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Grammar and Cognition

Dualistic models of language structure and language processing

Edited by

Alexander Haselow

Gunther Kaltenböck

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Preface

This volume has its origin in an international workshop held at the University of Rostock on 1–2 March 2018 with the title *One Brain-Two Grammars? Dualistic Approaches to Language and Cognition*. The aim of the workshop was to bring together researchers from different research fields to discuss evidence for and against dualistic approaches to linguistic structure, language processing and cognition. We are greatly indebted to all the participants of this workshop, both the speakers for their presentations and the members of the audience for the stimulating and constructive discussions.

The written versions of the papers have gone through a selective peer-reviewing process with each chapter having been reviewed anonymously by two referees as well as the editors. We would like to thank the contributors for their patience and excellent cooperation in the reviewing process and we are extremely grateful to all the external reviewers for their time and expertise, namely Karin Aijmer, Mathieu Avanzi, Laurel Brinton, Andreas Buerki, Ludivine Crible, Liesbeth Degand, Lachlan McKenzie, Günther Radden, Nikolaus Ritt, Stefan Schneider, Elizabeth Traugott, Alison Wray, Vitor Zimmerer.

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Münster (Germany), Graz (Austria), May 2020
Alexander Haselow, Gunther Kaltenböck

The brain and the mind behind grammar

Dualistic approaches in grammar research and (neuro)cognitive studies of language

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1. Introduction: Two traditions of grammatical research

Grammar researchers are not primarily concerned with what happens in the minds or brains of language users but rather with 'evidenced language behavior': in the study of grammar, the linguist attempts to understand and explain the structures in language using 'off-line' data coming from introspection (e.g. intuitions on grammaticality), elicitation experiments, or the analysis of either written records of language or transcripts of spoken language. This information may then be used to speculate on possible mental and neural correlates of grammar, but they do so indirectly, through the process of inference. In contrast, cognitive and neuroimaging approaches access these cognitive and neurological data more directly by using 'online' brain measurements or behavioral patterns, which provide immediate access to the underlying cognitive and neural processes involved in the production and processing of language.

This volume intends to bring both research traditions together, based on our conviction that each approach can enrich and fertilize the other: results deriving from off-line, product-based data can provide important theoretical underpinnings relevant for investigations into the underlying neurocognitive processes, and the study of neurocognitive processes can show how and why the 'products' have the shape they do under the processing constraints inherent in participants. In this respect, we follow other, more recent lines of research on modelling grammar which exhibit an increasing reorientation from pure theory-internal toward cognition-based approaches (e.g. Chafe 1994; Auer 2009; Boye and Harder 2012; Heine et al. 2017; Ullman 2015; Haselow 2017; Heine 2019; Boye and Bastiaanse 2018). Such approaches come in different guises, ranging from memory-based accounts of linguistic structure and language processing (e.g. Roll et al. 2013;

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Schremm, Horne and Roll 2015; Ullman 2004, 2015) to neuroanatomic and neurobiological studies, which focus on the processes underlying language use and comprehension (e.g. Friederici et al. 2006; Van Lancker Sidtis 2004, 2009).

The present volume is devoted to a discussion of what we call the *Cognitive Dualism Hypothesis* (CDH). The central idea of this hypothesis, which has been proposed and discussed in various lines of recent linguistic, psychological and neurological research, is that human cognitive activity in general and linguistic cognition in particular cannot reasonably be reduced to a single, monolithic system of mental processing, but that they have a dualistic organization. Such a dualism has been proposed, for instance, in psychological work on brain activity (Kahneman 2011), in psycholinguistic research on text comprehension (Kintsch 1988; Gernsbacher 1990; Graesser et al. 1994; Greene et al. 1992; McKoon and Ratcliff 1990, 1992, 1998; Prat et al. 2007), in neurolinguistic research on linguistic processing (Bahlmann, Gunter and Friederici 2006; Van Lancker Sidtis 2004, 2009; Sidtis and Van Sidtis 2018) and discourse production (Sherrat and Bryan 2012), in linguistic work on performance (Clark 1996; Clark and Fox Tree 2002), on syntax (Kac 1972), on speech act formulas (Pawley 2009), on discourse organization (Kaltenböck et al. 2011; Heine et al. 2013), on the analysis of conversations (Haselow 2016a, 2017), and on bilingualism (Maschler 1994; Heine 2016). The dualism is reflected in distinctions such as the ones listed in (1).

(1) a. novel speech vs. formulaic speech
b. analytic processing vs. holistic processing
c. propositional representation vs. discourse representation,
d. linear-hierarchical structures vs. linear (flat) structures
e. structural integration vs. structural aggregation
f. sentence grammar vs. thetical grammar
g. microgrammar vs. macrogrammar
h. clausal constituents vs.extra-clausal constituents

However, as the term "hypothesis" implies, the debate is open to evidence for and against the hypothesis. This volume thus does not engage in a hidebound defense of dualism, but brings together authors from different research fields who found supportive evidence for the CDH in their data while also accommodating critical views.

The distinctions presented in (1) derive from a wide range of methodological approaches and theoretical frameworks, but there is a more general assumption underlying them which we will take up and develop further with this volume: whatever the specific conceptualization of a dualistic organization of language structure and linguistic processing may be, we can safely assume that it has a cognitive basis. In other words, language use and behavior may be accounted for in independent theories, but these theories in turn will ultimately have to be based on a theory of how language users perceive, interpret, mentally represent, memorize, evaluate, plan, produce and understand linguistic discourse more generally. This topic thus invites a cross-disciplinary approach involving a broader range of research fields that deal with the relation between language and cognition. These include, next to linguistics, cognitive psychology, psycholinguistics and neurolinguistics. The present volume wants to take a step toward overcoming scientific departmentalism and bringing together theoretical approaches and empirical findings from a wide range of research fields and methodological approaches.

The contributors to this volume all participated in an international workshop titled *One Brain-Two Grammars? Dualistic Approaches to Language and Cognition*, held at the University of Rostock on 1–2 March 2018. The aim of the workshop was to bring together researchers from different fields to discuss evidence for and against dualistic approaches to language structure and language processing. This is, as mentioned above, also the aim of this volume, which presents a cutting-edge discussion of dualistic approaches more generally as well as studies of specific linguistic phenomena and their relation to dualistic models. This volume therefore sees itself as making a timely contribution to an ongoing and pertinent discussion in linguistics with a view to enhancing our understanding of how language is organized in the brain.

The volume consists of two parts. **Part 1** focuses on the description and evaluation of different dualistic approaches to language and cognition. It includes a paper on the dual process model (i.e. novel vs. formulaic language) (Van Lancker Sidtis), an overview paper which reviews different dual-process frameworks of reasoning and linguistic discourse (Heine, Kuteva and Long), a paper which models the relationship between grammar, (discourse-)pragmatics and processing operations in the two hemispheres of the brain (Guryev and Delafontaine), and a paper which argues in favour of a declarative memory/lexicon vs. procedural memory/grammar distinction (Harder and Boye). **Part 2** is dedicated to the analysis of specific linguistic structures in the light of dualistic approaches to grammatical knowledge, viz. pragmatic markers and particles (Izutsu and Izutsu), comment adverbs (Keizer), formulaic language (Kaltenböck), local and global structures in (spoken) discourse and interaction (Haselow), and dualistic syntactic processing of syntactic groups (Drienkó). The focus is on English, with some contributions including references to other languages, mainly to West-European and East Asian languages. We will provide a more detailed overview of the different chapters in Section 5. First, we will show how exactly the findings generated in the different fields are converging into relatively robust evidence for dualism in human cognition in general and linguistic cognition in particular.

2. Linguistic approaches to dualism

Dualistic distinctions are central in a number of linguistic frameworks and appear under a number of different guises, such as the representational vs. interpersonal level of language structure in Functional Discourse Grammar (Hengeveld and Mackenzie 2008, 2010), conceptual vs. procedural meaning in Relevance Theory (Wilson and Sperber 1993; Blakemore 2002; Ifantidou-Trouki 1993), analytic vs. holistic mode of processing (Pawley 2009), the open choice vs. idiom principle (Sinclair 1991), languaging vs. metalanguaging (Maschler 1994, 2009), primary vs. collateral track (Clark and Fox Tree 2002), microstructure vs. macrostructure (van Dijk 1980), intradiscursory vs. extradiscursory clauses (Kac 1972), clausal vs. extra-clausal constituents (Dik 1997), micro-syntax vs. macro-syntax (Blanche-Benveniste et al. 1990; Debaisieux 2007, 2018; Deulofeu 2017; Berrendonner 1990, 2003; Cresti 2000), microgrammar vs. macrogrammar (Haselow 2013, 2016a, 2016b, 2017), and sentence grammar vs. thetical grammar (Kaltenböck et al. 2011; Heine et al. 2013). For a discussion and a comparison of some of these frameworks see Heine (2019) and Heine, Kuteva and Long (this volume.)

Although these approaches differ from each other in a number of ways, they share the basic idea of an underlyingly dualistic organisation of linguistic discourse and the conviction that both components are involved, in a complementary fashion, in linguistic communication. What are then the main distinguishing criteria of the two domains? While a detailed discussion of the proposed distinctions is beyond the scope of this chapter, it is possible to identify some "hallmarks" of each of the two domains which are shared by most frameworks. For ease of reference, we will refer to them here as the micro and the macro domain respectively.

The micro domain covers what is commonly referred to as sentence grammar (cf. also Kaltenböck et al. 2011). It involves the expression of meaning in propositional format, typically events, states, or relations (see Heine 2019: Section 2.2.1.). Structurally, the micro domain covers sentence-internal relations and the arrangement of constituents in hierarchical order (e.g. Haselow 2017: Chapter 3). This requires knowledge of constituent structure and the morphosyntactic conventions of dependency relations and syntactic embedding. Its biggest achievement is arguably its ability to create a textual world of its own, which can be largely independent from situational and discourse context and the real world.

The macro domain, on the other hand, is more immediately tied up with the actual situation of discourse and the context of the speech event. It thus covers linguistic phenomena that have traditionally been 'outsourced' into the pragmatic domain, such as formulaic speech, pragmatic markers, and discourse structure. While the micro domain is concerned with the expression of propositions, the macro domain is responsible for relating them to the hearer and the situation of discourse, expressing communicative intents and cognitive states of the speaker and organising the larger discourse in to a coherent whole, or as Heine (2019: 420) puts it: "macrostructure provides a frame and global coherence to texts". As such, the macro domain is concerned with grammatical relations across sentences and larger text units and operates on serialization principles which involve speech planning, processibility, textual coherence and contextual embeddedness (cf. Haselow 2017: 103–104; Heine, Kuteva and Long, this volume).

The function of the macro domain, particularly with reference to discourse markers, has also been described as metatextual (Traugott 1995), metacommunicative (Frank-Job 2006: 397), meta-linguistic (Blakemore 2007: 313), metadiscursive (Degand and Evers-Vermeul 2015: 67), and as 'metalanguaging' about 'languaging' (Maschler 1994, 2009). In the framework by Van Dijk (1980: e.g. 27), macrostructures, more generally, are higher-level semantic structures that are responsible for organising the 'local' microstructures. Similarly, in Haselow's (e.g. 2013, 2016a, 2016b) view macro domain elements are procedural in meaning and as such play an important role in establishing textual coherence and providing interpretive information relevant to the interlocutor on the interactional and textual level.

As one of the early attempts at a more comprehensive description of the functional potential of the macro domain, Dik (1997: 384–387) identifies the following main functions for his category of Extra Clausal Constituents: (i) Interaction management, "the creation and maintenance of the interactional conditions which must be fulfilled for a discourse event to be implemented" (e.g. greetings, summonses, addresses), (ii) Attitude specification, "the emotional/attitudinal tone in which the discourse is carried out" (e.g. *damn it!, ouch! hurray!*), (iii) Discourse organization, "the organization, the structuring, and the presentation of the discourse content"(e.g. *well, by the way, okay*), and (iv) Discourse execution, "the expression of the actual content of the discourse" (Dik 1997: 384) (e.g. responses such as *yes, no, perhaps* and *question tags*). In a similar vein, the framework of Discourse Grammar (Kaltenböck et al. 2011; Heine et al. 2013) identifies six interrelated components of the situation of discourse that the macro domain (in their terminology Thetical Grammar) relates to: Text organization, Attitudes of the speaker, Speaker-hearer interaction, Source of information, Discourse setting, and World knowledge (see also Heine, Kuteva and Long, this volume, Kaltenböck, this volume).

When it comes to the identification of linguistic elements of the macro domain the different frameworks vary. In contrast to the micro domain, which can be described in terms of sentences, clauses, clausal segments and phrases (i.e. sentence grammar), the macro domain seems to accommodate a more diverse set of elements, ranging from single words to longer, mainly formulaic structures, and is, as such, less clearly delimitable. A useful description of typical properties of macro elements is, once again, provided by Dik (1997: 380–381) in his discussion of his category of extra clausal elements. They are noted to have the characteristics listed in (2).

(2) a. They either occur on their own, or are typically set off from the clause proper by breaks or pause-like inflections in the prosodic contour.
b. They are never essential to the internal structure of the clause with which they are associated; when they are left out, the clause still forms an integral whole.
c. They are not sensitive to the grammatical rules which operate within the limits of the clause, although they may be related to the clause by rules of coreference, parallelism, and antithesis.
d. They are especially common in the spoken register.
e. They are typical of linguistic expressions in ongoing discourse.
f. They are rather loosely associated with the clause, and cannot easily be described in terms of clause-internal rules and principles.
g. They can only be understood in terms of pragmatic rules and principles.

Typical examples of linguistic elements belonging to the macro domain include thus, in addition to the aforementioned discourse markers, a wide-ranging and motley crew from vocatives, interjections, final particles to formulaic language, question tags, and parentheticals, depending on the specific details of delimitation of each framework (see also the contributions in part II of this volume, especially Izutsu and Izutsu, Keizer, Kaltenböck, and Haselow). But the macro domain is generally seen as more than simply an inventory of specific, more or less fixed expressions. It also includes the speaker's ability to organise and design discourse beyond the sentence level (see Heine, Kuteva and Long, this volume), for instance the ability to linearize microgrammatical segments (e.g. phrases, clauses, elliptical structures, dislocated units) into a structured unit of talk (Haselow 2017: Chapter 3.3).

In sum, the micro and the macro domain constitute two complementary, yet highly interactive, systems which are available to speakers to design their discourse and, as such, ensure successful communication. They are characterised by a division of labour with the micro domain operating on the sentential, propositional level and the macro domain operating on the higher level of discourse planning, discourse organization and interaction management, relating the speaker's contributions to the immediate situation of discourse, particularly to the addressee(s) communicative needs and the larger co- and context. This suggests a basic asymmetry between the two domains in the sense that the micro domain is generally seen as more basic or 'primary' with the macro domain adding a meta-communicative or meta-linguistic level. Such a view is particularly obvious in Clark and

Fox Tree's (2002) distinction of a primary vs. a collateral track of communication, where the former represents 'basic communicative acts' and the latter backgrounded signals and 'meta-communicative acts', such as asking for confirmation or inviting completions, providing acknowledgements. A certain imbalance between the two domains can also be found in Discourse Grammar (Kaltenböck et al. 2011; Heine et al. 2013), where elements of the macro domain (Thetical Grammar) are assumed to be recruited from the micro domain (Sentence Grammar) via cooptation (Heine et al. 2017). However, this does not imply communicative primacy of the micro domain. On the contrary, both domains are taken to operate on the same level of linguistic processing, and successful communicative interaction requires the ability to integrate both components during the production of an utterance.

The various dualistic frameworks proposed in linguistics may differ in the specific details and theoretical assumptions of their approaches but, overall, they provide a fairly coherent rationale and robust evidence for an underlying dualism in discourse processing. The distinction of a micro and a macro domain in discourse structure has been further corroborated by research on mental and brain activity, which will be discussed in the following two sections.

3. Psychological approaches to dualism

Based on experimental evidence from language-impaired subjects it has often been suggested that the two memory systems involved in processing incoming information, *procedural* and *declarative* memory, exhibit a division of labor as regards language use and language processing (e.g. Ullman et al. 1997; Ullman 2004). The declarative system involves the explicit knowledge of meanings (semantic memory) derived from conscious experience, the knowledge of what things mean, which can be brought to and is available to consciousness. Procedural memory, on the other hand, refers to motor routines developed through usage or performance events, and thus to the tacit or implicit knowledge of *how* things are done.

Arguably, this dualism carries over to linguistic dichotomies, such as the one between the lexicon as the store of linguistic expressions from which speakers retrieve lexical items or pre-fabricated (holistic, idiosyncratic) chunks of language, and grammar as a rule-based system requiring automatized behavior and largely subconscious operations based on tacit knowledge involving procedural memory (see Boye and Harder, this vol.). The two memory systems can also be related to the distinction in linguistics between formulaic units, which are subjected to holististic processing under a noncompositional or not fully compositional meaning, and *novel units*, which involve analytic processing based on combinatory routines (see Van Sidtis, this vol. and Kaltenböck, this vol.). This division of labor is certainly far from absolute, given the gray zones between e.g. free combinatory and fixed holistic units. Moreover, each of the memory types involves mechanisms of the other types: for instance, lexical retrieval from declarative knowledge is certainly procedural, whereas procedural combination of, for instance, verbs and their arguments draw, to a certain extent, on declarative knowledge of inherent features of verbs, such as transitivity. Much cognitive activity is thus taking place between two modes, which are interacting in ways that cannot be captured by a simplistic dualism model alone.

Problems and deficits in specific language impairment (SLI) have often been associated with impaired procedural memory but not declarative memory given that, as a general tendency, grammatical knowledge is more affected than lexical knowledge in children with SLI (e.g. Lum and Bleses 2012). This suggests that lexical knowledge, which is associated with declarative memory, may remain relatively unaffected while grammatical performance, which correlates with procedural learning and memory, is strongly impaired.

A different line of research on dualistic ways of organizing mental representations concerns text comprehension: in some lines of psycholinguistic research a distinction is made between a *propositional representation* of text and a so-called *discourse model* (e.g. Gernsbacher 1990; Graesser et al. 1994; Greene et al. 1992; McKoon and Ratcliff 1990, 1992, 1998; Prat et al. 2007). Propositional representation concerns the organization of single propositions or ideas derived from a text under a coherent whole, based on the constuction of a network of interrelated, primarily referential ideas. Discourse model concerns the integration of text information with world knowledge and inferred meanings under a more global, coherent representation of what a text is about (see also Heine, Kuteva and Long, this vol. and Haselow, this vol.).

Dual-process theories play a central role in cognitive and social psychology more generally. They have been developed particularly since the 1970s by researchers on various aspects of human psychology, but the general idea has been shown to go back centuries (see Evans 2008; Frankish and Evans 2009; Frankish 2010, and Heine, Kuteva and Long, this volume, for overview surveys). Such dual-process views have been proposed for a number of cognitive tasks such as decision making, deductive reasoning as well as social judgment and come in various forms (e.g. Evans 2008). What they have in common is the assumption of two distinct processing modes being involved in carrying out these tasks, each fundamentally different from the other: One type of process is typically described as "fast, effortless, automatic, nonconscious, inflexible, heavily contextualized, and undemanding of working memory" (Frankish and Evans 2009: 2), while the other is characterised as "slow, effortful, controlled, conscious, flexible, decontextualized, and demanding of working memory" (ibid.).

Dual-process theories relating to specific cognitive tasks have further been expanded into larger and all-encompassing theories about the human mind in general, often referred to as dual-system theories (e.g. Frankish 2010; Evans 2008, Heine, Kuteva and Long, this volume).[1] Dual-system theories, in other words, relate the two types of processes to two separate reasoning systems or cognitive systems, generally called System 1 and System 2, which are thought to be architecturally and evolutionary distinct (e.g. Evans 2003; Evans and Over 1996; Stanovich 1999, 2004). This view is also known as 'the two minds hypothesis' (e.g. Frankish 2010: 914, Frankish and Evans 2009). System 1 is usually described as having fast-process characteristics (viz. fast, effortless, automatic, nonconscious, etc.), and System 2 as having slow-process characteristics (viz. slow, effortful, controlled, conscious, etc.) (e.g. Evans and Over 1996; Sloman 1996; Stanovich 1999, 2004). System 2 is also claimed to be evolutionary more recent and unique to humans, where it represents the source for decontextualized abstract thinking in accordance with logical norms (Frankish 2010: 914).

Depending on the specific framework, different characteristics have been attributed to each of the two systems. A useful overview of features is provided by Frankish and Evans (2009: 15), repeated in Table 1 (for further overviews see

Table 1. Features attributed by various theorists to the two systems of cognition (from Frankish and Evans 2009: 15)

System 1	System 2
Evolutionary old	Evolutionary recent
Unconscious, preconscious	Conscious
Shared with animals	Uniquely (distinctively) human
Implicit knowledge	Explicit knowledge
Automatic	Controlled
Fast	Slow
Parallel	Sequential
High capacity	Low capacity
Intuitive	Reflective
Contextualized	Abstract
Pragmatic	Logical
Associative	Rule-based
Independent of general intelligence	Linked to general intelligence

1. The terms dual-processes and dual-systems are not used consistently in the literature, as pointed out, for instance, by Evans and Stanovich (2013: 224–226), who also provide a useful comparison table of different terms.

e.g. Frankish 2010: 922, Evans 2008: 257). Heine, Kuteva and Long (this volume) found a total of more than two dozen features used to describe the difference between the two systems.

The dual-system view has recently been popularised by Kahneman (2011), who argues for two different modes of thought, System 1 and System 2. The former is fast, mainly unconscious, effortless, intuitive, associative, metaphorical, impressionistic, and sensitive to subtle cues from the environment, while the latter is slow, deliberate, effortful, and laboriously checks the facts (Kahneman 2011: 24–26, see also Kahneman and Frederick 2002; Heine, Kuteva and Long, this volume). The two systems are thought to interact in such a way that System 1 is usually activated first and System 2 tends to accept what System 1 tells it (Kahneman 2011: 24).

Both the dual-process and the dual-system theory have, however, also met with criticism. Evans and Stanovich (2013: 227–235), for instance, identify five major themes in the leading critiques: (i) multiple and vague definitions, (ii) attribute clusters associated with each system do not consistently hold together, (iii) there is a continuum of processing types rather than distinct processes, (iv) single-process accounts can be offered for what seem to be dual-process phenomena, (v) the evidence is questionable (cf. also Evans 2012). In their assessment of the criticism Evans and Stanovich (2013: 235) concede that some of the arguments raise valid points but, overall, they believe them to be overstated. They argue that there is sufficient evidence in cognitive science, particularly from neuroscientific studies using neural imaging, to support the dual-processing distinction. Their own preferred theoretical approach is consequently outlined as

> one in which rapid autonomous processes (Type 1) are assumed to yield default responses unless intervened on by distinctive higher or reasoning processes (Type 2). What defines the difference is that Type 2 processing supports hypothetical thinking and load heavily on working memory. (Evans and Stanovich 2013: 223)

Dual-processing accounts of human behaviour, no doubt, play a central role in cognitive and social psychology, critical views notwithstanding. It is also a field of research that is still very much in flux and can be expected to evolve further in the coming years, particularly along the following three lines of research, identified by Frankish and Evans (2009: 23): (i) a revision of the original framework which recognises the diversity of the processes in the two systems and moves away from a definition in terms of processing styles involved (heuristic and associative vs. analytic and rule-governed), (ii) increasing integration between dual-process theories in different fields, and (iii) the application of dual-process theory in other areas, such as neuropsychology and neuroscience.

