocalic /k/ manipulated for this experiment, whether voiced or voiceless, consisted of a 67-millisecond duration. By controlling for duration of the segment of interest and varying it only according to voicing, we ensured that the only difference between guises would be voicing, and that a shortened duration would not be a confound for listeners. This, of course, invites another confound: that listeners would *expect* a voiced segment to be shorter. We acknowledge that there are multiple cues to perception of voicing, and that this tradeoff may have affected listeners’ perceptions of the experimental voicing target.

As mentioned, the original 8 tokens extracted from the sociolinguistic interviews were all at least partially voiced. In order to ensure a perceivable contrast, we added voicing in Praat (Boersma & Weenink, 2016) via a ‘cut and paste’ function so that all tokens were at least 90% voiced. That is, we took the voiced portion of the /k/ and pasted it until we reached 67 milliseconds’ worth of voiced /k/ duration. To create their experimental voiceless counterparts, we extracted the /k/ portion of the utterance from the original, unedited sound file, and used a high pass band filter to filter out noise under 750 Hz at a 20 Hz smoothing rate (following File-Muriel & Brown, 2011). We then spliced this completely devoiced segment back into the original sound file at the zero-crossing point (following Styler, 2013), and manipulated the duration of the segment to 67 milliseconds. All tokens were manipulated in duration to ensure the same length after the guises were created. Two seconds of silence were added in Audacity prior to the stimulus, and one second following the stimulus. Two linguists were asked to evaluate the stimuli to ensure that the voicing distinction could clearly be heard and that the stimuli were natural sounding, which they confirmed.

The figure below shows waveforms and spectrograms of the voiced (on left) and voiceless (on right) guises of *la carretera* as spoken by the lower-middle SES male speaker. The difference in voicing of /k/ can be clearly seen in the differing guises.



3.3 Experimental delivery

This study used an online experimental delivery in order to be able to tap into perceptions by a diverse group of Chilean participants, and to facilitate data collection and aggregation. Stimuli were delivered through Qualtrics, which requires audio to be uploaded to YouTube. For this reason, all the stimuli are accompanied by a visual consisting of a blue circle on a black background, and the stimuli are in

video format created via *iMovie* (2018). Videos were uploaded to YouTube via the “Unlisted” setting to ensure that no one but the authors and participants would be able to access the clips.

Following Walker et al. (2014) and Chappell (2016), listeners were asked to pay attention to each recording and evaluate the speaker according to a set of social characteristics previously used in other perception studies (Chappell, 2016; Walker et al., 2014). Listeners were asked to move a slider bar according to their perception of the speaker along 8 scales: social class (*de clase baja/de clase alta* ‘high/low class/), education (*menos educad@/muy educad@*, ‘less/more educated’), surety of oneself (*segur@/insegur@ de sí mism@*, ‘secure/insecure of him/herself’), pleasantness (*antipático/simpático*, ‘unkind/kind’), masculinity or femininity based on the sex of the speaker (*muy masculino/femenino* ‘very masculine/feminine’ or *menos masculino/femenino* ‘less masculine/feminine’), and Chilean identity (*muy chilén/menos chilén* ‘very Chilean/less Chilean’). The options on the slider bar ranged from 0–6.

Participants were also asked to rate speakers’ overt social status, by providing ratings of more/less *flaite* and *cuico*, Chilean-specific terms. *Flaite* typically refers to stereotypically low-class or uneducated individuals, and may also have a criminal connotation. *Cuico* stereotypically refers to high-class individuals, or those who may act as though they are high-class. Similarly, participants responded to how old they thought the speaker was, using the same age range options as Walker et al. (2014) and Chappell (2016) of 15–19, 20–24, 25–29, 30–34, 40–44, and 45 or older. Finally, listeners were asked to indicate (in a short-answer box) where they thought the speaker was from within Chile.

Listeners were told that they would hear a total of 16 different speakers and were asked to provide assessments of each speaker according to the above characteristics. Finally, we asked listeners to provide any other observations about the person via the question “¿Se te ocurre algo más de la persona?” On the penultimate screen of the experiment, listeners were prompted to provide their own age, gender, education level, occupation, and the city and neighborhood they lived in. They were also asked if they wished to enter their email to be considered to win one of three gift cards in a raffle, worth 30,000 Chilean pesos (approximately \$50 USD).

Finally, on the last screen, we asked if they had any final comments, and whether they used headphones to complete the experiment. Given that voicing is a distinction found in the low frequencies (approximately 100–300 Hz), information about whether they used headphones was included in the analyses below. No other information about their listening conditions (including ambient noise, computer version, etc.) was solicited.

3.4 Participants

Participants were recruited for this study via social media, relying primarily on Facebook, as well as personal emails sent to the researchers' contacts. To participate, an individual had to be a native speaker of Chilean Spanish currently residing in Chile. A total of 32 listeners participated in the study, but two of these 32 participants were excluded from the following analysis. One speaker was not a native speaker of Chilean Spanish as the experiment instructions had dictated, so this person was excluded on the basis that he did not fit the experimental criteria. Additionally, in spite of our best efforts to recruit a demographically diverse sample, only one listener from a lower SES group participated, as indicated by their designated SES (Sadowsky, 2012). In order to ensure that our sample was statistically valid (i.e., that this one speaker would not form an individual group with only one set of observations), we decided to exclude this individual from the analyses below. Participants' demographic information is provided in Table 2.

Table 2. Listeners' demographic information

	Listeners' information
Median/mean age in years	32/32
Age range in years	20–49
Male/female, <i>n</i>	16/14
Level of education	Technical degree incomplete (2), University incomplete or technical complete (4), University complete or more (24)
Profession	Currently unemployed (1), specialized worker (such as machine operator; 3); office worker (1); professional (13); professional with postgrad degree (10); student (2)
Origin (Santiago/other)	11/19
Total listeners	30

4. Analysis

Many of the scales on which listeners rated the speakers targeted similar elements, such as overt social status (as indicated by education and social class), or covert social prestige (as indicated by the niceness and confidence scales). However, if independent variables are correlated with one another, they are not independent and could result in multicollinearity, which would violate the assumptions of this statistical test. Therefore, we first explored our data, visualizing a correlation plot of the eight social measures (social class, education, self-confidence, niceness, gendered identity, *flaute*-ness, *cuico*-ness, and Chilean identity.) From initial data

exploration, we observed that social class and education were highly correlated with each other, and that not being ‘flaite’ and being ‘cuico’ were also strongly correlated with social class and education in the expected direction. That is, speakers rated highly on social class and education also tended to be rated as being both more *cuico* and less *flaite*. Gendered identity and self-confidence also mapped onto this overarching factor group. This was first confirmed via use of a Principal Components Analysis (PCA) in the *FactoMineR* package (Lê, Josse, & Husson, 2008) following Levshina (2015: pp. 354–361). According to this test, a single factor accounted for a majority of the variance, with an Eigenvalue of 2.76, and this single factor included all six of the measures. Each of the variables are significantly correlated with each other according to a correlation test (*dimdesc*) in the *dplyr* package (Wickham, Francois, Henry, & Müller, 2017), and Table 3 shows the correlation values and the accompanying *p*-values.

Table 3. Correlation values among social evaluation scales included in the status factor

	Correlation	<i>p</i> -value
Education	0.87	<.001
Social Class	0.86	<.001
Not Flaite	0.84	<.001
Cuico	0.77	<.001
Confidence	0.64	<.001
Gendered identity	0.56	<.001

Once we determined that these six related variables mapped onto the broader social status factor, we combined the measures of each of the variables into one numeric item to use as the dependent variable for a linear analysis via the *cfa* function in the *lavaan* package (Rosseel, 2012). We did not test these factors as individual dependent variables because the correlation test and the PCA showed them to be closely related to one another.

Niceness and Chilean identity were not correlated with the other measures, so these factors are analyzed separately below as dependent variables. Each of the continuous variables are centered and scaled, such that a positive coefficient indicates an increase in listener evaluation, and a negative coefficient signals a decrease in rating. Additionally, given the production findings that demonstrated that intervocalic voicing of /k/ in this dialect of Spanish is typically carried out by younger speakers, we ran a fourth linear model to determine whether voicing affected how listeners perceived speakers’ ages.

We built separate linear mixed models of status, niceness, Chilean identity, and perceived age using the *lmer* function in the *lme4* package in R (Bates,

Maechler, Bolker, & Walker, 2015) to establish whether /k/ voicing had an effect on the evaluations of the speakers. In each model, we tested whether stimuli voicing, gender of the stimuli speaker, gender of the listener, perceived speaker age, listener age, origin of the listener, SES of the stimuli, SES of the listener, and stress of the stimuli affected the evaluations provided by the listeners, and relevant interactions were tested. Presentation order was also included to examine whether ratings were influenced by the order in which the listeners heard the stimuli and whether the listener used headphones. Following Chappell (2016), we compared the models via the use of the analysis of variance function in R, to determine which of the predictors significantly improved the model, keeping only those predictors that did so.

Additionally, in each model, participant, utterance, and speaker were included as random effects, and they were retained in the models if an analysis of variance test confirmed that they accounted for a significant amount of variance.

5. Results

In this section, we present the results of each model individually. In each model, order of presentation did not significantly affect listeners' ratings, enabling us to analyze the entire dataset.

Status

The best fit mixed-effects model for the status factor is shown in Table 4. According to this model, only the gender of the stimuli speaker has an effect on listeners' ratings of the stimuli. That is, listeners rate all stimuli spoken by a female speaker as significantly higher on the status scale than all stimuli spoken by a male speaker. This effect can be visualized in Figure 1.

Table 4. Best fit mixed-effects model for the status factor: perceived social class, education level, not flaite, cuico, security, and gendered identity of the speaker

Fixed effect	Coefficient	Standard error	<i>t</i> -value	<i>p</i> -value
Intercept	.36	.07	5.50	<.001
Stimuli sex				
Female	Ref	–	–	–
Male	–.70	.07	–9.31	<.001
Random Effects	Variance Component	Degrees of Freedom	χ^2	<i>p</i> -value
Participant	.05	1	8.63	<.01

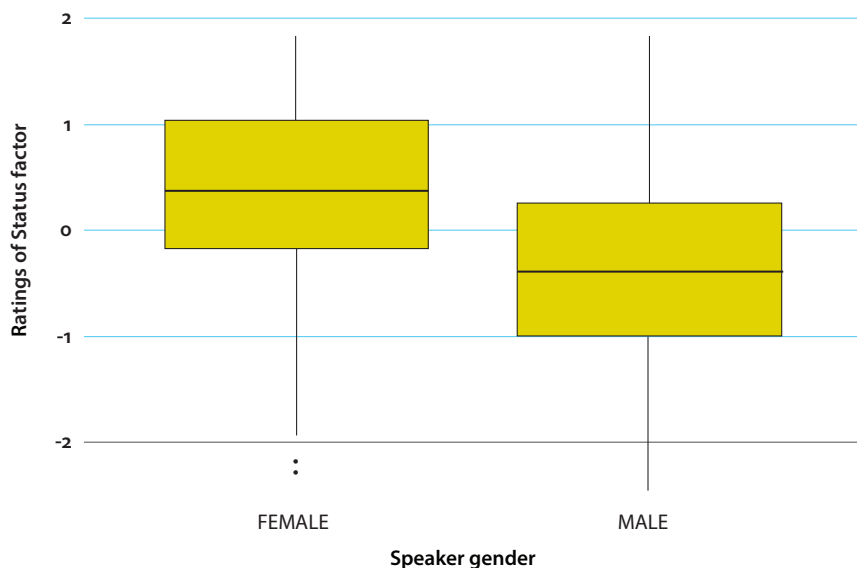


Figure 1. Listeners’ ratings of status factor according to sex of the stimuli speaker
No other interaction terms or main effects were significant in this model.

Niceness

The best fit model taking niceness as the dependent variable is shown in Table 5.

Table 5. Best fit mixed-effects model taking the niceness measure as dependent variable

Fixed effect	Coefficient	Standard error	<i>t</i> -value	<i>p</i> -value
Intercept	−.19	.13	−1.42	.18
Stimuli sex				
Female	Ref	–	–	–
Male	.43	.12	3.47	<.01
Random Effects	Variance Component	Degrees of Freedom	χ^2	<i>p</i> -value
Participant	.16	1	48.47	<.001
Utterance	.05	1	8.54	<.001

Again, only the fixed effect of the gender of the stimuli is a significant predictor of niceness, as can be observed in Figure 2. That is, males are rated overall as nicer than females.

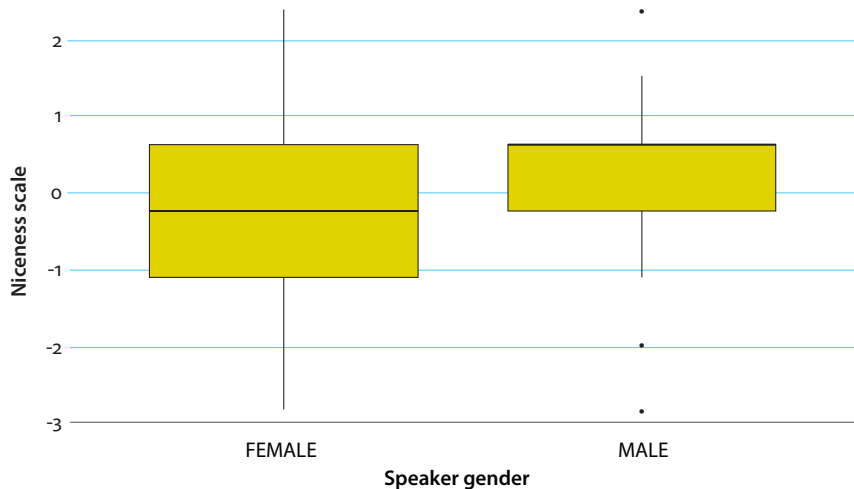


Figure 2. The effect of speaker gender on ratings of niceness

Chilean identity

We now turn to the third scale of evaluation, or evaluation of Chilean identity. No differences were found among ratings of female speakers for this variable, so in Table 6 below, we have subset the data to represent responses only to male stimuli speakers.

Table 6. Best fit mixed-effects model taking Chilean identity as dependent variable (responses to male stimuli speakers only)

Fixed effect	Coefficient	Standard error	<i>t</i> -value	<i>p</i> -value
Intercept	−.09	.14	−.61	.55
Stimuli voicing				
Voiceless	Ref	–	–	–
Voiced	.26	.10	−2.55	<.05
Headphones				
No	Ref	–	–	–
Yes	.46	.18	2.56	<.05
Random Effects	Variance Component	Degrees of Freedom	χ^2	<i>p</i> -value
Participant	.17	1	20.16	<.001

For the first time, we see a main effect for stimuli voicing. Specifically, voiced tokens spoken by male speakers are rated as more Chilean than voiceless tokens, as shown in Figure 3.

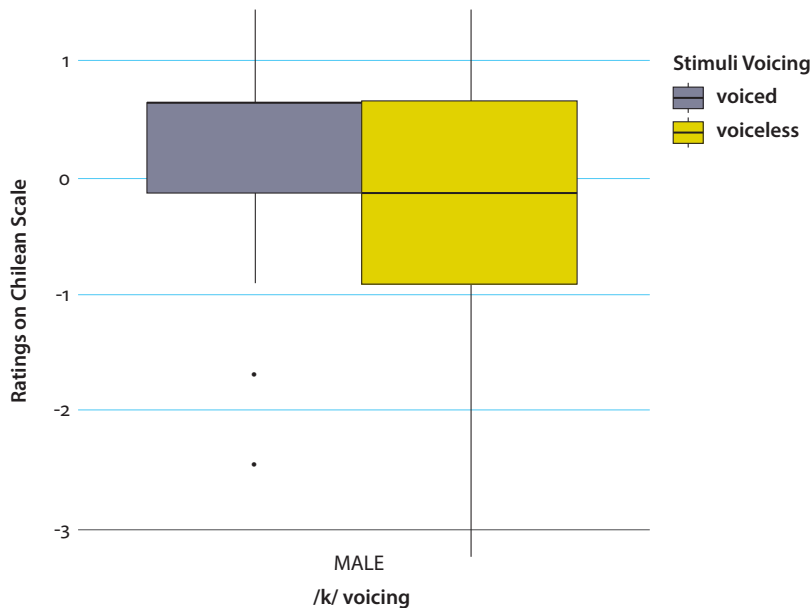


Figure 3. Effect of stimuli voicing on evaluations of male speakers' Chilean identity

A main effect for use of headphones was also found for this model: headphone users were more likely to rate speakers as higher on the Chilean identity scale overall. In the interest of ensuring that this variable did not impact our results, we subset the data into only those listeners who had used headphones ($N = 16$). Following the same procedure of analysis as in the previous model for Chilean identity, we found that listeners tended to rate male speakers as more Chilean when the stimulus was a voiced /k/, but this difference did not reach significance ($\beta = .28$, $SE = .15$, $t = 1.93$, $p = .06$). This suggests that the main effect found above is mitigated by headphone use, and therefore its strength is reduced. That is, when participants used headphones, they did not connect stimuli voicing to positive Chilean identity to a significant degree.

Perceived age

Finally, to test whether voicing conditioned listener perception of speaker age, we modeled perceived age as a function of the factors mentioned above. According to the results in Table 7, only the sex of the stimuli speaker affects how listeners rate the speaker's age. Intervocalic /k/ voicing does not affect listeners' perceptions of speaker age.

Table 7. Best fit mixed-effects model taking perceived age as dependent variable

Fixed effect	Coefficient	Standard error	<i>t</i> -value	<i>p</i> -value
Intercept	.18	.12	1.52	.14
Stimuli gender				
Female	Ref	–	–	–
Male	.48	.08	6.00	<.001
Random Effects	Variance Component	Degrees of Freedom	χ^2	<i>p</i> -value
Participant	.19	1	53.71	<.001

This is surprising given the production findings for this dialect. We expected listeners to be sensitive to age variation in intervocalic /k/ voicing, specifically for female speakers, but this hypothesis was not substantiated. We discuss each of these findings below.

6. Discussion

The objectives of the current chapter were to determine whether listeners were sensitive to differences in voicing in utterance-medial intervocalic position, and if so, how listeners evaluated speakers who voice /k/ in this position along a variety of social measures. We also aimed to examine whether the perceptual findings aligned with recent production findings from this dialect.

While not related to the voicing of /k/, listeners were overall more likely to assign significantly higher ratings of status but lower ratings of niceness to the female speakers. It appears as though male speech may be associated with a covert prestige (Trudgill, 1972), signaling their stronger social and linguistic flexibility, though unrelated to the voicing of /k/. Though this does not shed much light on the experimental variable of interest, it is important to keep in mind that listeners bring their own biases into an experiment. We cannot be sure whether it is these particular female speakers that garner these types of ratings on the experimental scales, or whether this is indicative of a broader social phenomenon in which females are evaluated as more prestigious but less nice (or contrastingly, that males overall are perceived to be nicer and belong to a lower status). This aligns with previous findings that other contextual information present in a stimulus may alter listener perceptions (cf. Campbell-Kibler, 2007; Pharaoh, Appel, Wolter, & Thøgersen, 2015).

With respect to intervocalic /k/ voicing, the results of this perceptual data indicate that voiced intervocalic /k/ may function as a type of identity marker, not for

age or gender, but for local identity. Specifically, males were rated as more Chilean (more local) when they produced a voiced /k/.² On the other hand, in spite of the tendency for young, female speakers to voice /k/ more than other groups (Rogers, 2017; Rogers & Mirisis, 2018), voicing was not a factor in the listeners' perception of female speakers' Chilean identity, status, age, or niceness.

In order to explore these mismatched findings, we return to the assumption of the close connection between speech production and perception described in Section 2. We posit that the lack of effects for young, female stimuli associated with /k/ voicing may be because this variation in production is newly emerging (as it is currently employed almost exclusively by young speakers in recent sociophonetic production data (e.g., Rogers, 2017; Rogers & Mirisis, 2018)) and, as such, is below the level of conscious perceptual access (Shattuck-Hufnagel, 2015: p. 437), similar to Campbell-Kibler's (2009) findings. This proposal is supported by the commentary provided by participants: none referred to the voicing distinction, or even to any differences in pronunciation.

A recent finding by Figueroa (2011) and Figueroa, Salamanca and Nanculeo (2013) provides further support for this hypothesis. These studies examined Chilean university students' social perceptions of use of variants of /tɾ/, /r/, /tʃ/, and /j/ in Concepción, demonstrating that the most fricated variants of each of these phonemes received evaluations of least prestige while the most occluded variants received evaluations of highest prestige. Though Figueroa (2011) did not directly compare the results of each phoneme, he found that listener reaction times were significantly longer for the /r/ and /j/ variants, which he posits is due to /tʃ/'s status as a linguistic stereotype (Labov, 1972) and /tɾ/'s as a linguistic marker. That is, listeners may have been surprised to hear variants of /r/ and /j/, and may not have had overt assumptions of speaker prestige related to the production of these variants, but given their familiarity with the variation of /tɾ/ and /tʃ/, were able to respond quickly with their opinions (M. Figueroa, personal communication, October 11, 2018).

Given the newly emerging status of /k/ voicing and its low perceptual salience, a similar tendency may be at work in our findings. We follow Campbell-Kibler (2009) in positing that close connections between production and social perceptions are more likely when production of the variant is more robust within the speech community. In other words, we propose that social evaluations are directly related to the robustness and saliency of a phonetic cue, in line with Agha (2003), Auer, Barden, and Grosskopf (1998), Barnes (2015), Campbell-Kibler (2009, 2012), Fridland, Bartlett, and Kreuz (2004), Kerswill and Williams (2002), and Rácz (2013), among others. Given that the voicing of /k/ was not particularly

2. This difference was not significant among headphone users.

salient for listeners in the present experiment, there appears to be a looser connection between social perceptions and production.

In making this claim, we acknowledge some potential limitations. First, a higher number of participants could increase the power of the statistical tests conducted in this analysis and allow for a more nuanced evaluation of the dataset, for example, to uncover a potential relationship between listener age and sensitivity to /k/ voicing. Additionally, it is possible that there are slight differences between the production results found in Concepción, Chile's third largest city, and Santiago, the origin of the speakers used in this study. However, no differences in evaluations were found according to listener origin. Further production research on voicing of /k/ in Santiago may uncover differences between these two cities that align more closely with the results of the present study. That is, it is possible that it is males who voice /k/ more in Santiago, while females voice /k/ more in Concepción. Finally, several listeners commented on the short length of the stimuli (2–3 word utterances), and stated that they would have been able to provide more accurate assessments of the speaker's social characteristics with more data. However, statistically significant results have been found by using short stimuli such as in forced-choice identification tasks (Janson & Schulman, 1983), and even just the single word “hello” (Purnell, Idsardi, & Baugh, 1999).

7. Conclusion

In this paper, we have aimed to determine whether listeners are sensitive to intervocalic /k/ voicing and whether listeners' social perceptions of intervocalic /k/ voicing aligned with previous production findings in this dialect. We found that while /k/ voicing is most likely among young, female speakers, listeners are not sensitive to this connection. That is, we found no differences in social evaluations for the female speakers based on voicing guise. However, we found a tenuous connection between stimuli voicing and Chilean identity: listeners were more likely to rate male speakers who voiced /k/ as more Chilean than male speakers who did not voice /k/. We argue that the mismatch between these production and perception findings relates to the saliency of this variant for listeners. Specifically, we posit that voicing of intervocalic /k/ is a newly emerging phenomenon among young, female speakers, and because of this novelty, listeners have not yet had sufficient exposure to this variant to associate it with the social group that produces it the most. The tendency to assign higher ratings of Chilean identity to male speakers who voice /k/ may be reflective of an overall tendency to link nonstandard variants to covert prestige in male voices.

An important issue that remains to be investigated is listeners' ability to distinguish between the /k/ lenition strategy most common among young women (voicing) and the /k/ lenition strategy most common among young men (spirantization) (cf. Rogers, 2017; Rogers & Mirisis, 2018). Spirantization of /k/ may be closer to the level of consciousness for Chilean Spanish speakers than voicing, and listeners in the present experiment may have been attuned to /k/ lenition in general rather than /k/ voicing in particular. Future research may be able to answer this question, providing more evidence for our hypothesis that a mismatch between production and perception results is related to saliency of the experimental variable.

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North America

The sociophonetic perception of heritage Spanish speakers in the United States

Reactions to labiodentalized <v> in the speech of late immigrant and U.S.-born voices

Whitney Chappell

The University of Texas at San Antonio

This study uses a prominent phonetic variable in U.S. Spanish (orthographic <v> as bilabial or labiodental) to investigate heritage Spanish speakers' social perceptions. Based on the results of a matched-guise test in which 75 U.S.-born heritage speakers evaluated voices with a labiodental and bilabial guise, heritage speakers perceive [v] positively in the voices of women as a marker of status, confident Hispanic identities, and older age, but negatively in the voices of men. The results show that heritage speakers use phonetic variants to discern social information about others, and their judgments largely align with monolingual Mexican Spanish speakers. I conclude that heritage speakers' sociophonetic perception in their home language attests to a rich inner world often overlooked by prescriptive forces.