To what extent dual processing accounts can also be applied to linguistic research remains to be seen. It is, however, not difficult to see some associations of

System 1 and System 2 with particular linguistic structures and forms of language processing. For instance, the distinction between automatic, unconscious and fast processing (System 1) and controlled, conscious and slow(er) processing (System 2) is reflected in the use of highly automatized forms of speech, such as interjections or expletives, as opposed to the more controlled construction of syntactic units, which is based on the syntactic and morphological machinery to relate constituents to one another. Moreover, interjections can be regarded as the codification of emotions in analog terms (showing), which is opposed to the rational expression of emotions by means of codification in words and sentences (verbalizing) (see Sebeok 1972: 10). Showing emotions (e.g. by means of interjections) can be plausibly related to the phylogenetically ancient limbic subcortical circuitry linked with emotion, and can be contrasted with verbalization by means of language, which involves more recent cortical structures in the neocortex (Wharton 2003: 89). Following this line of thinking, System 1 and System 2 can be conceived of as representing parallel, but interacting 'modes' of structuring and processing linguistic discourse.

4. Neurological approaches to dualism

The distinction between microstructural and macrostructural processing discussed above shows significant neurolinguistic correlations: recent lines of research in the neurocognition of language provide evidence for neuroanatomical differences associated with the processing of different types of language structure and structural elements in language. This evidence refers to two different, but related observations: (i) the cortical areas involved in the processing of syntactic-semantic structures are not exactly the same as those associated with the processing of higher-level pragmatic and discourse-structural aspects, and (ii) there is differential processing as regards the kind of linguistic material to be processed: the processing of clausal constituents and semantic relations ('novel speech'), which is based on propositionality, differs neuroanatomically from the processing of material that typically serves the structuration of language outside the prior domain, for instance on the pragmatic, discourse-organizational and interactional level, involving a considerable amount of 'formulaic speech'.

As regards (i), there is general agreement that the left cerebral hemisphere (LH) is language dominant as it hosts the main areas that are essential for syntactic and semantic processing. The areas identified thus far are (i) the frontal operculum, which is mainly associated with predicting upcoming elements, checking incoming elements against predicted elements on the basis of simple probabilities, and detecting ungrammaticalities, (ii) Brodman area BA 44 and the posterior part of BA 45, which mainly subserve syntactic processing, and (iii) Brodman area 47 and the anterior part of BA 45, which are strongly associated with logical-semantic processing (Friederici 2004; Hagoort 2005; Friederici et al. 2006; Bahlmann, Gunther and Friederici 2006; Vigneau et al. 2006; Brauer and Friederici 2007; Pallier, Devauchelle and Dehaene 2011). Extensive research on patients with LH or right-hemisphere (RH) impairment and neuroimaging studies have expanded our understanding of the brain areas that are associated with language processing tasks. One of the best-established findings deriving from these studies is that LH impairment leads to more or less severe forms of aphasia, agrammatism, and thus serious difficulties in producing and comprehending hierarchically organized syntactic structures (e.g. Okada et al. 2013). However, these patients have preserved skills as regards their ability to process discourse structure and to produce expressions serving this function (discourse markers and response tokens such as *well, yeah, okay, but*, pieces of rote-learned or high-frequency units, formulaic chunks or 'sentence initials' such as *I don't know, I can't*; Code 1997; Sherratt and Bryan 2012), most of which is based on holistic rather than analytic processing. Speakers suffering from RH impairment, in turn, show deficits in pragmatic abilities (Parola et al. 2016). These include communicative disorders that undermine their ability to process discourse structure and develop a coherent mental model of discourse (Lehman Blake 2010), structuring of emergent talk beyond a single unit of talk by making a new contribution coherent to prior talk, to process contextual information such as inferences, distinguishing direct vs. indirect speech acts and literal vs. non-literal meanings. For instance, patients with RH impairment produce significantly more violations of discourse coherence (e.g. frequent divergence from the main point or topic, Caplan & Dapretto 2001, or diffuse ordering of events in narratives, Marini et al. 2005) than those with an intact RH, and fewer, or no, expressions of cohesion (conjunctions, DMs), whereas their syntactic skills are usually unimpaired (Brady, Armstrong and Mackenzie 2006). They have difficulties in integrating units arranged in a linear way into a coherent whole, for instance to build up a coherent mental model of discourse based on filtering relevant information and the integration of each new segment into an emergent communicative co-text (Marini 2012; Sherratt and Bryan 2012), which suggests that there is a close relationship between RH activity and processing of the macrostructure of discourse in the widest sense.

RH activity has also been shown to correlate with sociocognitive abilities, that is, with social aspects of interaction. Patients with RH damage have been reported to show an "impaired appreciation of listener needs" (Myers 1994: 520), which means that they have difficulties in taking the addressee's perspective, making judgments on his/her cognitive state in terms of shared knowledge and background assumptions, and thus in tailoring discourse to the needs of the listener (Sabbagh 1999). Tompkins et al. (2002: 435) show that RH damaged patients show deficits in the "context-appropriate social use of language" and to form representations of other people's mental state and to use them to interpret the (linguistic) behavior and communicative intentions of others (often referred to as Theory of Mind, Chapagne-Lavau and Joanette 2009). Generally, it appears that the RH dominates in the control over many aspects of social interaction, leading to inappropriate social and emotional behavior, which is predominantly associated with right frontal dysfunction (Joseph 1990: Chapter 1; Blonder, Bowers and Heilman 1991). This is reflected in difficulties mastering pragmatic aspects of language such as understanding and producing non-literal language such as irony, metaphorical language, and indirect requests (Code 1987; Happé, Brownell and Winner 1999; McDonald 1999; Griffin et al. 2006), difficulties in using formulas of social exchange (e.g. greetings, leave takings; Van Lancker Sidtis 2009) and difficulties in comprehending and responding to emotional features in speech (Devinsky 2000; Borod et al. 2002; Friederici and Alter 2004; Mitchell and Crow 2005). Linguistically, these difficulties can be expected to have an impact on forms such as interjections, expletives, stance adverbs or clausal fragments that relate an utterance to the social context and the interaction between speaker and addressee, such as *see?*, *you see* or *see what I mean*, and thus macrogrammatical forms. These difficulties carry over to structural aspects of interaction, as they also become manifest in difficulties in respecting turn-taking in conversation (Chantraine, Joanette and Ska 1998; Hird and Kirsner 2003).

These findings relate to the proposal of a dualistic conceptualization of language structure and linguistic cognition as follows: 'core-grammatical' or 'microstructural' abilities (involving syntactic and semantic processing) are typically not, or not necessarily, impaired with patients suffering from RH damage. However, this group tends to show deficits concerning the processing of more global meanings and macrostructures in language, which relates to the complex interplay of pragmatic, discourse-related and interactional aspects.[2] These findings provide evidence for a neurologically-based functional differentiation between the processing of formal relationships (syntax-semantics), on the one hand, and processing of structural relationships outside syntax and semanics, on the other hand.

This finding, in turn, is congruent with the differential processing of *novel speech* vs. *formualic speech* discussed in other chapters of this volume (see Van

2. The situation is, of course, more complex since processing activities are by no means restricted to one hemisphere. Many processing tasks have been found to involve bilateral brain activity, with different degrees of contribution of the hemispheres. Long, Baynes and Prat (2005), for instance, conclude that only the LH is sensitive to propositional relations whereas the LH and the RH were equally sensitive to discourse model relations. So while we can say that it is not only activity in the RH that allows individuals to process macrostructure, it is a task that cannot be achieved without participation of the right hemisphere.

Lancker Sidtis, Heine, Kuteva and Long, and Kaltenböck, this vol.). *Novel speech* is based on language-specific rules of morphological-syntactic combination and propositionality, while *formulaic speech* is based on routine behavior and exhibits lower or no degrees of propositionality: the meaning of formulaic expressions is situation-specific and not subjected to truth-conditionality, but to communicative appropriateness (felicity). The bulk of the evidence suggests RH dominance with the processing of formulaic expressions (Blanken 1991; Code 1997; Van Lancker Sidtis 2004, this vol., Van Lancker Sidtis and Sidtis 2018), which is heavily impaired with individuals suffering from RH lesion, but largely preserved with patients with LH damage: Case studies with patients suffering from right-sided subcortical damage document a reduced ability to produce formulaic speech (Speedie et al. 1993; Van Lancker Sidtis and Postman 2006). Conversely, formulaic expressions are a major linguistic feature in the speech produced by aphasics with LH damage (e.g. Edwards and Knott 1994; Code 1997), who, on the other hand, suffer from agrammatism and deficits in syntactic processing. Formulaic expressions thus provide important evidence for the contribution of the intact RH to linguistic abilities.[3] Recent experiments using PET functional imaging of brain regions and combinations of regions have provided further evidence. Van Lancker Sidtis and Sidtis (2018), for instance, show that the regression weights for left caudate blood flow decrease while those for the right inferior frontal increase as the percentage of formulaic expressions increases. Their findings provide evidence that greater numbers of lexical units in formulaic expressions are linearly associated with higher blood flow in the right hemisphere and decreased blood flow in the left caudate.

What is relevant for the discussion of the distinction between a microlevel and a macrolevel of linguistic processing is that novel speech is based on the machinery required for structuring speech at the syntactic and semantic level, leading to microstructures in turns and discourse. Formulaic speech, on the other hand, serves a broad range of functions outside this domain, such as the organization of discourse and conversational interaction by marking the transition to a new interactive sequence, speaker-addressee interaction (e.g. formulae of social exchange), the expression or indication of emotional stance (e.g. swearing, wishing), cognitive planning (e.g. gaining planning time through filled pauses), and maintaining conversational flow and naturalness of speech. It includes, for instance, greeting

3. The distinction between formulaic speech and novel speech in neurolinguistic research originated from preserved utterances observed in aphasia (e.g. Code 1997; Blanken 1991) and has been one of the best established clinical observations, demonstrating the capacity of the isolated RH. The residual components found in the speech of LH impaired individuals provide evidence for the assumption that speakers maintain rich representations of the details of language, based on a massive storage of exemplars of different size and schematicity (Tenpenny 1995; Goldinger 1998; Bybee 2010: 22–25) that derives from the rich experience that speakers have with language.

formulas (*How are you?, What's new?*), expletives, response particles (e.g. *right, okay*), discourse markers, sentence initials (e.g. *I can't, no don't*), verbal actions like thanking, utterance residuals (*You got it., gotcha.*), and reciting rote-learned speech. It is based on the use of more or less ready-made chunks, which are prefabricated utterances or parts of utterances that are deployed in a routinized, quasi-automatic way and that have been argued to be processed holistically (Van Lancker 1993; Code 1991; Wray and Perkins 2000). The functions of formulaic expressions have been discussed extensively in linguistic literature (e.g. Bolinger 1976; Jackendoff 1995; Moon 1998), where they are also referred to as 'conversational routines' (Coulmas 1981) or discussed under the cover term 'formulaic language' (Wray 2002; Wray and Perkins 2000). Since the structural and functional properties of novel speech and formulaic speech are reflected in a differential neuroanatomy, there is further reason to assume that language structure and linguistic cognition (with differential brain activity as the neural substrate of cognition) are organized in a dualistic way.[4]

5. The contributions to this volume

The contributions to the present volume are organised in two parts. **Part 1** is dedicated to the discussion of dualistic approaches to language and cognition more generally and their impact on a number of fields, from formulaic language (Van Lancker Sidtis), the study of reasoning and linguistic discourse (Heine, Kuteva and Long), and the distinction of microsyntax and pragma-syntax (Guryev and Delafontaine) and the lexico-grammar distinction (Harder and Boye). **Part 2**, on the other hand, subsumes studies of specific linguistic structures, namely pragmatic markers and particles (Izutsu and Izutsu), comment adverbs (Keizer), formulaic sequences (Kaltenböck), extra-clausal elements in spoken discourse (Haselow), and the processing of syntactic groups (Drienkó), whose findings are related to dualistic models of language structure and language processing.

Diana Van Lancker Sidtis reviews the concepts of formulaic expressions (idioms, proverbs, conversational speech formulas, expletives), lexical bundles (sentence stems, conventional expressions, discourse organizers), and collocations

4. Note, however, that it is difficult to draw a clear-cut distinction between LH and RH representation and to determine to which degree cortical structures in the LH are involved in the production and understanding of formulaic expressions. As pointed out by Van Lancker Sidtis & Postman (2006: 421), there is evidence from comprehension studies that some kinds of formulaic expressions, above all idioms and proverbs, are represented bilaterally in the brain (also Brownell & Joanette 1993; Myers 1999; Van Lancker 1990).

(a range of other unitary, multiword expressions), all of which are subsumed under the umbrella term 'familiar phrases'. They are instances of known (non-novel) language, which are stored holistically in mental representation with their concomitant features of structure, phonetic and prosodic shape, meaning, and can be described in terms of nuance, role of frequency, and degree of cohesion. It is shown that neurolinguistic disorders, e.g. neural dysfunctions caused by Parkinson's disease or Alzheimer's disease, affect the production of formulaic expressions and lexical bundles in different ways, which suggest that novel and familiar language are subserved by different brain hemispheres. It is finally argued that linguistic, psychological, and neurolinguistic evidence converge to support a dual-process model of language, according to which newly created, grammatical phrases and unitary, familiar phrases are acquired and processed by different cerebral mechanisms.

Bernd Heine, Tania Kuteva and **Haiping Long**'s contribution offers a detailed comparison of two lines of research concerned with mental and linguistic processing. Both of them have emerged in recent decades, with one rooted in the field of cognitive and social psychology and the other in linguistics. While the former focusses particularly on the processes involved in reasoning, judgment and decision making and relies on the methodology commonly used in psychology and related fields, the latter is concerned with linguistic discourse and language data. Interestingly, both research traditions have developed dual process frameworks, which the chapter compares on a number of analytic levels (viz. interaction between the two types of processes, context, coherence, analyzability, truth conditions, control, intuitive vs. reflective behavior) and which are shown to exhibit a number of convergences and commonalities between the two research traditions.

Following the famous macro-syntax approach developed by researchers in the Swiss *Groupe de Fribourg*, **Alexander Guryev** and **François Delafontaine** distinguish two different types of mental operations in discourse processing called micro-syntax and pragma-syntax. While micro-syntax relies purely on classical relations of dependencies leading to clause-based units, macro-syntax involves relations based on syntactic, semantic, pragmatic and prosodic criteria on the level of communicative action. It is argued that this distinction is reflected in the neurophysiology of the human brain with the left hemisphere exhibiting a strong proclivity for micro-syntactic processing and the right hemisphere for macro-syntactic processing. This hypothesis is further explored with the help of phenomena which have been reported to be underwritten mainly by the right hemisphere, namely irony, indirect speech acts, and connectives.

Peter Harder and **Kasper Boye** present neurolinguistic evidence which, they argue, is not compatible with the Construction Grammar view of a 'constructicon', where the distinction between grammar and lexicon is downplayed. Instead, neurolinguistic findings suggest a significant difference between lexical and grammatical processing, which needs to be reflected in functional-cognitive theory. The chapter sets out to present precisely such a theory by integrating three recent frameworks: a usage-based linguistic theory of the grammar-lexicon distinction (Boye and Harder 2012), a theory of the distinction between declarative and procedural memory (Ullman 2004), and a theory of brain organization (Mogensen 2011). Thus, it is argued that the division of labour between procedural and declarative memory can be reinterpreted as a framework for a functional and usage-based neurocognitive architecture which accommodates a grammar-lexicon distinction.

In Part II, **Mitsuko Izutsu** and **Katsunobu Izutsu** discuss pragmatic particles in a number of Asian and West European languages (Japanese, Korean, Chinese, Mongolian; English, Spanish, and German) from the perspective of a dualistic conception of grammar, as proposed for instance by Discourse Grammar (Kaltenböck et al. 2011; Heine et al. 2013) and macrogrammar/microgrammar (Haselow 2017). They show that these particles exhibit properties which are associated with both domains of such dualistic frameworks, rather than just being associated with the macro domain. Thus, while functionally qualifying as elements of thetical grammar and macrogrammar, they simultaneously exhibit some properties of (morpho)syntactic integration and regulation, which are reminiscent of sentence grammar and microgrammar. It is therefore argued that those pragmatic particles suggest a continuum view of the two domains rather than a strict dichotomy.

Evelien Keizer investigates the uses of parenthetical adverbs such as *frankly* and *cleverly*, which are typically analysed in terms of a dualistic view of manner adverb (i.e. micro domain) vs. parenthetical disjunct (i.e. macro domain). Moreover, previous accounts have typically focused on only one particular aspect of their use, i.e. either their discourse-pragmatic functions, their semantic properties, their syntactic behaviour, or prosodic (non-)integration. This chapter demonstrates that, despite clear instances of parenthetical uses of these adverbs, which combine syntactic non-integration with prosodic non-integration and non-truth-conditionality, we are not dealing with a binary distinction parenthetical vs. sentence grammar uses (i.e. manner adverb). Instead, it is argued that it is necessary to distinguish three separate, though interacting, dimensions, which must be kept apart and analysed separately. It is further argued that the differences and the interaction between these three dimensions can be captured particularly well by the theory of Functional Discourse Grammar with its distinction of four interacting levels of analysis and the Discourse Act (a functional unit) as its basic unit.

Gunther Kaltenböck demonstrates how a dualistic model of language organisation and processing, viz. that of Discourse Grammar, can be fruitfully applied to the classification of formulaic language. More specifically, the chapter proposes a distinction of two main categories of formulaic sequences, 'Sentence Grammar formulaic sequences' and 'Thetical Grammar formulaic sequences', with each being associated with a different brain hemisphere: the left hemisphere with the former and the right hemisphere with the latter. The proposed classification is put to the test in an empirical study of speech data from patients with either left- or right-hemispheric disorder. The results support the proposed hypothesis, with the subdivision of two fundamental types of formulaic sequences providing a possible answer to the question why in previous studies the number of formulaic expressions in right-hemisphere disorder is significantly reduced but still surprisingly frequent.

Alexander Haselow proposes a conceptualization of grammar which is composed of two different domains: microgrammar, which serves the establishment of local or microlevel structures based on morphosyntactic and semantic relationships, and macrogrammar, which deals with the organization of language on a more global macro level in terms of interaction management, discourse structure, and cognitive alignment. Using extra-clausal constituents in turn-initial and turn-final position as a test case for the study of macrogrammatical elements in spoken language, it is shown that these turn-initial and turn-final 'fields' have a syntax of their own. More specifically, it is demonstrated that combinations of two or more extra-clausal elements (e.g. interjections, discourse markers, final particles, general extenders, parentheticals or tag questions) in turn-initial and turn-final position are not random but follow specific 'macrogrammatical' ordering principles.

Lázló Drienkó approaches the notion of dualism from the perspective of a syntactic processing model that operates on the basis of so-called 'agreement groups'. These agreement groups are groups of minimally differing utterances (of up to five words in length), which are argued to provide a means for processing novel sentences in language acquisition. The proposed processing model is essentially a computational one but designed to simulate a usage-based mechanism of syntactic processing. As such, it offers a possible answer to the question how syntactic categories arise as cognitive categories based on usage. Using data from the CHILDES corpus, the chapter discusses a number of dualistic aspects inherent in the proposed model, demonstrating, for instance, how it can account for the difference between familiar and novel utterances, and the processing of agreement groups as opposed to combinations of such groups (by a mechanism of 'coverage').

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PART I

Dualistic approaches to language and cognition

CHAPTER 1

Familiar phrases in language competence

Linguistic, psychological, and neurological observations support a dual process model of language

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Under the umbrella term of "familiar phrases," this paper presents an overview of current understanding of formulaic language, categorizing the phenomena, for heuristic reasons, as *formulaic expressions* (idioms, proverbs, conversational speech formulas, expletives), *lexical bundles* (sentence stems, conventional expressions, discourse organizers), and collocations (a range of other unitary, multiword expressions). These exemplars share the features of cohesion and familiarity: they are known and recognized by speakers of a language, and stored in mental representation with their concomitant features of structure, phonetic and prosodic shape, meaning, and use. This tripartite grouping of expressions can be differentiated in terms of nuance, role of frequency, and degree of cohesion. These characteristics lead to new conceptions of memory capacity. Examples from everyday observations and from the media, revealing cohesion and knowledge of typical expressions and their characteristics, are included along with linguistic and psychological studies to support various views of the similarities and differences between these classes of familiar phrases. Revised views of the processes involved in acquisition of FPs are also considered. Performance by persons with neurological disorders reveals specific effects on production of formulaic expressions and lexical bundles, suggesting not only that novel and familiar language are modulated by different brain structures, but that subclasses of FPs may be differently represented. Linguistic, psychological, and neurolinguistic evidence converge to a dual-process model of language, whereby grammatical, newly created and unitary, familiar phrases are acquired and processed according to different cerebral mechanisms.

Keywords: familiar expressions, formulaic language, dual process model, language and brain, pragmatics of communication

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1. Background

An altered view of the characteristics of language, as stored and processed by the speaker, is emerging from studies of formulaic expressions, lexical bundles, and other collocated verbal material. These diverse expressions, here, in this article, given the umbrella rubric "familiar phrases," lend themselves to various kinds of classification, and many items fit into more than one category. In this article, the discussion partitions the phenomena into three major groups, granting that many other kinds of classifications are valid and that multi-membership of individual items is common. Despite the irregularities in classification, familiar phrases[1] are to be distinguished from novel, newly created expressions, which are formed by arranging lexical items using grammatical processes.

Classical *formulaic expressions* consist of idioms, proverbs, expletives, pause fillers, conversational speech formulas, and sentence initials, being the most heterogeneous in membership of the three categories (Pawley and Syder 1983; Fillmore 1979; Wray 2002; Taylor, 1962). These are learned in close connection with the situations in which their use is appropriate (Wong Fillmore 1979; Kuiper and Haggo 1984; Kuiper 2004). Most exemplars have primarily nonliteral meanings, stereotyped form and prosodic contour, strong connotations and nuances, and detailed social contingencies of use.

Another important category of known, fixed expressions, called *lexical bundles*, has more recently been extensively studied in written and spoken corpora (Biber and Barbieri 2007; Biber and Conrad 1999; Salazar 2014; Heng, Kashiha and Tan 2014). These are sentence stems, conventional expressions, and discourse organizers consisting of contiguous or discontinuous multiword phrases. These are seen to occur in conversation and academic prose and they contribute to fluency in talking and writing (Biber, Conrad and Cortes 2003; Biber 2009). Lexical bundles invest less in nonliteral meaning processes than idioms or proverbs and are relatively devoid of affective nuance (here referred to as "neutral" with respect to connotative meanings) (Bridges 2014). This feature distinguishes these exemplars from other familiar expressions, and may account for a greater role of text frequency in their acquisition (Arnon and Snider 2010).