1. Introduction

Internationally, with more than 477 million native speakers (Instituto Cervantes, 2017), the Spanish language boasts great linguistic vitality and, given the 40 million speakers in the United States, or approximately 13% of the total population (U.S. Census Bureau, 2016), the vitality of Spanish seems strong nationally as well. However, in the United States, where English represents the language spoken by the ethno-linguistically dominant group, Spanish-speaking populations, whether homogeneous or heterogeneous, exhibit a gradual shift towards English that is generally completed within three generations (e.g., Rivera-Mills, 2000). In other words, while the children of Spanish-speaking immigrants in the United States show a wide range of linguistic abilities in the family language, their grandchildren and great-grandchildren are expected to have limited Spanish proficiency.

As a result, the Spanish spoken in the United States is transitory and cyclical, regularly renewed with new waves of immigration and repeatedly lost within a few generations (Montrul, 2012a).

Who are these children and grandchildren of Spanish-speaking immigrants in the United States? They have received a range of labels in the literature, but the moniker “heritage speakers” has gained in popularity since the 1990s (Beaudrie & Fairclough, 2012: p. 5). Because heritage Spanish speakers in the United States are such a heterogeneous group, even defining the population has been a challenge for scholars. Valdés (1997), for instance, outlined eight different profiles of heritage speakers in the U.S. and later proposed the widely used definition of heritage speakers in the United States as people (i) raised in homes where a non-English language is spoken and (ii) who come to be bilingual to some extent in English and the home language (Valdés, 2001). Fishman (2001) adopts an even broader definition, identifying heritage speakers as those with a familiar or personal connection to a minority language. It should be noted that the term has been criticized as vague and unclear in its applicability, serving as an effort to “apply a single label to a complex situation” (Wiley, 2001: p. 29), and Otheguy (2016) suggests avoiding the term entirely, as it can be used to further a deficit perspective of bilingual speakers. Others have contended the term is neutral and inclusive (Hornberger, 2005: p. 102) without implying any particular level of proficiency in the heritage language. While recognizing the limitations inevitable in labeling such a diverse group, the present chapter employs Valdés’ (2001) definition of heritage speakers, as it includes all individuals raised in the U.S. with exposure to Spanish at home.¹

In line with the theme of this volume, the present study seeks to investigate the world of heritage speakers’ sociophonetic perception. In fact, sociophonetic perception provides an excellent means of exploring heritage speaker knowledge, as it probes the depths of their listening skills in their home language, which is generally their strongest linguistic domain (Carreira & Kagan, 2011; Montrul, 2011). Heritage speakers are exposed to a range of phonetic variables in Spanish, with labiodental or bilabial realizations of orthographic <v>, e.g., *voto* ‘I vote’ as [vo.to] or [bo.to], serving as a particularly prominent one. In fact, Trovato (2017) finds that over 60% of cases of orthographic <v> are realized as [v] in Texas Spanish. Consequently, heritage speakers in the United States are very likely to have had exposure to bilabial and labiodental <v>, and this chapter explores their perceptions of the social attributes indexed by the phonetic variants.

1. Another possible label for this population would be “U.S.-born Spanish speakers”.

2. Literature review

2.1 Labiodentalized <v>

A relic of a phonemic contrast in Old Spanish that underwent a merger over time, the and <v> graphemes in Modern Standard Spanish represent the same phoneme (Penny, 2000: p. 46). Conditioned by preceding phonological context, both and <v> are realized as [b] in utterance-initial and post-nasal contexts and as [β] in all other environments, according to traditional phonological accounts (Morgan, 2010: pp. 171–178). Within these traditional accounts, [v] can only occur as an allophone of /f/ when followed by a voiced consonant, e.g., *afgano* ‘Afghan’ as [av.ˈɣa.no] (Piñeros, 2009: pp. 276–279), and phonetic texts generally do not recognize [v] as a variant of /b/ (Takawaki, 2012: p. 8).

In spite of the widespread dismissal of [v] as an allophone of /b/ (Sadowsky, 2010: p. 234), the realization is common in Venezuela (Romero, Guerreiro, & Alviárez, 2008), regions of Spain in contact with Catalan (Hualde et al., 2010: pp. 420–421), Paraguay (Lipski, 1994: p. 309), Chile (Sadowsky, 2010; Vergara Fernández & Pérez, 2013), Judeo Spanish (Harris, 1994: p. 74), and along the Uruguay-Brazil border (Carvalho, 2006: p. 89). Most important to the present study, the [v] allophone of /b/ is found in northern Mexico (Takawaki, 2012) and the American Southwest (Torres Cacoullos & Ferreira, 2000; Trovato, 2017). In other words, for an allophone that tends to be ignored or rejected by traditional accounts, it appears in a surprising number of varieties of Spanish, including the United States.

In Texas, Trovato (2017) finds that orthographic <v> is the single best predictor of labiodentalization in El Paso Spanish, with over 60% of the cases of orthographic <v> realized as the labiodental variant. In addition to orthography, speaker sex and written proficiency in English significantly conditioned labiodentalization, with [v] more common in women’s speech and in the speech of those with higher written English proficiency. Given the high frequency of [v] in the United States and its presence in Northern Mexico, heritage speakers of Spanish are likely to be exposed to variation between bilabial and labiodental <v>. In fact, Rao (2014, 2015) has found that while individuals who use Spanish the most in the United States produce more pure approximants, in line with monolingual tendencies, heritage speakers with less regular Spanish exposure realize <v> with more tense articulations, particularly in more formal tasks. Consequently, orthographic <v> serves as the variable of interest in this sociophonetic perception study, as it represents a familiar locus of variation that heritage speakers might associate with social or stylistic meaning.

2.2 A more detailed look at heritage speakers

In the first years of life, heritage speakers may be exposed only to the heritage language or a mix of the heritage and majority language, but they tend to start shifting toward the majority language when they reach school age. The educational system can play a critical role in heritage speakers' proficiency in their home language later in life. For instance, students enrolled in dual language programs tend to become more proficient in Spanish than those in English-medium programs (Lindholm-Leary, 2013), suggesting that dual language programs can and do improve Spanish maintenance over English-only programs. However, very few Latino children in the United States have access to such programs, with only 8% of high schools offering any at all (Rhodes & Pufahl, 2010), and even when high-school teachers are aware of the issues facing heritage speakers, they are often not sure how to best support them in practice (Russell & Kuriscak, 2015). When heritage speakers reach college, only 40% of universities offer courses for heritage speakers (Beaudrie, 2012), which means that most heritage speakers do not have access to language classes tailored to fit their needs.

The educational system also contributes to attitudes and ideologies that affect minority language use, and negative attitudes towards heritage Spanish can hasten its loss among second- and third-generation speakers. Heritage speakers in the United States are perceived as being less fluent than first-generation Spanish speakers (Chappell, forthcoming), and the Spanish they do speak is often attacked on the basis of two different arguments. First, monolingual Spanish speakers may view heritage speech as "contaminated" by English (Zentella, 2007), with many students referring to their own variety as "Spanglish" rather than Spanish (Otheguy & Stern, 2011). Second, the type of Spanish used by heritage speakers is often devalued, as it can contain archaic forms, colloquialisms, and contact phenomena that are held in low esteem in professional spheres and eschewed in academic Spanish (Blake & Zyzik, 2003).

Spatial limitations preclude a comprehensive review of the research on heritage production, but Beaudrie and Fairclough (2012) provide an excellent point of departure for further exploration, and, for a thorough discussion of the phonetic/phonological system of heritage Spanish speakers, Rao & Ronquest (2015) and Rao & Kuder (2016) detail the most recent findings. In broad terms, heritage speakers are often more proficient in listening and speaking than they are in reading and writing given the lack of formal education opportunities in the home language (Montrul, 2011; Rothman, 2007), and their listening skills tend to be superior to their speaking skills (Carreira & Kagan, 2011). In fact, Kim (2012, 2015) has shown that heritage speakers of Spanish, unlike second-language learners, exhibit monolingual-like perception of Spanish stop consonants and lexical stress, but

their production differs somewhat from the monolingual control group. Because of their early exposure to the Spanish language, heritage speakers tend to show a phonological system more in line with that of monolinguals than second-language learners (Au et al., 2002, 2008; Knightly et al., 2003; Oh & Au, 2005), and their exposure to conversational Spanish results in greater implicit knowledge than explicit knowledge, unlike second-language learners (Alarcón, 2011; Bowles, 2011; Montrul et al., 2008, 2013; Montrul & Foote, 2014). However, most studies on heritage speech highlight their differences from monolingual speakers, pointing to transfer from English, overgeneralizations, and differing levels of proficiency in the home language (Amengual, 2012, 2016; Chappell, 2018; Montrul, 2002, 2011; O'Grady, Kwak, Lee, & Lee, 2011; Polinsky, 2006; Rothman, 2007).

While previous studies have focused on heritage speaker weaknesses or how they diverge from monolingual Spanish speakers, it is clear that heritage speakers have many strengths in their home language that have not been fully explored. For example, the studies summarized here have shown that heritage speakers have strong perception skills, excelling in communicative contexts where implicit Spanish knowledge is most useful, but little is known about the nature or extent of this knowledge. For this reason, a matched-guise study was employed to learn more about heritage speakers' sociophonetic perception. As speaker sex is found to be a highly significant predictor of heritage listener evaluations, the following section briefly outlines the relationship between speaker sex and sociophonetics in the literature.

2.3 The importance of sex in sociophonetic studies

As this volume makes abundantly clear, the manipulation of a single phonetic variant in the speech stream can significantly alter listener perceptions about a speaker's social attributes (Barnes, 2015; Drager, 2010; Fridland et al., 2004; Plichta & Preston, 2005; Walker et al., 2014). Spanish speakers have been shown to be highly attuned to both consonants and vowels in their sociophonetic perception. For instance, vowel raising in Asturian Spanish tends to lower evaluations of speaker status and enhance perceptions of ruralness (Barnes, 2015), while aspirated /s/ is associated with heteronormativity in Mexican and Puerto Rican male voices (Mack, 2009; Walker et al., 2014).

Sex is a well-known predictor of sociophonetic production, as women tend to drive linguistic change below the level of consciousness, ahead of men by a full generation (Labov, 2001: p. 501). Many explanations of these sex-based differences have been proposed, ranging from two different groups of women either adhering to or deviating from the norm (Labov, 2001: p. 376), perhaps to create social differences with other women (Eckert & McConnell-Ginet, 2003: p. 302).

On the other hand, women use standard variants more frequently than men when the variation is stable or the change is above the level of consciousness (Labov, 1990, 2001: pp. 261–293), by which women may create their own prestige (Milroy & Gordon, 2003: p. 103) or potentially avoid negative judgments of sexual promiscuity (Gordon, 1997) or status (Chappell, 2016). In using nonstandard forms more than women, men may be capitalizing on covert prestige (Trudgill, 1972: pp. 182–183; Van Buren, 2017) to create a tough or local identity in line with socially valued hegemonic masculinities.

Important to the present study is the fact that sociophonetic variants are often perceived differently in male and female voices. Chappell (2016) highlights the importance of speaker sex in her study of intervocalic /s/ voicing: while male Costa Rican speakers who produced nonstandard [z] were perceived as more masculine, nicer, more confident, and more local than male speakers who produced standard [s], female speakers did not benefit socially from [z] production, receiving only lower ratings of status when they produced the hypoarticulated variant. In other words, prestige variants are perceived positively in women's speech, while hypoarticulated variants can evoke covert prestige, but only in male voices (see also Alfaraz, 2000; Labov, 1972: p. 314; Trudgill, 1972: p. 179; Van Buren, 2017).

Another study crucial to the present paper explores Mexican Spanish speakers' evaluations of labiodental <v> in the voices of late immigrant and heritage Mexican Spanish speakers in the United States (Chappell, forthcoming). The study shows that monolingual Mexican Spanish speakers perceive [v] as indicative of intelligence and confidence in late immigrant female voices, but the same variant triggers lower ratings of intelligence and Spanish competence for male speakers. That is, the hyperarticulated variant, [v], is perceived as a positive marker of status, but only for female speakers. These studies suggest that prestige features and hyperarticulated variants may not be viewed as consistent with a hegemonic masculine identity (see Zimman, 2013).

2.4 Research questions

Given that heritage Spanish speakers have the most exposure to their home language in social, communicative settings and excel at listening tasks, the present study seeks to explore whether heritage Spanish speakers use familiar phonetic variants to discern social information about others. To this end, I pose the following research questions:

1. To what extent are heritage speakers aware of the social information conveyed through phonetic variants?
2. What social properties do heritage speakers associate with labiodental and bilabial realizations of orthographic <v> in a matched-guise task?

3. Methodology

3.1 Speakers

The experiment involved a matched-guise test (Lambert et al., 1960) in which listeners heard the voices of eight target speakers from two different linguistic profiles or speaker types: late immigrant Mexican Spanish speakers and heritage speakers of Spanish. The voices of two men and two women were included for each of the aforementioned groups, about whom additional demographic information is provided in Table 1.²

Table 1. Speakers' basic demographic information

	Late Immigrant Mexican Spanish speakers	Heritage Mexican Spanish speakers
Men : Women (<i>n</i>)	2 : 2	2 : 2
Age range (in years)	21–37	20–21
Mean age	26	20.25
Median age	23	20
Profile	Born and raised in Mexico; exposed to Spanish at home/ in society	Born and raised in U.S.; exposed to both English and Spanish at home/English in society

Based on their responses to Montrul's (2012b) bilingual background questionnaire, which was completed before recordings were made, the speakers in these groups came from fairly homogeneous backgrounds. The late immigrant speakers were all born and raised in Mexico, exposed exclusively to Spanish at home, in school, and in society until coming to the United States after the age of 13, when

2. It should be noted that the voices of four second-language learners (two men and two women) were also interspersed throughout the experiment. These speakers were born and raised in the United States as monolingual English speakers and began studying Spanish in the classroom between the ages of 10–15. They rated their English abilities as much stronger than their Spanish skills, and each L2 speaker claimed to speak Spanish either with "some difficulty" or "great difficulty." These speakers were removed from analysis in the present study because, while the heritage listeners rated both heritage and late immigrant speakers differently given their production of either bilabial or labiodental <v>, evaluations of the language learners did not differ based on variant for any of the social factors tested. I hypothesize that language learners, if easily identifiable as non-native speakers, may be exempt from social judgments about the phonetic variants they use, as they are not perceived as in-group members using phonetic variants as meaningful markers of social identity. That is, variation in pronunciation is likely to be perceived as a first-language transfer issue and not as a meaningful marker of identity in second-language speech. For this reason, the language learners were removed from analysis.

they started studying English. Three of these speakers were students at a public university in Texas and one was a teacher at the same university, which is why the age range is somewhat broader for this group.³ The heritage speaker group includes individuals born and raised in the United States who were exposed to English and Spanish in the household before the age of five. These participants were all students at a public university in Texas. All received their education in English and rated their English abilities as better than their Spanish abilities. They also claimed to speak English more frequently than Spanish, using English with their brothers and sisters, a mix of English and Spanish with their parents, and Spanish with their grandparents.

Following Walker et al. (2014) and Chappell (2016), the speakers were recorded as they completed a map task using a headset microphone (Plantronics DSP-400) connected to a laptop. The speakers gave directions from a designated starting place to a series of fictional streets and buildings, all of which contained <v>, e.g., *Avenida Veintitrés* '23rd Avenue', *Bulevar Nueva Galicia* 'New Galicia Boulevard', *La agencia de viajes* 'Travel agency', or *El restaurante vegetariano* 'the vegetarian restaurant'. These street and building names provided numerous opportunities to splice bilabial or labiodental realizations into the speakers' utterances, which would ultimately provide the guises for the experiment. In addition to providing directions in the map task, speakers were trained to produce all target street names, destinations, and commonly used conjugations of direction-giving verbs (e.g., *vas* 'you go', *vamos* 'we go', *ves* 'you see', *vemos* 'we see', etc.) with both bilabial and labiodental productions to allow for more successful splicing. These bilabial and labiodental pronunciations were repeated until the author found them to be naturalistic and fluid.

Of the numerous directions given by each speaker, only one utterance was extracted to be used in the experiment, resulting in eight baseline utterances. Each utterance selected was fluidly produced and contained at least two cases of orthographic <v>, e.g., (*V*)as a pasar el bule(v)ar. Eh, sigues caminando y a tu izquierda está el Hostal O(v)aja Negra 'You're going to pass the boulevard. Uh, keep walking and on your left is the Black Sheep Hostel.' Using this baseline utterance, two guises were created, one including only labiodental realizations and the other only bilabial realizations of <v>. Each labiodental and bilabial token was spliced into

3. An anonymous reviewer wonders if the inclusion of a teacher in her thirties in the late immigrant group could have skewed the results, as the heritage group is somewhat younger and more homogeneous overall. While the heritage and late immigrant groups received somewhat different evaluations in terms of perceived age, the slight age difference is unlikely to affect perceptions of the linguistic variants of interest in this study, as the same voices are compared once with bilabial and once with labiodental <v>.

the baseline utterance along with the preceding and following vowel to prevent interruptions to the transitional cues. For example, in *Hostal O(v)eja Negra*, an [ove] sequence would be spliced into the baseline utterance for the labiodental guise. The splicing for the bilabial guise was more complicated, as both [b] and [β] can be produced in Spanish, depending on the preceding phonological environment: [b] occurs in post-nasal and post-pausal contexts and [β] occurs elsewhere (Morgan, 2010: p. 174). All native and heritage speakers were able to produce both [b] and [β] in the appropriate positions, allowing the appropriate allophone to be spliced into the bilabial guise. An example of one late immigrant speaker and one heritage speaker's production of the three allophones is provided in Figures 1 and 2.

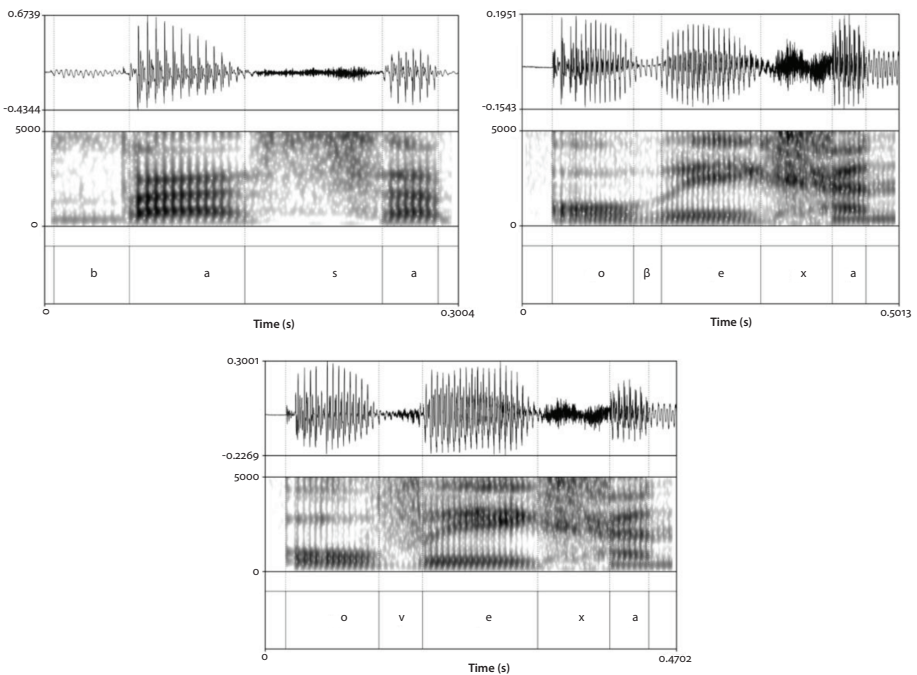


Figure 1. Late immigrant speaker #1 produces [b], [β], and [v] in *vas a* and *oveja*, respectively

In total, nine listeners tested the stimuli, including three native Spanish speakers, three linguists, and three advanced L2-Spanish language learners. All testers evaluated the final stimuli as naturalistic sounding, and the linguists could clearly identify which guise (bilabial or labiodental) was intended in each recording. Both the native Spanish speakers and the linguists were able to successfully identify the four late immigrant Spanish speakers and the four heritage speakers based on their production.

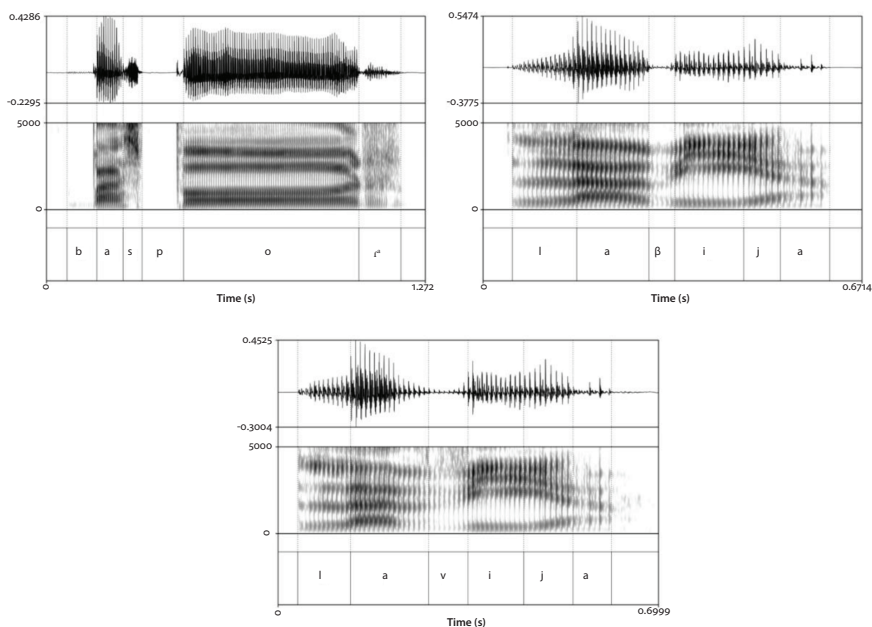


Figure 2. Heritage speaker #4 produces [b], [β], and [v] in *vas por* and *la villa*, respectively

3.2 Experiment and participants

The 16 final recordings (8 baseline utterances manipulated to two guises each) were uploaded in SurveyGizmo (Vanek & McDaniel, 2006) and organized in a pseudorandom order, interspersed with filler recordings from different Spanish-speaking voices. Demographic information was gathered at the beginning of the study using Montrul’s (2012b) survey for bilinguals in the United States. In addition to basic information about sex and education level, the survey helps establish with whom Spanish is spoken, how much it is spoken, and in what contexts. Heritage participants noted their age of Spanish/English acquisition, rated their overall Spanish/English language proficiency, and evaluated their competence in Spanish listening, speaking, reading, and writing.

Seventy-five listeners were recruited to participate in the matched-guise experiment. All were born and raised in the United States with exposure to Spanish in the household from their mother, father, or both. More specific demographic information is provided in Table 2.

As Table 2 shows, the heritage listeners were largely Texan and young, and most evaluated themselves as speaking Spanish fluently or comfortably.⁴ However,

4. Like the population of heritage speakers in the United States, there is a certain amount of heterogeneity in the sample used in this study. However, rather than limiting the analysis to

Table 2. Heritage listeners' basic demographic information

	Listener demographics	
Age (years)	Range: 18–57 Median: 21 Mean: 23.85	
Sex (<i>n</i>)	Male: 18; Female: 57	
Highest education level (<i>n</i>)	High school: 2 Some college: 50 College graduate: 23	
State of provenance (<i>n</i>)	Texas: 46 California: 10 Illinois: 7 New York: 3 Ohio: 3 Other: 5	
Mother's language (<i>n</i>)	Spanish and English: 36 Spanish: 35 English: 4	
Father's language (<i>n</i>)	Spanish and English: 44 Spanish: 24 English: 5 Other: 2 (Kaqchikel, Spanish, and English; Korean)	
Spanish ability (<i>n</i>)	Understand and speak fluently: 41 Understand and speak comfortably, with little difficulty: 22 Understand and speak with some difficulty: 8 Understand and can speak with great difficulty: 3 Understand but cannot speak: 1	
Competence in Spanish domains	Listening	Range: 2–5; Mean: 4.49; Median: 5
	Speaking	Range: 2–5; Mean: 4.15; Median: 4
	Reading	Range: 2–5; Mean: 4.2; Median: 4
	Writing	Range: 1–5; Mean: 3.69; Median: 4
Competence in English domains	Listening	Range: 4–5; Mean: 4.91; Median: 5
	Speaking	Range: 3–5; Mean: 4.82; Median: 5
	Reading	Range: 3–5; Mean: 4.85; Median: 5
	Writing	Range: 3–5; Mean: 4.74; Median: 5
Total # listeners	75	

the heritage participants self-evaluated as having greater competence in English across all domains, and they claimed to feel the most comfortable with listening in Spanish and least comfortable with writing, in line with previous studies.