Thirdly, collocations of considerable variety of length and form constitute still another very large category. *Collocation* denotes groupings or pairs of words that have a tendency to occur together in discourse, spoken or written; these kinds of expressions do not fit well into the previous two categories. Classic examples are irreversible binomials: *salt and pepper, cease and desist,* and trinomials: *red,*

1. The term "familiar phrases" in this paper is used as a cover term for expressions that are presumed or proven to be known in their unitary, canonical form to native speakers of a language.

white and blue. Other exemplars are *blissfully unaware, discharged from the hospital, completely unacceptable, heavy rain, scenic view*. As can be seen, these kinds of expressions are less cohesive and can be described as based on a *construction*.

These three categories of familiar phrase, all recognizable to varying extents to the average speaker, differ in specifiable features. Of course, there may be considerable overlap in categorization, depending on use and the nature of the expression. Figure 1 provides examples which typify each category.

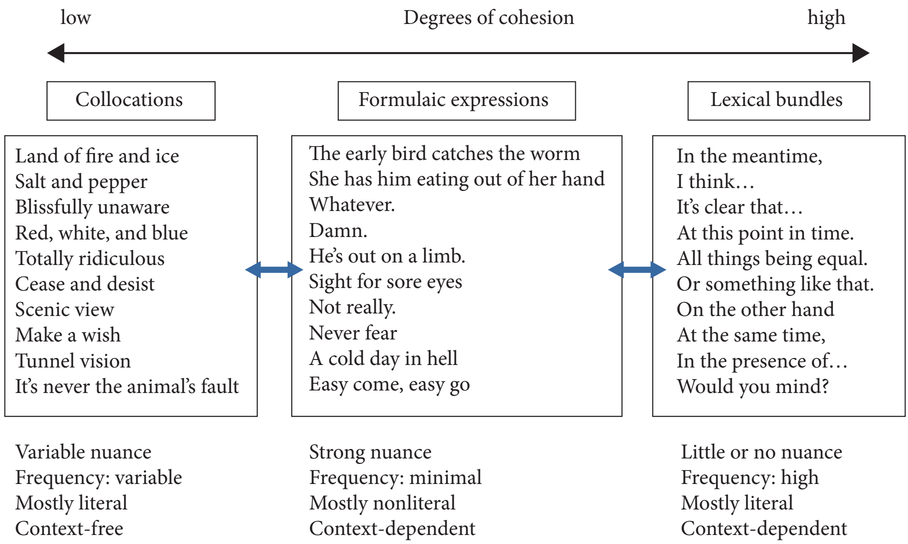

Figure 1. Schematic representation of three categories of familiar phrases, with their characteristic properties. Classification is imprecise: Is "Your money or your life" a collocation (literal) or a formulaic expression (nonliteral conversational speech formula)? Is "On the other hand" a lexical bundle (low nuance, frequent) or a formulaic expression (nonliteral)?

2. Characteristics of familiar phrases

Formulaic expressions, lexical bundles, and collocations have in common that they are familiar; that is, they are known to speakers of a language in a canonical form, as *formuleme*,[2] *template*, or *construction*, respectively, and yet they differ from each other in an array of important characteristics (Carrol and Conklin 2019). They vary importantly, for example, in degree of cohesion and type of meaning process.

2. This term is modeled on the traditional linguistic concepts of *phoneme, morpheme*, and *lexeme*.

Classical formulaic expressions – Idioms, proverbs, expletives, pause fillers, and conversational speech formulas, or *formulemes*, have stereotyped form and conventional meanings; they are highly cohesive and, because standard lexical meanings are not typically or necessarily utilized, the expression carries a nonliteral meaning (e.g., *she has him eating out of her hand; Gotcha; a rolling stone gathers no moss*).

The stereotyped form of these utterances includes certain words in a certain order as well as, in many cases, signature articulatory and prosodic details (McGlone and Tofighbakhsh 2000). These utterances generally carry a considerable load of nuance in the form of affective and attitudinal connotations (Van Lancker Sidtis and Sidtis 2018). For example, stress, risk, trouble and perhaps poor judgement are communicated intrinsically by the idiom, *he's out on a limb;* in contrast, there are no such connotations in a matched (for word length and grammatical structure) novel expression, *he's out on the lake*. Given this characteristic of affective load, formulaic expressions play a large role in social communication, for example, for couples (Hopper, Knapp and Scott 1981; Dunleavy, Booth and Butterfield 2009) and children (Corsoro 1979; Wong Fillmore 1979). Formulaic expressions are highly bound to the social setting: time of day, register, conversation partner, and many other factors determine choice of expression and the functional impact of formulaic expressions has been described to vary with the social setting (Skalicky, Berger and Bell 2015).

Although degree of cohesion in the underlying form, the *formuleme*, is high, the instantiations are flexible, allowing for syntactic changes and lexical insertions, so long as the abstract version, the *formuleme*, remains identifiable (Kuiper 2009). These manipulations have been extensively studied for idioms (see review in Psycholinguistic Studies below).

Lexical bundles are also highly cohesive and based on *templates*. They are more unitary in structure than idioms and they represent mostly literal or only slightly nonliteral meanings (*at this point in time, in the meantime);* they are relatively devoid of nuance (Bridges 2014). These include irreversible binomials (e.g., s*alt and pepper*) (Cooper and Ross 1975; Malkiel 1959; Heng, Kashiha and Tan 2014). These utterances arise from frequent exposure and are taught in second language classes to enhance fluency and attain native-like expression (Salazar 2014; Sorhus, 1977).

Collocations are made up of groups of words known for "keeping company" in ways that are recognizable as familiar (Macken 1978; Renouf and Sinclair 1991; Butler 1997). These constitute a very large "preestablished inventory" of expressions (Bolinger 1961: 381). For a glimpse at the vastness of this repertory, see the several collocation dictionaries (e.g., Oxford, Longman).[3] In the case of collocations, based on *constructions*, the bonding of constituents of the phrase is variable and looser (e.g., *blissfully unaware, blissfully ignorant*) and mostly literal meanings are implicated; affective and attitudinal connotations vary widely across this set of phrases in correspondence with the lexical constituents. Examples of looseness of constituency alongside known structural integrity are seen in a form of collocation called *snowclones* (*He's several bricks short of a load; he's missing a few cards in the deck*; Pullum 2004) and indirect requests (*It's warm in here; do you think it's kind of warm here?* (Searle 1975) where the illocutional force is a request to open a window. Meanings may be somewhat nonliteral (*blissfully unaware* – a hyperbole) or they are literal and transparent (*cease and desist)*, and there is an emergent meaning that adheres in a specialized manner to the collocated phrase. For the first, there is an ironic nuance; for the second example, the emergent tone is legalistic and insistent.

Although for heuristic convenience, this paper distinguishes three primary sets of familiar phrases: *formulemes*, *templates*, and *collocations*, it is important to note that there are other approaches to classification; in the current configuration, there is a large amount of overlap and many exemplars fall into more than one category (Buerki 2016; Tyler 1978; Bolinger 1976). "Have a nice day," for example, straddles all three categories: it is a conversational speech formula, a lexical bundle, and a collocation, meeting the criteria of all three categories. Classification into these three categories is only approximate; Bolinger refers to collocations as "[…] close to idioms – flurry of snow, smattering of knowledge, glimmer of hope; sharp knife, inclement weather; unconscionable liar; patently absurd" (Bolinger 1976: 101). Sentence initials or stems, such as *I guess, As I was saying,* can be classified as formulaic expressions or lexical bundles. Other expressions that straddle these three categories have been called theticals (Kaltenböck, Heine and Kuteva 2011). These include *you say, don't forget, I don't think, I mean, as you say, I suppose, if you don't mind me saying, I hate to tell you this, between you and me* (Kaltenböck 2009, 2011; Heine, Kuteva and Kaltenböck 2011) and hedges (*I think*) (Kaltenböck, Mihatsch and Schneider 2010) as extensively documented in normal discourse (Kaltenböck 2008, 2010). Others are *modalizing* expressions, such as *well, I mean, yes, of course, do you see what I mean, oh surely, a little bit better, if you please*, which have been described as preserved in aphasic speech (Nespoulous, Code, Virbel and Lecours 1998). Numerous types of familiar expressions are listed in Wray (2002). The main

3. McIntosh, C. (ed.) Oxford Collocations Dictionary; Benson, M. (ed.) The BBI Combinatory dictionary of English; O'Dell, F. English collocations in use. Advance book with Answers. Macmillan Collocations Dictionary for Learners of English. Longman Collocations Dictionary and Thesaurus. Pearson Education.

point is that native speakers use and recognize these phrases, and thousands like them, as sounding familiar, and having special, conventionalized meanings and a stereotyped forms and, usually, contingent conditions for use.

3. Examples from media: Knowledge of familiar expressions and their characteristics

Everyday speakers reveal a quick and easy understanding of familiar phrases as part of their knowledge and use. Bringing formulaic expressions into discussion in the classroom elicits smiles of familiarity and recognition (Van Lancker Sidtis 2011). While examples of familiar phrases are usually obtained from corpora, as transcribed from discourse, a ready source of knowledge of familiar phrases of all kinds, and modifications of them, lies in newspapers (Mieder 1978), magazines, television, radio, billboard advertisements, and other media. These data reflect knowledge by users. Idioms and proverbs, for example, provide an endless source of cartoon humor. Knowledge of a vast repertory of these expressions is confidently shown in jokes that allude to the formulaic phrase only partially, using one or a few words, or not at all verbally, using a drawing of the meaning. It is an amazingly common trope in cartoon humor to depict, in a drawing, the less likely literal meaning of an idiom or proverb. The author examined one year of *New Yorker* cartoons to find that about eighty percent of cartoons used this simple strategy for humor. Here is an example implying a literal interpretation of the well known proverb "too many cooks spoil the broth", alluding indirectly to the proverb (Mischa Richter, cartoon, *New Yorker*). Four cooks hover over a person sitting glumly before his meal at a restaurant table. One cook says:

(1) *Something wrong with the broth, sir?*

One word from the referenced proverb (*broth*) is sufficient to identify the proverb.

Lexical bundles, probably due to their relative colorlessness, figure less often in the play and humor of media examples. A few can be found. One example emerged in a newspaper story, advising pregnant women to quit smoking, punning on a familiar phrase – *no ifs, ands, or buts*, using this headline:

(2) *No ifs, no ands, – and definitely no butts.*

In another example, a cartoon by Arnie Levin in the *New Yorker*, depicts a man watching television. On the TV screen is a sign-off symbol, and the program host, using a formulaic expression (*thank goodness*) and two collocations (*brings to a conclusion, our broadcast day*) says:

(3) *And this brings to a conclusion, thank goodness, our broadcast day.*

The use of the formulaic expression (*thank goodness*) is sociolinguistically out of place in a formal newscast, providing the source of humor. The collocations set the correct scene.

Collocations occur frequently in media publications, implying knowledge of their underlying structure. The published cartoons below, (4)–(6), illustrate a natural propensity to proliferate the shapes of collocations. Eugene O'Neill in a cartoon from the *New Yorker* depicts a business man sitting at his desk, thinking:

(4) "*Enough procrastinating. Time to attack this*
with a vengeance!
With abandon!
With aplomb!?
With alacrity?
With no regrets?
With an eye to the future?
With tongue in cheek;
With a machete?
With a knick knack paddy wack…"

It is an accolade to the authority of theme and variation that the preposition *with* quickly generates seven familiar expressions which have little in common other than being collocations that begin with the word *with*.

In a Donald Reilly, New Yorker cartoon, six people (men, women, children) stand on a cliff with the designation "Inspiration Point," each with a thought balloon. The cartoon pokes fun at the use of "clichés" at a dramatically beautiful venue. Their thoughts, ironically, are:

(5) *Today is the first day of the rest of your life;*
You're as young as you feel;
A fool and his money are soon parted!;
No news is good news!;
When the going gets tough, the tough get going!
Sticks and stones may break my bones, but words will never hurt me.

These examples reveal that the artist knows the overlearned expressions and that he expects his readers also to know the expressions, and, further, he expects the readers to be familiar with their connotations and usage conditions. His artwork assumes that this complex mutual knowledge between artist and reader will constitute the humor, the fun, the point, and the import of the cartoon.

Prototypical collocations based on known constructions, and their familiarity to native speakers, emerge frequently in the public media. A *New Yorker* cartoon, drawn by Jack Ziegler, depicts four portly businessmen sitting in armchairs at a club, under a banner "Sweeping Statements," saying:

(6) *No one has ever successfully outwitted the IRS on an empty stomach;*
Idealism and dentistry rarely mix;
Money, like cheese dip, is useless unless it is spread;
Shirts and shoes are required on these premises at ALL times.

Example (6) illustrates universal knowledge of familiar construction types: these utterances resemble proverbs, advertising slogans, and public directives.

Example (7) below displays another example of pleasure in proliferating construction shapes. Artist Danny Shanahan drew a New Yorker cartoon with various characters and objects, each associated with a different version of the familiar construction _____ *o' the* ________, leading to some humorous results. The objects and persons depicted in the cartoon are given on the left.

(7) Angels: *Folk o' the Wee*
King and queen: *Queen o' the Sidhe, King o' the hill*
Astronaut figure: *John o' the Glen*
Baseball player: *Pride o' the Yankees*
Mug of beer: *Hair o' the dog*
Maintenance worker picking up trash: *Pick o' the litter*

The assumption of myriad familiar phrases emerging in the minds of native speakers is humorously represented in a *New Yorker* cartoon depicting a theatre with actors on stage, each with a thought bubble, presumably anticipating the critics' reviews. Here is what the actors are thinking, as they perform on the stage:

(8) *in a minor role, but giving a highly charged performance…*
after much too long an absence from the stage…
a strong dramatic effort…
the light's twinkled a little brighter on Broadway this night…
a star is born…
a fine supporting cast.

4. Incidence of familiar phrases known to speakers

The known repertory in a speech community of familiar expressions is quite vast; an upper limit has not yet been identified. Depending on categories, topics, and type of discourse, between one fourth and two thirds of discourse is made up of familiar expressions (Sinclair 1991; Foster 2001; Schmitt 2004). For the first category in this paper, formulaic expressions, incidence measures indicate that idioms, conversational speech formulas, proverbs, and pause fillers constitute about one fourth of spontaneous discourse (Van Lancker and Rallon 2004; Sidtis, Canterucci and Katsnelson 2009). In addition to these classified expressions, speakers produce and recognize countless quotes from speeches, poems, songs, and plays, titles, sayings, slang (Monro 1989), professional jargon (Kuiper 2004; Kuiper and Hoggo 1984) as well as a variety of unclassifiable routinized expression and catch phrases. The formuleme can be invoked by only a few words of the formulaic expression. Someone was heard to say, commenting on the behavior of a critical person:

(9) *Pot-kettle*

This terse expression invokes the idiom *it's the pot calling the kettle black*, which carries the meaning that the critic also has a possibly similar flaw. In another instance, a friend often says

(10) *Six o' one…*

to express no preference between two choices, alluding to the expression *Six of one and half dozen of the other*.

More recently studied, the second category in this overview, *lexical bundles*, is said to make up a large portion of discourse in both written and spoken versions (Biber 2009; Biber and Conrad 1999), with spoken proportions (59%) exceeding written (52%) (Erman and Warren 2000).

The repertory of collocations is very large; repertories have been compiled in several dictionaries dedicated to provide information on collocations in English. The new edition of the Oxford Dictionary of Collocations has over 250,000 entries. An alert, anonymous user of the Longmans Dictionary writes (Publisher's webpage):

> If you want to write and speak English like a native, get this. You'll get access to the mind of a native speaker.
>
> Words in a language tend to co-occur with others to form natural "chunks", which the native speaker can quickly bring to mind whenever they are needed. That is why it is much more effective to learn collocations rather than individual words. Learning collocations will also prevent common mistakes made by students when translating from L1 into L2.[4]

It is intuitively obvious that collocations are "known" to the native speaker as having a special status of more or less fixed or loose cohesion and their emergent meaning; and that idioms and other classical formulaic expressions are "known" with their stronger bonding and their unique, conventionalized meaning. To bring

4. Oxford Dictionary of Collocations Website.

these notions around to current linguistic theory, it might be said that formulaic expressions, lexical bundles, and collocations form visible instantiations of the vast repertory of constructions in language (Biber 1989), as proposed by Construction Grammar (Goldberg 2006, 2013). Constructions constitute "prototypical exemplars and conventionalized extensions" (Goldberg 2013: 16) and "conventional, learned form-function pairings at varying levels of complexity and abstraction" (p. 27). Constructions can appear at different levels of abstraction, implying the presence of specific words in some kinds of constructions but not in others. Hopper (2004) describes the openness of constructions, allowing for various lexical forms; in addition, the structure of constructions itself is open and liable to variations of all kinds. The construction that is not open is an idiom; collocations grade into idioms (Bolinger 1976, 1977) so that the idiom is the ultimate example of a construction. The schema (Lyons 1968; e.g., *to hell with ____; I'd rather be ______; Mother of all ______; When _____ is not enough; What part of ______ don't you understand?; you can take the _____ out of the _____ but you can't take the ______ out of the _____*) takes an intermediate place between fixed and open: one or more novel words are inserted into a prefabricated formuleme.

5. Cohesion and flexibility in familiar phrases

Much has been written about cohesion versus flexibility in familiar phrases. W. Nelson Francis, who summarized the "interrelationships and patterns which make up the intricate structures of language" (1958: 26) made this observation:

> The old axiom from Euclid, 'the whole is equal to the sum of all its parts,' does not apply to organized wholes. An organized whole is always *greater* than the sum of all its parts, because it is equal to the sum of its parts *plus the way they are organized.* (p. 28)

Jackendoff (2013: 90) made a similar point for constructions: "the meaning of whole goes beyond individual word meanings". Intuition supports the view that the constituent words in formulaic expressions, lexical bundles, and collocations "hang together" and offer emergent meanings, and experimental studies provide indirect support (Clark 1970; Van Lancker Sidtis and Rallon 2004; Van Lancker Sidtis, Kougentakis, Cameron, Falconer and Sidtis 2012; Van Lancker Sidtis, Cameron, Bridges and Sidtis 2015). Auditory retention studies reveal a chunking function, such that 6–7 words, 6–7 multisyllabic words, and 6–7 multiword idioms can be retained in short term memory (Simon 1974). Configurational superiority of aggregates, whereby constituent members are not perceived, has been demonstrated for visual phenomena (Poljac, de-Wit and Wagemans 2012; Pomeranz, Sager and Stoever 1977).

As mentioned above, despite cohesion at the level of the formuleme, flexibility in the produced forms occurs through syntactic changes and lexical insertion. Tannen (1989: 38) places prepatterned expressions on "a scale of fixity". Linguistic analyses of idioms have proposed various versions of individual word transparency, degree of phrasal compositionality, and holistic unity (Cutting and Bock 1997). In a semantic judgment paradigm, subjects responded quickly to all versions of idioms; the authors concluded that this result arose because the expressions were cohesive and known (Tabossi, Fanari and Wolf 2009). Depending on characteristics of the idiom stimuli and task demands (Titone and Libben 2014), speakers appear to process similarly the unitary as well as decomposed, variously altered instances of formulaic expressions (Conklin and Schmitt 2008; Libben and Titone 2008). This also makes intuitive sense: there is a canonical form that is known in various resolutions of abstraction, which can be subjected to an unspecified array of alterations on various levels.

A formal proposal representing a compromise between fixedness and flexibility in formulaic expressions is most aptly described in the hybrid model, describing both or several levels of fixedness as part of language competence (Cutting and Bock 1997; Titone and Connine 1994; Titone, Lovseth, Kasparian and Tiv 2019; Kuiper, Van Egmond, Kempen & Sprenger, 2007). While surveys, listening tests and online studies support the notion of stored formulemes, templates, and collocations, the many, ubiquitous examples of play, fun and humor perpetrated on these foundational forms attest to their flexibility.

6. Memory capacity: Relationship to familiarity

Previous notions in linguistic modeling highlighted the finite nature of memory capacity. Further, a previous view was that familiarity is not relevant to sentences in a language (Chomsky 1975), which obviates the need for memory to come into play. In a revised perspective, familiarity does indeed pertain importantly to many, many phrases, long and short, of various forms and types. This notion, that countless phrases of varying degrees of cohesion are known to native speakers, lead also to considering a revised view of the capacity of human memory (Bybee 2003). Linguistic and psycholinguistic studies have shown that a very large repertory of familiar phrases is maintained by speakers in a language community.

The revised understanding of a large memory capacity is supported by numerous studies revealing considerable retention in episodic memory of the phonetic, vocal, and other "surface" details of speech (Pisoni 1993; Goldinger 1996). Speech scientists have proposed an exemplar theory of speech perception, which specifies that indexical (vocal identity), phonetic, and prosodic features of speech utterances are retained in memory for utterances heard by a listener. Similar studies provide evidence for verbatim memory (Sipos 1964; Luka and Choi 2012; Goldberg 2006, 2013; Gurevich et al. 2010; Schwartz and Witherspoon 1974) of spoken utterances.

Further, examples of prodigious feats of memory outside of speech and language are easily found: Musicians and actors learn by heart hundreds of hours of material. An upper limit in autobiographical memory for familiar faces in the average person has not been established (Bahrick, Bahrick and Wittlinger 1975); and, in an extreme example, persons with hyperthemesia, or Highly Superior Autobiographical Memory (HSAM), exhibit detailed recall of vast portions of their previous experiences across decades (LePort, Mattfeld, Dickinson-Anson et al. 2012). These brief observations serve to provide an inviting substrate for a possible very large storage of familiar phrases in the form of formulaic expressions, lexical bundles, and collocations as part of language competence. It is likely that storage and processing of this vast repertory occurs in the parietal lobes of the brain, which specialize in cross modal associations (Fair 1992); evidence points to a preference of the right hemisphere for the familiar expressions that have been studied so far.

7. Acquisition of formulaic expressions: Frequency of exposure or rapid uptake

Questions arise about how familiar phrases are acquired. The dual process model of language processing proposes differential modalities of processing for formulaic expressions and novel language at the extreme ends of a continuum. The mental and neurological processes for acquiring these two different kinds of language are likely to be very different and appear to follow different maturational schedules. A disparity was shown for comprehension of idioms and proverbs, compared to novel expressions, in a longitudinal study (Kempler, Van Lancker, Marchman and Bates 1999). There is consistent evidence from child language studies that chunks of speech are acquired and used holistically alongside the emergence of grammatical language (Wong Fillmore 1979; Halliday 1975; Grimm, Cassani, Gillis and Daelemans 2019; Locke 1997; Peters 1977, 1983).

Because classical formulaic expressions, especially idioms, "stand out" as different (nuances, nonliteral meanings) from grammatical language, their very salience, causing heightened attention and arousal, may contribute to a condition of rapid learning. Emotion, arousal, and familiarity interact in perceptual learning (Rapaport 1950; Stephens 1988; Brown and Kulik 1977; Ohnesorge and Van Lancker 2001). Studies show that children are explicitly taught formulaic routines in appropriate contexts (Gleason and Weintraub 1976; Greif and Gleason 1980).