After providing demographic information, listeners were asked to evaluate a series of voices given a matrix of social properties, for example how nice, how intelligent, or how old the speaker sounded. They also had to guess where the speaker was from, and an optional textbox was provided for additional comments. An exact screenshot of what participants saw is presented below in Figure 3.

⏮ 00:00
00:07 ⏭

This person sounds... *

	1	2	3	4	5	6	
less intelligent	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	more intelligent
not hardworking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	very hardworking
meaner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	nicer
Anglo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Hispanic
insecure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	confident
down to earth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	stuck up
speaks good Spanish	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	speaks bad Spanish
more masculine	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	more feminine

This person is from... *

☐ Mexico

☐ The United States

☐ The Caribbean

☐ Somewhere else/I don't know

This person sounds... *

☐ 15-19

☐ 20-24

☐ 25-29

☐ 30-34

☐ 35-39

☐ 40-44

☐ 45 years old or more

Does anything else come to mind about this person?

Figure 3. Screenshot of the evaluation matrix presented to each heritage listener

Texan listeners or young listeners in their 20s, I opted to include all eligible participants in the analysis to provide more data points in the model fitting. In each model, no significant difference was found between the Texan listeners and listeners from other parts of the United States, nor was a difference found based on age, suggesting similar interpretations of [v] regardless of state of origin or age. Still, a more homogeneous sample would certainly prove beneficial in future studies to support the present study's findings.

3.3 Statistical analysis

Once participants' responses were collected, the data were transformed to make all scales comparable in the analysis. Listener evaluations, including evaluations of listener age converted to a continuous variable, were centered and standardized, which makes zero the new midpoint of the scale for each factor. As such, negative numbers indicate evaluations below the midpoint and positive numbers indicate evaluations above the midpoint of the scale.

Next, to determine the factors that account for the majority of the variation in the dataset and identify correlations between social features, a factor analysis was conducted using the `factanal` function in R (R Core Team, 2018). Using the Kaiser rule and the visual assistance of a scree plot, four factors (two joint and two lone factors) accounted for the most variation in listener analyses. These included listener evaluations of (i) Hispanicity, confidence, and goodness of Spanish; (ii) intelligence and work ethic, (iii) humility, and (iv) femininity. Because the speakers evaluated as more Hispanic were also rated as more confident and better at Spanish, these social factors were conflated into a single joint factor. Similarly, because speakers who were evaluated as more intelligent were also evaluated as harder working, these categories were collapsed into a joint factor as well.

Using the `lmer` function in `lme4` (Bates et al., 2015), separate linear mixed-effects models were then fitted to the two joint factors and the remaining lone factors to determine in which models the variant heard (labiodental vs. bilabial) significantly altered listener evaluations of a certain social attribute. In each model, listener evaluations of a particular lone or joint social property served as the dependent variable, and the independent variables tested for significance include which variant was heard (labiodental or bilabial), the listener's sex, the speaker's sex, the speaker type (heritage speaker or late immigrant speaker), the listener's age, the listener's education, and the listener's Spanish proficiency (both overall and in the specific domains of speaking, listening, reading, and writing, respectively). Additionally, audio file order (e.g., whether the audio file was heard first, ninth, or eighteenth in the experimental sequence) and variant presentation order (whether the labiodental guise or bilabial guise was heard first for a specific utterance) were tested as independent variables to establish whether the experimental design itself conditioned listener responses.

A stepwise procedure was used to add each independent variable to the model, including motivated interactions, and an ANOVA comparison (R Core Team, 2018) was used to establish whether the inclusion of an independent variable significantly improved the model's fit. Independent variables that did not significantly improve the model were removed from the best-fit model. In other words, if an independent variable is not discussed in Section 4, it was tested but

did not significantly improve the model. Each model specified by-participant and by-speaker random intercepts along with by-variant random slopes, in accordance with the experiment's maximal random effects structure (Barr et al., 2013). Finally, in addition to the linear mixed-effects models, a multinomial logistic regression model was created using *nnet* (Venables & Ripley, 2002) to test whether listener evaluations of speaker place of origin differed given labiodental or bilabial <v>. In the following section, only the models in which variant heard reached significance on its own or in an interaction with another independent variable are presented for analysis and discussion, as the research question of the present work revolves around listener perceptions of [v].

4. Results

Variant emerged as a significant predictor of listener evaluations in three best-fit models: (i) the joint factor of Hispanicity/confidence/Spanish competence, (ii) the joint factor of intelligence/work ethic, and (iii) the lone factor of perceived age. Each factor will be discussed individually in the following sections. In each best-fit model, all main effects and interactions below the alpha level (0.05) are discussed, and the estimate, Standard Error, *t*-value, and *p*-value are presented for each model. Because treatment contrasts were used, the levels of an independent variable were compared to a reference level. In the following models, the reference level for Speaker Sex is Female, the reference level for Variant is Bilabial, and the reference level for Speaker Type is Heritage. For each given level in the following tables, a positive estimate indicates that the level received higher evaluations than the reference level, and a negative estimate means the opposite: the given level received lower evaluations than the reference level.

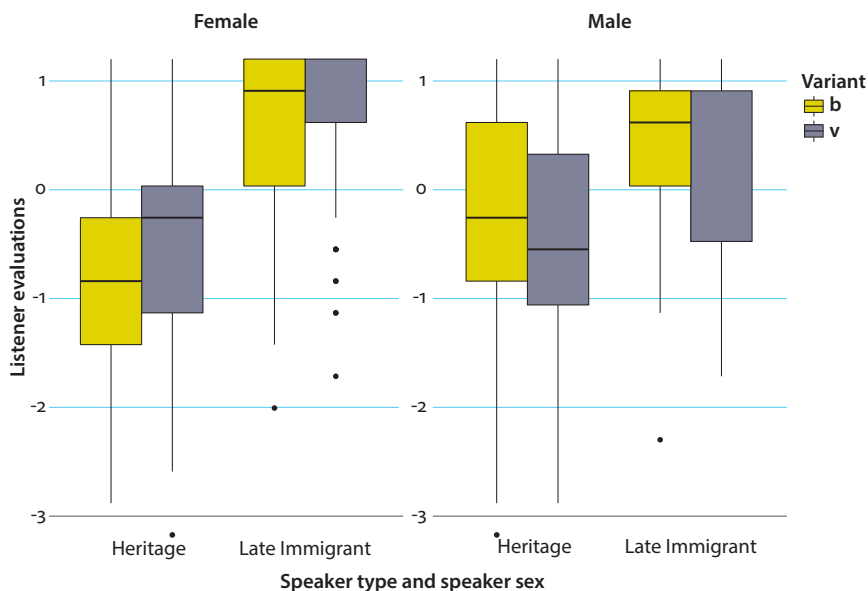
4.1 Hispanicity/confidence/Spanish competence

In the best-fit model for Hispanicity/confidence/Spanish competence, there is a significant interaction between variant and speaker sex. That is, heritage listeners rated the speakers in significantly different ways when male speakers and female speakers produced [v], with women receiving higher ratings and men receiving lower ratings. Another interesting finding is that the heritage listeners evaluated the late immigrant speakers as significantly more Hispanic, confident, and competent in Spanish than other heritage speakers, which is evident in the positive estimate for Speaker Type = Late Immigrant. Following the principle of marginality, the lower-level main effects are marginal to the interaction effect between variant and speaker gender, which is why they are presented in parentheses in Table 3.

Table 3. Best mixed effects model for the joint factor of Hispanicity/confidence/Spanish competence ($N = 1,200$)

	Estimate	SE	<i>t</i> -value	<i>p</i> -value
(Intercept)	-0.568	0.233	-2.437	0.05
Interaction Between Variant and Speaker Sex				
Variant = [v] : Speaker Sex = Male	-0.42	0.085	-4.935	<0.001
Speaker Type = Late Immigrant	0.914	0.239	5.117	<0.012
Marginal Main Effects				
(Speaker Sex = Male)	0.177	0.274	0.645	0.548
(Variant = [v])	0.255	0.06	4.233	<0.001
Listener evaluation range: -3.173 to 1.201, AIC = 2705.32				

To clarify the relationship between variant and speaker sex given speaker type, the boxplot in Figure 4 illustrates how evaluations differ for heritage speakers and late immigrant speakers based on their sex. Both male and female late immigrant speakers receive higher evaluations of Hispanicity/confidence/Spanish competence than the heritage speakers, but variant alters how the male and female voices are heard. For the female speakers, evaluations of Hispanicity/confidence/Spanish competence are higher given [v], while the male speakers were given lower listener evaluations when heard with the same variant.

**Figure 4.** Faceted boxplot showing listener evaluations of speakers' Hispanicity/confidence/Spanish competence by speaker sex, speaker type, and variant

4.2 Intelligence/work ethic

The second model in which variant significantly conditioned heritage listener evaluations is the joint dimension of speaker intelligence/work ethic. Again, an interaction emerged between variant and speaker sex in the best-fit model, showing a similar directionality to listener evaluations of Hispanicity/confidence/Spanish competence. That is, although women who produce [v] are evaluated as significantly more intelligent/hard working, men are seen as less intelligent/hard working with labiodental <v>. This model also finds that listeners who rank themselves as more competent in Spanish writing exhibit a tendency to rate speakers as more intelligent/hard working than other listeners, although this variable only approaches significance.

Table 4. Best mixed effects model for the joint factor of intelligence/work ethic ($N = 1,200$)

	Estimate	SE	<i>t</i> -value	<i>p</i> -value
(Intercept)	-0.715	0.301	-2.379	0.022
Interaction Between Variant and Speaker Sex				
Variant = [v] : Speaker Sex = Male	-0.346	0.08	-4.307	<0.001
Speaker Type = Late Immigrant	0.531	0.186	2.847	<0.036
Spanish Writing	0.12	0.064	1.864	0.066
Marginal Main Effects				
(Speaker Sex = Male)	-0.003	0.201	-0.016	0.988
(Variant = [v])	0.189	0.057	3.324	<0.002
Listener evaluation range: -3.207 to 1.637, AIC = 2750.503				

The interaction plot in Figure 5 illustrates the relationship between variant and speaker sex: while evaluations of men and women’s work ethic is similar given the

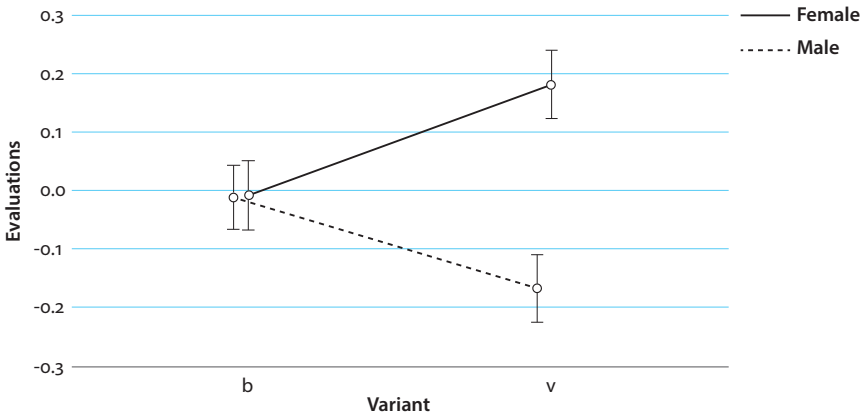


Figure 5. Interaction plot showing listener evaluations of male and female speakers’ intelligence/work ethic in the bilabial and labiodental guises

bilabial guise, male speakers experience a large drop in listener evaluations when presented with [v], while the opposite is true of female speakers, who receive more positive evaluations when heard with [v].

4.3 Perceived age

The third model in which variant significantly conditioned listener evaluations is perceived speaker age. In this model, there is yet another interaction between variant and speaker sex and, again, male and female voices are evaluated in different ways. In this case, women were perceived as older when heard with labiodental <v>, while men were perceived as younger. Late immigrant speakers were not perceived as significantly older or younger than heritage speakers.

Table 5. Best mixed effects model for the perceived age factor ($N = 1,200$)

	Estimate	SE	t-value	p-value
(Intercept)	0.105	0.387	0.272	0.795
Interaction Between Variant and Speaker Sex				
Variant = [v] : Speaker Sex = Male	-0.235	0.079	-2.976	<0.005
Marginal Main Effects				
(Variant = [v])	0.125	0.056	2.229	0.029
(Speaker Sex = Male)	-0.217	0.545	-0.398	0.704
Listener evaluation range: -1.198 to 2.422, AIC = 2598.205				

Figure 6 makes clear the divergent evaluations for male and female voices given the two guises. The male speakers were perceived as younger than female speakers overall, but the difference is greatest with the labiodental guise: women are heard as significantly older with [v], while the opposite is true of the men.

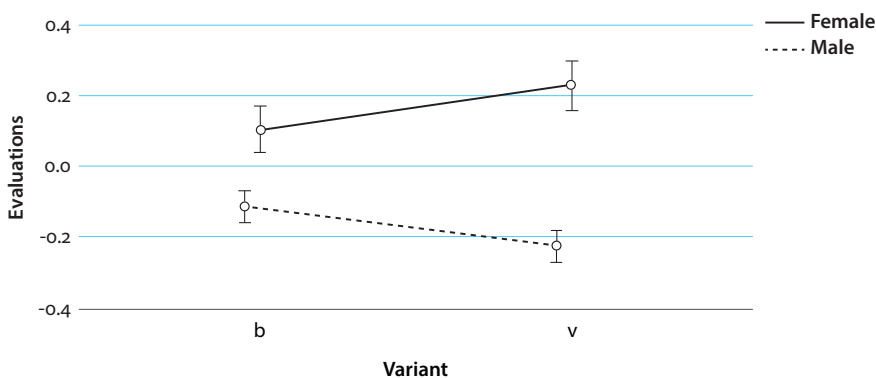


Figure 6. Interaction plot of perceived age for male and female speakers in the bilabial and labiodental guises

5. Discussion

Having reviewed the results of the experiment, we can now return to the study's research questions. The first research question asked, "To what extent are heritage speakers aware of the social information conveyed through phonetic variants?" As heritage speakers are often more comfortable speaking English and exhibit a wide range of linguistic abilities in Spanish, it was unclear if heritage speakers would associate phonetic variants with social meaning as monolingual or Spanish-dominant speakers do. However, the present study shows that heritage listeners perceived variant (labiodental vs. bilabial) as a socially meaningful marker of three different social dimensions. In other words, heritage speakers can and do perceive social information conveyed through phonetic variants.

The second research question asked, "What social properties do heritage speakers associate with labiodental and bilabial realizations of orthographic <v> in a matched-guise task?" This study has shown that heritage speakers do not perceive [v] in a static way, nor is its interpretation uniform across speakers. Rather, evaluations of [v] depend crucially upon the sex of the speaker, with different social meanings evoked by male and female voices. More specifically, women who produce [v] are rated as more intelligent/hard working, more Hispanic/confident/competent in Spanish, and older, which is likely due to an association with professional women in the workforce. Men, on the other hand, are heard as less intelligent/hard working, less Hispanic/confident/competent in Spanish, and younger. Based on these findings, [v] appears to mark prestige and status in the minds of heritage listeners, but only for female speakers. While late immigrant speakers received higher evaluations of intelligence and Hispanicity than heritage speakers overall, this sex-specific interpretation of [v] is consistent across late immigrant and heritage voices, suggesting a generalized interpretation in the heritage community.

Interestingly, heritage perceptions of [v] parallel monolingual Spanish speaker interpretations. As noted in Section 2.3, a recent study finds that monolingual Mexican Spanish raters hear female speakers as significantly more intelligent and confident when they produce [v], but men are viewed as less intelligent and less competent speakers of Spanish when they employ the same variant (Chappell, forthcoming). In simple terms, both monolingual Mexican Spanish speakers and heritage Spanish speakers view [v] positively in women's speech and negatively in men's speech, suggesting a gendered interpretation across listener groups. Although heritage speakers sometimes diverge from monolingual speakers in their Spanish production, their social perception of familiar phonetic variants aligns neatly with that of monolingual Spanish speakers, providing proof of the rich inner world of heritage speakers.

Why is labiodentalized <v> associated with status, a confident Hispanic identity, and older age in the speech of women but not men? A possible explanation lies in listener expectations about standard and hyperarticulated speech. According to Bucholtz (2001: p. 92), a “precisely enunciated speech style has semiotic connections to literacy.” If an individual pronounces <v> as [v] in casual speech, s/he indicates clear knowledge of orthographic conventions, pointing to his/her literacy and knowledgeability of Spanish. By extension, this attention paid to hyperarticulated <v> “...can be seen as part of a broader national ideology that links hyperarticulation to clarity and clarity to education and power” (Eckert, 2008: p. 470). In other words, articulating <v> as [v] can be indexical of education and power, two measures of status, and women tend to benefit socially from the use of prestige variants (Chappell, 2016).

However, male speakers may benefit more from the realization of hypoarticulated variants than hyperarticulated variants, as nonstandard realizations can evoke covert prestige for men (Alfaraz, 2000; Labov, 1972: p. 314; Trudgill, 1972: p. 179; Van Buren, 2017), including positive evaluations of masculinity, niceness, confidence, and localness (Chappell, 2016). The production of hyperarticulated variants, particularly variants that appear more frequently in female speech (Trovato, 2017), may strike listeners as aberrant or incongruous with a hegemonic masculine identity (Zimman, 2013). While additional research is needed to support this claim, the supposition does parallel others’ findings on the perception of hyperarticulation in male voices. For example, women tend to exhibit greater articulatory space between vowels than men (Bradlow, Torretta, & Pisoni, 1996; Neel, 2008), and hyperarticulated vowels in male voices may be considered a deviation from hegemonic heteronormativity (see Pierrehumbert et al., 2004; Smyth & Rogers, 2002). The same appears to be true of [v] in men’s voices, and heritage listeners, just like monolingual listeners, are sensitive to this relationship between speaker sex and hyperarticulation.

6. Conclusion

The results of the present study demonstrate that heritage speakers are highly attuned to the social meaning conveyed through phonetic variation. Although many scholars and teachers approach heritage speakers from a deficit perspective, focusing on what is lacking or what needs to be improved, these results highlight the depth of uncharted heritage speaker knowledge. The richness of heritage speaker knowledge may be ignored precisely because it is largely implicit knowledge of grammar (Alarcón, 2011; Bowles, 2011; Montrul et al., 2008) and, as it turns out, sociophonetics. These strengths are difficult to explicitly recognize in

conversations and in the classroom, which can help explain why heritage speaker advantages are often overlooked.

The present study has shown that heritage speakers are highly adept at discerning social information based on variation to which they are regularly exposed. It remains unclear if heritage speakers would have the same degree of success interpreting social information from variation to which they are less commonly exposed, but future studies should explore how salience and exposure work to condition heritage speaker perceptions. As the present experiment involved a fairly heterogeneous sample of heritage listeners and used only self-reported Spanish proficiency, future studies should also make attempts to employ a more homogeneous sample of listeners and account for listener proficiency to determine a) if all heritage groups have similar perceptions of familiar phonetic variants and b) if Spanish proficiency plays a role in sociophonetic perception. While much work remains to be done on heritage speaker perception, this study clearly shows that heritage speakers possess a wealth of sociophonetic knowledge just as monolingual speakers do, highlighting the unexplored depths of their abilities in their home language.

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Appendix

Heritage and late immigrant speaker stimuli heard by all listeners, organized here by speaker group. All instances of <v> were manipulated to include either the appropriate allophone of [b]/[β] or [v]. The cases of manipulated <v> are indicated by parentheses.

- Heritage speaker 1 (female, 20): (V)olteamos a la izquierda en Bule(v)ar San Pablo, y la clínica está a la derecha. ‘We turn to the left on San Pablo Boulevard and the clinic is on the right.’
- Heritage speaker 2 (male, 20): (V)as a pasar una calle en tu derecha, y en la esquina (v)as a pasar Fábrica de (V)idrio San Pablo. ‘You’re going to pass a street on your right, and on the left you’ll pass the San Pablo Glass Factory.’
- Heritage speaker 3 (female, 20): (V)amos a ir, um, derecha en la calle, en la calle A(v)enida (V)eintitrés, pasando la clínica en la derecha. ‘You’re going to go, um, right on the street, on the street, 23rd Avenue, passing by the clinic on your right.’
- Heritage speaker 4 (male, 21): (V)as por ... tres cuadras y luego a la derecha hay Hotel la (V)illa. ‘You’re going to go three blocks and then on the right is The Villa Hotel.’
- Late immigrant speaker 1 (female, 37): (V)as a pasar el bule(v)ar. Eh, sigues caminando y a tu izquierda está el Hostal O(v)eja Negra. ‘You’re going to pass the boulevard. Uh, keep walking and on your left is the Black Sheep Hostel.’
- Late immigrant speaker 2 (male, 23): Tomas (V)olcanes. Aquí, luego luego, a la izquierda está – la (v)illa. ‘You take Volcanoes (Street). Here, right away, it’s on the left – the villa.’
- Late immigrant speaker 3 (female, 23): (V)a a doblar a la izquierda, y después de allí, a su mano derecha, (v)a a (v)er la Fábrica de San Pablo. ‘You’re going to turn left and after that, on your righthand side, you’re going to see the San Pablo Factory.’
- Late immigrant speaker 4 (male, 21): (V)a a seguir derecho, aquí en la esquina (v)as a tomar a la izquierda, y en tu derecha (v)a a estar el Hotel la (V)illa. ‘You’re going to keep going straight, here at the corner you’re going to take a left, and The Villa Hotel is going to be on your right.’

Spoken word recognition and *shesheo* in Northwestern Mexico

A preliminary investigation into the effects of sociophonetic variability on auditory lexical access

Mariela López Velarde and Miquel Simonet

University of Arizona

This study investigates the auditory lexical processing of the two main variants of “ch” (as in *charco* ‘puddle’) used in the Spanish spoken in northwestern Mexico. A feature of this dialect is the variable implementation of “ch” either as an affricate, [tʃ], or a fricative, [ʃ]. We designed an auditory lexical decision task with auditory priming to explore the effects (if any) of this variability on the recognition of words by members of this community. Target words were presented with either variant as their word-initial consonant (e.g., [tʃ]arco ~ [ʃ]arco), and they were preceded by auditory primes with a matching variant ([tʃ]arco-[tʃ]arco, [ʃ]arco-[ʃ]arco), a mismatching variant ([tʃ]arco-[ʃ]arco, [ʃ]arco-[tʃ]arco), or an unrelated prime. The results show that members of this community are equally likely to accept Spanish word forms produced with either variant. Furthermore, both variants primed listeners equally effectively in their recognition of spoken words, suggesting that both activate the same entry in their mental lexicon (as opposed to parallel representations). Finally, recognition was found to be faster when the word-initial phonetic variant was [tʃ]; this suggests a privilege of [tʃ] over [ʃ] at some level of representation. The results support the claim that, in cases of sociophonetic variability, members of the speech community may include more than one phonetic variant in their mental representation of words, but that, even in such cases, one of the variants may take processing precedence over the other. These results, in turn, suggest it is possible that the nature of the mental representations of an individual are particularly affected by the dialect spoken in their speech community.

Introduction

In most dialects of Mexican Spanish, the word-initial consonant in words such as *charco* ‘puddle’ is pronounced as a postalveolar affricate, [tʃ]. If a speaker of Mexican Spanish pronounces this consonant as a postalveolar fricative, [ʃ], one can infer (with a better-than-chance probability of success) that the person is from one of the northwestern states. In fact, the fricativization of the word-initial consonant in a word such as *charco* is one of the most distinctive features of what is known as *norteño* ‘northern accent’ Mexican Spanish (Serrano Morales, 2009), and the pronunciation of this particular sound is used to geographically demarcate the varieties of Mexico in dialectological treatises (Lope Blanch, 1990–2000; Martín Butragueño, 2009, 2011, 2014; Moreno de Alba, 1994; Serrano Morales, 2000, 2009). In the remainder of this study, as well as in its title, we refer to this process – the practice of pronouncing *charco* as [ʃ]arco – as *shesheo*, a term we borrow from Méndez (2017).