In a study of new acquisition of formulaic expressions, following exposure by young children to idioms and matched novel expressions in a naturalistic context, successful one-trial learning was demonstrated to be superior for the idioms (Reuterskiöld and Van Lancker Sidtis 2013).

Frequency of exposure plays an important role in the acquisition of many kinds of familiar phrases. Frequency may contribute more efficiently to acquisition of lexical bundles, including irreversible binomials (Siyanova-Chanturia, Conklin and Van Heuven 2011) and other collocations (Bybee 2013) than for formulaic expressions (e.g., idioms and proverbs). The notion may not be necessary or sufficient to explain the acquisition into the mental lexicon of idioms and proverbs (Carrol and Conklin 2019; Eaton and Newman 2018). Corpus studies suggest that frequency alone might not be accountable: in very large corpora, selected idioms are seen not at all or occur only once (Moon 1998). Only one proverb was found in 43,000 lines of conversation (Norrick 1985). Further, individuals who successfully recognized idioms and proverbs endorsed little or no exposure to many of the items that they correctly transcribed (Rammell, Pisoni and Van Lancker Sidtis 2018), These questions remain provocative for further studies of formulaic language.

8. Psycholinguistic approaches: On line and survey studies

Listening tests and written surveys have demonstrated speakers' knowledge of familiar expressions, in particular, idioms (Clark 1970), proverbs, and schemata. Listeners were able to accurately distinguish formulaic from matched exemplars from the acoustic signal alone (Van Lancker and Canter 1981; Van Lancker Sidtis 2003). When formulaic expressions and matched novel expressions were presented to listeners in noise, transcription accuracy was dramatically higher for FEs, suggesting that the utterances are represented by memory traces (Rammell, Pisoni and Van Lancker Sidtis 2018). In written surveys, participants correctly filled in the blanks of formulaic expressions and schemata (Van Lancker and Rallon 2004; Van Lancker Sidtis, Kougentakis, Cameron et al. 2012; Van Lancker Sidtis, Cameron, Bridges and Sidtis 2015). Proverbs (Hallin and Van Lancker Sidtis 2017) and nonliteral exemplars of ditropic[5] sentences (Van Lancker, Canter and Terbeek 1981) are spoken faster than matched novel expressions, contributing to an impression of phonological coherence (Lin 2010). On-line reading tasks for native participants were both faster and more accurate at performing a judgement task on frequent lexical bundles (Jiang and Nekrasova 2007; Tremblay, Derwing, Libben and

5. Phrases or sentences that are ambiguous as to a literal or an idiomatic meaning: e.g. he hit the sack (nonliteral – he went to bed or – literal – he struck a sack with hand or hammer).

Westbury 2011), irreversible binomials (e.g., *salt and pepper*; Siyanova-Chanturia, Conklin and Van Heuven 2011), idioms (Siyanova-Chanturia, Conklin, & Schmitt, 2011) and frequent collocations (*I don't know why* (Arnon and Snider 2010). These and many related studies suggest that familiar phrases, including formulaic expressions, lexical bundles and collocations are stored and processed differently in mental representation than novel expressions (Jackendoff 2002; *cf* p. 169). These observations give rise to the dual-process model of language processing to be proposed below.

9. Neurological studies of formulaic language

The several characteristics mentioned above – varying degrees of cohesion, storage in the mental lexicon, more or less nonliteral or emergent meaning, and, often, affective content – distinguish familiar from fully novel expressions. These essential differences may reflect distinctive cerebral mechanisms underlying their comprehension and production. Although numerous clinical anecdotes have identified prefabricated and holistic utterances that are preserved in persons with severe aphasia (language disorder following damage to the left hemisphere), the first controlled survey was provided by Code (1982, 1989). Since then, clinical studies, targeting persons with diagnosed neurological disorders, have focused on classical examples of formulaic language: recited (rhymes, prayers) and serial (e.g., counting) speech, idioms, conversational speech formulas, proverbs, sentence initials (*I guess, So*), expletives, and pause fillers (*ya know, um*). These studies identify brain structures that are crucial for specified verbal behaviors.

Clinical observations of persons with acute and progressive neurological diagnoses reveal that formulaic language production is significantly affected by neurological disturbance (Espir and Rose 1970; Luria 1966; Lenneberg 1967; Marie 1925/1941). Certain types of utterances are preserved in severe aphasia, when novel language production is very poor, as shown by completion of partial idioms (Hughlings Jackson, 1974, 1978; Nakagawa, Tanabe, Ikeda, Kazui et al. 1993; Berthier 1999; H. Whitaker 1976) and preserved prayers (Shinoura, Onodera, Kurokawa et al. 2010). Controlled studies of persons with aphasia (Graves and Landis 1985; Lum and Ellis 1994; Van Lancker Sidtis and Yang 2016) support the view that formulaic and novel language are processed differently in the brain.

Following left hemisphere (LH) damage, proportions of formulaic expressions in spontaneous speech are significantly increased over those of healthy speakers (Nespoulous, Code, Virtel, Lecours 1998; Bruns, Varley, Zimmerer & Carragher, M. 2019; see Van Lancker 1975 for a review). This is all the more striking when considering that aphasia, an essential language disorder, is generally associated with LH damage. Persons with LH damage and aphasia produce a significantly greater proportion of formulaic expressions in their spontaneous speech than those with right hemisphere (RH) damage or healthy speakers (Baldo, Kacinik, Moncrief, Beghin and Dronkers 2016; Van Lancker Sidtis and Postman 2006; Sidtis, Canterucci and Katsnelson 2009). Dramatic evidence arises from persons whose LH was removed for cancer therapy; in these cases, formulaic expressions alone remain effective as residual speech (Smith 1966; Crockett and Estridge 1951; Hillier 1954).

These findings imply a meaningful contribution of the right hemisphere in modulation of formulaic expressions. This assumption is supported by observations from persons with RH damage: the spontaneous speech of these individuals reveals a significant diminution of formulaic expressions when compared to age- and education-matched healthy speakers (Baldo et al. 2016; Van Lancker Sidtis and Postman 2006; Sidtis, Canterucci and Katsnelson 2009). Formulaic expressions also undergo less repetition in the speech of persons with RH damage than those with LH damage or healthy speakers (Wolf, Van Lancker Sidtis and Sidtis 2012). These observations are in accord with current understanding of right and left hemisphere function (Joanette and Goulet 1990; McGilchrist 2009; Lindell 2006; Brownell, Gardner, Prather and Martino 1995).

In a related study using native speakers of Korean, productions of formulaic expressions elicited from persons with LH or RH damage differed significantly. Korean listeners were better able to distinguish intended formulaic from intended literal meanings of Korean ditropic sentences (ambiguous for these two meanings, such as *It's rotten to the core* in English) produced by persons with LH than those with RH damage (Yang and Van Lancker Sidtis 2016). Identification of intended meanings was successful for productions from matched healthy speakers of Korean.

In addition to these findings for unilateral hemisphere damage, other observations implicate subcortical structures (basal ganglia) in formulaic expression production. The basal ganglia consist of an organized grouping of neurological structures centered in the brain. These structures participate in the initiation, modulation, and monitoring of motor gestures. Persons with basal ganglia dysfunction have compromised motor function, including slowness and rigidity, and in later stages, tremor. The first observation involves the speech of persons with Parkinson's disease, a condition that is associated with progressive dysfunction of basal ganglia structures, and is very revealing. Although Parkinsonian speech is relatively normal in grammar and lexical processes, proportions of formulaic expressions are proportionally reduced compared to normal speakers (Illes 1989; Van Lancker Sidtis, Choi, Alken and Sidtis 2016). Persons with this kind of neurological damage also fail in utilizing commonly known recited material, such as prayers and nursery rhymes (Bridges, Van Lancker Sidtis and Sidtis 2013). A stroke to a subcortical structure results in significantly diminished proportions of formulaic expressions (Sidtis, Canterucci and Katsnelson 2009), as well as a loss of long-known memorized verbal material (recited speech, see Speedie, Wertman, Ta'ir and Heilman 1993). The basal ganglia are known for modulating routinized motor acts, or chunks, of motor behavior (Graybiel 2005; Mishkin, Malamut and Bachevalier 1984) and are therefore favorable for modulating the production of known, routinized phrases.

Diminished production of formulaic expressions in RH and subcortical damage impacts communicative competence, given the many important functions of formulaic expressions: empathy, bonding, turn-taking in conversation, affiliative interest (Bell and Healey 1992; Bruess and Pearson 1993; Wray and Perkins 2000). Failure to use a normal proportion of formulaic expressions in spontaneous speech may confer an impression of indifference or even irritability.[6]

Related to the observations of persons with subcortical dysfunction are findings in Alzheimer's disease. In this disorder, the subcortical nuclei remain functional for a considerable time after cortical deterioration has drastically impaired cognition. It has long been anecdotally known that the Alzheimer profile, as part of the cognitive disorder, features many high frequency words, "clichés", and overlearned phrases, while lacking in statements carrying information. Recent studies have quantified this clinical impression (Zimmerer, Wibrow and Varley 2016). In the speech of persons diagnosed with Alzheimer's disease, an over-abundance of formulaic expressions has been documented (Bridges and Van Lancker Sidtis 2013). Persons with Alzheimer's disease continue to use conversational speech formulas, idioms, quotes, and other formulaic expressions long after their ability to communicate meaning or information is severely compromised. Documentation of this communicative condition is important, because copious use of conversational speech formulas, produced with good articulation and normal prosody, may lull some listeners into assuming more communicative ability than is the case, where abilities for propositional language are impaired.

10. Dual-process model of speech production

There are several sources supporting a proposal for a dual-process model of speech production (Heine 2018; Heine, Kuteva and Kaltenböck 2014). The first

6. As a test of this idea, try holding back – not producing – those "back channel" kinds of formulaic utterances, such as *right, sure, okay, I certainly will, yes, indeed, you bet, really? You've got to be kidding! It's great to talk with you,* during a telephone conversation with a significant other. Very soon, within several seconds, your telephone partner will ask "is something wrong?" or *"what's wrong?"*

source arises from linguistic observations that some utterances are newly created and others are prefabricated, and that these types differ in important properties of form and meaning (Sadock 1972; Lyons 1968; Lounsbury 1963; Jespersen 1933; Bolinger 1961, 1976; Hockett 1958; de Saussure 1916), referred to by some authors as the idiom principle and the open choice principle (Erman and Warren 2000; Sinclair 1991). Formulaic and novel (grammatical) language differ in important, essential characteristics: holistic versus analytic, nuanced versus (potentially) neutral, known (stored in memory) (Fillmore 1977) versus not previously encountered (newly created). Novel and newly created refers to utterances that are newly generated using grammatical operations on lexical items. Familiar phrases of great variety are stored in memory (known to speakers in the language community) in canonical form, with their phonological-phonetic, meaning, and usage characteristics; novel expressions are not so organized. Given these vital differences in structure, meaning, and use, it is to be expected that mental mechanisms underlying these two modes of language behavior will differ. One can propose a "dual process model" based on the linguistic data alone.

Following the seminal work of J. H. Jackson, who originated the distinction between "propositional" and "nonpropositional" modes of speech, observations from neurological disorders lend strong support to the dual process model of language as based in cerebral function; the evidence indicates that novel, grammatical language is represented in the LH, while classical formulaic language is modulated by a right hemisphere-subcortical system (Sidtis, Van Lancker Sidtis, Dhawan and Eidelberg 2018; Van Lancker Sidtis 2012). Further, the characteristics of many familiar phrases are compatible with how neuropsychologists describe these structures (Brownell, Potter, Bihrle and Gardner 1986; Brownell, Simpson, Bihrle, Potter and Gardner 1990). The right hemisphere excels at processing configurations and patterns; familiar expressions are coherent entities, in contrast to grammatical sentences, which are composed of lexical items sequenced anew in accordance with generative rules. Familiar expressions are known in their unitary form, unlike novel utterances, which are, by definition, newly created. Many utilize situation-bound and nonliteral meanings, an arrangement of semantics that has been shown to be preferred by RH processing (Sidtis, Volpe, Holtzman, Wilson and Gazzaniga 1981; Drews 1987; Titone 1998). Formulaic expressions and many collocations carry nuances and connotations, highly compatible with neuropsychological characteristics of the RH, which include affective behaviors and emotional experiencing.

A natural affinity for subcortical nuclei is also inferred from studies of production of formulaic expressions. Phonological-phonetic and acoustic measures suggest that formulaic expressions and lexical bundles are each produced as a coherent verbal gesture. This portrayal reflects known properties of the basal ganglia, where overlearned, routinized motor behaviors are initiated and executed (Ullman 2004; Graybiel 2005, 2008).

It can be expected that other differences in brain processing, in association with subgroups of familiar expressions, will be uncovered. In a study of chronically depressed persons, proportions of non-nuanced (neutral) expressions, including pause fillers, discourse elements, sentence stems, – all classified as *lexical bundles,* were found to differ from proportions of nuanced familiar phrases, identified as conversational speech formulas, idioms, proverbs, and expletives. Following treatment by deep brain stimulation, people with depression produced fewer nuanced and more neutral expressions than pre-operatively (Bridges, Sidtis, Mayberg and Van Lancker Sidtis 2017).

We do not know of any clinical studies specifically addressing impaired or preserved competences for the class of familiar phrases called *collocations*, although, because of fuzzy category membership, these types have also been anecdotally observed as excessive or impoverished in the spontaneous speech of persons with neurological disorders. Although idioms and proverbs are usually easily classified, other collocated items can fall in any of these categories. For example, many conversational speech formulas (*See you later, I'm sorry you feel that way, Leave me in peace*) can be classified as formulaic expressions, lexical bundles, or collocations. It is to be speculated that degree of cohesion, which can be expected to occur on a continuum (Tannen 1989; Van Lancker 1975; Bolinger 1977) will be seen to be correlated with predilection of brain structures in processing. This remains to be studied.

11. Conclusion

Measures and perspectives from many sources reveal that as much of half of usual discourse, in many settings, is drawn from known and familiar verbal material that is stored in memory at various levels and in various degrees of fixedness and flexibility. This perspective has important implications for memory, language acquisition, cognition, and a model of language competence. This review of current research on pre-patterning, routines, prefabs and collocational strength in language raises fundamental questions, as stated so well by Tannen (1989: 46), "about the nature of language, and the degree to which language is freely 'generated' or repeated from language previously experienced."

A revised view of language might look like this: In addition to grammatical rules for generating novel sentences through formal operations on lexical items, language in the mind consists of a large collage of preformed verbal entities (Figure 2). Constructions (for collocations), templates (underlying lexical bundles), and formulemes (for formulaic expressions) are abstractions, housing vast, tentative repertories of collocations, lexical bundles and formulaic expressions in various degrees of granularity. This means that a very large portion of mental language representation is an agglomerate, a mélange, a patchwork quilt of interrelated, known, familiar expressions.

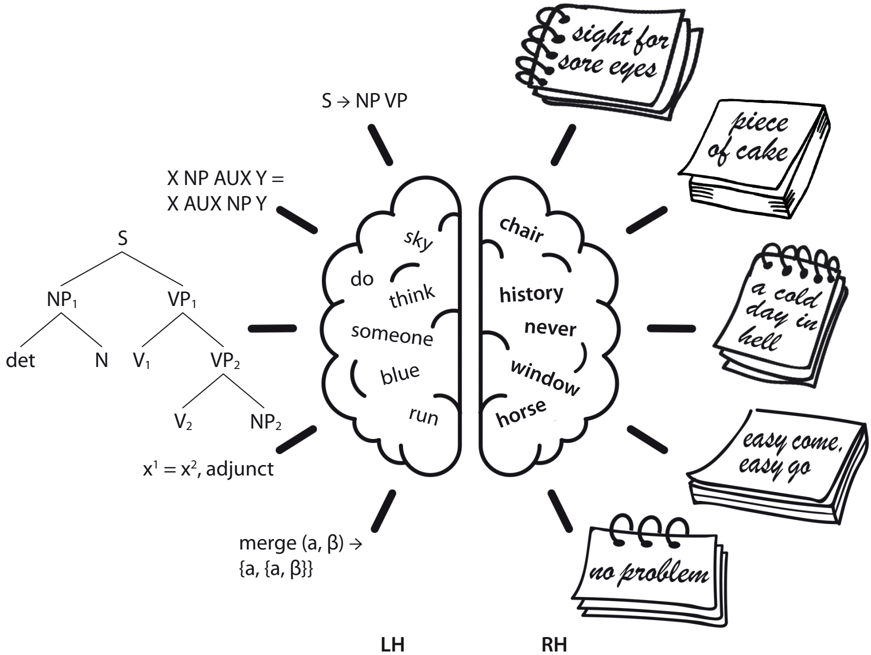

Figure 2. A schematic representation of the dual-process model of language representation in the brain. Both hemispheres process words, but in different ways. Grammatical processing is modulated by the left hemisphere, while formulaic expressions and (most likely) lexical bundles are stored in and accessed from the right hemisphere. (Not seen here: Production of familiar expressions is facilitated preferentially by subcortical structures (the basal ganglia).) This model is derived from clinical studies that have examined the incidence of formulaic expressions and lexical bundles in persons with left or right hemisphere damage (and subcortical dysfunction). The brain status of collocations has not been addressed. Graphic by Michele Burgevin

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CHAPTER 2

Dual process frameworks on reasoning and linguistic discourse

A comparison

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The objective of the present paper is to compare two kinds of research traditions that developed in the course of the last decades to understand mental and linguistic processing. One tradition relies on the perspective and methodology commonly used in social psychology, cognitive psychology and related fields, while the other is rooted in some form or other in linguistics, drawing mainly or exclusively on language data. In both research traditions it has been argued that certain parts of human behavior exhibit a dualistic organization which can be described in terms of dual process frameworks of analysis. The paper argues that findings made in psychological and linguistic work exhibit a number of commonalities which are in need of explanation.

Keywords: analyzability, coherence, context, control, intuitive behavior, macrostructure, microstructure, reflective behavior

1. Introduction

Over the last decades, a basic distinction between two kinds of linguistic processing has been proposed in research on language use or language structure (e.g., van Dijk 1980; Gernsbacher 1990; Pawley 2009; Maschler 1994, 2009; Clark and Fox Tree 2002; Prat et al. 2007; Debaisieux 2007, 2018; Van Lancker Sidtis 2009, 2012; Kaltenböck et al. 2011; Heine et al. 2013; Haselow 2013, 2016a, 2016b; Deulofeu 2017). This distinction, which cuts across classical linguistic domains such as syntax, morphology and semantics, is most commonly described as one between a macrostructure and a microstructure of linguistic discourse.

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In Heine (2019) it is argued that the distinction exhibits significant neurophysiological correlations relating to brain lateralization, in that the microstructure implicates mainly the left hemisphere while building a macrostructure of discourse cannot be achieved without participation of the right hemisphere (see also Heine et al. 2014, 2015). As is demonstrated in Heine (2019), the two structures complement one another and both are needed for successful linguistic communication, but there is an asymmetric relationship between the two in that the macrostructure represents somehow a higher level of discourse processing.

In addition to this linguistic and neurolinguistic work, a similar distinction between two kinds of mental activity has been postulated in psychological research (e.g., Evans and Over 1996; Sloman 1996, 2002; Stanovich 1999; Stanovich and West 2000; Evans 2003, 2008, 2012; Kahneman and Frederick 2002; Barbey and Sloman 2007; Kahneman 2011), where it is described in terms of dual system or dual process theories or models (see Osman 2004, Frankish 2010, and Evans and Stanovich 2013 for overviews).

The goal of the present paper is to compare the last two kinds of research traditions, which developed independent of one another in the course of the last decades. To this end, work carried out in the psychological tradition is summarized in Section 2 while Section 3 is devoted to work relying in some form or other on linguistic data and methodology. In Section 4, an attempt is made to relate the two research traditions to one another, and some conclusions are drawn in the final Section 5.

The studies to be examined in the paper have been framed in terms of theories, models, or approaches; henceforth, they will summarily be called 'frameworks'. A basic distinction is made between 'psychological frameworks' and 'linguistic frameworks', where the former are rooted in the tradition of social and cognitive psychology (Section 2) while the latter rely in a broad sense on linguistic analysis (Section 3). In order to ensure maximal comparability between the two traditions, the terminological distinction between two forms of human behavior will be referred to throughout as one between Type 1 and Type 2, roughly corresponding to the distinction between macrostructure and microstructure (see Sections 2.1 and 3).

2. Mental activity

2.1 The distinction

Dual process frameworks in social and cognitive psychology and related fields assume that there are two more or less distinct processing modes available for many cognitive tasks. The distinction is described by some as one between Type 1 and Type 2 (e.g., Evans 2008; Frankish 2010; see Evans and Stanovich 2013 for discussion), a terminology introduced by Wason and Evans (1975). Dual system theories go one step further by assigning the two types of processes to two separate reasoning systems, or cognitive systems (Frankish 2010: 919), called System 1 and System 2 (e.g., Kahneman 2011). The latter perspective is sometimes described as 'the two minds hypothesis' and, in fact, in their most ambitious form, dual system theories claim that we have, in effect, two minds. On the 'system' view, human cognition is composed of two distinct cognitive systems, with different structures, functions and evolutionary histories (Frankish 2010: 919).

While the terms System 1 and System 2 appear to be used most frequently in the relevant literature, we will nevertheless adopt the former convention because it is theoretically less committal. Thus, unless there are specific reasons to do otherwise,[1] System 1 will generally be referred to as Type 1 and System 2 as Type 2, and approaches subscribing to either of the conventions will be called dual process frameworks (henceforth: DPFs).[2]

Most commonly, Type 1 processing is described as automatic, associative, non-conscious, implicit, intuitive, heuristic, and fast, and Type 2 processing as controled, conscious, explicit, rule-based, reflective, and slow but, as we will see below, there is a wide range of additional or alternative features hypothesized to characterize the distinction; altogether, we found more than two dozens of distinguishing features adduced in the relevant research (see Frankish 2010: 922; Evans and Stanovich 2013: 225).

The two types of processing are argued to operate in concert but to suit different kinds of knowledge, and they serve complementary functions (Sloman 1996: 18). Nevertheless, the two also share some features. Inferences and decisions can reflect processes of either type. For example, Mercier and Sperber (2009) distinguish between intuitive inferences and reflective inferences, where the former relate to Type 1 and the latter to Type 2.

DPFs have long history in psychology (see Osman 2004, Frankish 2010; Gawrowski and Creighton 2013 for surveys). They are commonly traced back to dualist distinctions such as that between irrational and rational thinking in the studies of James ([1890] 1950), Freud ([1900] 1953) and others. For example, Freud's dual theory of information processing distinguishes between a primary

1. Such reasons concern most of all authors for whom the distinction system vs. process is important.

2. With the term 'framework' we wish to avoid the problem of whether, or to what extent DPFs qualify as 'theories', 'models', or something else (see Gawrowski and Creighton 2013: 307 for discussion of this problem).

system that is associative and unconscious, and a secondary system that is conscious and capable of rational thought (Osman 2004: 988).

Some earlier work also included neurophysiological findings on non-human animals to establish the distinction between two processes of behavior. For example, underlying the dual process theory of response to repeated stimulation of Groves and Thompson (1970: 419) there is a distinction between habituation, that is, decreased response to stimulation (Type 1) and incremental response sensitization (Type 2). Both types are argued to interact to produce the net response to repeated stimulation. Groves and Thompson 1970: 421) suggest that "the two inferred processes are assumed to be independent in that they are subserved by separate neuronal mechanisms, and either process can occur in relative isolation".

Earlier work of the 1980s and 1990s foused mainly on domain-specific applications of DPFs, but interest subsequently shifted to identifying general principles assumed to be domain-independent (Gawrowski and Creighton 2013: 282).

2.2 Features proposed

Most DPFs share a core of similar features to describe the distinction between the two processes but there also some differences in terminology and content; for listings of such features, see Frankish 2010: 922; Evans and Stanovich 2013: 225). Epstein's (1994) experiential and rational processing systems correlate with the Type 1 vs. Type 2 distinctions non-conscious vs conscious, holistic vs analytic, associative vs logical, concrete vs abstract, and rapid vs slow processing. For Sloman (1996), the distinction is one between a reflexive associative system (Type 1), which draws inferences from statistical regularities in the environment, and a deliberate rule-based system (Type 2), which operates on symbolic structures and aims to describe the underlying logical and causal structure.

Evans and Over (1996) propose a dual system model of reasoning and judgment, building on dual process theories of reasoning and work on implicit learning. Their model posits implicit and explicit cognitive systems, where the implicit system is non-conscious or pre-conscious, rapid, parallel, low effort, high capacity and shaped by biologically constrained, domain-specific learning. The explicit system, by contrast, is conscious, slow, serial, high effort, limited capacity and responsive to verbal instruction. Inferences and decisions can reflect processes in either system.

Using a dual process model of the brain, Kahneman (2011), hypothesizes that we apprehend the world in two radically opposed ways, employing two different modes of thought or clashing decision-making processes, referred by him as System 1 and System 2. System 1 (that is, Type 1) is fast and largely unconscious, and cannot be switched off. It is intuitive, associative, metaphorical, automatic, and impressionistic, and it is highly sensitive to subtle environmental cues. Its operations involve no sense of intentional control, resting on basic emotions, memory, and hard-wired rules of thumb. System 2 (Type 2), by contrast, is mostly detached from emotions, and it is credited with the continuous monitoring of one's behavior. Being in charge of self-control, it is slow, deliberate, effortful, laboriously checking the facts and doing the math, and it usually accepts what System 1 tells it (Kahneman 2011: 24–6).

In the default-interventionist model of Evans and Stanovich (2013: 236–237), the defining characteristic of Type 1 processes is their autonomy, they make minimal demands on working memory resources. Type 2, on the other hand, involves higher order reasoning processes. Defining features of processing are working memory capacity and cognitive decoupling (Evans and Stanovich 2013: 236). The differential role played by working memory is also addressed by some other authors. De Neys (2006) found that System 1 (Type 1) works independent of working memory, and when System 2 (Type 2) was impeded due to lack of working memory space, System 1 took over.

Other studies are located more peripherally to DPFs but still can be subsumed under them. This applies, for example, to the distinction made by Mercier and Sperber (2009) between intuitive and reflective inferences, which exhibits some features of the Type 1 vs. Type 2 distinction. The Type 1 vs. Type 2 distinction exhibits also overlaps with that made in philosophy between belief and opinion (e.g. Dennett 1978: 300–9), where 'belief' in Dennett's sense is a basic mental state which is common to humans and non-human animals. Opinions, by contrast, are more sophisticated, 'linguistically infected' states, possessed only by humans. To have an opinion is to be committed to the truth of a sentence in a language one understands. Frankish (2010: 918–9), on the other hand, distinguishes basic belief (Type 1) and superbelief (Type 2) and the two are defined as processes rather than systems. The former is non-conscious, implicit, passive, graded and non-linguistic, and the latter conscious, explicit, active, binary and language-involving.

2.3 Interaction between the two types

A common thread in the research findings surveyed is, first, that both types of processing are constantly available, second, that they may, or do interact and, third, that Type 1 is likely to apply before Type 2. For example, Epstein (1994) observes that the experiential and rational processing systems distinguished do not only compete but also interact with one another.

Furthermore, some domains of behavior have been identified where both Type 1 and Type 2 are needed. The following in particular are argued to require the two types to work in concert: Judgment, evaluation, complex planning, complex decision making, complex problem solving, critical thinking, strategic thinking, hypothetical thinking, systematic thinking, innovation, and technical design (Evans 2003). In the dual system model of reasoning and judgment of Evans and Over (1996), decisions can reflect processes in either system, but there is also interaction between the systems, and conscious thinking is continuously 'shaped, directed and limited' by implicit, pre-attentive ones.

In the dual process model of Kahneman (2011; see also Kahneman and Tversky 1972, 1973; Tversky and Kahneman 1974; Kahneman and Frederick 2002), System 2 somehow presupposes the presence of System 1. Type 1 is likely to apply before Type 2, and there may be a hierarchy of precedence between the two, in that Kahneman (2011: 24, 26) argues that his System 2 usually accepts what System 1 tells it, it is mobilized when a question arises for which System 1 does not offer an answer.

2.4 Discussion

Authors proposing DPFs draw on a large body of theoretical premises and methodologies, including experimental, psychometric, and neuroscientific techniques. While their interest is generally with human behavior, neurophysiological experiments have also been carried out, e.g., to provide supporting evidence that the two processes in dual process theory have separate and distinct neuronal substrates (Groves and Thompson 1970: 419); see Evans and Stanovich (2013: 233–234) for an overview of this work.

A common thread in a number of DPFs can be seen in the claim that Type 1 is suggestive of an evolutionarily old form of cognition, one that includes innate skills that are shared with non-human animals. In contrast, Type 2 is claimed to be more recent, being unique to humans (e.g., Reber 1993; Epstein 1994; Evans and Over 1996; Stanovich 1999, 2004; Kahneman 2011: 21; Evans and Stanovich 2013: 225). In the dual system framework of Stanovich (1999, 2004), System 1 was designed for the promotion of narrowly genetic goals, such as reproductive success, while the more flexible System 2 serves the goals of the individual person and allows us to rebel against genetic imperatives. Intuitively appealing as such views may be, more data are needed to assess their empirical significance.

At the same time, work on psychological DPFs has not gone unchallenged.[3] Evans himself (2012: 22), one of the main proponents of the paradigm, draws attention to the fact that there are a number of 'fallacies' apparent in some of the dual process studies and, in fact, the following caveats need to be taken into acccount:

3. We are ignoring here critical reviews such as that by Talmont-Kaminski (2010: 331), which are driven less by factual than by emotioal considerations.

a. Not all DPFs are essentially the same; rather, there is a wide range of alternative approaches, even if most of them subscribe to a common core.
b. The boundary between the two types is not clearly delineated and there also is some vagueness in the way the two systems are characterized (Mercier and Sperber 2009: 150).
c. Some of the features proposed to characterize Types 1 and 2 have been claimed to be problematic, and it has been argued that certain kinds of reasoning phenomena have been misclassified by dual process theorists (Osman 2004).
d. It has also been argued that there is no need for a dualist distinction (see especially Osman 2004; Kruglanski et al. 2006), or that the range of phenomena covered by DPFs is better taken care of by a continuum model extending from implicit to explicit processes of learning and reasoning. For students of continuum models, the distinction in the performance on reasoning tasks relates to differences in degree rather than in the kind of reasoning system used. For example, Cleeremans and Jiménez (2002) and others propose a single-system learning framework incorporating a continuum between implicit and explicit processes; see also Osman (2004: 993). And finally, there remain some unresolved questions. For example, whether we store, retrieve, encode, and forget information separately in the two types or completely independently of each other remains to some extent controversial.

It would seem, however, that in spite of such problems, which are in fact in need of further research, the DPFs surveyed have provided a relevant perspective of mental activity. First, they are built on a substantial body of experimental, psychometric, and neuroscientific evidence (Evans and Stanovich 2013: 224). Second, they have shaped the fields of social and cognitive psychology to some extent, stimulating an enormous amount of research (see Gawrowski and Creighton 2013: 294). And third, they are able to identify some traits of mental behavior that are not, or not satisfactorily within the scope of alternative frameworks, in that they relate phenomena to one another that have been treated as unrelated in other research.

3. Linguistic activity

The work summarized in Section 2 has had quite some impact on our understanding of reasonsing processes and mental activity in general. But it does not constitute the only line of research suggesting that underlyingly human behavior exhibits a dualistic organization. Another line of research concerns language, and the present section gives an overview of dual process frameworks as they have been proposed in work based mainly or exclusively on the analysis of linguistic data (henceforth: linguistic DPFs). To our knowledge, these frameworks were developed largely independently of those surveyed in Section 2, and their subject is different: Rather than with reasoning, judgment, decision making, etc., their interest is with how people construct linguistic discourse and what lexical and grammatical resources are available to them for doing so.[4]

In accordance with the terminology used in Section 2, the two structures distinguished are also referred to as Type 1 and Type 2 for comparative convenience. No claim is made at this point, however, that the distinction is equivalent to or reflects that made in psychological work. The reason for nevertheless using the same terminology for both research traditions is that, at least on the surface, there are some resemblances in the two kinds of distinctions. These resemblances will be the subject of Section 4, which is devoted to the question of how the DPFs proposed by linguists and neurolinguists relate to those by psychologists that were examined in Section 2.

3.1 Frameworks

An overview of linguistic and neurolinguistic work on the distinction between two contrasting modes of behavior is found in Heine (2019). Discussion in the present section is restricted to three frameworks which may be taken to be representative of that work. The reason for focusing on these three DPFs is that each of them highlights a different aspect of language structure and language use. Thus, the framework in Section 3.1.1 is concerned with the nature of linguistic forms and that in Section 3.1.2 with the structure of grammar, while the concern of work summarized in Section 3.1.3 is with the organization of texts.

3.1.1 *Formulaic vs. novel speech*

Using a neurolinguistic perspective, Van Lancker Sidtis and associates (e.g., Van Lancker Sidtis 2004, 2009) propose what they call a dual process model of speech. Central to the model is the distinction between formulaic speech, also referred to as automatic speech (Type 1) and novel speech (Type 2).[5]

The dual process model features a holistic mode for processing formulaic speech and an analytic mode for the generation of novel speech, the distinction

4. The term 'discourse' is used here generally in the sense of Halliday (1985: xxii) for "what people say and write and listen to and read". No distinction is made between 'discourse' and 'text'. Discourse can be conceived and analyzed either as activity, a product, or a knowledge store.

5. A detailed account of this model is found in various publications of Van Lancker Sidtis and associates (Van Lancker 1988, 1990, 1997; Van Lancker Sidtis 2004, 2009, 2012; Van Lancker Sidtis and Postman 2006; Sidtis, Canterucci and Katsnelson 2009).

being one between fixed or nonpropositional language (Type 1), on the one hand, and newly created or propositional language (Type 2), on the other. Unlike the latter, the former is not newly created from the operation of grammatical rules on lexical items (Van Lancker Sidtis 2009: 445).

Type 1 speech has the characteristics listed in (1), easily identified instances of it being interjections, expletives, pause fillers (*uh, um*), discourse elements (*well, so*), nonliteral lexical meanings of idioms *(He was at the end of his rope*), and proverbs.

(1) **Characteristics of instances of formulaic speech** (Van Lancker Sidtis 2004, 2009, 2012)
  a. They have stereotyped form, they are fixed and unitary
  b. They have a set intonation contour
  c. They have conventionalized meaning which is complex and usually nonliteral, rife with nuance and connotations, and depend in special ways on social context
  d. People know them intuitively.

Type 2 speech, by contrast, is concerned with fully productive language use.

There is substantial neurological evidence to suggest that novel speech is represented in the left hemisphere of the human brain, whereas formulaic speech is facilitated by a subcortical right hemisphere circuit. For example, right hemisphere and/or subcortical damage lead to selective impairment of formulaic language (Type 1), while left hemisphere damage leads to selective impairment of novel language (Type 2) with relative preservation of formulaic language (Van Lancker Sidtis 2009: 460).

Being extremely rare in aphasia following right hemisphere damage, aphasia is almost exclusively associated with left hemisphere damage and, in fact, precursors of the dual process model and brain lateralization can already be found in research on aphasia in the 19th century (see Van Lancker Sidtis 2004, 2009: 460 for detailed discussion). Thus, the neurologist Hughlings Jackson (1874 [1932]) provided examples of preserved aphasic speech, distinguishing between 'nonpropositional' (or 'automatic') and 'propositional' speech associated with right and left hemisphere processing, respectively. Head (1926) found that non-propositional speech appears first in both receptive and expressive aphasia, Bay (1964) described aphasia as an inability to propositionalize, and according to Luria (1966), clinical observations showed that it was speech formulas, expletives, pause fillers, proper nouns, sentence stems, and serial speech that were preserved in aphasic speech.

Support for the dual process model also comes from some recent lines of linguistic research, in particular from Pawley's (2009) work on speech act formulas. He argues that competent speakers have a dual knowledge of their language, knowing many linguistic entities in two ways: holistically and analytically, and they can move between the two. On the one hand, people have severely limited rapid processing capacity but they have an enormous memory, which allows them to store and retrieve, or recognize familiar complex form-meaning pairings (Type 1). On the other hand, they are good at generalising, at perceiving patterns, and the generalising capacity is essential to the learning of general rules (Type 2).

3.1.2 *Thetical grammar vs. sentence grammar*

Discourse Grammar, as proposed by Kaltenböck, Heine and Kuteva (2011) and Heine et al. (2013), is composed of all the linguistic resources that are available for constructing spoken or written (or signed) texts. It is based on the assumption that there are two domains of discourse processing that need to be distinguished, referred to respectively as thetical grammar (Type 1) and sentence grammar (Type 2).[6] Thus, both are part of grammar, even if the regularities and 'rules' organizing the two domains are not the same (see Heine et al. 2013 for some details).

Sentence grammar is well documented; it has been the main or the only subject of theories of mainstream linguistics. It concerns the structure of sentences presented in a propositional format, being organized in terms of parts of speech or constituent types plus the syntactic and morphological machinery to relate constituents to one another. Thetical grammar consists of a catalog of thetical formulae and constructions as well as the ability to coopt new theticals from sentence grammar for structuring discourse (see below). The main kinds of formulae are listed in (2).

(2) **Types of formulaic theticals** (printed in bold)
- a. Discourse markers (e.g., *This is,* ***you know,*** *not exactly what I wanted.*)
- b. Exclamatives (***What a pity!***)
- c. Expletives (e.g., ***mother-fucker!***)
- d. Formulae of social exchange (e.g., ***Good morning!***)
- e. Ideophones (e.g., ***bang!, plopp!***)
- f. Interjections (e.g., ***Damn,*** *we've missed the bus.*)
- g. Vocatives (e.g., ***Sir!, Ladies and Gentlemen!***)

Theticals (Type 1) differ from sentence grammar units (Type 2) in a principled way, their defining properties are the following: (a) They are syntactically unattached, (b) they tend to be set off prosodically from the rest of an utterance, and (c) their meaning is non-restrictive or metatextual (Kaltenböck, Heine and

6. 'Discourse processing', as understood here, is about what to say to whom and how to say it; it concerns (a) the way a text is planned and produced by the speaker (or writer) and (b) how the text is understood by the hearer (or reader). Notice that for a number of authors, discourse processing relates only to (b) whereas (a) is called discourse planning.

Kuteva 2011: 853). Type 1 and Type 2, thus, are distinguished in this DPF by means of grammatical criteria. For example, being syntactically independent means, that theticals

– can form full utterances without containing a clause (***Good morning!***),
– cannot form arguments of a sentence (e.g., *This is* ****Good morning!***),
– cannot be subordinated (e.g., **Joe is a man who* ***what a pity!***), and they
– cannot form cleft constructions (e.g., **It is* ***what a pity!*** *that Joe couldn't come*).

Being prosodically set off means that theticals tend to be separated from the surrounding text by means of distinct intonation contours and/or small pauses. In writing, this is frequently signaled by punctuation marks like commas, colons, dashes, or parentheses. The hedge 'tends' draws attention to the fact that prosodic breaks can be missing, especially in fluent speech and when short theticals are involved, and they are more likely to be missing towards the end than at the beginning of an utterance. But, importantly, such breaks can always be restored when the speaker, or the writer, wishes to emphasize the thetical character of an expression.

The term 'non-restrictive meaning' indicates that theticals are not part of the meaning of the sentence that they cooccur with. Rather, their meaning concerns reasoning processes and inferential mechanisms that are grounded directly in the situation of discourse. More specifically, their meaning concerns text organization, speaker-hearer interaction, and/or the attitudes of the speaker (Heine 2019).[7]

As all the work on Discourse Grammar suggests, Type 1 and Type 2 somehow belong to parallel 'spaces' structuring linguistic discourse, but the two spaces interact in a number of ways. First, being separated from the structure of sentences, Type 1 may provide a kind of meta-level for Type 2 by relating sentences, that is, Type 2 units, to the overall situation of discourse. This observation has been made in particular in research on discourse markers, whose function has been characterized as 'metatextual', 'meta-discursive', or 'metacommunicative' (see Heine 2019, Section 2).

Second, the two types of processing can be said to proceed in parallel but to jointly contribute to the linear format of linguistic communication. Type 1 units, that is, theticals, can either be placed at the left or the right periphery of a sentence, or be inserted within a sentence, but many may also occur on their own as 'standalones' (e.g., *Good morning!*). There are, however, a number of patterns of frequent collocations where Type 1 typically precedes Type 2 units. Paradigm sequences to be observed in discourse are listed in (3). Note, however, that Type 1 units do not

7. In addtion to text organization, speaker-hearer interaction, and attitudes of the speaker, further components are source of information, discourse setting, and world knowledge; see Kaltenböck et al. (2011: 861–864) for details.

require the presence of a Type 2 unit; rather, they can also occur on their own, and the same applies for Type 2 units.

(3) Recurrent English Type 1 – Type 2 combinations (theticals are printed in bold)
   a. Discourse marker – elaboration: ***Alright,*** *let's go now.*
   b. Greeting – socializing expression: ***Hi,*** *how are you this morning?*
   c. Interjection – explication: ***Oh,*** *I didn't know that!*
   d. Vocative – reason for calling: ***Paul,*** *can you help me?*
   e. Yes/no markers – comment: ***Yes,*** *that's correct.*

And third, the two types are related to one another via cooptation, an operation whereby pieces of sentence grammar can be deployed for use in thetical grammar, thereby acquiring the structure of theticals (Heine et al. 2017).

These features can be illustrated with the following example. The English item *frankly* is an adverb of sentence grammar, determining the meaning of the predicate in (4a). But it has also been coopted to thetical grammar, as exemplified in (4b), to serve as a thetical, alternatively referred to as a stance adverbial (Biber et al. 1999: 133), or a disjunct (Quirk et al. 1985: 648, 613).[8]

(4) a. *She spoke frankly about herself now and then.*
   b. ***Frankly,*** *Kris didn't want to know.* (Biber et al. 1999: 132)

The use of *frankly* in (4b) is the result of cooptation, having been transferred from the space of sentence grammar (Type 2) to that of thetical grammar (Type 1). As a result of this transfer, the grammatical and semantic structure of *frankly* has changed: In accordance with its status as a thetical, *frankly* in (4b) is syntactically detached, placed at the left periphery of the utterance, and it is typically set off prosodically, signaled by a comma in (4b). And its meaning is non-restrictive and metatextual: Whereas in (4a) it is part of the sentence meaning, qualifying the predicate *spoke*, *frankly* in (4b) relates to the world of speaker-hearer interaction, establishing a special relationship between the speaker and the hearer with reference to the semantic content of the sentence.

Findings made by students of Discourse Grammar confirm those made by Van Lancker Sidtis and associates (e.g., Van Lancker Sidtis 2004, 2009), suggesting that there are significant neuroanatomical correlations between the two types of grammar and brain lateralization: Whereas sentence grammar structures of Type 2 implicate mainly the left hemisphere, building a Type 1 structure of discourse is a task that cannot be achieved without participation of right hemisphere activity (Heine et al. 2014, 2015; Heine 2019).

8. For an alternative analysis of *frankly*, see Keizer (this volume).

3.1.3 *Macrostructure vs. microstructure*

DPFs of the organization of texts – or discourse analysis – are of a different kind than the preceding two frameworks. Rather than dealing with the distinction between two kinds of linguistic forms (Section 3.1.1) or grammars (Section 3.1.2), the model of discourse analysis of van Dijk (1980), for example, is concerned with the question of how texts are constructed and comprehended, based on the distinction between a macrostructure (Type 1) and a microstructure (Type 2).[9]

Type 1 is a higher-level semantic and conceptual structure that organizes the 'local' microstructures of Type 2. The underlying role played by Type 1 is "to establish global meanings and global coherence in a discourse". For van Dijk (1980: 29), some means for expressing macrostructures are summaries, short paraphrases, and conclusions.

Type 2, by contrast, is about the strucure of sentences and sequences, it concerns local information, such as the meanings of words, phrases, clauses, and simple actions, and van Dijk (1980: 29, 99) conceives microstructures as the actually and directly expressed structures of discourse.

The relationship between the two types is conceived by van Dijk as one of derivation and inferencing via macrorules, which derive macrostructures from microstructures (van Dijk 1980: 13, 46). Central functions of Type 1, the macrostructure, are to reduce complex information, organize complex information, and to establish global coherence in texts, but Type 1 may also be expressed in the discourse itself by thematical words or sentences.

Rather than 'macrostructure' and 'microstructure', Haselow (2013, 2016a, 2016b) uses the terms macrogrammar (Type 1) and microgrammar (Type 2) in proposing a wider conception of grammar. The two kinds of grammar use different serialization principles (Haselow 2016a: 81; 2016b: 386).

Observing that linguistic activity seems to exhibit a dualistic organization, he describes Type 1 as referring to grammatical relations across sentences and larger text units. It serves to establish information structure and textual coherence and regulates the distribution of extra-clausal elements. It is based on knowledge of how to assemble different kinds of units expressing information relevant on different levels of the general communicative system into a coherent unit of talk. The serialization principles of Type 1 rest upon speech planning, processibility, textual coherence and contextual embeddedness.

Type 2, by contrast, refers to sentence-internal structural relations underlying the arrangement of constituents in hierarchical configurations. It is based on

9. The distinction is described by Heine (2019) in the following way: "Whereas the microstructure of discourse serves the expression of propositional meaning contents, macrostructure provides a frame and global coherence to texts."

knowledge of morphosyntactic dependency relations, constituency and ways of syntactic embedding.

Whereas the meaning of Type 2 structures concern propositions, Type 1 elements do not change propositional content (Haselow 2013: 412, 2016a: 82). The Type 1 elements used by Haselow in support of his DPF are the English sentence-final particles *actually, anyway, but, even, so, then* and *though*, their use is illustrated in (5) with the English particle *then* (printed in bold). These particles differ from elements of Type 2, on the one hand, in their grammatical structure in that they are syntactically peripheral and have low key intonation. On the other hand, they also differ in their functions: They link not only a discourse unit and an implied proposition but also two independent subsequent units of spoken discourse, expressing 'conversation-actional' values such as agreement, disagreement, concession, correction, or surprise.