The fricativization of (ch)¹ is not restricted to northwestern Mexican Spanish, but has been documented (albeit to a lesser extent) in other regions of Mexico – such as parts of Michoacán, Colima, and Jalisco (cf. Moreno de Alba, 1994: p. 122 map 37) – as well as in many Spanish-speaking regions of the world, including in South and Central America (Cedergren, 1973; Quintanilla-Aguilar, 2013), in the Caribbean (Fails, 1984; Quilis & Vaquero, 1973; Vaquero, 1972), and in the Iberian peninsula (Melguizo Moreno, 2007). In northwestern Mexico, as in most varieties where it is found, the fricativization of (ch) is a variable phenomenon whereby both [tʃ] and [ʃ] are possible variants (Alessi Molina & Torres Díaz, 1994; Brown, 1989; Carreón Serna, 2007; Méndez, 2017); in fact, most *norteño* speaker-listeners are likely to be exposed to *both* variants over the course of any given day, and they are not unlikely to produce the two variants themselves. This creates an interesting asymmetry: Whereas people who reside in, for instance, the central high valley of Mexico are most likely to be exposed to only one of the phonetic variants of *charco* ([tʃ]arco), those who live in the northwestern region are recurrently exposed to two ([tʃ]arco ~ [ʃ]arco), in “free” variation. In turn, this raises an important question:

1. In the present study we use the *variable* notation, (ch), following the usual practice in sociolinguistics (see similar argument in Foulkes, Docherty, & Watt, 2005). Pronunciation variants are coded in *surface allophone* notation, [tʃ] and [ʃ], using the symbols of the International Phonetic Alphabet. Variable notation is used to circumvent the problem of making *a priori* decisions on the phonemicity of this consonant. It is problematic to assume *a priori* that speakers who variably use [tʃ] and [ʃ] in their speech, as people from northwestern Mexico do, phonologically represent this sound as the phoneme /tʃ/ (Casillas, 2012; Herrera Zendejas, 2006; but note Martín Butragueño, 2009). Making this assumption reveals an unnecessary reliance on standard pronunciation practices to assign phonemicity.

How does variation impact the patterns of spoken word recognition of people with a life-long experience with more than one variant? The present study addresses this question by means of a lexical access experiment. Our specific research questions are as follows: first, does the phonetic variant in which a target word is played impact the recognition of the word? Secondly, does the phonetic variant of the prime further modulate recognition efficiency?

Review of the literature

Shesheo and Norteño Mexican Spanish

Based on impressionistic descriptions, studies find up to 13 variants of (ch) in Mexico, although dialectologists use a variable number of symbols across studies (Lope Blanch, 1990–2000; Martín Butragueño, 2009; Moreno de Alba, 1994). According to such descriptions, phonetic variants of (ch) differ as a function of manner (e.g., affricate, affricate with long obstruction, affricate with brief obstruction, fricative) and place (e.g., dentoalveolar, alveopalatal, fronted postalveolar, postalveolar, backed postalveolar). It is not clear whether all these variants are dialectally significant, rather than anecdotal observations. In variationist studies of the *norteño* dialect of Mexico, scholars typically restrict their categories to a two-way distinction, a fricative and an affricate (Brown, 1989; Carreón Serna, 2007; Casillas, 2012; Jaramillo & Bills, 1982; Méndez, 2017; Serrano Morales, 2002), and we follow this practice here.

The use of [ʃ] as a variant of (ch) is not categorical. In northwestern Mexico, the variants of (ch) find themselves in a situation of “free” variation. By this, we mean that variant choice does not obey a phonological rule – variants are not in complementary distribution. Nevertheless, the studies that have investigated the use of (ch) variants have demonstrated that both linguistic and extra-linguistic factors may help explain some of the variability. We are aware of only five variationist studies of this variable in the *norteño* dialect. Data have been collected around the state of Sonora (Alessi Molina & Torres Díaz, 1994; Brown, 1989), in Ciudad Juárez (Amastae, 1996; Méndez, 2017), and in the city of Chihuahua (Carreón Serna, 2007). Three further studies have analyzed this variability in the Spanish of the southwestern United States, with a focus on Tomé, New Mexico (Jaramillo, 1986; Jaramillo & Bills, 1982) and Tucson, Arizona (Casillas, 2012). The latter demonstrate the existence of dialectal continuity between northwestern Mexico and (some) southwestern US varieties.

An important predictor of the presence of [ʃ] as a variant of (ch) is phonetic context. A recurrent finding is that [ʃ] is more likely to surface in intervocalic position than after a consonant (Alessi Molina & Torres Díaz, 1994; Brown, 1989; Jaramillo & Bills, 1982; Méndez, 2017). The fricative variant of (ch) has been

described as a lenited or reduced version of the affricate (Herrera Zendejas, 2006; Moreno de Alba, 1994). This interpretation follows from the fact that, in dialects in which [ʃ] is common, speakers tend to use this variant mostly in intervocalic position, whereas affricate variants typically appear in postconsonantal position, particularly after /n/ or /l/ (Herrera Zendejas, 2006; Jaramillo & Bills, 1982). The fact that this sound is more obstructed after an homorganic consonant than in other contexts is reminiscent of the spirantization pattern affecting Spanish /b d g/, which many understand as a synchronic lenition process (see Hualde, 2005). As far as we are aware, Herrera Zendejas (2006) constitutes the only study to report on instrumental (rather than impressionistic) data pertaining to these facts. Interestingly, the author concludes that her two *norteño* speakers produced fricatives by default, and that the apparent affricates occurring after /n/ and /l/ were not “true” affricates, but were softer and shorter than the affricates produced by a speaker from central Mexico – a result of full-contact inertia after an homorganic consonant. As a variant of (ch), [ʃ] is a diachronic innovation, and it is more restricted geographically than [tʃ]. While, from a historical point of view, it is reasonable to see [ʃ] as a lenited version of [tʃ], it is not self-evident at this juncture that a synchronic, regular phonological process that “turns” /tʃ/ into [ʃ] in intervocalic position accounts for the phonological knowledge of *norteño* speakers. We will thus refrain from making *a priori* claims about lenition and phonemicity in this study.

Amongst the extra-linguistic factors that modulate the variants of (ch) we find age, level of education (years of schooling), and gender. Some studies find that women are less likely to use fricative variants than men (Méndez, 2017), but this effect is usually small (Carreón Serna, 2007), and some studies do not find it at all (Alessi Molina & Torres Díaz, 1994). Some have found that gender is significant only in that it interacts with age (Jaramillo & Bills, 1982). Studies typically find that older speakers are more likely than younger ones to deploy [ʃ] as a variant of (ch) (Alessi Molina & Torres Díaz, 1994; Carreón Serna, 2007; Méndez, 2017). Furthermore, people with more years of schooling are less likely to produce fricative variants in their speech than people with less education (Carreón Serna, 2007; Méndez, 2017). Finally, some have found that socioeconomic status is a strong predictor of (ch) variants (Carreón Serna, 2007; Méndez, 2017), but one must note that, in these communities, level of education and socioeconomic status tend to be correlated with each other. Moreover, age tends to also be correlated with level of education, with younger speakers being more likely than older ones to have undergone many years of schooling. Jaramillo and Bills (1982) sensibly speculate that, as people receive more education, they expand their *variant competence*; that is, their conjecture is that younger and more educated speakers may use more fricative variants when talking to friends and relatives than when interviewed by

linguists (i.e., they use more affricate variants in contexts they consider to require the use of “standard” variants), while older and less educated subjects may use similar rates of (ch) variants across registers.

Studies vary widely in terms of their reported fricativization rates. While Brown (1989) reports that most of her informants use fricative variants most of the time (81%), others find that affricate variants are more common than fricatives in the speech of most people (Alessi Molina & Torres Díaz, 1994; Carreón Serna, 2007; Méndez, 2017). In Méndez’s (2017) study of Ciudad Juárez, for instance, fricative variants account for 33% of the overall variability; and in Carreón Serna’s (2007) study of Chihuahua, men use fricatives 58% of the time and women use them 41% of the time, but she notes that younger informants use fricatives only 23% of the time, overall. Even though reported fricativization rates seem to vary from study to study, members of these speech communities are likely to be exposed to both variants on a daily basis at rates that members of other communities are not. In other words, they have ample, life-long experience with both variants. How does this experience (if at all) shape their patterns of spoken word recognition?

Phonetic variability and spoken word recognition

In addition to speech rate and register, as well as to individual speaker patterns, phonetic variability is triggered by conventionalized phonological processes.² For instance, in Spanish, /s/ may be debuccalized, but debuccalization rates vary widely across varieties of the language, and this process tends to be restricted to coda position (Lipski, 1994). In the dialects in which it is common, the debuccalization of coda /s/ is a conventionalized pattern, the result of a diachronic phonological process (Widdison, 1995). The variability in the phonetic implementation of (ch) in the dialect of northwestern Mexico results from one such conventionalization process.

A number of experimental investigations have been concerned with the effects (if any) of conventionalized variability on spoken word recognition as well as how such variability may impact phonological representations. Mostly on English, research to date has focused on processes such as /t/ and /d/ flapping (Connine, 2004; McLennan, Luce, & Charles-Luce, 2003), postnasal /t/ deletion (Pitt, 2009; Ranbom & Connine, 2007), glottalization or deletion of word-final /t/ (Deelman & Connine, 2001; Sumner & Samuel, 2005), and schwa deletion (Connine, Ranbom, & Patterson, 2008; LoCasto & Connine, 2002). Most such studies have employed lexical decision tasks with auditory priming, and they can be classified into two categories: those employing short-term or immediate form (or semantic) priming

2. See Hualde, Simonet, and Nadeu (2011) for an explanation of *conventionalized* phonological variation.

(Deelman & Connine, 2001; LoCasto & Connine, 2002; McLennan et al., 2003; Ranbom & Connine, 2007; Sumner & Samuel, 2005, 2009) and those using long-term form priming (McLennan et al., 2003; Sumner & Samuel, 2005, 2009). Immediate priming refers to cases in which the latency between the prime and the target is very low, typically around or below one second, and there is no further acoustic information between the two key stimuli. In short-term priming studies, the latency between the prime and the target is relatively low, typically a few minutes, and other auditory stimuli are played between them. Long-term priming refers to cases in which such latency is high (or very high), typically above 30 minutes (and sometimes a few hours or even a few days), and many other stimuli are played between the prime and the target. It is generally assumed that long-term priming studies reveal information about the nature of words' representations in long-term memory, whereas immediate priming studies do not. Short-term and immediate priming designs tap into online encoding processes, such as encoding efficiency, and they reveal information about working-memory representations (or codes).

On the one hand, investigations testing for long-term effects typically find that canonical (or "standard," in cross-dialect investigations) forms are retained in memory longer and in better detail even if such forms are relatively infrequent in daily speech (Sumner, Kim, King, & McGowan, 2014; Sumner & Samuel, 2005, 2009). It is concluded that such variants are somehow privileged in long-term mental representations of word forms. On the other hand, the studies analyzing immediate priming have not led to consistent results, and they may be classified into three groups according to the nature of their findings: those that find a processing advantage of the variant most frequently encountered in the speech community (see also Connine, 2004; Connine et al., 2008), those that find an advantage of canonical forms (LoCasto & Connine, 2002; Pitt, 2009; Ranbom & Connine, 2007), and those that find that all variants are processed equally efficiently so long as listeners have ample experience with them (Deelman & Connine, 2001; McLennan et al., 2003; Sumner & Samuel, 2005, 2009).

The inconsistent findings obtained in prior studies using short-term priming are well illustrated with the following examples. In word-final position, American English /t/ has at least three variants: it may be released, unreleased, or glottalized. Whereas one explores visual word recognition with auditory semantic priming (Deelman & Connine, 2001) and another investigates spoken word recognition (also with auditory semantic priming) (Sumner & Samuel, 2005), two studies find that all conventionalized variants (released, unreleased, and glottalized) lead to the same amount of associative priming (*ca*[t] primes *dog* as much as *ca*[ʔ] does). Furthermore, by means of a spoken word recognition task with short-term (but not immediate) auditory form priming, McLennan et al. (2003) demonstrate that the two conventionalized variants of word-medial American English /t/ (*bu*[t]*er*,

bu[r]er) lead to the same amount of priming, even though only the flap is common in spontaneous speech. This suggests, on the one hand, that all the conventionalized variants of a word are able to activate a lexical entry.

Consider, on the other hand, the findings pertaining to postnasal /t/ deletion in American English. The word *center* may be produced with or without a [t] (*ce[nt]er*, *ce[n̩]er*), and a corpus analysis of spontaneous speech shows that the /t/-deleted variant is more frequent than the full variant (Ranbom & Connine, 2007). By means of a single-presentation auditory lexical decision task, Pitt (2009) finds that listeners are slower at recognizing auditory stimuli without a [t] than those with a [t], even for words whose postnasal /t/ is frequently deleted. In addition, within a cross-modal form priming paradigm, Ranbom and Connine (2007) show that stimuli without a [t] yield a lesser amount of priming than those with a [t]. This suggests that a spoken form such as *ce[nt]er* is able to activate a lexical entry, /sɛntə/, more efficiently than a form such as *ce[n̩]er* can. Thus, even if common in daily communication, some variants lead to a processing cost relative to other variants. This, in turn, may have implications for our understanding of the nature of phonological representations in the mental lexicon. As the literature on long-term priming suggests, it seems that the mental lexicon privileges full, canonical variants over “casual” forms (Sumner & Samuel, 2005, 2009), and the current theoretical debate focuses on explaining why variants that are extremely common in daily communication do not seem to be privileged in mental representations of words (Sumner et al., 2014). The literature on spoken word recognition and short-term priming is concerned with (perceptual) processing patterns rather than issues of representation, but some results may be illuminating in that regard as well.

The present study

The central goal of the current study is to understand the effects of phonetic variability on the spoken word recognition patterns of a group of speaker-listeners with ample experience with such variability. More specifically, we aimed to explore how speakers of *norteño* Mexican Spanish, who are recurrently exposed to the variability that affects (ch) in their speech community, lexically process the two most common variants of this variable, [tʃ] and [j]. Here, we investigate the speech patterns of *norteño* speakers by means of an exploration of their auditory processing patterns. Together with sociophonetic production studies, the present study provides us with a complementary understanding of the *norteño* speaker-listener, and of the particular variable at hand. As Sumner and Samuel (2009) have pointed out, “having a dialect” means more than speaking with a particular accent: It may mean listening with a particular set of perceptual strategies, or possessing a particular set of phonological representations in the mental lexicon.

Since people from northwestern Mexico are recurrently exposed to two variants of (ch), we hypothesize that both target phonetic variants allow these listeners to access the words that, in their lexicon, possess this phoneme. We do not know, however, whether one variant will be privileged over the other, as it is sometimes found (Pitt, 2009; Ranbom & Connine, 2007). To explore this question, we designed an auditory lexical decision task using the form priming paradigm (McLennan et al., 2003; Sumner & Samuel, 2005, 2009). This paradigm was selected because it allows for an examination of the effects of surface phonetic features, such as the difference between a fricative and an affricate, on the access of phonolexical representations. On the one hand, an auditory lexical decision task allows us to explore whether, under identical perceptual conditions, one variant is recognized faster than the other (Pitt, 2009; Ranbom & Connine, 2007). On the other hand, the auditory form priming paradigm allows us to examine whether phonetic variants of the same variable prime each other as much as they prime themselves (McLennan et al., 2003; Sumner & Samuel, 2005, 2009).

Method

Participants

The data were collected in Hermosillo, the largest city in Sonora, Mexico. Those who were actively recruited to participate in the listening experiment were lifelong residents of the state. The participants were native Spanish speakers, and they grew up as monolingual speakers of the language. At the time of testing, most of the participants had lived in the city of Hermosillo from birth – some, however, had been born in other municipalities of Sonora and had moved to Hermosillo with their families as children. As a result, all of the participants are assumed to be familiar with the phonetic variants of (ch) that characterize the dialect of Spanish spoken in Hermosillo.

A total of 48 people (24 females, 24 males) participated in this study. (The data from one of them were lost, which means we were able to retain data from 47 listeners.) Participants' ages ranged between 18 and 33, and 44 of the 48 participants were college students at the time of testing. Two participants had graduated with a college degree and were working as professionals in their field, and two did not complete college and were employed by industrial and communications companies. The educational profile of the participants make them, by definition, not representative of the entire population of residents of Hermosillo. Future research might address the question of whether schooling affects the processing patterns reported below.

The first author, a native of Hermosillo, invited every participant to partake in the experiment and briefly chatted with them in Spanish. The experimental task was conducted in a quiet library room at a public institution of higher learning in Hermosillo.

Design and materials

Data were collected by means of an auditory lexical decision task with immediate auditory priming. In this task, participants are presented with auditory renderings of words and nonwords and they are asked to decide, as accurately and rapidly as they can, whether what they heard was an actual word in their language or not. In our particular version of the task, *target* words and nonwords – that is, auditory stimuli for which they had to decide their lexicality – were immediately preceded by *primes*. Primes, in our experiment, were also auditory. Participants were instructed to ignore the primes and to respond only to the targets. In order for this task to be feasible and its instructions understandable, we adapted the experimental design in Sumner and Samuel (2009): primes were recorded by a male talker and targets were recorded by a female talker. Participants were, therefore, asked to respond only to the female voice and to ignore the male voice. Our main dependent variable was the time latency between the onset of the auditory target and the key press with which they indicated their lexical decision.

The materials for this experiment consisted of 24 target words whose first consonant was (ch). Thus, the target consonant appeared always in word-initial position. In all cases, the segment following the target consonant was /a/, as a dictionary search revealed <cha> to be more frequent than <ch{e,i,o,u}>. Target items were two- and three-syllable words with stress in either the first or second syllable. Furthermore, 90 fillers comprised of words and nonwords were included in the design. Fillers consisted of 29 real words and 61 nonwords. Nonword fillers were created by swapping two segments from real words. Among the nonword fillers, there were 18 items starting with (ch) – this was done so that not all (ch) forms corresponded to real words, which could impact the results.

Target word forms occurred in two phonetic forms, [tʃ] and [ʃ]. Two types of primes were selected to precede the 24 target items: related and unrelated primes. Related primes consisted of the same lexical item as the target, and they could phonetically match or mismatch the target. For instance, a target such as [tʃ] *arco* could be preceded by either [tʃ] *arco* (match) or [ʃ] *arco* (mismatch), and a target such as [ʃ] *arco* could be preceded by either [tʃ] *arco* (mismatch) or [ʃ] *arco* (match). The form priming paradigm “typically produces strong priming for identical items and moderate priming for similar items compared to unrelated controls” (Sumner & Samuel, 2009: p. 491). Under this premise, therefore, it is crucial that we find out

whether a given variant primes the other one as much as it primes itself, because this reveals whether such variants are considered equivalent (identical) or only similar (McLennan et al., 2003; Sumner & Samuel, 2005, 2009). Unrelated primes were real words beginning in either /s/ or /t/, and they matched the targets in terms of their syllable structure and stress configuration.

Eight counterbalanced lists were created for each item to serve as a critical target for an identical prime and a control target for an unrelated prime. Each list included 12 critical pair combinations and 12 unrelated control pairs. Neither primes nor target items (including variants) were repeated within each list, so that a list included only one condition per target lexical item. In addition to the 24 critical items and control pairs, 48 filler pairs were included. Fillers were 36 nonword targets and 12 word targets. Of the 12 fillers with real word targets, three had nonword primes, three had matching primes, and six had unrelated word primes. Of the 36 fillers with nonword targets, nine had word primes, nine had matching nonword primes, and 18 had unrelated nonword primes. Each list, therefore, contained 72 trials. Participants were randomly assigned to different counterbalanced lists. A coding error in the experiment file resulted in participants providing data in four lists rather than one; this might (or might not) reduce the sensitivity of the experiment (Llompert & Simonet, 2018).

Stimuli

Two monolingual Spanish speakers, a female and a male born and raised in Hermosillo, served as the talkers. They were recorded in their home, in a quiet room, using professional recording equipment – a Shure SM10A head-mounted dynamic microphone, a Sound Devices USBPre2 audio interface, and a laptop computer running Praat (Boersma, 2001). Speech productions were digitized at 44.1 kHz and 16-bit quantization, and the tokens were later stored in individual sound files. Sound files were normalized for intensity.

We asked our talkers to produce two versions of the 24 target words. For the first version, the word-initial (ch) of each target word was produced as an affricate, and, for the second, it was produced as a fricative. Tokens of each of the two versions were collected in separate blocks. Within each block, target words were consistently produced in the same version, but words were presented in random order to avoid systematic effects of list intonation and exhaustion. Each target, in each of its two versions, was produced three times ($24 \text{ tokens} \times 2 \text{ versions} \times 3 \text{ iterations} \times 2 \text{ talkers} = 288 \text{ target tokens}$). From each version of each target token we selected one without disfluencies, extraneous noises, etc. This produced a total of 96 target stimuli, 48 in a male voice and 48 in a female voice. In addition to the target tokens, the two talkers were also asked to produce the 90 fillers, 29 words and 61 nonwords.

Following an auditory verification of the files, we selected a single recording for each filler item from each of the two talkers (90 fillers \times 2 talkers = 180 items).

Target stimuli varied in duration as a function of the phonetic variant of (ch). Thus, in the prime set, variants with [ʃ] were longer than those with [tʃ] ($t_2(23) = 8.93$, $p < 0.001$, $d = 1.8$) by, on average, 152 ms; and, in the target set, variants with [ʃ] were longer than those with [tʃ] ($t_2(23) = 8.01$, $p < 0.001$, $d = 1.6$) by, on average, 60 ms. These effects are not surprising, as fricatives tend to be longer than affricates.

Procedure

Participants were tested individually in a quiet setting. They were given the instructions, which highlighted the fact that they were asked to make lexical decisions only on the second item in each pair, the word form in the female voice. They were encouraged to ignore the first item in the pair, the word form in the male voice. Participants were instructed to respond as quickly and accurately as possible by pressing the keys ‘m’ (word) or ‘z’ (nonword) on a laptop keyboard. In each trial, participants were presented with an auditory prime immediately followed by an auditory target. Each target sound file was set to play 1000 ms from the onset of the prime stimulus. The average duration of the primes was 740 ms. In other words, the stimulus onset asynchrony (SOA) was set to 1000 ms, which resulted in a variable interstimulus interval (ISI) with an average of 260 ms. In no case did the prime and target overlap in time. Response times were measured from the onset of the auditory target until the pressing of a key. If a participant did not provide an answer within two seconds, a new trial was introduced. A new trial began one second after the participant responded.

Analysis

Lexical decisions were first explored for accuracy. Even though, in Sonora, both variants are associated with actual words in Spanish, it is possible that listeners recognize one of the variants more readily as a word than the other (LoCasto & Connine, 2002; Pitt, 2009; Ranbom & Connine, 2007). We focused exclusively on the critical targets – i.e., the lexical decisions on the (ch) word tokens in the female voice – and our factor had two levels, [tʃ] and [ʃ]. Each participant provided 288 lexical decisions. Of these, 48 were made over target words with [ʃ] and 48 over target words with [tʃ], which leaves 192 lexical decisions made over fillers, both words and nonwords. Correct lexical decisions over target words consisted of responding “yes” to real words and correct decisions over fillers consisted of responding “yes” to real word fillers and “no” to nonwords fillers.

The second, and most important, step consisted in analyzing the latency data. Our analysis of these data had six levels, organized into two factors: *target type* ([tʃ], [ʃ]), and *priming condition* (match, mismatch, unrelated). This is a $(2) \times (3)$ design in which both factors are within-subject and within-item predictors. Only response times of correct responses were included in the analyses. We conducted by-subjects (F_1) and by-items (F_2) analyses of variance. The by-subject dataset contained the by-subject means as a function of the two factors, for a total of 144 observations. The by-items dataset had the by-items means, as a function of the same two factors, for a total of 222 observations. Responses with reaction times greater than 1.75 seconds and smaller than 0.2 seconds were discarded (2.5% of the dataset). Analyses of variance and planned pairwise comparisons were conducted in R (R Development Core Team, 2016) with the *ez* package (Lawrence, 2016). In addition to null-hypothesis testing, we provide effect sizes, which were obtained either with the *ez* package (η^2) or the *effsize* (Cohen's d) package (Torchiano, 2017).

Results

Recognition rates

Participants varied as to their overall accuracy (or word-acceptability scores). Of the 47 participants, we selected for further analyses only those who had overall proportion-correct scores above 0.8 ($N = 37$). We decided that overall (either mean or median) error rates above 20% could indicate that a participant was not engaged with the task or could have misunderstood our instructions ($N = 10$). Of the remaining 37 listeners, 16 had overall scores above 0.95, 11 had scores between 0.9 and 0.95, and 10 had scores between 0.8 and 0.9. Of these 37 people, 16 were women and 21 were men. Along with means, we report standard deviations.

A repeated-measures ANOVA yielded no effects of *condition* for accuracy scores ($F(2,72) = 0.368, p > 0.6, \eta^2 = 0.003$). Thus, these participants were similarly accurate across the three conditions: target words with [tʃ] ($M = 0.92 [\pm 0.067]$), target words with [ʃ] ($M = 0.91 [\pm 0.084]$), and fillers ($M = 0.92 [\pm 0.069]$). In sum, an analysis of the word-acceptability data reveals that our Sonoran participants are equally likely to recognize (or accept) as possible words of their language variety those word forms that, beginning with (ch), are produced with either the [tʃ] or the [ʃ] variants.