(5) A: they have it in the Video in Camden Road
B: oh do they
oh right
where did you hear it from **then** (Haselow 2013: 377; ICE-GB s1a–049)

The distinction between macrostructure (Type 1) and microstructure (Type 2) has generated some amount of neurolinguistic research, and a major theme underlying that research is how the distinction relates to brain activity. As this research in fact shows, there are significant correlations with brain lateralization in that the macrostructure is strongly associated with right hemisphere activity whereas the microstructure implicates left hemisphere activity (e.g., Joanette et al. 1989, 1990; Beeman and Chiarello 1998; Jung-Beeman et al. 2000; Lindell 2006; Long and Baynes 2002; Marini et al. 2005; Prat et al. 2007). Correlations between discourse structure and brain activity concern in particular the domains of discourse planning, inferencing, and coherence (see Heine 2019, Section 3 for evidence and detailed discussion).

3.2 Discussion

The DPFs considered in Section 3.1 have developed essentially independent of one another, and they differ not only in their goals but also in their findings. Differences are most pronounced between the first two frameworks (Sections 3.1.1 and 3.1.2), on the one hand, and the last ones (Section 3.1.3), on the other, for obvious reasons: Whereas the former focus on the lexical and grammatical resources employed for constructing texts, the latter are concerned with the overall structure of discourse processing.

Nevertheless, there are a number of features that linguistic DPFs seem to have in common. These features are described in Heine (2019) on the basis of a larger sample of frameworks and are summarized below.[10] Note that the listing below is not restricted to the frameworks outlined in Section 3.1 but also refers to studies made in other linguistic DPFs, see Heine (2019) for details.

a. *Type 1 provides a meta-level for Type 2*
The main 'meta'-functions of Type 1 surfacing from the relevant studies are, in that order, (a) to construct a coherent model for a text, (b) to provide instructions on how to interpret the text, and (c) to relate the text to the situation of discourse.
For example, we observed in Section 3.1.2 that Type 1 may provide a kind of meta-level for Type 2 by relating sentences, that is, Type 2 units, to the overall situation of discourse. In the comprehension framework of Prat et al. (2007) and others, Type 1 (called the discourse model) provides a representation of what a text is about; it is 'globally coherent', that is, ideas in the text are connected by means of some overarching theme. Type 1 has also been described as discourse about discourse (Nespoulous et al. 1998), or as 'metalanguaging' (Type 1) about 'languaging' (Type 2) (Maschler 1994, 2009). And for van Dijk (1980: 29), macrostructures (Type 1) are higher-level semantic and conceptual structures that organize the 'local' microstructures (Type 2) (van Dijk 1980: 27).[11]

b. *Type 2 is in some sense more basic than Type 1*
All frameworks surveyed in Heine (2019) converge on assuming that the two types are equally needed for structuring discourse. But in most of them it is argued that there is an imbalance between the two. On van Dijk's view, for example, microstructures (Type 2) are the actually and directly expressed

10. In the terminology used in Heine (2019), Type 1 is referred to as macrostructure and Type 2 as microstructure.

11. Notice that – at first sight – this feature seems to be incompatible with the the evolutionary hypothesis that Type 1 precedes Type 2: the 'meta'- functions of Type 1 can relate the text to the situation of discourse, but first there must be *text* in place. As argued in Kuteva and Heine (2020) in the context of Discourse Grammar, however, this seeming incompatibility exists only if one takes a uniformitarian perspective to human language evolution. From a non-uniformitarian perspective – which is the one taken there as well as in the present study – the evolutionary precedence of Type 1 before Type 2 is not surprising at all, especially given the feature discussed in (d) below about the heterogeneity of the structures Type 1 involves. In other words, it is highly plausible to assume that that part of Type 1 which takes care of (primary) interjections, ideophones, vocatives, for instance, was already in place before the structures of Type 2 evolved (cf. Kuteva and Heine 2020 for details).

structures of discourse (Van Dijk 1980: 29), and similar views surface in the DPF of Maschler (1994: 334). In the framework of Clark and Fox Tree (2002: 78, 106), the primary track (Type 2) deals with the 'official business' of the discourse whereas the collateral track (Type 1) carries out 'successful communication'.

This generalization does not apply to the framework of Discourse Grammar (Section 3.1.2), however, where both types contribute to structuring linguistic discourse on the same level of processing (see Kaltenböck et al. 1911: 161, Figure 1).

c. *Type 2 is based on a propositional representation of sentences*
There is fairly general agreement among the linguistic DPFs that Type 2 concerns the structure of sentences in a propositional format (see Section 3.1.2; see also van Dijk 1980: 99), where each constituent is morphosyntactically related to at least one other constituent in a hierarchical relationship (Haselow 2016a: 82). In the comprehension framework of Kintsch (1974), the propositional representation (Type 2) is organized as a network of explicit ideas or propositions derived from the text and the relations among them.

d. *The linguistic structure characterizing Type 1 is of two kinds*
The linguistic structure of discourse units of Type 2 can be described in terms of semantic, syntactic, and prosodic features that characterize sentences in all their manifestations. But that of Type 1 units is more heterogeneous and more difficult to understand, in that there are two main components, which are hard to reconcile with one another. On the one hand, Type 1 is composed of a set of more or less fixed, formulaic expressions that are stored for re-use in a frozen form, like the speech act formulas of Pawley (2009) or the formulaic theticals of Heine et al. (2013) (see Sections 3.1.1, 3.1.2 above).

On the other hand, Type 1 can be characterized as an ability to design texts, dedicated to the structuring of discourse beyond the sentence, consisting of parenthetically inserted text pieces (Heine et al. 2017; see also the contributions in Dehé and Kavalova 2007, and Dehé 2014), of summaries, short paraphrases, and conclusions (van Dijk 1980: 29), or of even larger pieces of discourse (see Johnstone 2002: 64).

e. *Type 1 is based on inferencing of a kind that is absent in Type 2*
The nature and role played by different kinds of inferencing is still largely unclear and in need of more research. In more general terms, the frame for inferencing is provided by propositional units in the case of Type 2 but by the overall structure of the text and the way the text is embedded in the discourse situation in the case of Type 1.

According to van Dijk (1980: 13, 46), inference rules are needed to derive macrostructures from microstructures, and in the comprehension model of

Prat et al. (2007), readers must engage in active inferential processing in order to construct a discourse model (Type 1). In the framework of Discourse Grammar, inferential mechanisms on which thetical grammar (Type 1) rests are anchored in the situation of discourse, that is, the organization of the text, the interaction between speaker and hearer, and the attitudes of the speaker (Kaltenböck et al. 2011: 861–4).

f. *Type 1 and Type 2 are structurally separated from one another*
While some of the studies cited are silent on this issue, this is a generalization that emerges in some form or other in quite a number of the linguistic DPFs surveyed. Perhaps most clearly, the distinction is described as one between formulaic and novel speech by Van Lancker Sidtis (2004, 2009) or between holistic and analytic encoding by Pawley (2009; see Section 3.1.1).
In the framework of Discourse Grammar (Kaltenböck et al. 2011; Heine et al. 2013), there are grammatical criteria to separate the two types, namely syntactic, prosodic, and semantic features (Section 3.1.2). For similar criteria, see Haselow's (2013: 378, 382, 412) discussion of the distinction between macrogrammar (Type 1) and microrammar (Type 2) (Section 3.1.3), as well as Dik's (1997: 379–407) framework of Functional Grammar, where the distinction is one between extra-clausal constituents (Type 1) and clausal constituents (Type 2).

g. *There are correlations between the two types and brain activity*
Correlations with brain activity concern hemispheric lateralization. As demonstrated in the dual process model of Van Lancker (2004, 2009), there is substantial neurological evidence to suggest that novel speech (Type 2) is represented in the left hemisphere of the human brain, whereas formulaic speech (Type 1) is facilitated by a subcortical right hemisphere circuit.

Research on formulaic theticals also suggests that there are neuroanatomical correlations between the two types of grammar and brain lateralization: Whereas Type 2 structures implicate mainly left hemisphere activity, building a Type 1 structure of discourse is a task that cannot be achieved without participation of right hemisphere activity (Heine et al. 2014, 2015; see Section 3.1.2 above).

Finally, we saw in Section 3.1.3 that evidence has also been found in neurolinguistic research suggesting that the macrostructure (Type 1), being responsible for the processing of whole texts and for creating coherence between the various parts of a text, is strongly associated with right hemisphere activity whereas the microstructure (Type 2) implicates left hemisphere activity.

The linguistic frameworks considered in this section are based on a range of different theoretical stances and methodologies, and the nature of the data examined also differs from one author to another. Furthermore, we observed that the seven features summarized above are not all necessarily shared by all of the linguistic DPFs. Nevertheless, taken together, the features are suggestive of a common core allowing for some general understanding of the architecture of the two types.

4. Comparison

The work surveyed in the preceding sections presents a challenge to alternative frameworks. It has been subjected to critical analysis, contesting either parts of a framework, a whole framework or questioning the significance of dual process frameworks altogether. For obvious reasons, challenges were most pronounced in the case of psychological DPFs: They have a long tradition and have generated by far the largest amount of research activity and, accordingly, have also been subject to the largest amount of critical discussions (see Section 2).

The question to be looked into now is the following: Are the findings made in psychological and linguistic DPFs compatible with one another and, if yes, to what extent? To this end, a number of themes are identified below that seem to be shared by the two kinds of frameworks.

4.1 Themes

4.1.1 *Interaction between types*

A common theme in both kinds of DPF is that the two types, while being clearly distinct, constantly interact – as Pawley (2009) puts it, people constantly move between the two. Interaction can take a wide range of forms; for the present purposes, we are restricted to the following forms: (a) sequence of processing, and (b) the status of the two types vis-à-vis one another.

According to one observation made in linguistic DPFs, the types operate in parallel spaces (Section 3.1.2) where units of Type 1 can be interpolated within Type 2 texts in the form of (paren)theticals (Heine 2017). Paradigm examples are provided by discourse markers, such as *if you will* in (6), which are inserted in the linear flow of otherwise Type 2 utterances. Note that discourse markers can be combined (Lohmann and Koops 2016) and have been described as signaling a meta-level of discourse organization (Traugott 1995: 5; Heine 2019, Section 2).

(6) *This is the fundamental philosophical fact, the grundrisse* ***if you will*** *of our enterprise.* (1997 *Queen's Quarterly* [Strathy]; Brinton 2008: 165)

This pattern can be reconciled with observations made in psychological DPFs according to which the processing of Type 1 and 2 proceeds in parallel, each having their say, and conflicts are resolved if necessary (Sloman 1996; Barbey and Sloman 2007).

But there is another, more salient pattern concerning the order in which the two types are activated. Observations in Discourse Grammar show that a number of thetical categories (Type 1) occur in sequence with sentence grammar units (Type 2) and, not uncommonly, the former provides a stimulus followed by a more elaborate and more detailed comment added by Type 2 (see Section 3.1.2). The utterance in (7), repeated below for convenience from (3), may illustrate the linguistic difference between the two types.

(7) Recurrent English Type 1 – Type 2 combination [= (3c)]
Interjection – explication: ***Oh,*** *I didn't know that!*

The interjection *oh* in (7), a Type 1 unit, is a holistic, unanalyzable expression for an intuitive, emotive state which can be characterized as being produced fairly automatically without much mental effort, needing little processing energy to be evoked, and it can form an utterance of its own. The Type 2 unit *I didn't know that*, by contrast, requires some processing effort from both the speaker and the hearer, who both need to analyze its grammatical features, such as its deictic values of person (*I*, first person) and of time (*did,* past tense), negation (*'nt*), and reference to the preceding discourse (*that*).

This shows a parallel to observations made in psychological DPFs: There is a division of labor between the two types, but Type 1 activation tends to precede, if not trigger Type 2, or even be a prerequisite for Type 2 (Kahneman 2011: 22, 44). For Evans and Stanovich (2013: 228), Type 1 processing generates intuitive default responses on which subsequent reflective Type 2 processing may or may not intervene, and Kahneman observes:

> System 1 continuously generates suggestions for System 2: impressions, intuitions, intentions, and feelings. If endorsed by System 2, impressions and intuitions turn into beliefs, and impulses turn into voluntary actions. When all goes smoothly, which is most of the time, System 2 adopts the suggestions of System 1 with little or no modification … When System 1 runs into difficulty, it calls on System 2 to support more detailed and specific processing that may solve the problem of the moment. (Kahneman 2011: 24)

The second form of interaction concerns the status of the two types vis-à-vis one another. As was pointed out in Section 3.2, thetical grammar (Type 1), and especially discourse markers (Heine 2019, Section 2), may provide a kind of meta-level for sentence grammar (Type 2) by relating sentences, that is, Type 2 units, to the overall situation of discourse.

There are also features in psychological DPFs suggesting some kind of vertical orientation, in that Type 1 is said to be top-down, providing the 'big picture', whereas Type 2 works bottom-up and is elemental and detail-oriented. Note further that according to Kahneman (2011: 24, 26), Type 2 (his System 2) usually accepts what Type 1 (System 1) tells it, it is mobilized when a question arises for which System 1 does not offer an answer.

4.1.2 *Context*

Linguistic communication generally requires a context, that is, a situation of discourse, to take place. But the role played by context in the two types appears to be intrinsically different: In the propositional content expressed by Type 2 text units, the contextual environment is distinctly less important than in Type 1 text units, where context is an inherent part of speech units (Heine et al. 2013: 182–185). This observation has been made in some way or other in most linguistic DPFs. For example, formulaic speech (Type 1) depends in special ways on the social context in the dual process model of Van Lancker Sidtis (2004, 2009, 2012). And in Haselow's distinction between macrogrammar (Type 1) and microgrammar (Type 2), the serialization principles of Type 1 rest not only upon speech planning, processibility, and textual coherence, but crucially also on contextual embeddedness (Haselow 2016a: 81, 2016b: 386; see Section 3.1.3).

Similar observations have been made in psychological DPFs. For Sloman (1996), the reflexive associative system of Type 1 draws inferences from statistical regularities in the environment, that is, in the context, and according to Kahneman (2011), System 1 (Type 1) is highly sensitive to subtle environmental cues. In more general terms, Type 1 has been described as being contextualized whereas Type 2 is said to be decontextualized (Frankish 2010: 922) or abstract (e.g., Evans and Stanovich 2013: 225).

4.1.3 *Coherence*

In a number of neurolinguistic studies a distinction is made between local and global coherence. The former concerns relations within a sentence or between pairs of sentences while the latter concerns the overall structure of a text or major parts thereof (e.g., Ferstl and Cramon 2001; Marini 2012: 72).[12] A major theme in linguistic DPFs devoted to discourse analysis can be seen in the analysis of (global) text coherence: Establishing coherence between different parts of discourse is considered by many to be a central, if not the central function of Type 1. For van Dijk (1980: 29), the underlying role played by the macrostructure (Type 1) is "to establish global meanings and global coherence in a discourse", organizing the local microstructures of Type 2 (see Section 3.1.3).

12. When used without an attribute, 'coherence' usually stands for 'global coherence' in the relevant literature.

Coherence is less of an issue in psychological DPFs but it also surfaces in some studies. Kahneman (2011: 13, 81, 86) portrays Type 1 as a 'coherence-seeking system', constructing a coherent interpretation of what is going on in our world at any instant. This involves the construction of the best possible interpretation of the situation.

4.1.4 *Analyzability*

Throughout the linguistic studies of dual processing, function-specific units of Type 1 tend to be portrayed as fixed and unanalyzable, that is, as having little or no internal morphological structure. Type 2, by contrast, is characterized as being proposition-based and as having the analytic structure of sentences, where words and morphemes are organized compositionally by means of rules for syntactic constituency or dependency, linear arrangement, agreement, etc. This distinction is reflected in the terminology used, being described, respectively, as one between a holistic and an analytic mode (Pawley 2009), between formulaic and novel speech or newly created language (Van Lancker Sidtis 2009: 445), or between formulaic and fully compositional linguistic expressions (Heine, Kaltenböck and Kuteva 2016: 52–58).

This is a somewhat simplified account of the distinction considering that there are exceptions. For example, in the framework of Discourse Grammar, some kinds of theticals (Type 1) can have a complex internal structure (Kaltenböck, Heine and Kuteva 2011), and according to van Dijk's (1980: 29) discourse analysis, macro-structures (Type 1) can consist of summaries, short paraphrases, and conclusions. Nevertheless, the distinction is supported by probabilistic generalizations of the following kind: Whenever one encounters in linguistic discourse a syntactically independent unit that is formulaic and unanalyzable then it invariably belongs to Type 1. In contrast, whenever there is a text piece exhibiting the propositional structure of a predicate with its arguments, adjuncts and modifiers then this is highy likely to be a Type 2 unit.

In psychological DPFs there is a corresponding distinction in analyzability, frequently described, on the one hand, in terms of distinctions like holistic vs. analytic, heuristic vs. analytic, or synthesis vs. analysis (e.g., Frankish 2010: 922). On the other hand, the distinction is also reflected in the differential role played by rules in the two types. As argued by a number of proponents of psychological DPFs, Type 2 is rule-based whereas Type 1 is not (e.g., Kahneman 2011: 36), or follows rules of a different kind (see Evans and Stanovich 2013 for discussion).[13] Type 1 can detect only simple relations, such as involving similarity or differences

13. The claim that Type 1 is not rule-based has been challenged in a number of publications (e.g., Kruglanski and Gigerenzer 2011); for a response, see Evans and Stanovich (2013).

in quantity or quality. Type 1 is associative, and an associative memory is claimed to be the core of System 1 (Kahneman 2011: 13). Type 2, on the other hand, is rule-based (Frankish 2010: 922), only System 2 can follow rules or compare objects on several attributes (Kahneman 2011: 36), it "constructs thoughts in an orderly series of steps" (Kahneman 2011: 24).

4.1.5 *Truth conditions*

A feature that is in need of more research concerns assumptions on the truth conditions of what is being said. This is a complex field, but paradigm examples of Type 2 units can be said to respond to truth conditionality while paradigm examples of Type 1 do not or do considerably less so, as research findings on (paren)theticals suggest (cf. Ifantidou 2001; MacFarlane 2014). This applies, for example, generally to discourse markers (Type 1), which do not affect the truth conditions of an utterance and do not add anything to the propositional content of an utterance (Jucker 1993: 436). Take the example in (8a), reprinted from (7). Whereas the sentence grammar unit *I didn't know that* (Type 2) can be commented on by (8b), the Type 1 unit *wow* can not, cf. (8c).

(8) a. ***Wow,*** *I didn't know that!*
b. *It is true that I didn't know that.*
c. **It is true that wow.*

This observation can be related to some findings made in psychological DPFs. According to Kahneman (2011: 62), System 1 produces an impression of familiarity while System 2 relies on a true/false judgment. Similarly, there is a distinction made between belief (Type 1) and opinion (Type 2), where 'belief' in the sense of Dennett (1978: 300–309) is a basic mental state, while opinions are more sophisticated, 'linguistically infected' states committed to the truth of a sentence in a language one understands (see Frankish 2010: 918).

4.1.6 *Self-control*

Whether there is a significant linguistic parallel to the distinction between automatic processing (Type 1) and controled processing (Type 2) made in psychological DPFs (see Section 2) is an issue that is not clearly within the scope of standard linguistic methodology. Nevertheless, there are two possible ways of determining differences in control. The first concerns the fact that linguistic expressions of Type 1 are for the most part unanalyzable, formulaic units, typically produced intuitively and automatically (Van Lancker Sidtis 2009, 2012: 63; see Section 3.1.1, (1)). The processing of Type 2 expressions, by contrast, requires some planning and controled behavior.

The second way concerns a difference between spoken and written discourse: Writing is normally associated with a distinctly higher degree of control in processing discourse than speech. Now, there are classes of Type 1 units, especially hesitation fillers or pause markers and certain discourse markers, that are widely used in speech but hardly ever in writing. Tottie (2014: 20) found that the hesitation filler UHM (*uh* or *hm*) is not entirely restricted to speech in American English, but when it occurs in writing "it is used intentionally, with a stylistic purpose in mind". Such observations would seem to suggest that self-control is distinctly less pronounced in Type 1 than in Type 2.

In psychological studies, control is in fact one of the paradigm features characterizing Type 2.[14] Kahneman (2011: 26) argues that System 2 is in charge of self-control, whereas operations of System 1 involve no sense of intentional control. And Stanovich (2004) and Evans and Stanovich (2013: 237) say that the execution of Type 1 processes is mandatory when their triggering stimuli are encountered and they are not dependent on input from high-level control systems.

4.1.7 *Intuitive vs. reflective behavior*

All languages for which there exists appropriate information dispose of function-specific categories dedicated to the expression of intuitive and emotive states. Such forms, which include most of all interjections, exclamatives, and expletives, are invariably located in Type 1 of the dual process model of Van Lancker Sidtis (2004, 2009, 2012; see Section 3.1.1) and of Discourse Grammar (Heine et al. 2013; see Section 3.1.2). Unlike Type 2 expressions, Van Lancker Sidtis (2012: 63) argues, people know the formulaic expressions of Type 1 intuitively.

A number of psychological DPFs point out that intuitive behavior is one of the main features of Type 1 (see Frankish 2010: 922). For Evans and Stanovich (2013: 228), Type 1 processing generates intuitive default responses, or intuitive inferences (Mercier and Sperber (2009). Type 1 rests on basic emotions (Evans and Stanovich 2013: 225), it continuously generates impressions, intuitions, intentions, and feelings while System 2 is mostly detached from emotions (Kahneman 2011: 24–25).

4.2 Discussion

The features discussed above take care of but a fraction of all the terminological distinctions that have been proposed in psychological studies (see, e.g., Frankish

14. Note, however, that there is also the view according to which the difference between automatic behavior and conscious control is better taken care of by means of a continuum model than in terms of dual processing (Cleeremans and Jiménez 2002; Osman 2004: 993).

2010: 922 for a list of 23 features). There are three main reasons for this restriction. First, for a number of the distinctions proposed in psychological work there are no clear correlates in linguistic DPFs. Second, the distinctions proposed are treated best as specific manifestations of some of the features discussed above. And third, there are also distinctions made by psychologists that presumably are related to distinctions made in linguistic studies but there is no appropriate information available to the linguist to allow for empirical testing. Linguists are hard-pressed to determine, for example, what exact correlates there may be to Kahneman's (2011) distinctions such as fast vs. slow, effortless vs. effortful, or cannot be turned off vs. can be turned off.

This also applies to the neurological correlations between Type 1 and Type 2 in linguistic DPFs that were pointed out in Section 3.2, (g). A number of neurophysiological correlations are mentioned in psychological DPFs (e.g., Groves and Thompson 1970: 421; Eichenbaum and Cohen 2001; Tsuji and Watanabee 2009); see Evans and Stanovich (2013: 233–234) for an overview. But on the whole, no significant correlations have been identified in psychological DPFs, and Kahneman (2011: 29) concludes that "there is no one part of the brain that either of the systems would call home". Whether this difference between linguistic and psychological DPFs is due to differences in the respective knowledge states obtaining in the two fields of research or else is suggestive of an inherent contrast between mental and linguistic processing cannot be established on the basis of the data available to us.