Response latencies

The study of the response time data focused only on the correct responses (“yes”) of the 37 participants whose overall proportion-correct scores were above 0.8 (80% accuracy). Response times were analyzed with reference to two acoustic landmarks pertaining to the target stimuli, the onset and the offset of the target auditory stimuli. The descriptive statistics are shown in Table 1.

Table 1. Descriptive statistics (mean and standard deviation) of response-time data (ms) aggregated as a function of *target type* (affricate, fricative) and *priming condition* (match [+ M], mismatch [– M], unrelated [UR]), pertaining to the participants whose overall accuracy was above 80% (N = 37). Response times are shown with respect to two acoustic landmarks, the onset and the offset of the target auditory stimuli

	Latency from Target Onset				Latency from Target Offset			
	Affricate		Fricative		Affricate		Fricative	
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)
+M	885	(252)	992	(235)	141	(265)	186	(241)
– M	871	(244)	1014	(241)	125	(249)	207	(246)
UR	1001	(223)	1146	(213)	253	(230)	339	(224)

The first set of analyses concerns the response time data measured with respect to the acoustic onset of the auditory stimuli. A set of repeated-measures ANOVAs yielded significant effects of *target sound* ($F_1(1,36) = 258.5$, $p < 0.001$, $\eta^2 = 0.21$; $F_2(1,23) = 92.7$, $p < 0.001$, $\eta^2 = 0.48$) and of *priming condition* ($F_1(2,72) = 78.3$, $p < 0.001$, $\eta^2 = 0.21$; $F_2(2,46) = 119.1$, $p < 0.001$, $\eta^2 = 0.45$). There were no significant interactions. The effects of *target sound* were due to the fact that response times were longer when responding to the [j] variants than when responding to the [tj] variants, with a mean difference of 131 ms. The effects of *priming condition* were explored by means of two sets of pairwise planned comparisons, for which we used paired-samples *t*-tests. First, pairwise comparisons revealed that targets in the matching priming condition were recognized much faster than those in the unrelated condition ($t_1(73) = -13.5$, $p < 0.001$, $d = -1.57$; $t_2(47) = -15.2$, $p < 0.001$, $d = -2.19$). The priming effect of matching phonetic variants was, on average, 136 ms. Second, there was a significant difference between targets in the mismatching priming condition and those in the unrelated condition ($t_1(73) = -12.5$, $p < 0.001$, $d = -1.45$; $t_2(47) = -12.1$, $p < 0.001$, $d = -1.73$). On average, the priming effect of the mismatching condition was 131 ms. Finally, and most importantly, there was no significant difference between matching and mismatching priming conditions. In other words, the priming effects of both the matching and the mismatching conditions (relative to the unrelated condition) were identical in magnitude – i.e.,

both the affricate and the fricative variants primed each other as much as they primed themselves.

The second set of analyses focuses on the response time data measured relative to the acoustic offset of the auditory stimuli. It is important that we conduct this analysis because of the main effect of target type detected above. Words in which (ch) surfaced with an affricate variant were recognized faster than those with a fricative variant, but one must note that stimuli containing affricates were acoustically shorter than those with fricatives. Thus, it is possible for the main effect of target type to be due exclusively to the length of the acoustic stimuli. This means that both variants could be functionally equivalent in their recognition efficiency, and that any differences would be dependent upon their duration. In order to verify the existence of target type effects, one must measure response times from the acoustic offset rather than the onset, which will determine if there are processing differences from the point in which all of a word form's acoustic information has been output. A set of repeated-measures ANOVAs revealed significant effects of *target sound* ($F_1(1,36) = 70.03, p < 0.001, \eta^2 = 0.07$; $F_2(1,23) = 45.4, p < 0.001, \eta^2 = 0.13$) and of *priming condition* ($F_1(2,72) = 82.4, p < 0.001, \eta^2 = 0.21$; $F_2(2,46) = 119.1, p < 0.001, \eta^2 = 0.31$). There were no significant interactions. Note that these results replicate those of the analyses conducted on the onset response times, but the size of the *target sound* effects is smaller. Thus, while some proportion of these effects were indeed due to the variation in stimuli duration, the effects remain significant when duration is neutralized. Response times were longer when responding to the [ʃ] variants than when responding to the [tʃ] variants, with a mean difference of 71 ms. The effects of priming condition were identical, as such effects are kept constant in this measure relative to the previous one.

Discussion

Summary of findings

The present study collected spoken word recognition data by means of an auditory lexical decision experiment with immediate auditory form priming. Data came from 37 residents of Hermosillo, Sonora, Mexico. Target lexical items were word forms whose first consonant is (ch), which had been produced as one of the two phonetic variants that are commonly heard in the Spanish dialect spoken in northwestern Mexico, [tʃ] and [ʃ].

The word-acceptability data suggest that long-time residents of Hermosillo are equally likely to accept both word-initial variants of (ch) in their identifications of possible Spanish words. Response times provided a fuller picture of the

word recognition patterns. First, the latency data suggest that speakers of *norteño* Mexican Spanish are faster at recognizing lexical items with word-initial (ch) when this consonant is produced with the standard variant, [tʃ], than when it is produced with the local variant, [ʃ]. This effect emerges regardless of the acoustic landmark relative to which response times are expressed, the onset or the offset of the target stimuli. Second, both types of word form variants are identically primed in matching ([tʃ]-[tʃ], [ʃ]-[ʃ]) and mismatching conditions ([tʃ]-[ʃ], [ʃ]-[tʃ]). In other words, in spoken word recognition, phonetic variants prime each other as much as each variant primes itself.

Interpretation and implications

The first relevant finding is that one of the two phonetic variants commonly found in this dialect leads to increased efficiency in lexical activation relative to the other, even though both yield acceptable words. The variant that leads to increased efficiency is the affricate, which is also the variant that constitutes the norm in standard varieties of Spanish. There is a slight processing cost attached to the local variant, the fricative. We can think of three possible interpretations of the results. The first concerns the fact that word forms that contained the affricate variant were shorter than those that had the fricative variant. In a study on the auditory processing of flapped variants of /t/ and /d/ in American English, word forms with [ɾ] were recognized faster than those with [t], but this effect was attributed to the fact that [ɾ] leads to shorter word forms (McLennan et al., 2003). In the context of our study, word forms with [tʃ] provide the listener with more acoustic information in less time, leading to increased processing efficiency. Note, however, that when response times were expressed relative to the offset of the stimuli, a procedure that effectively normalizes for stimuli duration, the difference in recognition rates between affricate and fricative variants remained – it was reduced in size, but not fully neutralized. This suggests that an explanation exclusively based on the acoustic duration of the stimuli cannot fully explain the results. We surmise, therefore, that *norteño* listeners do privilege affricate over fricative variants of (ch) in their patterns of spoken word recognition.

An alternative explanation is that affricates are privileged over fricatives because they are more frequent in daily speech. The effects of frequency on the recognition of spoken words are well known (Connine et al., 2008; Goldinger, Luce, & Pisoni, 1989; Howes, 1957): words (or word forms) that occur more frequently in regular linguistic usage are recognized faster than those that occur less frequently, and they induce more potent lexical activations. An episodic or exemplar theory of lexical organization can easily model such effects (Goldinger, 1998), although models of spoken word recognition that assume abstract representations can also

do so (Norris & McQueen, 2008). It could be that the cloud of exemplars with affricate variants is more populated (larger) than that with fricative variants, thus leading to more potent activation via resonance; or, within an abstractionist model, it could be that the thresholds of activation for word forms containing the affricate variant are higher by default than those containing the fricative. As mentioned in the literature review, it is not known which of the two variants is more frequent in daily usage in the community overall: some studies find the fricative to be the most frequent (Brown, 1989) while others report the affricate to be the most common (Carreón Serna, 2007; Méndez, 2017). As long as production rates in the population remain unknown, this question will remain unanswered. Future variationist work conducted on the speech of Hermosillo could shed light on this issue.

A third explanation utilizes a recent theoretical proposal (Sumner & Kataoka, 2013; Sumner et al., 2014). Sumner and colleagues observe that spoken word recognition studies within the long-term priming paradigm consistently find a recognition advantage of canonical forms over casual or reduced variants (e.g. Sumner & Samuel, 2005, 2009). In some cases, the frequency rates of the target variants are reasonably well known, and it is usually the case that canonical forms are much less frequent in regular usage than casual-speech forms – flapping, for instance, is a very frequent process in American English (Connine, 2004), and so is postnasal /t/ deletion (Ranbom & Connine, 2007). Sumner and colleagues surmise that infrequent forms may be privileged over frequent forms as long as the former are socially salient. In other words, they propose that *socially weighted encoding* “enables infrequent, but socially salient tokens to result in robust representations, despite being less often experienced compared to highly frequent tokens” (Sumner et al., 2014: p. 1). In fact, many studies concerned with cross-dialect spoken word recognition have found that speakers of regional dialects recognize “standard” variants, which are arguably socially salient, as efficiently as they recognize the variants of their own variety, which are more frequent in their environment (Adank, Evans, Stuart-Smith, & Scott, 2009; Floccia, Goslin, Girard, & Konopczynski, 2006; Llopart & Simonet, 2018). It is possible, therefore, that our *norteño* listeners privilege affricates over fricatives because the former are socially salient in their community; while fricatives are local variants, affricates might be associated with “standard” Spanish. Further research is needed – including a comparison of the perceptual behavior of *norteño* listeners with listeners from more standard varieties of Spanish as well as a comparison of their own behavior across recognition paradigms, including long-term priming – for us to more fully understand the implications of our main finding.

The second key finding of our study is that there are no differences in terms of the variants' priming between matching and mismatching conditions, which suggests that listeners not only recognize words with either variant as possible

words in their dialect, but both variants actually activate the same phonolexical representations when processing them (McLennan et al., 2003). An episodic model of lexical organization would arguably predict that variants would prime themselves more than they would prime each other. In episodic models, recognition is a function of the phonetic distance between stored episodes and the tokens encoded during speech comprehension, and stored episodes contain veridical information (i.e., acoustic information as experienced by the speaker-listener). It would be reasonable to hypothesize that fricative tokens should primarily activate episodes containing fricatives, and affricate tokens should in turn privilege affricate episodes. Rather than phonetic variants activating parallel episodic representations, however, what seems to occur is that two phonetic variants of the same (ch) word activate the same entity in the lexicon. An identical finding involving /t/-flapping was reported by McLennan et al. (2003), who argue for a model of the lexicon based on abstract representations and word-recognition processes involving mediated phonological encoding. In such a model, a listener encodes an acoustic token into segments (surface allophones) as she receives it in real time. Segments are then recoded into phonological representations (phonemes), and such representations access conceptual entries (meanings). In the context of our finding, one could hypothesize that, whereas [tʃ] and [ʃ] may be initially encoded as separate surface allophones (note that one allophone was recognized more efficiently than the other), they are immediately recoded into the same underlying representation. Underlying phonological representations would, therefore, be the ones responsible for the priming effects reported in our study.

One must acknowledge that the latter claim is based upon a null finding. In our study, stimulus onset asynchronies were relatively long and they were fixed (1 second), whereas interstimulus intervals were variable. In order to further investigate whether mismatching leads to a processing cost at some point or other in the chain of events involved in spoken word recognition, we must explore other onset asynchronies and interstimulus intervals. For the time being, our findings support an abstractionist conceptualization of the lexicon as well as mediated understanding of the processes involved in recognizing spoken words.

The results obtained from our study suggest that members of a speech community where sociophonetic variability takes place may include more than one phonetic variant in their mental representations of words. The nature of these mental representations may be possibly affected by the dialect spoken in the community. This, in turn, would imply that having a dialect does not only mean speakers speak differently from each other, but that they perceive speech differently based on their own dialect experiences.

Conclusion

The present paper complements prior research on the variation affecting (ch) in northwestern Mexico by exploring it from the perspective of spoken word recognition. While it is commonly stated that (ch) surfaces as [ʃ] in *norteño* Mexican Spanish, the fact is that the presence of [ʃ] is not categorical in this region, but coexists in “free” variation with that of [tʃ] (Brown, 1989; Carreón Serna, 2007; Méndez, 2017; Serrano Morales, 2000). Long-time residents of Sonora are exposed daily to two variants of (ch), [tʃ] and [ʃ]. At the outset of the study we asked whether this variability impacts the patterns of auditory lexical access of the members of this speech community. Our findings confirm it does. First, *norteño* listeners accept (ch) words uttered with either [tʃ] or [ʃ] as possible words of their language variety – their lexical acceptability rates are identical. Nevertheless, response latencies are faster for [tʃ] than for [ʃ], which suggests that the former variant leads to more efficient word recognition than the latter. This might entail that [tʃ] is somehow privileged in phonolexical representations containing (ch), perhaps because it is the most frequent variant or because it is socially salient in the community. Moreover, our priming study found that both phonetic variants prime each other equally efficiently, and they do so as much as they prime themselves. In sum, *shesheo* does not impair lexical activation: it produces potent activation patterns, but it does lead to a slight delay in word recognition. We have proposed that a theoretical framework based on a single abstract representation that comprises both phonetic variants plus recoding can account for these facts better than an episodic model can. We contend that explorations of dialectal differences across the Spanish-speaking world would benefit from investigating further the possibility that people do not only differ from each other in the way they speak, but also in the way they listen to speech as well as, possibly, in the nature of the phonological representations that constitute their mental lexicons.

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The perception-production connection

/tʃ/ deaffrication and rhotic assibilation in Chihuahua Spanish

Natalia Mazzaro and Raquel González de Anda
University of Texas at El Paso

This study investigates the perception and production of two sociophonetic variables of Chihuahua Spanish: rhotic assibilation ([ʀ]), a change from above associated with women and higher classes, and deaffrication of the voiceless post-alveolar affricate ([tʃ]), a change from below associated with men and lower social classes. Thirty-three native Spanish speakers from Chihuahua completed a production task to establish whether they produced [ʀ] or [tʃ] and a discrimination task to determine if they were able to perceive these variants. Results show that while production rates were similar for [ʀ] and [tʃ], listeners had greater sociolinguistic awareness of [tʃ], resulting in a closer production-perception relationship for this variant. We conclude that the perception and production of phonetic variants interact in variable-specific ways that depend crucially on a combination of linguistic and social factors, including phonological context, frequency, and social salience to the speech community.

1. Introduction

Studies of sociolinguistic perception suggest that speakers assign different social attributes to standard and non-standard speech sounds (Campbell-Kibler, 2009; Casillas, 2013; Chappell, 2016; Jewell, 1993; Labov, 1972; Niedzielski, 1999; Plichta & Preston, 2005). However, for a variant to reflect such distinctions, the variant needs to be produced and it also needs to be recognized (Fridland & Kendall, 2012). Such a connection between speaker production and speaker linguistic perception has not been well established. Studies that look at the connection between production and perception, generally focus on sociolinguistic perception, in other words, the distinct social indexes of a number of variants (e.g., Campbell-Kibler, 2009; Chappell, 2016). Fewer studies have looked at the relationship between production and linguistic perception of standard/non-standard variants.

The results of studies exploring the relationship between speech production and perception have been contradictory, with some studies affirming and others calling into question the relationship between linguistic perception and production. For instance, a study by Kettig and Winter (2017) found little evidence that the production of a retracted vowel in English is related to its perception. Production results show that young females were the ones producing the innovative (retracted) variants. However, perception results showed only weak statistical evidence that young females perceived vowel retraction more than any other group. The authors conclude that changes in production occur before changes in perception, as even innovative variant producers “...must accommodate the fact that they are continuously exposed to both innovative and conservative variants in perception” (Kettig & Winter, 2017: p. 94).

On the other hand, in their analysis of three different dialects of American English where different vowel shifts were occurring, Fridland and Kendall (2012) found that an individual’s production directly relates to his/her perception. By comparing the results of a production task with a perception task, the authors showed that an individual speaker’s perception depends on the variants that the speaker produces and the region to which that the speaker belongs. The authors concluded “...that processing is affected by both what you say and what others around you say” (p. 792).

To better understand this relationship, the present study explores the production and perception of two variables in Mexican Spanish: absolute final /r/ and /tʃ/. More specifically, we investigate the production and perception of rhotic assibilation and /tʃ/ deaffrication in Chihuahua to determine how phonological context, frequency, and social salience influence this relationship.

2. Literature review

2.1 Rhotics and rhotic assibilation

Articulatorily, standard taps and trills share the same place and voicing features: they are both usually realized as alveolar¹ and voiced. The main difference between taps and trills is that taps are produced with a single contact between the tip of the tongue towards the alveolar ridge, while trills are produced with several (usually two or three) such rapid contacts (Hualde, 2005). Acoustically, [ɾ] and [r] share a

1. Lipski (1994) and Hualde (2005) discuss other non-standard realizations including dorsalization and pre-aspiration of the trill, neutralization, retroflexion, and strengthening of rhotics in codas and onset clusters.

lowered third formant (Colantoni, 2001), but rhotics differ in the duration of the segment with taps being shorter than trills. Quilis (1993) reported an average of 20 ms for taps and 60 ms for trills.

According to traditional phonological accounts, the distribution of the tap and trilled rhotics in Spanish are determined by the environment in which they occur. The tap /ɾ/, as in *caro* /káro/ 'expensive', and trilled /r/, as in *carro* /káro/ 'car', are contrastive only in word-internal intervocalic position (Hualde, 2005). In word-initial position and after a consonant in a different syllable, only the trill occurs, e.g., *rosa* /rósa/ 'rose' and *honra* /ónra/ 'honor'. The tap occurs in onset clusters, e.g., *prosa* /prósa/ 'prose', and in word-final position before a vowel, e.g., *ser amigos* /sér amígos/ 'to be friends'. Either rhotic is possible in coda position (within a word or across word boundaries) when followed by a consonant or a pause, e.g., *arte* 'art' or *amor* 'love', where syllabification is not possible. While a tap is more frequently found in these contexts (Amastae et al., 1998; Martín Butragueño, 2006), an emphatic trill can also occur.²

Another variant is possible in numerous varieties of Spanish, including Chihuahua Spanish: the assibilated rhotic [ř]. It has been reported in Argentina (Colantoni, 2006), Bolivia (Morgan & Sessarego, 2016), Costa Rica (Vásquez Carranza, 2007), Ecuador (Bradley, 2004), Spain (Henriksen & Willis, 2010), Dominican Republic (Willis, 2007), and Mexico (Amastae et al., 1998; Eller, 2013; Lope Blanch, 1967; Perissinotto, 1972; Rissel, 1989; Bradley & Willis, 2012), but different social and linguistic factors seem to influence the variant across varieties.

Articulatorily, Solé (1992) contends that trills may become fricatives if the finely controlled articulatory or aerodynamic requirements for trills are not met, as fricatives involve a less complex articulation and allow a wider range of oropharyngeal pressure variation than trills. Assibilated rhotics result when the vibrating tongue-tip fails to make contact with the palate, or apical vibration fails to occur, which allows the high velocity air to flow continually through the aperture generating friction (Solé, 2002). Assibilated rhotics in utterance final position result from the difficulty of sustaining trilling with the lowered decreased subglottal pressure that occurs at the end of a statement. Thus, rhotic assibilation is a natural phenomenon that arises when small (unintended) articulatory changes occur in a sound that requires a very precise articulatory execution.

As taps, trills, and assibilated rhotics can all occur in coda position, Figures 1, 2, and 3 provide spectrograms of the three variants. While tap and trill rhotics are articulated with brief periods of occlusion, assibilated rhotics are produced with partial rather than total closure between articulators. Acoustically, assibilated rhotics are characterized by the presence of high-frequency noise on the spectrogram

2. The distribution of trills and taps is further discussed in Hualde (2005).

and of audible friction (Solé, 2002) that occurs at around 3000 Hz. In Figure 3, the aperiodic noise of the assibilated rhotic in the word *pedir* ('ask') begins at 3130Hz.

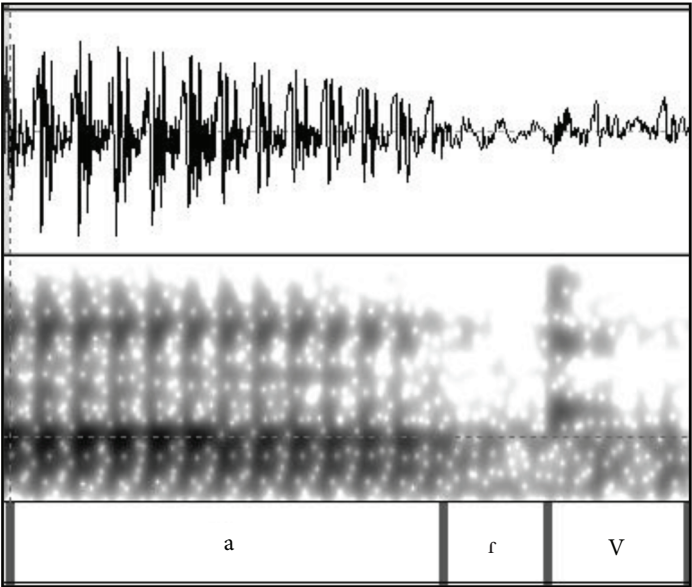


Figure 1. Tap in absolute final position in the word *guisar* ('cook') followed by an epenthetic vowel. Male speaker (UT075)

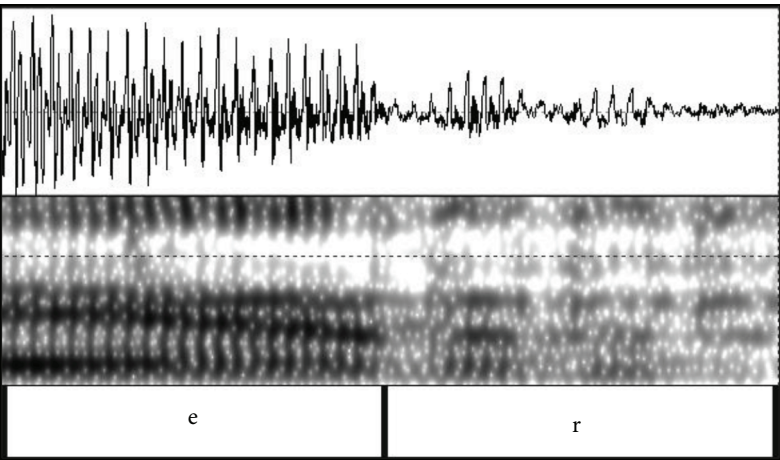


Figure 2. Trill in absolute final position in the word *poder* ('power'). Male speaker (UT086)

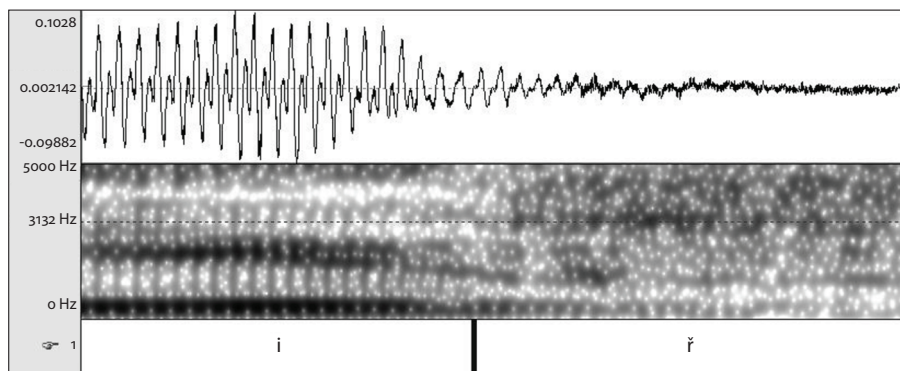


Figure 3. Assibilated rhotic [ř] in the word *pedir* ('ask'). Male speaker (UT086)

In Mexican Spanish, assibilated rhotics were first observed in Mexico City by Lope Blanch (1967). The author argued that assibilation was a recent phenomenon that emerged around the 1950s in the speech of women, specifically in coda position. Lope Blanch (1967) concluded that assibilation was probably brought from Spain, because it had been observed there and in several other Latin American countries.

The first synchronic sociolinguistic analysis of rhotic assibilation in Mexico City was published by Perissinotto (1972), based on 110 hours of recorded conversations collected between 1963 and 1969. His results showed a high overall percentage of rhotic assibilation in absolute final position (68.2%), with female speakers producing assibilated rhotics at a rate of 81.8% and men only producing the assibilated variant with 38.9% frequency. Perissinotto (1972) also presented the distribution of the assibilated variant by age and socioeconomic status and concluded that assibilation was more common in the younger age group and in the high and middle socioeconomic classes. In other words, assibilation appeared to be a prestigious, innovative variant adopted by women, younger speakers, and higher classes.

Three decades later, Martín Butragueño (2006) found only 27% rhotic assibilation in Mexico City Spanish. A multivariate analysis of rhotic assibilation found a number of linguistic and social factors that favored assibilation: (1) absolute final position; (2) formal style; (3) mid to high education; (4) older generation; and (5) women. Martín Butragueño (2006) concluded that rhotic assibilation seemed to be receding as the variant was produced less frequently and by older speakers when compared to Perissinotto (1972).

Rhotic assibilation spread to the north of the country in the 1960s, with the first study conducted in Ciudad Juárez in the 1990s (Amastae et al., 1998). Their study showed that assibilation in absolute final position was present but relatively infrequent in Ciudad Juárez, occurring in only 6% of all possible environments (word final and utterance final), while the percentage of assibilation in absolute final position was 22%. A multivariate analysis showed that assibilation was more likely in

female speech, in the higher socioeconomic class as compared to the middle class,³ among middle-aged and older speakers, and more educated speakers. All these effects suggest that assibilation was also a prestigious variant in Ciudad Juárez.

2.2 Deaffrication of the voiceless post-alveolar affricate /tʃ/

There is only one affricate phoneme in standard Spanish, /tʃ/, a prepalatal voiceless affricate limited to prevocalic position in word-initial and word-medial positions.⁴ The exact point of articulation of the affricate varies across Spanish dialects, ranging from alveolar in Chilean Spanish to palatal in Cuban Spanish, but the prepalatal variant is the most frequent realization in Chihuahua Spanish (Casillas, 2013).⁵ Articulatorily, the standard affricate consists of a closure that is followed by a frication release, as shown in Figure 4. When deaffrication occurs, the occlusion of [tʃ] is lost, which results in the fricative [ʃ] (Hualde, 2005), shown in Figure 5.

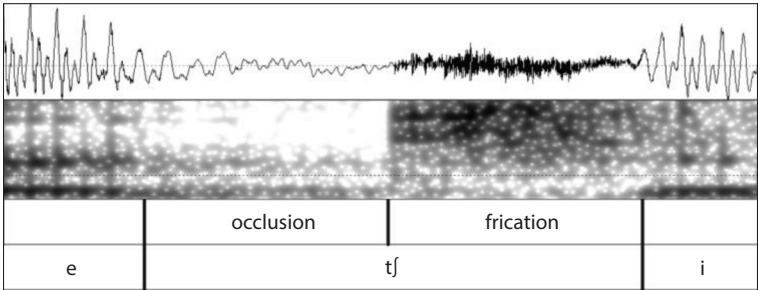


Figure 4. Standard affricate [tʃ] in the word *chile* ‘chile’ preceded by *de* ‘of’. Male speaker (UT086)

Deaffrication of the voiceless post-alveolar affricate /tʃ/ occurs in Northwestern Mexican Spanish (Brown, 1989; Moreno de Alba, 1994; Amastae, 1996; Hualde, 2005; Méndez, 2017) as well as in New Mexico (Jaramillo & Bills, 1982) and Arizona (Noriega, 2004), which share borders with the northwest Mexican States of Baja California, Sonora, and Chihuahua. The map presented in Figure 6 shows the locations where /tʃ/ deaffrication was frequently found in Mexican Spanish in the 1990s.

3. Amastae et al. (1998) did not analyze the speech of participants from lower socioeconomic groups.

4. In final position, [tʃ] occurs in the spelling pronunciations of Catalan names with *-ch* such as Llorach, Blanch, Domenech, etc. (Hualde, 2005).

5. There is also an alveolar affricate variant similar to the same sound in Tarahumara, but it is rather infrequent in Chihuahua Spanish (Amastae, 1996).

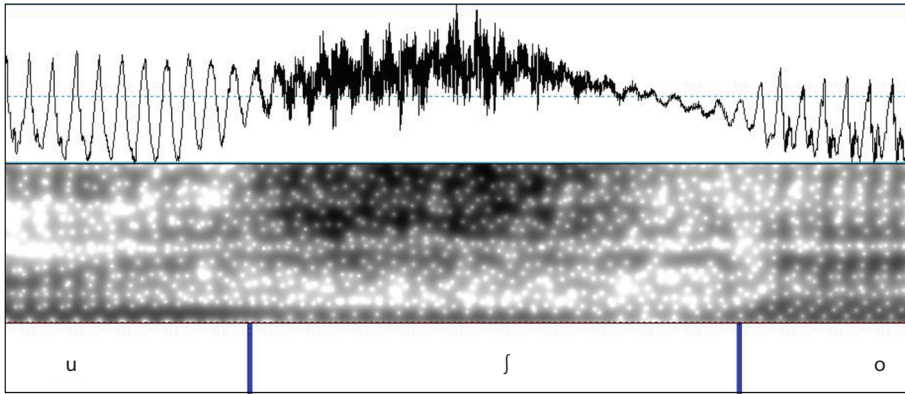


Figure 5. No occlusion in the non-standard variant [j] in the word *mucho* ‘a lot’. Female speaker (UT097)



Figure 6. Map of the distribution of /tʃ/ deaffrication (Moreno de Alba, 1994)

Deaffrication of /tʃ/ originated with the movement of people from rural to urban areas (Delgado, 1994), where it became the characteristic feature of northern Mexican speech. In terms of its production, Amastae (1996) found that the deaffrication in Ciudad Juárez was most likely found in the speech of lower-class men, while the lowest rates of deaffrication occurred in the speech of high-class women. Older speakers produced the deaffricated variant the least, and speakers with lower education levels were more likely to produce [j] than more educated speakers. In a more recent study, Méndez (2017) also found that men and speakers of lower social classes were more likely to produce [j] than other groups in Ciudad Juárez, and almost all the participants in his study (97.5%) agreed that this feature was typical of the speech of *Juarenses*. However, only 20% of participants expressed the opinion that the non-standard variant was stigmatized and should be avoided.

Similarly, Jewell (1993) explored Mexican students’ attitudes toward the use of [j] by having participants listen to segments of interviews from Chihuahua

Spanish speakers, indicating if they thought a speaker was a 'professional' or a 'laborer'. While participants connected the non-standard [ʃ] to the north of Mexico, making it a diatopic marker, Jewell (1993) found that the occurrence of [ʃ] for [tʃ] did not influence listeners' evaluations of a speaker's social class. However, another investigation of attitudes towards the /tʃ/ variants ([tʃ] and [ʃ]) in the south of Arizona (Casillas, 2013) showed that listeners awarded higher competence ratings to speakers who produced the standard variant [tʃ] and lower competence ratings to speakers who produced the non-standard variant [ʃ], suggesting that listeners may have implicit attitudes towards [ʃ].

2.3 Change from above and below

According to Labov (1972: p. 290) a change from above is a linguistic change that enters the language from above the level of consciousness and social awareness; that is, speakers are generally aware of the linguistic form and they manipulate its use depending on the context and/or their interlocutors. The upper classes use these new linguistic forms in order to differentiate themselves from the lower classes, while lower classes use these forms in order to sound more formal and similar to the upper class.

Conversely, changes from below are below the level of conscious awareness. These linguistic changes originate in interior social classes, i.e., the lower-middle or upper-working class, and production rates rise to a curvilinear pattern, whereby members of the interior social groups produce higher rates of the innovative variant and production rates decrease among the lowest and highest classes (see Labov, 1966, 1974, 1980, 1981). Labov contends that this innovation occurs to symbolically mark group solidarity, and working-class speakers may be more prone to this type of innovation as they share a cooperative ideology that renders local linguistic variants especially valued. Additionally, working-class speakers may feel more free to innovate linguistically, as they are not necessarily loyal to the status quo. On the contrary, upper-class speakers may explicitly resist linguistic variation, and this group's linguistic conservatism may be a means of maintaining the status quo. That is, upper-class speakers likely want to preserve their privileged position in the social structure, and avoid linguistic variants associated with lower social classes. This would allow the upper-class group to evade potential threats to their social status (Kroch, 1978).

In Northern Mexico, the assibilated rhotic is likely a change from above. The variant is associated with women, higher socioeconomic classes, and more educated speakers, and these effects suggest that assibilation is a change from above imported from Mexico City by the higher classes and transmitted by women (Amastae et al., 1998). The deaffrication of /tʃ/ presents almost opposing

characteristics. The variable originated with the movement of people from rural to urban areas (Delgado, 1994), where it became the characteristic feature of northern Mexican speech. Because it was more frequently found in the speech of lower socioeconomic classes and lower levels of formal education, the variable was considered stigmatized and, in fact, many speakers did not acknowledge that they used it, even when the recordings showed they did (Amastae, 1996). All these characteristics seem to suggest that the deaffrication of /tʃ/ is a change from below the level of consciousness.

Since Labov's (1972) seminal work, researchers often characterize innovative linguistic variants as coming 'from above' or 'from below'. However, speakers' conscious awareness of the variants is not generally explored but rather inferred from its occurrence across different social factors. Rhotic assibilation, a change from above, and /tʃ/ deaffrication, a change from below, co-occur in Chihuahua Spanish and provide fertile ground for understanding the relationship between the perception and production of phonetic variants.

2.4 Hypothesis

Because rhotic assibilation is considered a change from above, we hypothesize that those who have more assibilation in their speech will also perceive assibilation in a more nuanced way. More specifically, we expect that older women, who tend to produce assibilated rhotics more than other groups (Amastae et al., 1998; Mazzaro & González de Anda, 2016), will perceive assibilation the most successfully. On the contrary, because /tʃ/ deaffrication is considered a change from below, we hypothesize a less clear relationship between perception and production. That is, we expect listeners to be less aware of the presence of the variant.

3. Method

3.1 Speakers

The participants in this study are native Spanish speakers recruited in the El Paso, Texas – Ciudad Juárez, border area (Table 1). The majority of participants were students enrolled in a beginner ESOL (English for Speakers of Other Languages) class at the University of Texas at El Paso, and non-college student participants were all permanent residents of Ciudad Juárez, Mexico. These participants were recruited in Ciudad Juárez using the 'friend-of-a-friend' technique (Milroy, 1987), whereby potential informants are contacted through common friends, an approach that is particularly appropriate for the community under study.

Table 1. Participants' demographic information

	Participants' information
Participants <i>n</i>	33
Age range in years	18–69
Generation 1 (<20 years) <i>n</i>	10 (7 females, 3 males)
Generation 2 (21–35 years) <i>n</i>	12 (8 females, 4 males)
Generation 3 (36–55 years) <i>n</i>	8 (5 females, 3 males)
Generation 4 (>56 years) <i>n</i>	3 (3 females)
Male: Female <i>n</i>	10:23
Median/Mean age in years	22/29.8
From location (<i>n</i>)	Ciudad Juárez (14), El Paso, TX (13), Chihuahua (2), Delicias (2), Parral (1), Jimenez (1)

All participants were raised in the northern Mexican state of Chihuahua. A total of 35 subjects participated in this study: 24 women and 11 men, with an age range between 18 and 69 years. For the analysis, the participants were divided into four generational groups. Generation 1: <20; Generation 2: 21–35; Generation 3: 36–55; and Generation 4: >56. All the participants had at least some college education, and they came from mid-high to high social classes. Participants were asked to complete an adult language background questionnaire that elicits information about the participants' place of birth, language(s) of schooling, and language use. The questionnaire contained a section that asked for participants' self-proficiency ratings in both English and Spanish, and only those who reported to use mostly/only Spanish in their daily everyday interactions (at home, at work, and in social situations) were selected to participate in the study. Additionally, two participants were excluded from the analysis (UT094 & UT109) because they did not complete the two tasks (perception and production). The demographic information of the participants considered in the statistical analysis is presented in Table 1.

3.2 Data collection

The production data was elicited by asking participants to narrate the Little Red Riding Hood and by asking them to talk about their favorite food. Participants' speech, which lasted for about 15 minutes, was recorded using Audacity 2.1.2 and a Snowball microphone, and all the recordings were transcribed using PRAAT (Boersma & Weenink, 2018). The transcriptions were aligned using Praatalign (Lubbers & Torreira, 2016), and a script was used to count the number of rhotics in absolute final position, and the number of /tʃ/s produced by each participant. All the rhotics in absolute final position were perceptually classified as either

assibilated or non-assibilated, and all the /tʃ/ tokens were perceptually classified as an affricate or a fricative.

For the perception portion of the study, participants were asked to complete a discrimination task based on oral stimuli. The stimuli presented had been previously recorded by a female⁶ native Spanish speaker from the state of Chihuahua and presented to participants using a Sennheiser HD280 pro headset. The stimuli consisted of six different sentences, each recorded three times (see Table 2). The speaker first used standard Spanish from the area to record the six sentences, which included an affricate [tʃ] and a tap rhotic in absolute final position. The same sentences were then recorded with the standard affricate [tʃ] and assibilated rhotic [ʃ̺] in absolute final position. The last set of sentences was recorded with a voiceless post-alveolar fricative [ʃ] and standard tap rhotic. An example sentence is provided below with its three recorded iterations: *En El Paso hace mucho calor* ‘It’s too hot in El Paso’ (see Appendix A for a full list of sentences used).

1. Neutral [en el páso áse mútʃo kalór]
2. Assibilated rhotic [en el páso áse mútʃo kalór̺]
3. Deaffrication of /tʃ/ [en el páso áse múʃo kalór]

Table 2. Number of sentences evaluated per variant

	Total
Neutral	6
Assibilation	6
Deaffrication	6
Total	18

For each listener, the neutral guise was played first, the guise with assibilated rhotics second, and the guise with deaffrication of /tʃ/ last. A fixed presentation order of the guises simplified the experimental design and allowed for explicit comparisons to be made between one guise to the next, but we acknowledge that presentation order might have played a role in listeners’ evaluations. Additionally, a priming effect is possible, as speakers heard the same voice several times in different guises. Future studies are needed to control for presentation order and speaker voice, but none of the participants commented on the fact that the speaker reading the

6. Casillas (2013: 185) found that male/female voices were rated differently on the basis of their pronunciation of /tʃ/. We are not aware of any studies analyzing the perception of assibilated rhotics, but studies on other variables of Spanish and English (e.g., Chappell, 2016; Plichta & Preston, 2005) suggest that female/male speakers tend to be rated differently. Thus, it is possible to expect that if the guises had been recorded by a male speaker the results would have been different. This should be investigated in a future study.

guises was the same. After listening to a recording, participants were asked if they noticed anything different about the speech of the person in the recording they had just listened to as compared to the previous one. The exact question was: *¿Nota algo diferente en la manera de hablar de esta persona (con respecto a la grabación anterior)?* 'Do you notice anything different in this speaker's way of talking (compared to the previous recording)?' Listeners could then orally explain if/what type of difference they perceived.

3.3 Coding and statistical analysis

In order to determine whether a subject produced the variant under study throughout the narrative task and description of his/her favorite food, we coded the total number of occurrences of absolute final rhotics and all cases of /tʃ/, with the exception of loanwords from English, e.g., *sketch*, which were excluded from analysis. Variant production was coded categorically as 'standard' or 'non-standard' production for each token. We classified listeners' metalinguistic awareness, or perception, of the variants in the following categorical way: i) Perceived nothing different at all (no); ii) Perceived something different but could not explain what specifically (something diff.); iii) Perceived the specific variable in question, i.e., rhotic assibilation or deaffrication (yes). Gender and age were also analyzed as categorical variables, with Male and Female levels for gender and Generations 1 (youngest), 2 (middle), and 3 (oldest) for age. Because there were very few participants in Generation 4 (N=3), it was collapsed with Generations 3 in all analyses. Finally, the participants were relatively homogenous in terms of their education level and no significant effects were found for education. As a result, education will not be discussed further in this paper.

All statistical analyses were conducted in R (R Core Team, 2017) and the alpha level was set at ($\alpha = .05$). To analyze the data, we used the *step* function to find the best predictors for each model. Next, binary logistic regression models were constructed using the *glm* (general linear model) function to find the best fit for the data. The dependent variable for each model was production of rhotic assibilation or production of deaffricated /tʃ/, respectively, and the independent variables tested included gender, generation, and perception of the non-standard variant in question. Given the relatively low number of participants, participant was not included as a random effect. Conditional inference trees were created using the *party* package (Hothorn, Hornik, & Zeileis, 2006) and violin plots were made in *ggplot2* (Wickham, 2016).

4. Results

4.1 Production and perception

Table 3 shows the production results for all participants; the results for individual participants are presented in Appendix B. As Table 3 shows, the overall percentage of assibilation is 17.15%, and the overall percentage of deaffrication is 11.83%. These results are based on a total number of 379 tokens for /r/ in absolute final position and 634 tokens of /tʃ/ in all positions and phonetic contexts.

Table 3. Total number of tokens of /r/ and /tʃ/ and overall percentages of assibilation and deaffrication

Variant	%	N	Total
Assibilation	17.15 %	65	379
Deaffrication	11.83 %	75	634

The overall percentage of assibilation is higher than that of deaffrication in our study, which contrasts with previous studies that show higher percentages of deaffrication (33% in Méndez, 2017) and lower percentages of assibilation (22% in Amastae et al., 1998). This difference could be attributed to two possible explanations. First, the social characteristics of the subjects are somewhat different, with a broader range of formal education levels and social classes in previous studies as compared to a more homogenous group in the present study. Second, we only analyzed rhotic assibilation in absolute final position, which is the context where most of the variation occurs (Perissinotto, 1972; Amastae et al., 1998). Amastae et al. (1998) found 6% of assibilation in final position (including word final and absolute final), but this overall percentage of assibilation increased to 22% when only absolute final position was considered.

To better understand the distribution of rhotic assibilation and /tʃ/ deaffrication across social factors, a more detailed breakdown of the raw data is presented in Table 4. This table includes the number of non-standard tokens produced by the 33 participants given the total number of phrase-final rhotic and /tʃ/.

Table 4. Distribution of assibilation and deaffrication by social factors

Factor groups		[ř]		[ʃ]	
Sex	%	N	Total	%	Total
Male	11%	10	93	18%	40
Female	19%	55	286	9%	35
Age					
Generation 1	29%	23	79	19%	34
Generation 2	10%	15	150	7%	18
Generation 3	12%	27	150	12%	23
Total N		65	379		75

Table 4 shows that female speakers produce higher rates of rhotic assibilation than male speakers (19% vs. 11%, respectively), while deaffrication of /tʃ/ shows the opposite tendency, with higher rates of deaffrication among male speakers (18%) than female speakers (9%). To determine if these gender differences were significant, we created binary logistic regression models with gender and generation as independent variables. The models found a significant effect of gender for both variables, as shown below in Tables 5 and 6 (reference levels are Gender = female and Generation = 1).

Table 5. Binary logistic regression model coefficients for production of assibilation

	Estimate	SE	z-value	p
(Intercept)	−0.71	0.26	−2.69	<0.01
Generation 2	−1.35	0.37	−3.65	<0.001
Generation 3	−0.66	0.33	−2.01	0.045
Gender = male	−0.75	0.37	−2.01	0.044

Table 6. Binary logistic regression model coefficients for production of deaffrication

	Estimate	SE	z-value	p
(Intercept)	−1.65	0.26	−6.32	<0.001
Generation 2	−1.17	0.32	−3.67	<0.001
Generation 3	−0.54	0.30	−1.78	0.08
Gender = male	1.70	0.26	2.67	0.007

The models also found a significant effect of generation for both variables. The raw data for deaffrication show higher rates of [ʃ] in the youngest age group (19%), followed by the oldest (12%) and middle age groups (7%), and the results in Table 6

prove that the youngest group (Generation 1) is significantly more likely to produce deaffrication than the other groups. Similarly, the raw distribution of rhotic assibilation shows that younger speakers are the most frequent users of assibilation (29%), followed by the older (12%) and middle age groups (10%). Although the frequency of assibilation production slightly increases from the middle age group to the older age group (10% and 12%, respectively), a conditional inference tree (see Figure 7) shows that the main difference is between the youngest speakers and the other two age groups.

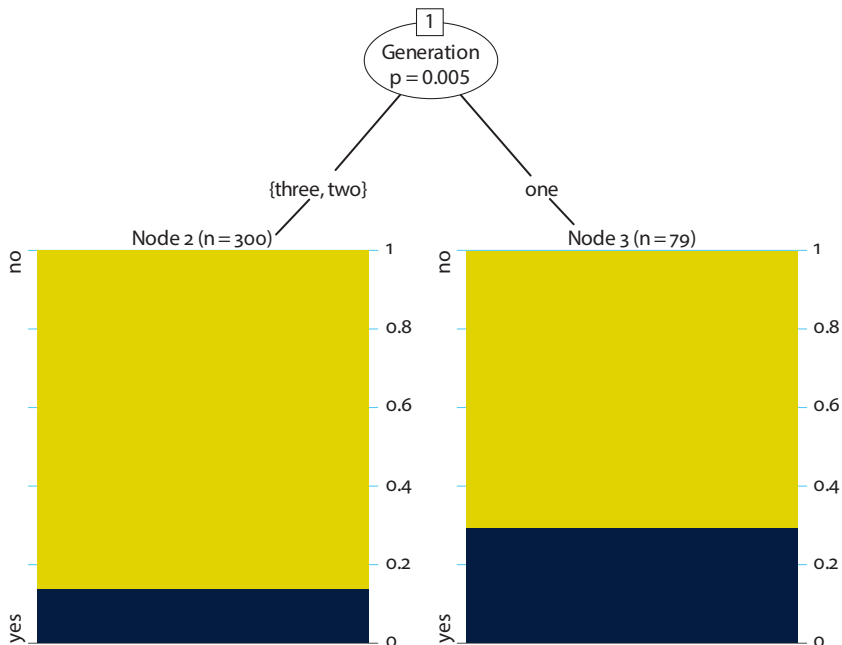


Figure 7. Conditional inference tree showing production of rhotic assibilation (yes) given generation

Next, we investigate whether listeners were able to perceive the non-standard variants in question. As shown in Figure 8, listeners successfully identified [ř] with 9.1% frequency, the rate of those who noted something different in the speaker's pronunciation but could not identify the variant in question was 51.5%, and the percentage of those who did not notice anything different in the pronunciation of the speaker was 39.4%. These results contrast sharply with the percentage of listeners who explicitly recognized /tʃ/ deaffrication, with 84.8% of the listeners able to perceive the non-standard variant, while 9.1% noted something different in the pronunciation but could not specify what it was, and 6.1% did not notice anything different in the pronunciation.

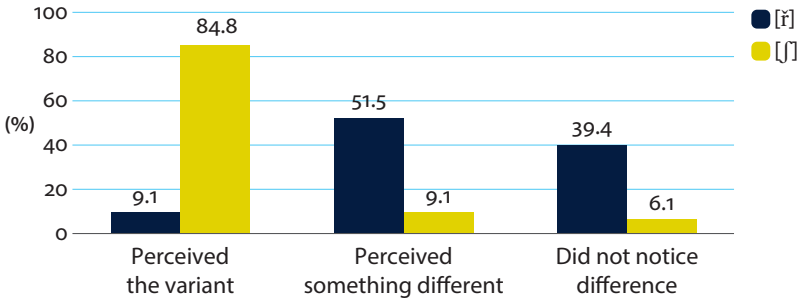


Figure 8. Perception rates of [ř] and [ʃ] in 33 listeners from Chihuahua

4.2 The Production-perception relationship

This section explores the relationship between production and perception of both variables. The results are illustrated with violin plots in Figure 9 for [ř] and Figure 10 for [ʃ]. The vertical axis corresponds to the production of the non-standard variant per speaker, and the horizontal axis corresponds to whether

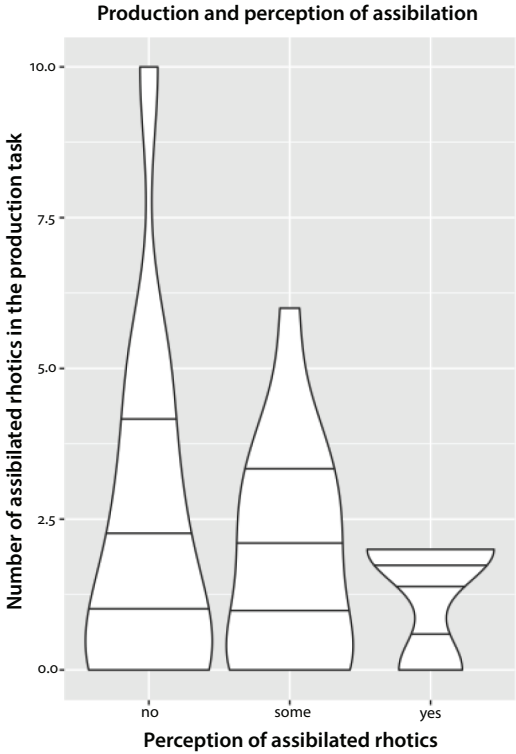


Figure 9. Violin plot showing the relationship between production and perception of [ř]

listeners were able to perceive the variant (yes, no, or something is different). The width of the shapes in the violin plots corresponds to the number of responses in that perception category given the number of non-standard variants produced. The horizontal lines show the distribution of the data in quartiles.