On the whole, however, the observations made in the preceding section suggest that the findings made in two kinds of DPFs have a number of features in common, in particular the ones listed in (9).

(9) Shared manifestations of the distinction Type 1 vs. Type 2 in linguistic and psychological dual process frameworks
  a. There is a common pattern according to which Type 1 provides a stimulus, and this stimulus may but need not be followed by a more elaborate comment made by Type 2.
  b. Type 1 may function as a kind of meta-level for Type 2.
  c. Type 1 is distinctly more sensitive to context than Type 2.
  d. Establishing (global) coherence is a function of Type 1 rather than Type 2.
  e. The preferred type of organization in Type 1 processing is holistic and synthetic, while that of Type 2 is analytic.
  f. Unlike Type 1 processing, Type 2 processing is highly sensitive to truth conditions.
  g. Self-control is distinctly less pronounced in Type 1 than in Type 2.
  h. Emotions and intuitive behavior are more strongly associated with Type 1 than with Type 2.

The distinctions listed in (9) do not exhaust the range of features that have been pointed out in the relevant literature. Suffice it to mention another feature that might qualify as an additional manifestation of the contrast between the two types. We observed in Section 3.2 (d) that the two types differ from one another in that the units of Type 1 are more heterogeneous and more difficult to understand in that Type 1 contains two main components which are hard to reconcile with one another. A possibly related observation has been made in psychological work, where Type 1 tends to be portrayed as being less unitary than Type 2. Evans and Stanovich, for example, conclude:

> These disparate categories make clear that the categories of Type 1 processing have some heterogeneity – encompassing both innately specified processing modules or procedures and experiential associations that have been learned to the point of automaticity. (Evans and Stanovich 2013: 236)

Whether this structural difference between the two types in fact constitutes a significant parallel is a question that cannot be answered at the present state of research.

In concluding, mention should also be made that there is also one feature that appears to be at variance with the generalizations summarized in (9). This feature concerns the status of the two types. We saw in Section 3.2, (b) that a number of linguists consider the microstructure (Type 2) as being the actually and directly expressed structures of discourse (van Dijk 1980: 29). This perspective is hard to reconcile with that surfacing in some psychological DPFs. In particular, in the default-interventionist model of Evans and Stanovich (2013; see also Evans 2003), the rapid autonomous processes of Type 1 are assumed to yield default responses unless intervened on by the distinctive higher order reasoning processes of Type 2 (Evans and Stanovich 2013: 223). Such observations raise the question of whether the descriptive categories that were developed in the two disciplines concerned are mutually compatible to the extent that they allow for sound comparative analysis.

5. Conclusions

The research traditions characterizing psychology and linguistics differ greatly in their history, their perspective, their methodology, and the data examined. To compare the findings made in these two traditions, which was the objective of the present paper, is therefore not an easy task. What our comparison suggests, however, is that there are some striking commonalities surfacing from the work carried out in the two traditions.

Nevertheless, the observations made in the paper cannot be taken to compellingly suggest that the dual process distinctions made in psychological and linguistic frameworks are the same. The question then is: Is there reason to assume that commonalties such as the ones proposed in (9), are suggestive of some shared form of underlying mental activity? On the basis of the information that is available there is no satisfactory answer so far. What seems obvious, however, is that these commonalities are in need of explanation.

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CHAPTER 3

Language activity in the light of cerebral hemisphere differences

Towards a pragma-syntactic account of human grammar

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This chapter explores in a theoretical manner the potential correlations, previously suggested by Heine et al. (2015), between hemispheric specialization in neurolinguistics and a dual organization of discourse. The dual processing of language is represented here by the *pragma-syntax*, the level at which grammatical units manifest shared mental representations in *discursive memory* and generate inferences. While it is widely accepted that the left hemisphere of the brain is of utmost importance for morphosyntactic structuring of discourse, we will argue that the right hemisphere is crucial in processing operations at the pragma-syntactic level. Following a review of the questions surrounding hemispheric specialization, and of the language phenomena it can affect, we will present the pragma-syntactic model of human grammar. This paper will then suggest how it can effectively describe the phenomena whose comprehension has been previously reported in a number of studies as being dependent on the intact activity of the right brain, notably: irony, indirect speech acts and connectives.

Keywords: hemispheric asymmetry, pragma-syntax, language processing, right hemisphere, discursive memory, pragmatic inferences, discourse deficits

I do not believe in the left brain/right brain myth: I believe in discovering the truth about hemisphere difference. Iain McGilchrist (The Master and His Emissary)

1. Introduction

Anyone who has worked with ecological data, particularly that which derives from spontaneous oral interactions, knows the potential difficulties arising from

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its analysis. Given the dynamic and unstable nature of spoken data, its analysis requires taking into account multimodality and prosodic features, as well as the potentially ambiguous nature of some productions, whose analysis can depend on the transcription guidelines adopted (Gadet 2017). Moreover, the grammatical analysis of ecological data is further complicated by the presence of various metadiscursive markers and multiple forms of disfluencies, including speech planning markers, interruptions, repairs, reformulations and hesitations (Blanche-Benveniste et al. 1990; Blanche-Benveniste 1997, 2003). Considered once as secondary or accessory, modern linguistics now acknowledges these phenomena as being integral to our understanding of discourse processing. After all, the speaker cannot simply produce discourse by applying a set of grammatical rules (in the sense of generative grammar), but also requires other types of knowledge that are involved in managing the entire discourse structure. Following the theoretical assumptions of Groupe de Fribourg (2012), we will use the term *pragma-syntax* to refer to this kind of linguistic knowledge. In the following paper, we will assume that pragma-syntax is a prerequisite for successful language activity, since it allows a series of basic cognitive tasks aside from the morphosyntactic structuring of discourse, such as speech planning, reference resolution tasks, pragmatic inferences and updating shared knowledge.

That the grammar of spoken language is not linear and static, but rather dynamic, is also acknowledged by Chomsky, when he suggests that it would be difficult to apply a formal grammatical model to the language analysis of natural speech:

> In actual fact, it [performance] obviously could not directly reflect competence. A record of natural speech will show numerous false starts, deviations from rules, changes of plan in mid-course, and so on. (1965: 4)

Admittedly, formal syntactic analyses still have their place in language studies; they enable us to comprehend the nature of cognitive tasks involved in processing the morphosyntactic dependency rules upon which basic syntactic structures are produced. However, formal models have their limits when it comes to exploring the dynamic side of language. In the end, discourse activity relies simultaneously on *static* and *dynamic* aspects of language (Langacker 2010). On the one hand, to ignore the former would lead to the rejection of a structural grammar entirely: there's no doubt that speakers have access to a set of grammatical rules and a set of stable, discrete resources from which they produce their speech. On the other hand, to ignore the latter, that human language is a complex poly-semiotic system requiring knowledge of discourse or interaction on top of morphosyntactic rules, would artificially reduce the speaker's activity to a series of algorithms and conceptual schemes. In metaphorical terms, taking into account the dynamic side of human grammar alongside its purely formal aspects 'let[s] us escape the hall of mirrors in which language studies language' (McNeill and Pedelty 1995: 64).[1] Evidently, human grammar is not a programming language, but, in a very biological manner, is subject to variation. In this regard, it accepts a certain degree of "errors",[2] which is the consequence of this dynamism and a *sine qua non* requirement for its versatility and further evolution.

The idea that linguistic studies should reconcile purely structural concerns with discursive or interactional aspects of language is, of course, not a new one. For instance, some recent linguistic movements in Europe, working mainly with English and French data, have suggested that it is possible to distinguish at least two different operations in language processing, each contributing in its own unique way to discourse structuring (Blanche-Benveniste 1997; Groupe de Fribourg 2012; Heine et al. 2015; Haselow 2016a, 2016b). While the first operation is of a **micro-syntactic** order and seeks the implementation of an utterance's internal syntactic structure, the second is **macro**- or **pragma-syntactic** and is essential for speech structure management, given that a series of successive utterances contribute to the discourse's unfolding as a whole. From the pragma-syntactic perspective, each enunciation modifies the previous state of the participants' shared knowledge and, much like a 'domino effect', has immediate consequences on the next enunciation to come (Groupe de Fribourg 2012).

In this chapter, we will mainly argue that the possibility to distinguish two different types of operations, micro-syntactic and pragma-syntactic, in discourse processing could reflect the neurophysiology of the human brain. More specifically, we believe that it is promising to explore the differences in cerebral hemispheres (hemispheric asymmetry) under that light. Our hypothesis is that while the two hemispheres are simultaneously involved in various activities and ensure the normal cognitive functions in an individual, they do not have the same priorities, nor do they process information in the same way. For instance, a number of neurolinguistic studies have shown that the left hemisphere (LH) exhibits a strong proclivity for micro-syntactic processing, and the right hemisphere (RH) for macro-syntactic processing. A landmark study in this respect is that of Xu et al. (2005), which shows that while text comprehension relies on the activity of both hemispheres, they "will be differentially engaged when the words are processed in isolation, in a syntactic structure, or in a coherent narrative" (2005: 1002). For

1. The authors talk about the importance of gestures – which are part of this dynamism – for the comprehension of cognitive aspects of language in relation to cerebral organization.

2. Henri Frei's work, first published in 1929 with a provocative title for the time, *La grammaire des fautes* (*Grammar of mistakes*), reveals much about the nature of language. In his work, the author argues that language productions often perceived as "erroneous" or "grammatically incorrect" by purists reflect at a deeper level the speaker's fundamental communicative needs.

example, if the LH stays active throughout the reading of a story, ensuring grammatical and propositional encoding, the RH activity increases dramatically at the end of the story, when subjects need to assess the entire discourse and make appropriate pragmatic inferences in order to understand the story's outcome.

Crucially, hemispheric asymmetry does not concern just language but manifests itself equally at other levels. As such, it is hard to imagine that the phenomenon of cerebral asymmetry would be purely coincidental and there must be substantial differences between both hemispheres at a neurophysiological level (McGilchrist 2019). We believe that the study of human grammar principles constitutes a particularly promising research direction to better understand hemispheric differences.

This study is organized as follows: First, we will consider the consequences of hemispheric asymmetry for some basic cognitive tasks used in everyday human activity (Section 2); then we will look at some possible correlations between hemispheric asymmetry and the two domains of discourse processing, micro- and macro-syntax (Section 3); thirdly, we will consider one particular macro-syntactic approach, widely known as *Pragma-Syntax* and developed by the Swiss linguistic movement Groupe de Fribourg (Section 4); finally, while the authors of this approach make no explicit conclusions about the possible links between their model and psycho- or neurolinguistic observations (at best, their aim is to provide the cognitive representation of discourse), this paper will offer some parallels between the pragma-syntax and the functions specific to each hemisphere in language activity (Section 5). To this end, it will particularly be helpful to explore the phenomena whose processing has been previously reported as being dependent on the intact activity of the RH, notably: irony, indirect speech acts and connectives.

2. Hemispheric asymmetry in humans

Hemispheric asymmetry is such a striking phenomenon that differences between both hemispheres can be easily observed at a neurophysiological level (Weinstein 1978: 20). For instance, as reported by McGilchrist (2010: 504, 2019: 33), the RH tends to be larger and heavier than the LH, has a higher ratio of white matter to grey matter and responds differently to hormones and pharmacological agents. Most importantly, as has been consistently shown by a number of clinical studies, damage to the RH does not generally result in the same neurological dysfunctions as those resulting from damage to the LH. As we shall see below, there are also substantial differences between the two hemispheres with respect to cognitive tasks of major importance in everyday human activity.

One of the most important and well-established differences regards visuo-spatial perception skills. Since the observations first made by John Hughlings Jackson in the 19th century, numerous other neuropsychological studies have concluded that the RH performs better at visuo-spatial perception than the LH. It has notably been established that the attention produced by the RH is larger and engages both visual fields, and has the crucial responsibility of providing a subject's consciousness of their entire body, that is to say, the faculty to perceive their body from both sides. Interestingly, the LH's visuo-spatial perception predominantly concerns the right side (i.e. its contralateral side): multiple studies have shown that when the RH is damaged, the patient is likely to be diagnosed with hemineglect, a condition in which individuals are no longer aware of objects to their left (Kinsbourne 1978: 8). In some cases, the dysfunction can be so severe that a RH-damaged patient might not anymore recognize the left side of their body. In contrast, LH-damaged patients, whose RH neurocognitive functions remain intact, do not usually lose their visuo-spatial perception abilities. However, the same individuals tend to develop a certain negligence for details, suggesting that the LH, contrary to the RH, is more focused on details than the bigger picture (McGilchrist 2010: 507, 2019: 37–40, 42–49). See also Cummings (2019), who refers to the study from Carter et al. (2017) for recent accounts of visuo-spatial and perceptual deficits in RH-damaged individuals.

This difference in visuo-spatial processing by each hemisphere is illustrated clearly in neuropsychological experiments where subjects are asked to draw several items, with either their LH or RH activity being temporarily suppressed. In particular, the study conducted by Nikolaenko et al. (1997, also cited by McGilchrist 2019: 78–79) has demonstrated that both hemispheres possess a different visuo-spatial perception, with each hemisphere having a 'unique take' in its capacity to see or appreciate objects. Compare, for example, the drawings done by individuals asked to draw a table (Figure 1) and rails (Figure 2) under control conditions and after right and left UES (i.e. unilateral electroconvulsive seizure); in both images the suppressed hemisphere is shaded accordingly:

As can be seen in Figures 1 and 2, the drawings produced by the RH (right column) differ from those of the LH (middle column) in at least two important aspects. First, the RH succeeds, in general, at representing objects while respecting the characteristics of a three-dimensional space: width, depth and height. By contrast, the LH drawing tends to be more schematic and abstract, often missing a dimension and lacking in depth. In short, the RH's visuo-spatial perception is closer to reality than that of the LH, to the extent that this hemisphere can consistently provide a three-dimensional representation of an object. Secondly, the LH demonstrates a strong predisposition towards a conceptually abstract or symbolic representation. This can be observed in Figure 3, where the drawings done by this hemisphere appear as symbols rather than actual objects (Nikolaenko et al. 1997). For instance in Figure 3, the figure of a man has been reduced to a cross shape:

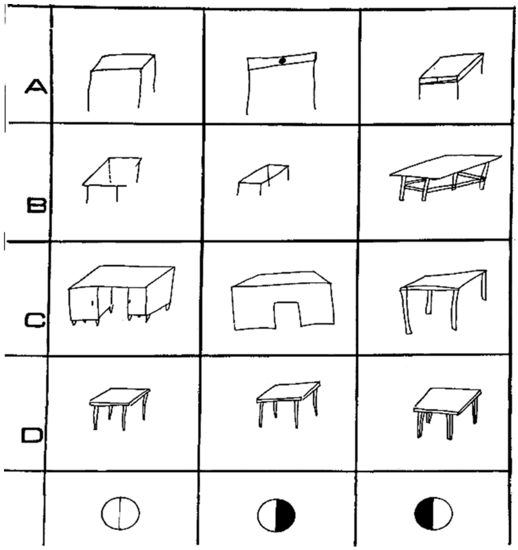

Figure 1. Drawings of a table undertaken by four patients (A, B, C, D) (from Nikolaenko et al. 1997)

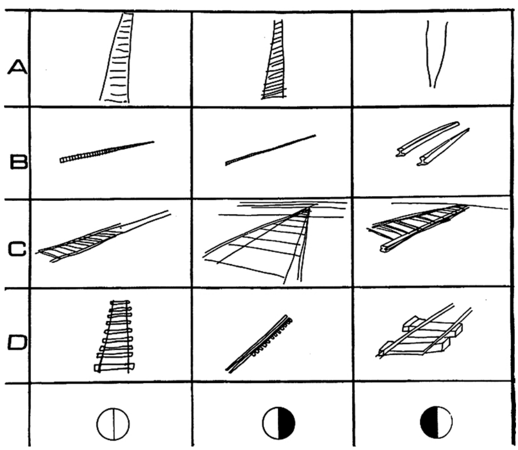

Figure 2. Drawings of rails receding into the distance undertaken by four patients (A, B, C, D) (from Nikolaenko et al. 1997)

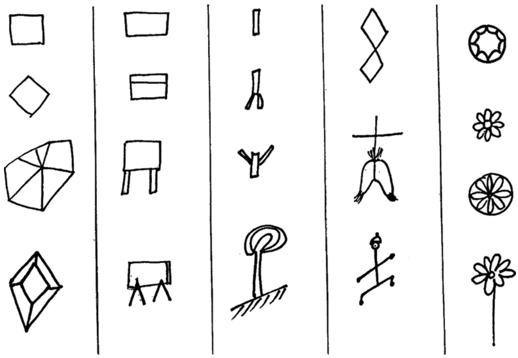

Figure 3. Drawings of a cube, a table, a tree, a man and a flower by patients after right UES [unilateral electroconvulsive seizure]. Activity of the left hemisphere was retained (from Nikolaenko et al. 1997)

This leads us to conclude that the LH is more specialized in abstract, conceptual and schematic representation than in authentic and/or realistic representation. In other words, "with the help of the left hemisphere, the subject represents a conception of the object rather than the object itself" (Nikolaenko et al. 1997: 58).

Another important difference in how both hemispheres operate, in relation to the observations made in Figures 1–3, concerns how we understand the world in its different aspects, our response to life situations and those norms inherent to interindividual interaction situations. It is interesting to note that if RH visuo-spatial perception reveals itself closer to reality than that of the LH, evaluations from that hemisphere regarding diverse life interactions or situations also happen to be closer to reality than those of the LH. On the one hand, multiple studies considering the relations between RH and ToM (Theory of Mind) reported that right brain-damaged subjects demonstrate a lack of access to other people's state of mind and thus fare worse, compared to other categories of individuals, in some pragmatic aspects of speech (Weed et al. 2010; Blake 2017: 257–260). On the other hand, individuals with right brain dysfunctions tend to consider fictitious or unrealistic scenarios in their attempt to apprehend reality. For example, in a study led by Akhutina et al. (2012), the authors analysed the discourse of two sets of children with (relative) deficits on either the RH or the LH. Their discourse was evaluated using a picture story-telling task. Results suggest that children with RH dysfunction (with LH functions that are intact) tend to make up a non-existent reality by adhering to unrealistic models of the world. By contrast, children with LH dysfunction (with RH functions intact) adhere to plausible world models and consider genuine narrative scenarios, even though they encounter more difficulties when expressing themselves and structuring their utterance at a morphosyntactic level (Section 5.1).

Furthermore, these observations on visuo-spatial perception and understanding of the world are reinforced by neuropsychiatric studies which suggest that neurocognitive dysfunctions observed on right brain-damaged subjects mimic on a number of points that of the schizophrenic and is characterized, in particular, by a limited access to socio-interactive norms, an inappropriate use of prosody, a tendency to select the literal meaning of utterances at the expense of the metaphoric meaning, and problems at identifying facial expressions (Cutting 1992; Mitchell and Crow 2005). Left brain-damaged individuals, for their part, as well as speech comprehension or production problems, can face difficulties with tasks requiring conceptual thinking, detail recognition or categorical reasoning (Cutting 1992). In that regard it is important to underline that the LH excels at categorical and general thinking while the RH seems more comfortable with recognition of the specific or unique features of a concept (McGilchrist 2010: 507–508, 2019: 51–54).

To summarize, it seems that the RH's perceptual abilities, whether visuo-spatial or of reality, are superior to that of the LH to the extent that the former provides a more authentic reality, appreciates objects or situations in a more authentic context and allows an individual to have additional faculties with which to experience daily activities: three-dimensional object perception, consciousness of the whole body, a broader focus, more realistic scenario-making regarding life situations, access to socio-interactive norms and figurative speech. This leads us to conclude that the RH's representation of the world is more dynamic and refers to real experiences, while the LH's can only provide a more schematic version. It is also relevant to consider the hypothesis of McGilchrist (2019: 42) that differences between the hemispheres in their understanding of the world are deeply rooted in their neurological structure, since the RH has more white matter, constituted by myelin sheath and recognized for its ability to accelerate information transmission (Sampaio-Baptista and Johansen-Berg 2017).[3] As the result, contrary to the LH, the RH facilitates information sharing through the different cerebral regions, which could explain, according to McGilchrist, why both hemispheres offer two different views of the world:

> In general the left hemisphere is more closely interconnected within itself, and within regions of itself, than the right hemisphere […]. This is all part of the close focus style, but it is also a reflection at the neural level of the essentially *self-referring* nature of the world of the left hemisphere: it deals with what it already knows, the world it has made for itself. By contrast […], the right hemisphere has a greater degree of myelination, facilitating swift transfer of information between the cortex and centres below the cortex, and greater connectivity in general. […]

3. According to Rasband and Macklin (2012), myelin sheath represents about 50% of all dry weight in white matter.

> At the experiential level it is also better able to integrate perceptual processes, particularly bringing together different kinds of information from different senses […] including information from the ears, eyes, and other sensory organs, and from memory, so as to generate the richly complex, but coherent, world we experience. (McGilchrist 2019: 42)

In light of these observations, the LH's proclivity for conceptual, categorical, abstract, static, schematic and symbolic representation makes it far superior, compared to the RH, in basic linguistic tasks like phono- or morphosyntactic structuring of discourse. After all, for the LH, language is a system of abstract knowledge or symbols that enables us to *grasp* or *re*-present human reality (McGilchrist 2019: 111–115). To that effect, Langacker's assessments are quite instructive when he suggests that "grammar is symbolic in nature, [and] consists in established patterns for assembling complex expressions out of simpler symbolic elements" (Langacker 2010: 122). At the same time, given that ""grammatical" units are generally more schematic than those considered "lexical"" (Langacker 2010: 122), the LH role needs to be mitigated as soon as we move beyond purely morphosyntactic principles to reach the lexical domain.[4] That is to say, if morphosyntactic structuring of discourse is achieved by applying categorical and abstract rules of grammar, the lexical component, which activates the semantic level, is more ambiguous and is characterised by less predictable and more dynamic action schemes. As such the LH may have its limits in apprehending complex discourse scenarios, whose understanding goes beyond relying on common schemes or abstract reasoning and can necessitate dealing with semantic or pragmatic ambiguities.

3. Hemispheric asymmetry in language processing

Language studies also provide strong evidence for cerebral hemispheric asymmetry. However, before we discuss the importance of hemispheric differences for our understanding of language activity, it is important to stress that both hemispheres are simultaneously involved in most, if not all, language activities. Indeed, as pointed out by Bottini et al. (1994: 1241), "the interpretation of language involves widespread distributed systems bilaterally". That being said, we know that the two hemispheres do not share the same priorities, nor do they process information in the same way (Hellige 1993; Beeman and Chiarello 1998a, 1998b; Bryan and Hale 2001; Federmeier et al. 2008; McGilchrist 2010, 2019):

4. In his work, Ronald Langacker does not mention hemispheric differences, although some of his observations regarding the nature of language seem relevant to this research by aiding our comprehension of cerebral hemispheric asymmetry.