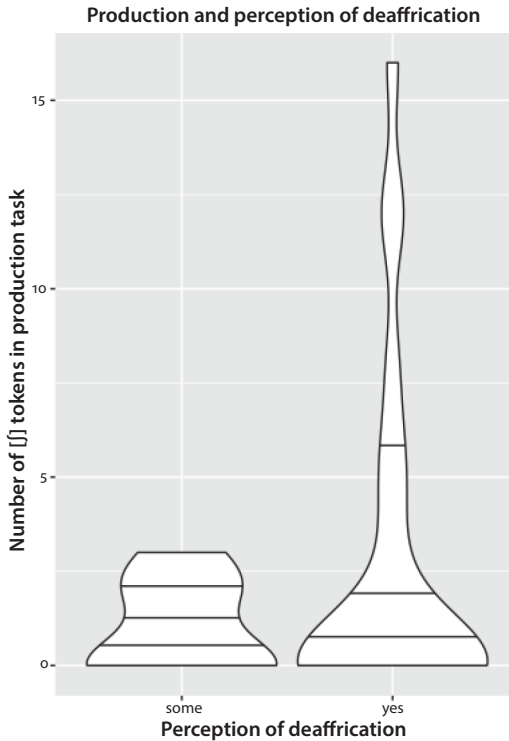


Figure 10. Violin plot showing the relationship between perception and production of [ʃ]

Figure 9 shows a subtle relationship between production and perception of [ɹ], with speakers who perceive assibilation producing assibilation somewhat less frequently than those who do not perceive it. However, this slight difference is not a significant difference, likely given the very low rates of listeners' explicit identification of rhotic assibilation. When the best-fit model for assibilated rhotic production (see Table 5) was modified to include the participants' perception of assibilation as a categorical independent variable, none of the levels of the factor reached significance.

If we turn our attention to the relationship between production and perception of [ʃ], we find different results. First, the violin plot in Figure 10 shows that individuals who perceive deaffrication in the perception task tend to produce

it more as well.⁷ When perception of [ʃ] is included in the binomial logistic regression model fitted to [ʃ] production (see Table 6), perception proves to be a significant predictor of production, as shown in the revised model in Table 7. In other words, participants who explicitly commented on [ʃ] in the perception task (reference level is sh perception = yes) were significantly more likely to produce [ʃ] than individuals who could not specifically name what was different about the recording ([ʃ] perception = something diff.).

Table 7. Binary logistic regression model coefficients for production of deaffrication with perception of deaffrication as an independent variable

	Estimate	SE	z-value	p
(Intercept)	−1.61	0.26	−6.3	<0.001
Generation 2	−1.24	0.33	−3.75	<0.001
Generation 3	−0.57	0.31	−1.85	0.065
Gender = male	0.67	0.26	2.56	0.01
[ʃ] perception = something diff.	−1.47	0.75	−1.97	0.049
[ʃ] perception = no	−0.02	0.52	−0.04	0.97

5. Discussion

This section more fully explores participants’ production, their perception, and the relationship between the two. With regard to production, assibilation is more common among the youngest group and slightly more common among women, contradicting previous studies that indicate the use of the assibilated variant is receding (Amastae et al., 1998; Martín Butragueño, 2006; Perissinotto, 1972). At least in Chihuahua, the fact that the variant is used most frequently by the youngest speakers suggests that it is not disappearing. Additionally, the principles of gender differentiation proposed by Labov (2001: p. 274) predict that for assibilation, which has been characterized as a change from above (Amastae et al., 1998), women would have higher rates of assibilation. This prediction was partly borne out in the present study, as women produce slightly higher rates of assibilation, but the difference was not found to be significant, which could suggest a more thorough diffusion of rhotic assibilation throughout the community.

For the production of deaffrication, which has been considered a change from below (Amastae, 1996), the principle of gender differentiation would predict

7. As only one participant could not perceive deaffrication at all, the perceptual “no” group could not be visualized in this plot.

higher rates of the innovative form by women (Labov, 2001: p. 292). Yet, in the present study, deaffrication is favored by the youngest generation and by men. We argue that the classic characterization of deaffrication as a change from below is not accurate. Instead, deaffrication displays all the characteristics of stable linguistic variation, with low rates of stigmatized forms by women and higher rates of the stigmatized forms by men. This classification is further supported by the frequency of use of the variant across generations: there is a drop in the use of the non-standard form by middle-age speakers, which could indicate that the speakers most affected by the linguistic marketplace (Bourdieu, 1991) avoid the non-standard variant more than other groups.

In terms of perception, our results showed that a very low number of participants successfully perceived assibilation (9.1%), while deaffrication was perceived by almost all participants (84.4%). There are several factors that can account for the low level of perception of assibilation and the high level of perception of deaffrication. First, it is possible that the position of the variable in the syllable could affect the degree of its perception. Assibilated rhotics occur in less salient coda position, while deaffrication occurs in more salient onset positions. Second, the difficulties in perceiving assibilation could be due to its rather low frequency of occurrence in speech. As explained earlier, the occurrence of assibilation in this dialect is most common in absolute final position, which involves a more limited phonetic environment than deaffrication, where variation occurs in a greater range of contexts (Hualde, 2005). This frequency difference is supported by the production data, in which only 379 tokens of absolute final /r/ were produced as compared to 634 tokens of /tʃ/.

Finally, the social salience of a variable to a particular speech community is likely to affect its perception. Linguistic innovations, such as assibilation, may start as an undefined linguistic variable found in a restrictive subgroup. These variables show inter-speaker variation, differences between the speech of the group and of others. Labov (1972) termed this social variation as ‘indicator’, while Silverstein (2003) called it ‘first-order indexicality’, the initial step in registration of social meaning. When outsiders begin to adopt these features to signal group affiliation, the variable becomes a ‘marker’ (Labov, 1972) or ‘second-order index’ (Silverstein, 2003). Markers take on social meanings in line with how the user group is evaluated. A third step in the development of variables is achieved when they become the object of overt attention and comment. Labov (1972) termed these ‘stereotypes’ and Silverstein (2003) ‘third-order indexes’. Because deaffrication is openly identified with the northern dialect and is subject to criticism from speakers of other dialects, we believe that it has become a stereotype in Chihuahua. Overt comments about deaffrication may increase participants’ sociolinguistic awareness of this variant that is stereotypically associated with their dialect.

Turning now to the relationship between production and perception, our hypotheses proposed that rhotic assibilation, a change from above associated with social prestige (Amastae et al., 1998), would involve a positive relationship between perception and production. In other words, we predicted that individuals who produced rhotic assibilation would perceive it more successfully than individuals who do not produce it. On the other hand, we expected an inverse relationship between perception and production for deaffrication, given that it had been previously labeled as a change from below (Amastae, 1996). That is, we expected participants who produced [ʃ] to perceive it less successfully than speakers who did not deaffricate /tʃ/.

However, a statistical analysis did not support these hypotheses. Binomial logistic regression models fitted to the production of rhotic assibilation and deaffrication, respectively, revealed a variable-specific difference: the perception of rhotic assibilation did not significantly condition rhotic production, but the perception of /tʃ/ deaffrication did significantly condition /tʃ/ production. In other words, the link between production and perception appears to be closer for more socially salient variation, as listeners' sociolinguistic awareness of a stereotyped variant appears to influence their production. On the other hand, variation that is less socially salient and, as a result, less readily perceived does not appear to influence production in the same way. These findings suggest that the relationship between phonetic production and perception is not absolute and unequivocal; rather, this relationship appears to be variable-specific within and potentially across speech communities.

6. Conclusion

This study has concluded that speakers' perception of phonetic variants is related to their production of these variants, but the perception-production relationship depends crucially upon an individual variable's phonological context, frequency, and social salience to the speech community. While this study represents an important step in deciphering this complex production-perception relationship of sociolinguistic variables, a great deal more work is needed.⁸ For instance, this study only explored explicit, metalinguistic perception of rhotic assibilation and /tʃ/ deaffrication, and future studies should investigate implicit perceptions of

8. The perception of rhotic assibilation should also be explored in other phonological environments beyond absolute final position, particularly where it is more marked, such as coda position before a consonant or a vowel.

these variants in matched-guise tests (Lambert et al., 1960) and more gradient discrimination of the variants (Chappell, 2017).

Another remaining question is whether perceptual or acoustic salience could play a role in explaining why listeners perceived /t/ deaffrication more successfully than rhotic assimilation. While both [ɾ] and [ʃ] are high-intensity noises in the upper frequencies (around 3500 Hz for both), perceptual differences could also be explained in terms of the syllabic positions of the variables. Finally, speaker-listeners from lower social classes should be included in future work, as the inclusion of only middle- and upper-class speakers in this study may have affected the production of non-standard variants. More speakers from a wider range of socioeconomic backgrounds could help resolve this issue and determine whether stigmatized variants are less or more easily perceived than prestigious variants.

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Appendix A

1. *En El Paso hace mucho calor.* ‘It’s too hot in El Paso.’
2. *Los tacos en Juárez tienen otro sabor.* ‘Tacos have a different taste in Juárez.’
3. *La leche es mas barata en El Paso.* ‘Milk is cheaper in El Paso.’
4. *Mi niña no quiere dejar su chupón.* ‘My (little) girl won’t give up her pacifier.’
5. *Tengo tres perritos chihuahuas.* ‘I have three small Chihuahuas.’
6. *Cuando empiezo a comer chocolate no puedo parar.* ‘When I start eating chocolate, I can’t stop.’

Appendix B

Participants	[ř]			[ʃ]		
	%	N	Total	%	N	Total
UT030	0%	0	12	5%	2	41
UT076	50%	2	4	60%	6	10
UT077	0%	0	14	0%	0	7
UT078	25%	3	12	0%	0	2
UT079	12.20%	5	41	0%	0	33
UT080	0%	0	4	9.10%	3	33
UT081	33.33%	3	9	0%	0	5
UT082	90.91%	10	11	0%	0	32
UT083	40%	4	10	0%	0	7
UT084	6.25%	1	16	7.41%	2	27
UT085	8.33%	1	12	8.33%	1	12
UT086	0%	0	12	0%	0	14
UT087	0%	0	6	0%	0	14
UT088	0%	0	9	57.14%	8	14
UT089	0%	0	6	0%	0	5
UT090	8.33%	2	24	0%	0	28
UT091	28.57%	2	7	0%	0	25
UT092	42.86%	3	7	0%	0	12
UT093	16.67%	2	12	44.44%	12	27
UT095	0%	0	8	0%	0	10
UT096	0%	0	7	0%	0	20
UT097	50%	5	10	42.86%	12	28
UT098	50%	3	6	0%	0	13
UT099	20%	1	5	0%	0	13
UT100	66.67%	6	9	33.33%	4	12
UT101	6.25%	1	16	0%	0	38
UT102	30%	3	10	15.38%	2	13
UT103	0%	0	7	12.50%	2	16
UT104	0%	0	9	0%	0	21
UT105	8.70%	2	23	29.41%	5	17
UT106	18.18%	2	11	32%	16	50
UT107	0%	0	23	0%	0	28
UT108	57.14%	4	7	0%	0	7
TOTAL			379			634

Future Directions

Of intersectionality, replicability, and holistic perspectives

Methodological considerations in Spanish sociophonetic perception studies

Sara Mack

University of Minnesota-Twin Cities

Sociolinguistics is grounded in the premise that social variables are essential to understanding how language works. While early Spanish sociolinguistic studies focused on speech production, there is a growing body of work in Spanish sociophonetics that recognizes the role of speech perception in variation and social identity. As this field grows, it is useful to reflect upon best practices for moving forward. To that end, this chapter considers the field from a theoretical lens, focusing on intersectional approaches (Crenshaw, 1989; Levon, 2015) as it addresses the practical challenge of replicability (Simons, 2014) and offers recommendations for a holistic approach that will poise Spanish sociophonetic perception data to effectively address questions of language variation and change.

Introduction

Long before interdisciplinarity became a prosaism (Andrén, 2008; Penny, 2009), sociolinguistics developed as a field utilizing cross-disciplinary methods from linguistics, sociology, ethnography, acoustics, and other disciplines to more fully examine and more accurately understand language variation and change. With the development of affordable portable recording technology in the 1950s and 60s, researchers were able to capture and analyze data in ways that opened up a new world of research possibilities. In the 1990s, the term sociophonetics came into widespread use, demarcating a subfield of sociolinguistics that, necessarily, entailed interdisciplinary approaches as well. And similar to the early days of sociolinguistics, sociophonetics researchers are taking advantage of new technology in the form of computer hardware and software that is

continuously expanding the possible methods used and the types of data that can be examined in the field.

Foulkes and Docherty (2006) term sociophonetics “the social life of phonetics and phonology” (p. 409), and this tagline provides an accessible entry point into this area of inquiry. Sociophonetics adds to a traditional understanding of phonetics and phonology by considering the relationship between social factors and variation, focusing specifically on phonetic variables.¹ Around the same time as Foulkes and Docherty’s (2006) seminal article, there was growth in what is termed “third wave” variation studies (Eckert, 2010) that problematize approaches to our understanding of the social meaning of variable forms. Sociophonetics research has come to be differentiated from other areas by a number of characteristics: by in-depth quantitative analyses, especially those that quantify the salience of linguistic representations of variation in long-term memory (Munson, 2011: p. 15); by a recognition of the role of multiple, diverse social identities in both production and perception of phonetic variants; and finally, by the use of computer hardware and software that is capable of measuring listener response not only in a variety of ways (Simonet, 2011), but also at a minute level that was previously impossible to assess via traditional phonetic transcription (Munson, 2011; cf. Mack, 2010a).

While Spanish sociophonetic production studies are more and more commonplace, there has been less work done in sociophonetic perception, both in Spanish sociolinguistics and in sociolinguistics overall (Eckert & Labov, 2017). This is despite the fact that the interaction between phonetic cues and social factors has been documented in perception tasks since the mid-20th century (see Lambert, Hodgson, Gardner, & Fillenbaum, 1960), and that leaders in the field have clearly acknowledged that approaches incorporating data on perception and production together are necessary to account for the relationship between social meaning and language use (Eckert & Labov, 2017: p. 471). In other words, sociophonetic perception studies, in Spanish and across languages, have an important role to play in our understanding of phonetic variation, and in language variation and change more broadly. As the field of Spanish sociophonetic perception continues to grow, it is an opportune moment to engage in critical dialogue, examining theoretical and practical considerations that will strengthen the field as it moves forward.

This chapter focuses on two areas, intersectional approaches and reproducibility, and is conceptualized as an introduction of sorts for those who are unfamiliar with these topics. Although the two focus areas may seem unrelated, they are

1. Researchers versed in sociolinguistic methods will note that ‘sociophonetic’ studies had been carried out before the term was widely used. The term’s popularity may be due to its efficacy in differentiating phonetic and phonological analyses that break with the more traditional view of phonetics and phonology data as unrelated to social factors.

both pivotal to progress in the field. Together, they encompass the two pillars of sociophonetic perception studies: the qualitative theoretical framework of social dynamics necessary for understanding the “social life” (Foulkes & Docherty, 2006) of phonetic variation, and the recognition of the quantitative processes necessary for rigorous examination of sociophonetic perception data. An additional common thread that unites them is that both are powerful tools for advancing our understanding of complex systems in our field, and at the same time present conceptual and practical difficulties that have limited their application in the field thus far. Throughout, the article includes recommendations for a holistic approach to advance our understanding of Spanish sociophonetic perception in the future.

Intersectional approaches

Although the term intersectionality has garnered a great deal of cachet in academia in recent years (Davis, 2008), it has formed part of legal and academic discourse for nearly 50 years. Intersectionality theory grew out of work on race and social class in the 1970s (Anthias & Yuval-Davis, 1983; Combahee Women’s Collective, 1977; hooks, 1981), and the term itself was coined by Crenshaw (1989), who presented a theoretical model for understanding how power structures interact to affect individuals based on social identity. Crenshaw’s scholarship in legal studies, along with work by other Black feminist scholars in a variety of disciplines at the time, led to a central critique: that treating race and class as “mutually exclusive categories of experience and analysis” (Crenshaw, 1989: p. 139) fails to account for the multiplicity of social identities that exist and interact in lived experience. In Crenshaw’s area of legal studies, intersectionality theory provided a way to better conceptualize the situation of women from underprivileged racial and social class backgrounds in discrimination cases. From this initial problematization in a specific context, intersectionality theoretic approaches have grown, developed, and are now central to explanations of complex, dynamic relationships in a diverse range of fields such as population health (e.g., Bauer, 2014; Green, Evans, & Subramanian, 2017), educational research (e.g., Grant & Zwier, 2011), and biomedicine (e.g., Hankivsky et al., 2017). Indeed, intersectionality theoretical approaches are now in such wide application that they are considered by many to be “emerging as a cornerstone of sociological thought” (Green et al., 2017, p. 214).

The question, then, is what can intersectional approaches add to a field such as Spanish sociophonetic perception, where variationist researchers as a matter of course combine questions of sociological identity with analyses of phonetic variation? Part of the answer lies in the power of intersectionality theory to present what Davis (2008) terms “a novel twist on an old problem” (p. 72), looking

at relationships between social variables as additive. Indeed, it is in this area that the general idea of intersectionality as a theoretical framework may seem familiar to researchers accustomed to analyzing the complexities of language use, even though it is not yet fully integrated in linguistics as a field (Levon, 2015).²

As Levon (2015) outlines, there are three core principles of an intersectionality theoretic approach that make it particularly important for analyses of language use and social identity. The first theoretical underpinning, reflecting Crenshaw (1989), is that lived experience is not reducible to any variable that fails to interact with another or, as Levon (2015) states, “lived experience is ultimately intersectional in nature” (p. 297). Thus, theoretical models and methodological approaches that isolate variables necessarily fall short, and any analysis that seeks to document and understand the effect of social variables on speech perception (or really, on language use overall) must necessarily consider intersectionality as part of the analysis. A second understanding of an intersectionality theoretic approach is that connections among social variables (that is, intersections) are dynamic, and their interplay is affected by outside variables such as social, historical, and interactional contexts (Levon, 2015). This dynamism, Levon argues, calls for a methodological approach that is “process-centered” (p. 298) and attempts to account for how institutional or individual practices work together to create social meaning (Staunæs, 2003, as cited in Levon, 2015).³ The final core principle detailed by Levon (2015) is that categories of social identity are mutually constitutive. That is, variables do not simply interact with each other, but rather their creation and moment-to-moment realizations are shaped by their relationships to and interactions with each other.

An important logical conclusion here is that there is a cost to separating variables and assigning social values in perception studies. Accounts that conceptualize individual variants and assess their power to index a social characteristic in the mind of the listener in isolation may be useful to document phenomena as an area of inquiry develops (Mack, 2010b), but a more integrated and holistic treatment of social variables in perception studies is needed to account for variation and advance theoretical understanding. To put it differently, the intersectionality theoretical approach requires us to recognize that phonetic representations of region of origin, social class, educational level, race/ethnicity, gender/sexuality, etc., are

2. Levon (2015) is careful to note that while he feels there is a need for “fuller and more sustained engagement” with principles of intersectionality in the field as a whole, the field is not without sociolinguistic studies that do include a comprehensive treatment of the theory in their analyses, notably Mallinson (2006), Mendoza-Denton (2008), and Bucholtz (2009).

3. Note that while recent discourse on the dynamic nature of intersectionality has yielded new terms (Levon, 2015) such as social dynamics (Cooper, 2004), axes of difference (Yuval-Davis, 2006), and assemblages (Puar, 2007), the term intersectionality remains at the core.

not separated in the mind of the listener, and are not static. When recruiting these forms in speech, speakers can draw on all of these underlying social relationships together, while in speech perception, listeners draw on associations simultaneously (Levon, 2015, p. 296). As an anonymous reviewer of this article notes, this shares certain parallels with the process of bricolage, in which stylistic elements (e.g., specific realizations of phonetic variables) detach from a source performance and function as a sort of free agent, combining with other elements to construct new meanings (Campbell-Kibler, 2010; Eckert, 2000; Hebdige, 1979). Any variationist theory of speech perception, then, would benefit from conceptualizing social categories as interdependent, mutually constitutive, and interactive with each other as the field moves forward.

Reproducibility

Many readers will be familiar with the so-called reproducibility, or replication, “crisis” that first began in the field of psychology and has now spread across disciplines in the social sciences. Whether or not one believes that the crisis is overblown (see Pashler & Harris, 2012), it offers important lessons for all fields that depend on similar approaches to study design, data collection, and analysis. Since Spanish sociophonetic perception is an emerging area of inquiry that employs interdisciplinary quantitative methods from fields such as sociology and experimental and social psychology, it is especially important to be aware of the dialogue surrounding replicability for continued work in the field.

The crux of the reproducibility crisis is that many of the guiding theories in the social sciences have been built on quantitative studies whose results have not been reproducible, drawing into question the underpinnings of the theories themselves. Ignoring the importance of reproducibility, then, works against forward progress and the legitimacy of the field. Indeed, Makel and Plucker (2014), in their assessment of replicability in educational research, offer a stark warning: dismissing the importance of replicability, they maintain, “indicates a value of novelty over truth (Nosek, Spies, & Motyl, 2012) and a serious misunderstanding of both science and creativity” (p. 10). Furthermore, for those practically concerned or motivated by external pressures, replication is an important step for any discipline “...in order to better legitimize itself in the eyes of other researchers and the public” (Plucker, as cited in Tyson, 2014).

Any field’s path to effective integration of replication studies is not an easy one. The social science research community has generally viewed replication work as devoid of innovation, excitement, and prestige (Lindsay & Ehrenberg, 1993; Makel & Plucker, 2014: p. 306; Neuliep & Crandall, 1993). Perhaps for this reason, few

traditional fields in the social sciences have a historical scholarly tradition of replication studies. Even in more established fields, there has been a lack of attention to replicability as fields have developed. For example, Makel et al. (2016) conducted a comprehensive historical analysis of all articles published in 36 journals in the field of special education, which has experienced significant growth in the past 50 years (Winzer, 2009). Makel et al.'s analysis categorized a mere 0.05% of the 45,490 articles as work that attempted to replicate previous findings. Given a lack of scholarly tradition, any field is at a disadvantage when it seeks concrete answers to questions ranging from the theoretical (e.g., which combination of factor analysis and complementary post-hoc tests hold the most promise for replicability?) to the imminently practical (e.g., how will this count in my tenure review?).

What, then, are some practical lessons for interdisciplinary work in Spanish sociophonetic perception? First, those familiar with the complexities of replicability in scholarly work are in an important position to serve as mentors to those new to the field, as well as to those who may be experienced scholars, but unfamiliar with this area. Together, scholars must recognize the importance of a comprehensive understanding of statistical methods in general (including replicability) for Spanish sociophonetic perception: is it a key building block to ensure that as our theories continue to develop, they are based on an accurate understanding of complex social dynamics as documented by quantitative data, or can the field advance just as well without it? (Hint: this is not really a question.) This, of course, carries direct implications for graduate programs of study in Hispanic Linguistics at the broadest level. While some Ph.D. programs require courses in statistical methods, the requirement can become a barrier that negatively impacts time to degree. Channeling Simonet's (2011) call for students to consider "jumping on the bandwagon of instrumentation, experimentation and quantification" if they are interested in a career in linguistics (p. 558), students should take advantage of opportunities for developing the skills, knowledge, and perspectives needed to conduct scholarly work in Spanish sociophonetic perception. However, it is just as important that departments support doctoral students in developing competency in quantitative methods and prioritize it in degree program design. Both students and departments must recognize this may require a greater commitment of time and resources.

In a similar way, this work is a specific challenge for early career and junior faculty seeking tenure and promotion, especially in foreign and second language departments where a majority of faculty colleagues are scholars of literature and culture.⁴ In this case, the ability to communicate across disciplinary boundaries

4. Special thanks to an anonymous reviewer for highlighting this context of challenges for the field.

and clearly articulate concepts to a more general audience (e.g., department colleagues and chairs, deans, and provosts) is essential. Ultimately, it falls upon us to advocate effectively and foster connections with allies to fashion guidelines and policies that recognize and respect disciplinary needs and differences.

Outside of professional formation in graduate programs and advocating for supportive approaches to tenure and promotion, there are steps and processes related to study design, publication of results, and longer-term research programs that are useful for those new to the topic to consider. For example, Murayama, Pekrun, and Fiedler (2014) provide three straightforward steps to counter the inflation of false-positive rates. First, there is a need for researchers to carefully consider *a priori* hypotheses in research design, articulating directional hypotheses, which help reduce the likelihood of false-positives (for example, speech variants stereotypically associated with Group X will be perceived with more saliency when awareness of Group X is invoked in study materials). As Murayama et al. (2014) explain, a directional hypothesis provides the groundwork for factor analyses that are then followed by post-hoc tests in the predicted directions; together they decrease the likelihood that a significant interaction will be observed by chance (p. 108). Of course, a well-founded directional hypothesis is “based on past research, accepted theory, extensive experience, or literature on the topic” (Salkind, 2010), which presents issues to an emerging field. When I began work on my first project in Sociophonetic perception studies of sexual orientation in 2005 (see Mack, 2009), there were “few data upon which to posit hypotheses” (Mack 2016: p. 131). However, now that the field has developed, we find ourselves at a juncture where directional hypotheses are possible in many, if not all areas. The second step discussed by Murayama et al. (2014) is to include multiple studies in a single paper or publication. For example, including multiple studies with different methodologies expands the generalizability of findings. This approach, the authors maintain, can also give researchers the opportunities to address potential problems that may have been brought to light in the initial study, and can give more empirical support for theoretical claims. While this idea is promising, it presents a practical problem in terms of time to publication, and also may negatively impact career advancement if tenure review guidelines evaluate performance based on sheer number of publications (rather than evaluating each publication’s overall contribution to the field, for example). Finally, Murayama et al. (2014) recommend using the observed results to collect more data, but within parameters acceptable to the field. This practical technique is one that is perhaps most easily integrated into research programs. Relevant to any emerging field, however, is the discussion of what is acceptable in terms of introducing or collecting additional data to influence *p*-values, colloquially (and disparagingly) known as ‘*p*-hacking’ (see Chavalarias, Wallach, Li, & Ioannidis, 2016; Vermeulen et al., 2015).

Conclusion

Throughout this chapter, I have outlined the need for approaches to Spanish socio-phonetic perception that take into account intersectionality and reproducibility. Both concepts present theoretical and practical challenges at the same time as they offer productive ways of conceptualizing sociophonetic perception methods so that the field may move forward. A deceptively simple step to begin to deal with those challenges is to acknowledge openly that barriers exist, change will not be immediate, and progress comes as new approaches bring new understandings of previous work. In the case of intersectionality theoretic approaches, a broader focus on social, historical, ideological, and linguistic interrelationships can yield better understanding of how social variables and phonetics create meaning in speech perception. There is a need to go beyond questions of how a linguistic practice may be affected by different variables, to a fully-integrated framework where we ask how the variables work together, co-create each other, and adapt to each other to constitute social meaning (Levon, 2015).

Similarly, there is a need to go beyond traditional views that might dismiss replication studies, and instead integrate them more fully into the field. This effort necessarily includes faculty and administrative colleagues who have a voice in shaping graduate curriculum and tenure and promotion guidelines; graduate faculty in the position to assign classwork that could include projects integrating replication or reproducibility principles; search committee members reviewing applicants' scholarly records; journal editors and publishers who are in the position to curb publication bias and promote a balance between new research and replication studies; and, of course, many others. In considering both intersectionality theoretical approaches and reproducibility, progress entails collective awareness as well as a commitment at the individual level to not merely engage with these ideas, but take action when there is an opportunity to do so.

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Future directions for sociophonetic research in Spanish

Nicholas Henriksen

University of Michigan

This epilogue offers a brief overview of the eleven chapters included in this volume, calls attention to effective commonalities amongst the studies, and highlights innovative strategies for future sociophonetic research. The methodologies applied by the authors are discussed in relation to their work, which includes but is not limited to consonantal, vocalic, and regional variation in Spanish. Of these, special attention is paid to incorporating future work on vowel contrasts and prosody, with an in-depth discussion of potential implications. These topics are then re-integrated with the rest of the epilogue in order to offer insights into new avenues of theoretical interest, such as listener-based models of language change. A closer melding of data from production (articulation and acoustics) and from the perception of individual speakers presents a particularly fruitful direction for future research. Altogether, the works included in this volume lay the foundation for a promising future in the area of Spanish sociophonetic perception.

1. Introduction

Recent Advances in the Study of Spanish Sociophonetic Perception presents a variety of chapters, methodologies, and linguistic phenomena that provoke new questions and innovative techniques for continued, exciting research in the growing field of Spanish sociophonetics. This epilogue offers a brief overview of the volume, as well as directions for future research as they relate to broader questions of linguistic theory. In the volume, one chapter presents a critical synthesis of methodological concerns linked to sociophonetic research (Mack), and ten chapters report data based on original empirical research, nine of which center on consonantal variation. Of these, the papers cover topics related to a comprehensive range of phenomena in Spanish, including stops, affricates, fricatives, rhotics, and laterals.

As for regional varieties, three chapters focus on sociophonetic variation in Peninsular Spanish, whereas seven others focus on variation in Latin-American Spanish. The latter group covers a broad range of Latin-American varieties (including US Spanish), from Mexico to the Southern Cone. Four chapters explore the role of language contact in sociophonetic perception (Barnes; Chappell; Davidson; Lipski), whereas the remaining chapters explore perceptual questions through assessment of data from a single variety of Spanish. In terms of perceptual methods, five chapters use the matched-guise technique, whereas the others rely on experimental techniques through perceptual identification (Barnes; Lipski; López Velarde & Simonet; Mazzaro & González de Anda; Schmidt). One study incorporates the analysis of production data together with perception data (Mazzaro & González de Anda), whereas the other nine studies maintain a singular focus on the empirical benefits of perceptual methodologies. Additionally, five of the papers include explicit reference, either through design or results, to the effect of speaker or listener gender on the outcomes of their study (Bolyanatz Brown & Rogers; Chappell; García; Mazzaro & González de Anda; Regan).

Regarding theoretical approaches, a common theme emerging from the volume's research is that there is a need to consider the role of social information, in addition to phonetic detail, in language users' mental representations of speech. Increasingly, there is evidence that social and linguistic details are entwined in the cognitive representations of sounds and sound patterns (see Foulkes & Docherty, 2006 for review), and there are proposals that account for how social identity and phonetic and phonological patterns emerge simultaneously in cognitive representations, based mostly on an exemplar-based mental representations (Johnson, 2006). In this volume, authors such as Barnes, García, and Schmidt address this issue directly in their research, and López Velarde and Simonet use their perceptual findings to offer new proposals regarding the nature of mental representations in contexts of sociophonetic variation. Bolyanatz & Rogers and Mazzaro & González de Anda frame their findings around the production-perception link, and its relationship to understanding language change, and sound change in particular.

Having discussed the common methodologies and themes among the chapters in this volume, Section 2 considers empirical directions for future research, with a focus on vocalic variation, as well as on prosodic (and especially intonational) variation. Following this, Section 3 offers ideas for a continued theoretical grounding of perceptual data deriving from sociophonetic findings, and Section 4 provides concluding remarks.

2. Variables of interest for future research

2.1 Vowels

As mentioned in Section 1, nine of the ten empirical chapters of this volume focus on consonantal sociophonetic variation in Spanish, making vocalic variation fertile soil for future sociophonetic perception research. In Chapter 1, the only chapter to explore a vocalic phenomenon in the Spanish-speaking world, Barnes concentrates on the perception of back vowel alternations in Asturian Spanish. She finds that variation in listeners' categorizations of gradient [-o] to [-u] realizations are modulated in part by visual information about the speaker and listener attitudes towards the minority language in the region. Barnes' approach and findings offer a promising lead for future work in Spanish focused on vocalic variation.

Whereas Spanish exhibits a five-vowel system (/a e i o u/), a majority of the languages with which it is in contact do not use this five-vowel space. As has been demonstrated through research focused on bilingual speakers of Spanish in contact with languages such as English (Casillas & Simonet, 2016; Ronquest, 2012), Catalan (Amengual, 2016; Llompart & Simonet 2017; Simonet, 2011), Galician (Amengual & Chamorro, 2015), and Afrikaans (Henriksen et al., forthcoming), bilinguals are not consistent in maintaining separate the vowel systems of their two languages due to effects derived from language contact. For example, in a study on Spanish-Catalan bilingualism in Majorca, Simonet (2011) showed that Spanish-dominant bilinguals possess a two-category mid-back vowel system, one for /o/ and one for merged Catalan /o/ + /ɔ/, whereas Catalan uses both vowels contrastively. On the whole, studies like that of Simonet (2011) demonstrate that language contact, and especially relative dominance in the two languages in question, provides an advantageous base from which to build future research on Spanish sociophonetic perception.

Notwithstanding the findings of the papers mentioned above, there is much room for new research on the sociophonetic perception of vowel contrasts in monolingual varieties as well. One recent inquiry by Henriksen (2017) into vocalic variation centers on the vowel system of Eastern Andalusian Spanish (EAS), spoken in the southern Spanish provinces of Granada, Jaén, and Almería. In EAS, speakers duplicate (or assimilate) the same vowel in different grammatical forms to distinguish meaning, such as [nene] 'boy' (with tense vowels), and [nɛnɛ] 'boys' (with lax vowels), whereas this vowel duplication is not typical of North-Central Peninsular Spanish (NCSP). Similar to the consonantal findings of Schmidt (this volume), the results of a word identification experiment showed that dialect contact can affect perception. More specifically, EAS and NCPS listeners were able to associate the tense-lax vowel difference with a singular-plural difference, yet EAS

listeners were more reliable in doing so. Through the use of reaction-time data, Henriksen also showed that although NCPS listeners had accuracy rates similar to EAS listeners at the end of the experiment, NCPS listeners were consistently slower at doing so. Studies like Henriksen (2017) and López Velarde and Simonet (this volume) demonstrate the importance of including reaction-time data, and future studies should employ this approach to explore sociophonetic perception in more nuanced ways.

In sum, there is clearly space for further research in vocalic variation, through the incorporation of data from both bilingual and monolingual communities. Additionally, the gathering of reaction-time data (which are more easily collected in controlled, laboratory settings) offers promise for nuanced insights into language users' processing mechanisms.

2.2 Prosody

As the chapters in the volume focus on segmental variation in the Spanish-speaking world, the social perception of prosody, and intonation in particular, serves as a logical next step. This is the focus of Section 2.2.

In his handbook of general phonetics, Abercrombie (1967) defines the indexical properties of speech communication as those which provide indication about specific speaker attributes. These attributes include particular group membership (e.g., gender and regional dialect), talker-specific idiosyncrasies, context-specific properties for a given speaker, and emotional states. Abercrombie contends that the speech signal carries not only physiological information about a particular speaker (e.g., male vs. female voice), but also social or demographic information such as their socioeconomic status or region of origin. More recent research in the field of speech perception and word recognition has shown convincingly that listeners are able to encode specific information about a speaker's voice (Clopper & Pisoni, 2004; Mullenix et al., 1989; Pisoni & Lively, 1995). It is also well-established that certain speaker-specific properties are easier to categorize than others. For example, Lass et al. (1976) reported that listeners were 96% accurate in categorizing unfamiliar speakers according to gender. As for the role of geographical origin in speaker classification, Preston (1993) performed a now classic study in which the author asked naïve adult participants to listen to narratives produced by nine male speakers from nine different cities between Alabama and Michigan; the participants were then asked to assign each speaker to one of the cities. Preston found that although listeners were able to easily distinguish between Northern and Southern talkers, their identification performance within each region was quite poor. In another study, Van Bezooijen and Gooskens (1999) investigated dialect identification of Dutch and English varieties spoken in the Netherlands and the

United Kingdom, respectively. In particular, the authors focused their study on the importance of segmental vs. prosodic features on dialect categorization, and found that segmental features alone, as opposed to prosodic features, provided a more robust metric of determining accurate dialect recognition. However, in a follow-up study, Gooskens (2005) examined the perceptual categorization of Norwegian dialects by high school students and showed that when pitch information was removed from the speech stimulus, dialect detection decreased between 9% and 17% for listeners. Until a more complete research program is proposed that seeks to answer which speech-signal characteristics contribute to perceptual dialect categorization, the impact that intonation has on dialect perceptual categorization will remain largely unknown.

Provided that intonation, and in particular question intonation, is a key linguistic property that contributes to cross-dialect differences in Spanish (cf. Henriksen, 2013; Prieto & Roseano, 2010; Sosa, 1999), the incorporation of intonational analysis could enrich future perceptual research. Díaz-Campos & Navarro-Galisteo (2009) examined how well naïve listeners of Spanish perceptually categorize speakers from different Spanish speaking countries. In their study, listeners of Peninsular and Venezuelan Spanish heard speakers from six Spanish-speaking countries in data recorded from a sentence reading task and a passage reading task. Both listener groups obtained 33–35% accuracy in the reading task, but discrepancies were found in the passage task. Of importance, Díaz-Campos and Navarro-Galisteo eliminated all prosodic information from their speech stimuli, leaving the exact extent of prosody or intonation on perceptual dialect categorization unexplored. What remains to be seen, and is left for future work, is whether listeners of a particular variety of Spanish are able to recognize a speaker's regional origin based on prosodic information alone, such as intonation, or even voice quality (e.g., Armstrong, Henriksen, & DiCanio, 2015; Podesva, 2007, 2013).

3. Theoretical approaches for future research

3.1 The role of the listener as the initiator of sound change

As mentioned in Section 1 of this epilogue, most papers in this volume focus on perceptual methodologies, and only one focuses on the direct link between individuals' production and perception (Mazzaro & González de Anda). Nonetheless, the notion that production and perception are inherently connected is implicit in all chapters, and even explicitly mentioned in others. For example, Bolyanatz and Rogers assume "...a close connection between individuals' speech production and perception" (p. XX) in their study on intervocalic /k/ voicing, and Schmidt argues

that contact with regional varieties that produce [ʃ] can account for individual differences in linguistic perception. Similarly, López Velarde and Simonet (this volume) argue that in contexts of sociophonetic variability, individual members of a speech community may store more than one phonetic variant in their mental representations, with one variant taking precedence over time. They emphasize the need to consider whether there are differences in an individual's production and perception patterns before advancing claims about phonological representations, and in the remainder of Section 3.1, we explore this critical link between production and perception in greater detail.

The production-perception link is critical for understanding the role of the individual listener/speaker in sound change; it therefore represents a promising avenue for continued exploration. Within this research program, the question of how the listener might initiate change can be approached through two different lenses. First, Ohala (1981, 1993) has proposed a model of listener-based sound change centered on a listener's misperception of the articulatory source of contradictory (or overlapping) acoustic information. In normal communicative contexts, listeners can correctly attribute the effects of temporally overlapping articulatory gestures to their respective sources through perceptual compensation (e.g., Mann & Repp, 1980). However, in some cases, the listener may fail to compensate for overlap produced by the speaker's articulatory gestures, and thus misperceive the effects that arise from one articulatory source as being due to a different source in the vocal tract. Sound change, therefore, initiates at the level of listener (mis) perception, with the listener incorrectly attributing the overlapping properties of the acoustic signal.

An alternative view comes from Beddor (2009, 2012, 2015), who proposes a mechanism for sound change that does not rely on listeners' misperception as the necessary source of linguistic change. Rather, Beddor leans heavily on the notion of phonetic cue weighting, such that "the perceptual weights that listeners assign to the covarying phonetic properties for a phonological contrast will be manifested in those individuals' productions of that contrast" (Beddor, 2015: p. 6). In other words, a language user's perceptual judgments of particular phonetic variants should correlate with their production of these variants. According to Beddor, an important first step of sound change occurs when the articulatory source of an acoustic output and its phonetic effects begin to exhibit a trading relationship with one another. At this point, a listener may correctly perceive a phonetic effect but may attribute it to an articulatory gesture that is different from the sound's origin. A concrete example is that of potential listener confusion when interpreting phonetically nasalized [ṼN] sequences. While hearing the phonetic segment [Ṽ], a listener may incorrectly attribute the coarticulatory effect derived from the /N/ to the /V/ that precedes it, causing a sound change in the mind of the listener.

Beddor's theory of listener-based sound change does not exclude the possibility of misperception, but Beddor proposes that sound change can occur even when speech is accurately perceived. In Beddor's model, listener-based sound change occurs when listeners perceive acoustic output with a different weighting between co-varying articulatory properties than was originally produced by the speaker.

Beddor (2015) offers analysis from one representative project that explores a relatively stable pattern of coarticulatory variation in American English. Specifically, Beddor and colleagues used an eye-tracking paradigm to investigate participants' use of coarticulatory information to anticipate upcoming nasal consonants. In addition, they examined each participant's production of these forms by recording their speech of CVNC and CVC words from the perception study. Their perceptual findings show that there is variability in the individual listener's usage of coarticulated $[\tilde{V}]$ as a cue to an upcoming nasal consonant. Though it was a reliable predictor for some, this was not the case for all participants. Further analysis of the participants' production and perception measures showed a promising trend whereby those who heavily coarticulated their vowels were also especially perceptive of $[\tilde{V}]$ in the eye-tracking paradigm portion. Findings such as these bring to the fore the importance of exploring the production-perception relation at the level of the individual language user.

3.2 The role of the production-perception relationship in sound change

There is much potential for future research in sociophonetic perception to investigate how data from Spanish (and the many sub-varieties therein) can offer implications for the differing views of listener-based perception outlined in Section 3.1. Research published in 2018 has begun to offer new strategies for continued exploration. For example, Carignan (2018) used acoustic (F1 frequency) and articulatory (degree of nasalization, tongue height, breathiness) data gathered from speakers of French, in a study focused on the oral-nasal phonological contrast in this language. The French-speaker recordings were then presented to nine Australian English listeners, who completed an imitation task. The data from the English participants were subsequently submitted to articulatory and acoustic analysis equal to that of the original French speakers. Carnignan's results suggest that, although the English-speaking French imitators used different articulatory movements during the imitation, they successfully reproduced the acoustic distinctions made by the original French speakers. Carnignan's results offer some support for Beddor's notion of perceptual cue re-weighting, since the English imitators obtained the same acoustic (F1) outcomes that the native speakers of French produced.

In another study, Coetzee et al. (2018) focused on the perception and production of a sound-change in progress which involves tonogenesis in Afrikaans.

Specifically, Afrikaans, which until recently was understood to provide contrasts between prevoiced and voiceless unaspirated stops through voicing, is currently undergoing a sound change whereby the prevoicing of phonologically voiced stops is not realized through voicing. Instead, the F0 contour of the post-stop vowel provides this distinction (the F0 is higher for voiceless than for phonologically voiced consonants). Coetzee et al.'s study of sound change involving tonogenesis shows that Afrikaans-speaking listeners were also variably attentive to phonetic information – in this case, to prevoicing information when differentiating voiced from voiceless stops. Whereas for some listeners (mostly older in age), prevoicing overrode post-stop F0 cues, for other (mostly younger) listeners, prevoicing carried little perceptual weight. A critical outcome of this study is that the younger listeners were more likely to produce the phonological contrast through F0 cues than through prevoicing. These findings are reminiscent of those of Lipski (this volume). Specifically, Lipski shows that there is a subtle, but important, role for Palenquero-Spanish phonological predictability in language identification, with enhanced importance for young L2-Palenquero speakers. A next step in the work on Palenquero Spanish might be to offer a detailed integration of individual language users' production and perception data.

The findings of research like those of Carignan (2018) and Coetzee et al. (2018) create space for explorations into theoretical proposals put forth on the origins of sound changes in other languages. One possible avenue for exploration is the Spanish phenomenon of the coda /s/-lention. Coda /s/ is perhaps the most researched sociolinguistic variable in the Spanish sound system (e.g., Carvalho, 2006; Cedergren, 1973; File-Muriel & Brown, 2011; Lipski, 1984, 1994; Terrell, 1981), and recent instrumental analyses have focused on the acoustic properties of /s/ + voiceless stop sequences (i.e., /sp st sk/ clusters) in Andalusian Spanish. In this variety, speakers produce /sp st sk/ clusters with longer voice onset time than in intervocalic stops, especially when the fricative is deleted prior to the stop closure (Parrell, 2012; Ruch & Harrington 2014; Torreira, 2006, 2012). For instance, although a word like /pasta/ can be variably pronounced as [pasta] or [pahta], [pat^ha] with post-aspiration is most common. Using notions derived from Articulatory Phonology (Browman & Goldstein, 1989, 1991, 1995), Torreira (2012) and Parrell (2012) suggest that post-aspiration occurs when the trading relation between the glottal spreading of phonological /s/ and the oral closure of the voiceless stop shifts from anti-phase (sequential) to in-phase (simultaneous) (cf. Ruch & Harrington, 2014).

Critically, most research on Spanish coda /s/ relies on acoustic data through production experiments (e.g., Erker, 2010; Henriksen & Harper, 2016). Ruch and Harrington (2014) present data on production and perception of /st/ clusters in two sub-varieties of Andalusian Spanish, but the link between a particular

individual's production and perception outcomes was not the focus of their study. In order to maximize results, a melding of these two techniques is needed. A closer integration of data from production (articulation and acoustics), as well as from perception of individual speakers, presents yet another fruitful direction for future research. Such research could additionally speak to broader ideas in linguistic theory and sound change, along the lines of the analyses put forth in Carignan (2018) and Coetzee et al. (2018), and expound on theoretical arguments put forth in papers like Torreira (2012) and Parrell (2012). The next stage of Spanish sociophonetic research should employ new methodologies that combine data from individual language users' perception and production abilities through multi-faceted experimental paradigms.

Exploring the myriad non-linguistic factors that mediate the perception-production relationship is another promising direction, as these factors also contribute to language variation and change. Beddor (2015) provides several avenues for future research, stating that:

Many non-phonetic factors also mediate the perception-production relation, especially when that relation is assessed from the perspective of the initiation of sound change. Study of language users' cognitive processing styles (Yu, 2010, 2013) and the work of many researchers on social influences on accommodation (Pardo, 2006) and sound change (Foulkes et al., 2010) all point towards influences that may heighten or attenuate the perceivers' attention or speakers' articulatory adjustments. (p. 7)

For example, ongoing research by Beddor and colleagues (see Beddor, 2015) explores whether the trading relations that are to be expected between production and perception could be overridden if a particular phonetic effect exhibits social stratification in the target language. To illustrate, although in American English coarticulatory nasalization is socially neutral, in Afrikaans it carries social meaning whereby speakers from different ethnic groups produce systematically different patterns of nasalization. The phenomenon of /s/-weakening (offered from Andalusian Spanish in this section) might help to complement the data from Beddor's research.

In the case of Spanish coda /s/, one recurrent outcome from varieties of Spanish that exhibit /s/-lenition is that female speakers favor retention, whereas male speakers favor lenition (e.g., File-Muriel, 2010; Fontanella de Weinberg, 1973; Momcilovic, 2009; Stewart, 1999; Terrell, 1981). Perceptual research shows that in spite of speaker and listener origin, /s/ lenition is linked to male heteronormativity (Chappell, 2016, 2019; Mack, 2011; Walker et al., 2014) as well as higher evaluations of heteronormativity (Mack, 2011; Walker et al., 2014), illustrating how observed patterns of sociolinguistic production can inform perception. However,

little is known about how cognitive processing styles or accommodation intersect with this production-perception relationship, and incorporating additional non-linguistic factors in future analyses can illuminate the path of phonetic variation and sound change.

4. Conclusion

In this epilogue, we first reviewed some of the main commonalities among the contributions of this volume. This afforded us the opportunity to propose avenues of research for sustained work in the field of Spanish sociophonetic perception. Specifically, suggestions were offered for future work involving vocalic variation as it relates to bilingual and monolingual communities, as well as prosodic variation as it relates to dialect perception. From a theoretical perspective, we have offered recommendations for incorporating data extracted from Spanish into current debates regarding sound change, and the role that individual listeners play in the production-perception link. One caveat for some of the suggestions proposed here (especially those proposed in Section 3) is that they are best carried out in a laboratory setting, which may not be ideal given the restrictions of time, travel, and speaker recruitment. For example, García (this volume) elicited data from an impressive sample of 219 listeners using social-media platforms – this may not be entirely possible using controlled, experimental designs. Ultimately, researchers in Spanish sociophonetics should make decisions about data collection that relate directly to the empirical questions and/or hypotheses that drive their research programs.

Together, the contributions included in this volume have laid the groundwork for sustained growth in the area of Spanish sociophonetic perception. Future research should build upon this foundation, investigating vocalic variation and prosody as well as using innovative experimental paradigms to advance linguistic theory. Such research can shed light on the role of the production-perception relationship in language variation and change.

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This book provides a cutting-edge exploration of the social meaning of phonetic variation in the Spanish-speaking world. Its 11 chapters elucidate the ways in which listeners process, perceive, and propagate phonetically motivated social meaning across monolingual and contact varieties, including the Spanish spoken in Spain (Asturias, Catalonia, and Andalusia), Ecuador, Colombia, Argentina, Chile, Mexico, and the United States. The book presents a wide variety of new and innovative research by renowned scholars, and the chapters examine issues like the influence of visual cues, bilingualism, contact, geographic mobility, and phonotactic predictability on social and linguistic perception. Additionally, the volume engages in timely discussions of intersectionality, replicability, and the future of the field. As the first unified reference on Spanish sociophonetic perception, this volume will be useful in graduate and undergraduate classrooms, in libraries, and on the bookshelf of any scholar interested in Spanish sociophonetics.

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