> We contend that most, if not all, language components include complementary right- and left hemisphere processes. […] but language processing in the two hemispheres is parallel in the sense that each performs its own computation on information at every level of processing. (Beeman and Chiarello 1998b: 2–3)

> Subsequent research has in any case revealed that each hemisphere contributes to language, visuospatial skills, reason, and emotion, indeed to virtually every cerebral function, suggesting that the bihemispheric structure of the brain is an anomaly. [However] it is not *what* is done, but *how* it is done, that distinguishes the two hemispheres. (McGilchrist 2010: 503, 507)

Furthermore, whilst there are multiple brain networks and interhemispheric connections that are engaged in any task, it is poignant that "the hemispheres are vastly more connected within themselves than they are connected to one another" (McGilchrist 2019: xv–xvi). In this section, we will show how right-left hemispheric differences matter in the context of language activity.

Ever since the observations of Paul Broca (1865) and his collaborators in the 19th century, the LH has been recognized as playing a key role in the phono- and morphosyntactic structuring of an utterance. In fact, damage to this hemisphere may cause aphasia, resulting in impairments of rudimentary operations involved in speech comprehension and production. The speech operations in question can be analysed "through a formal generative linguistic model that describes a set of grammatical rules operating on basic units of phonology, syntax, and the lexicon" (Code 1997: 39). Even though in some cases these basic speech operations have been found to be lateralized to the RH, as is the case for 4% of extreme right-handers, in the vast majority of the general population they are lateralized to the LH. To illustrate this point, research shows that 70% of extreme left-handers will still have their basic speech competence lateralized to the LH (Knecht et al. 2000).

By contrast, regarding the role of the RH in language, it has long had the reputation of being the 'silent' or 'minor' hemisphere (see Nebes 1978 for a review of 60s-70s studies). Despite the hypothesis by Jackson (1874, see Code 1997) as far back as the 19th century that this hemisphere plays an important role in 'ritualized' content language, which includes different kinds of formulas like *yes*, *do not know*, *I can't…*, *Oh my God* and *all right*, its role in language has long remained a mystery. However, a number of recent studies in the field have pointed to the intact activity of the 'minor' hemisphere as being a prerequisite for a pragmatically successful interaction (Cutting 1992; Van Lancker 1997; Paradis 1998; Beeman and Chiarello 1998 a–b, Beeman 2005; Mitchell and Crow 2005; Marini et al. 2005; Federmeier et al. 2008; Akhutina et al. 2012; Gajardo-Vidal et al. 2018; Barnes et al. 2019; Cummings 2019), leading some to view it as the 'pragmatic hemisphere'.

Neuroscience is a dynamic field of study, however, and results are often contradictory. As a result, there is some disagreement among neuroscientists on the role of the RH in language, and its relationship to 'pragmatic competence' is still a matter of debate (Cummings 2014; Calvo et al. 2019). On the other hand, since the pioneering work of Penelope Myers in 1979 (Cummings 2019),[5] a number of clinical and experimental studies have consistently demonstrated the essential role of the RH in understanding the *pragmatic components* of language, such as figurative language (metaphors, irony, humor, indirect language acts) (Brownell et al. 1990; Bottini et al. 1994; Joanette et al. 2007; Blake 2017; Champagne-Lavau et al. 2018), inferential computations (Dipper et al. 1997; Brownell and Martino 1998; Myers 1999; Beeman et al. 2000; Beeman 2005; Marini 2012), complex speech-accompanying gestures (McNeill and Pedelty 1995), emotional prosodic characteristics and facial expressions (Schmitt et al. 1997; Blake 2017: 249).

Some recent studies working from a linguistic (Heine et al. 2015; Haselow 2016a, 2016b) or neurocognitive (Xu et al. 2005; Mitchell and Crow 2005; Johns et al. 2008; Barker et al. 2017) perspective have used hemispheric differences as evidence to either implicitly or explicitly propose the idea of a 'dual organization' of discourse, where the LH is thought to be essential for the 'micro-syntactic processing' of the utterance and the RH is thought to play a key role in the 'macro-syntactic structuration' of the discourse. While the former competence specializes in the morphosyntactic structuring of utterances according to the basic grammar principles of hierarchical dependencies, the latter aims to structure the discourse in all its complexity and, critically, requires the mobilization of long-term memory, making it a prerequisite for calculating inferences, initiating reference resolution tasks, determining narrative event sequences, and processing sentences as objects of discourse for the purpose of updating the speakers' common ground (Groupe de Fribourg 2012). This is illustrated in the representation below (Figure 4) proposed by Barker et al. (2017: 24).

Consequently, grammar models based on hemispheric specialization are in line with findings from other studies of the brain that suggest differing language performance in brain-damaged individuals depending on whether the deficits are found in the RH or the LH. As stated previously, damage occurring in the LH can produce aphasia, which affects processing of the basic phono- and morphosyntactic units of language. However, when the RH is affected and the LH activity remains intact, individuals may produce and understand the literal content of

5. In her study "Profiles of communication deficits in patients with right cerebral hemisphere damage: Implications for diagnosis and treatment", published in *Clinical aphasiology conference* in 1979, Penelope Myers considers discourse impairments in RH-damaged individuals, even though she does not use the term "pragmatics" (Cummings 2019).

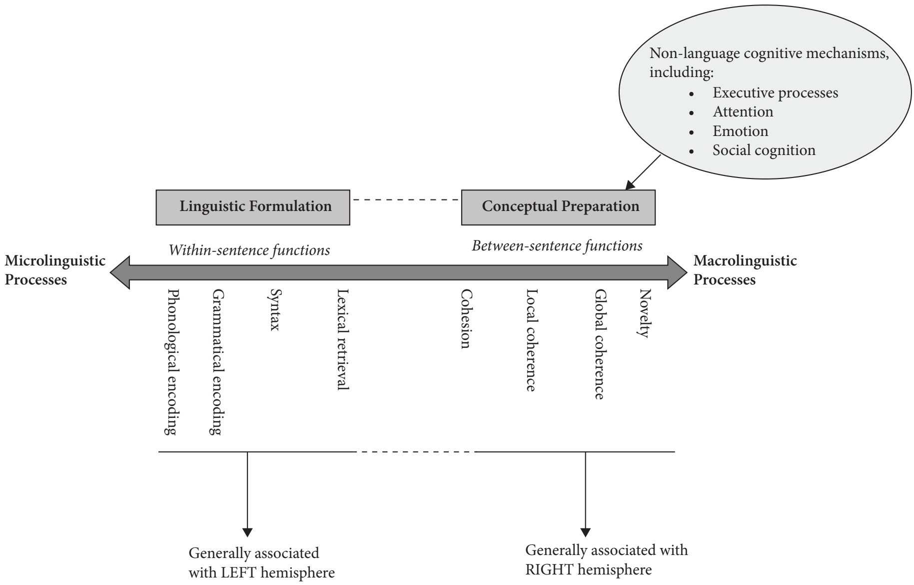

Figure 4. Barker et al.'s (2017) dual organization of discourse production

utterances but may drastically lose the ability to organize their discourse coherently, to make inferential computations, and to interpret rhetorical devices (see Johns et al. 2008 and Blake 2017 for a review of different studies).

For instance, as pointed out by Johns et al. (2008: 1039), who refer to the study from Byng (1988), patients with damage to their LH can find it difficult to distinguish the syntactic functions of subject and object in (and therefore interpret) the following utterance: *The fireman weighed the policeman*. These same individuals (with the RH intact) have no difficulty, however, to understand the utterance, *The butcher weighed the meat*, where it is pragmatically obvious who is doing the weighing.

Moreover, another recent study by Gajardo-Vidal and her colleagues found that damage to the RH, and more precisely to "the right inferior frontal sulcus and right mediodorsal thalamus", can compromise everyday speech comprehension (Gajardo-Vidal et al. 2018: 3401). According to the authors, everyday speech comprehension increases demands on non-linguistic working memory, something that can be impaired in RH damaged individuals:

> For some language tasks, right-hemisphere activation may be driven by non-linguistic perceptual processing (Baumgaertner et al., 2013), or the recruitment of attention and working memory (Vigneau et al., 2011). […] speech comprehension can be impaired after right hemisphere stroke because: (i) normal speech comprehension increases the demands on non-linguistic working memory; and (ii) non-linguistic working memory (an executive function) is supported by right hemisphere regions. (Gajardo-Vidal et al. 2018: 3390, 3399)

This finding is supported by another earlier study carried out by Lehman-Blake and Lesniewicz (2005, cited in Johns et al. 2008: 1045), in which the authors report that RH damaged individuals may fare poorly at maintaining inferences over time when the supportive context is not strong enough. This seems to provide further evidence that RH damaged patients may have limited or impaired working memory capacity. If so, this could explain difficulties encountered by the same individuals in understanding or maintaining narrative discourse coherence. A number of studies have apparently shown that individuals with RH damage tend to make more errors in intertextual connections and that their discourse generally exhibits a reduced use of connectives or discourse markers (Dipper et al. 1997; Marini et al. 2005; Sitdis et al. 2009; Marini 2012; Sherratt and Bryan 2012; Barker et al. 2017).

In light of the observations made above, one could hypothesize that impaired RH activity will severely affect interactions in everyday conversations, in which one needs to pay attention both to the phono-syntactic processing of the utterance (demanding verbal short-term memory), as well as to the overall structure of the interaction (demanding long-term memory) that includes a set of pragmatic tasks simultaneously involved in the overall discourse processing (inference calculation, reference resolution tasks, updating shared knowledge, monitoring feedback from other interactants, respecting social and interactive norms, etc.). Research by Powers et al. (2012) appears to back up this hypothesis. In their study, the authors assessed the hemispheric performance of neurologically normal individuals in their ability to choose the appropriate inferences presented to the left visual field (RH) or to the right visual field (LH) during an auditory comprehension task incorporating narratives and conversations. According to their findings, while both hemispheres appear to be equally involved in narrative comprehension, the auditory comprehension of conversations requires a significantly greater level of RH activity.

Several hypotheses have been proposed so far to explain the RH's proclivity for the macro-syntactic or pragma-syntactic organization of discourse vs the LH's proclivity for micro-syntactic processing: According to the 'coarse semantic coding' hypothesis (Beeman 1993, 1998, 2005; Beeman and Chiarello 1998b), the RH (unlike the LH) activates semantically-broader interpretations, which makes it possible to maintain several discursive scenarios with a view to the ultimate accomplishment of inferential tasks. Notably, Federmeier et al. (2008) hypothesized that the LH processes information in a more committed and discriminatory way by anticipating a possible scenario ("predictive processing"), while the RH adopts a "wait-and-see approach", remaining open to several scenarios, even those that are least expected (as is usually the case, for example, with figures of speech involving irony or humour). The hypothesis proposed by Lehman and Tompkins (2000, also Lehman-Blake and Tompkins 2001), however, posits that the RH specializes in the neutralization of inappropriate discursive scenarios, such that individuals with RH damage are unable to discard wrong inferences. Another hypothesis is that the two hemispheres process stimuli at two different time scales (Poeppel 2003; Xu et al. 2005). According to this view, the LH is more efficient at processing rapidly changing stimuli. As such, it is thought to be crucial for the phono-syntactic structuring of isolated utterances. In contrast, the RH "becomes engaged when it is necessary to process and integrate information acquired over longer periods" (Xu et al. 2005: 1013) and, as a result, is more efficient at processing the macro-syntactic features of discourse. Similarly, Ivry and Lebby (1998: 12) suggested that "the left hemisphere is biased to represent the high-frequency information of a stimulus whereas the right hemisphere is biased to represent the low-frequency information of the same stimulus". Indeed, it has been reported that the RH is better suited to processing paralinguistic information because "such information is carried predominantly in the lower speech frequencies" (Beeman and Chiarello 1998b: 3).

Finally, it is important to mention research by McGilchrist (2010, 2019: 42–43), which postulates the biological premises for hemispheric specialization from a broad neurobiological perspective. Iain McGilchrist suggests that hemispheric differences reflect two differing modes of attention; in particular, the LH is characterized by attention that is "local" and "narrowly focused", while attention in the RH is "broad, sustained, global, and flexible" (McGilchrist 2010: 505). According to the author, this explains the LH's preference for syntax and the abstract and linear processing of linguistic information, as well as the RH's preference for pragmatics and the gestalt mode of discourse processing. Furthermore, as mentioned earlier, the RH seems to possess greater memory skills than those of the LH (Metcalfe et al. 1995; McGilchrist 2010: 507) and to contain more white matter, known for its capacity to accelerate information transmission. Here too, as suggested by McGilchrist, the difference in neurochemical structure compared with the LH allows the RH to sustain a more durable focus, a necessary condition for the comprehension of discourse as a whole:

> […] new stimuli lead to release of noradrenaline in the right hemisphere. Most neurones 'fatigue', that is to say they cease to respond, when continuously stimulated. These noradrenergic neurones do not fatigue, however, but maintain their condition of excitation, so that exploratory attention is held open across a greater expanse of both space and time. (McGilchrist 2019: 43)

4. The Fribourg pragma-syntax[6]

4.1 Macro-syntactic approaches in French linguistics

The division between 'micro-syntactic' and 'macro-syntactic' operations has been mainly justified, in French approaches (Fr. *Groupe de Fribourg*; *Groupe aixois de Recherche en Syntaxe*), by questioning the concept of the 'sentence' itself (Fr. *phrase*) (Groupe de Fribourg 2012; Berrendonner 2002a, 2002b, 2004, 2017; Blanche-Benveniste 1989, 1997, 2002, 2003). Traditionally, the sentence has been defined as a functional unit which relies on three basic assumptions: (a) syntactic autonomy, (b) semantic completion and (c) conclusive intonation or strong punctuation. However, the available corpus data from authentic interactions provide strong evidence that these assumptions do not hold and any attempt to analyze the grammar of everyday conversations in these traditional terms would fail (Sabio 2006; Groupe de Fribourg 2012; Berrendonner 2017).

The need for grammar to integrate structures and phenomena that have been traditionally set aside as deviant language, mistakes or noise has led to the distinction of two grammatical domains: micro-syntax and macro-syntax. The first domain, micro-syntax, relies purely on classical relations of dependencies leading to clause-based units. The second domain, macro-syntax, involves relations based on syntactic, semantic, pragmatic and prosodic criteria (Blanche-Benveniste et al. 1990: 113). These relations of a very different nature are what justifies splitting grammar into two subdomains. Approaches diverge on how macro-syntactic relations are described, as well as to what elements and structures they apply, but they generally agree on the need to rely on more than just purely syntactic criteria to identify and categorize those relations.

4.2 The Fribourg model: Discourse and articulations

The Fribourg Macro-Syntax model (Fr. *Macro-Syntaxe Fribourgeoise*), or Pragma-Syntax, is based on language structuration through 'articulations' (Fr. *articulations*), as developed by Martinet (1967). Martinet distinguishes two language articulations, i.e. phonology and morphosyntax, such that each articulation has a distinct nature and possesses its own types of operations. Phonologic units constitute the signifier in the linguistic sign, with a distinctive function, and the 'phoneme' is classically viewed as its minimal unit, below which the audio signal cannot

6. In this section, we introduce a few rudimentary notions of the theory of pragma-syntax. Please consult a reference work in this area, *Grammaire de la période* (Groupe de Fribourg 2012), for a more complete overview.

be segmented or isolated further. Morphosyntactic units constitute the linguistic signs, with a significative function, and the 'morpheme' can be defined as its minimal unit, below which there is no relation between the signifier and the signified.

In addition to these two articulations the Fribourg Macro-Syntax adds a third one called *pragma-syntax* (Groupe de Fribourg 2012: 38, Fr. *pragma-syntaxe*). Pragma-syntactic units constitute language behaviours or communicative actions with the 'enunciation' (Fr. *énonciation*) being its minimal unit. By 'communicative action' (Fr. *action communicative*), which can be viewed as a praxeological unit (hence, the term *pragma-syntax*), we mean the transformation of a sign into a gesture within the ostensive-inferential framework, as described by Sperber and Wilson (1989). Figure 5 illustrates these three articulations:

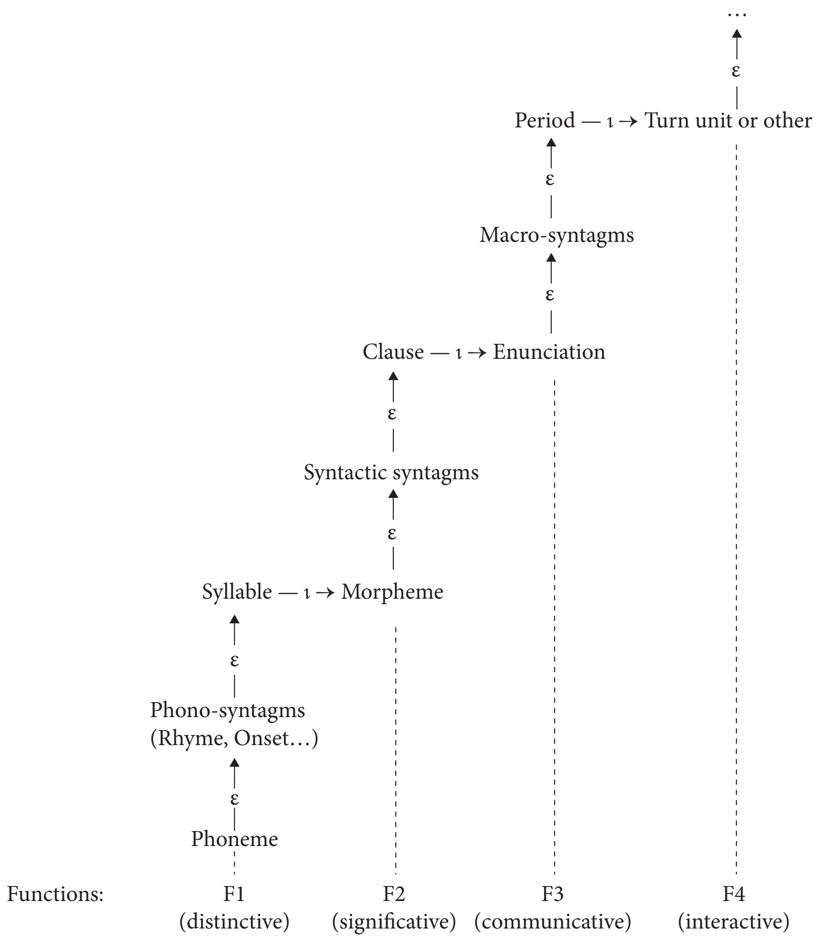

Figure 5. Discourse and its articulations according to the Fribourg Macro-Syntax (from Groupe de Fribourg 2012: 38)

Just as each articulation possesses its minimal unit, each articulation also possesses a maximal unit, a unit that results from and exhausts the given articulation's internal operations. For phonology (F1), it is usually the 'syllable', beyond which the figure suggests that no more phonological rules can exist. For morphosyntax (F2), it would be traditionally the 'sentence' (Fr. *phrase*), but the model here replaces it, for the reasons discussed in Section 4.1, with the concept of the 'clause' (Fr. *clause*), defined as a unit beyond which no syntactic dependency exists. The relation between clause and the minimal unit in pragma-syntax (F3), the 'enunciation', is comparable to that of the syllable and morpheme: just as the morpheme is built on the syllable, the enunciation is built on the clause, and there is a strict opposition in nature between these two units. Likewise, the pragma-syntax (F3) possesses a maximal unit that we propose here to call the 'period' (Fr. *période*), which consists of 'macro-syntagms' (Fr. *macro-syntagmes*) or elementary 'macro-syntactic routines' (Fr. *routines macro-syntaxiques*) and exhausts all pragma-syntactic operations. From a pragmatic or interactionist perspective, the period can be viewed as a minimal communicative program realised by enunciator. But since it does not correspond to the whole discourse, the model requires a fourth articulation (F4), possibly operating with the concept known in conversational linguistics as 'turn unit'. However, the model does not touch on the fourth articulation.

4.3 Morphosyntactic domain

For the Fribourg Macro-Syntax model, the micro-syntax is reducible to purely morphosyntactic operations specialised in structuring a clause, i.e. autonomous morphosyntactic units beyond which no dependency rules are relevant. From a generative perspective, the clause structure is studied in accordance with the grammatical constraints that impose restrictive rules on the grammatical choices made by the speaker uttering it. In other words, the micro-syntax overlaps with what Chomsky (1957, 1965) calls the "linguistic competence": the speaker has a finite number of grammatical resources to produce an infinite number of clauses. However, in our opinion, the scope of linguistic competence is wider and must therefore include the pragma-syntax (see also Haselow 2016a, 2016b).

In the Fribourg model, those morphosyntactic operations correspond to the *rection*, as defined by Hjelmslev (1968: 42): "the variety of grammatical relations in the internal structuration of a clause can be reduced to a single and unique base relation: the implication between occurrences, or *rection*" (Groupe de Fribourg 2012: 43, translated from French). This means that different morphosyntactic elements can be combined together, if at least one of the two elements requires the co-occurrence of the other. For element A to *govern* element B, the occurrence of B must, in logical terms, imply the occurrence of A: A ← B (*ibidem*). This definition of the *rection* is wider than a syntactic definition relying purely on dependency relations between a verb and its constituents (Blanche-Benveniste et al. 1990: 40).

The clause can therefore be defined as the 2nd articulation's maximal unit (see Figure 5), beyond which no governance relation can be established (Groupe de Fribourg 2012: 47). The principle of a lack of rection beyond the clause unit is illustrated in (1), where two clauses constituting a macro-syntactic routine do not hold any morphosyntactic relation between each other:

(1)	*N'y touchez pas,*	*il est brisé*	
	'Don't touch it'	'it's broken'	
	clause 1	clause 2	(Sully-Prudhomme < Groupe de Fribourg 2012: 8)

Empirical clues can verify the presence or absence of governance (for greater detail, see Groupe de Fribourg 2012: 44).

The Fribourg Macro-Syntax thus defines the 'rection' as a very general and abstract syntactic relationship. As such, micro-syntactic operations must rely heavily on LH activity due to the latter's specialization in abstract and symbolic information processing (Section 2).

4.4 Pragma-syntactic domain

Just like morphosyntax, pragma-syntax possesses a syntax and a semantics. The syntax is covered by a possible combination of clauses or enunciation units, while the semantics corresponds to a model of mental representations elaborated through those enunciations. The model called "discursive memory" (Fr. *mémoire discursive*) is of particular interest to the theoretical assumptions of the Fribourg framework.

In what follows we will first define the 'enunciation' (Section 4.4.1) as the minimal pragma-syntactic unit, before introducing the concept of 'discursive memory' and the way it is transformed by enunciations through discourse activity (Section 4.4.2). Subsequently, we will briefly describe pragma-syntactic combinations which give rise to some basic 'macro-syntactic routines' (Section 4.4.3), before concluding our elaboration on the Fribourg Macro-Syntax by distinguishing two domains of mental representations within the discursive memory, known as 'model of the world' and 'model of communicative actions' (Section 4.4.4).

4.4.1 *Enunciation*

Pragma-syntax relies on a poly-semiotic operation: in its standard configuration, an enunciation, representing the 3rd articulation unit (Figure 5), is: (i) syntactically the actualization (or realization) of a clause; (ii) prosodically the presence of a prosodic contour (*intoneme*) at the unit's end; (iii) pragmatically the incrementation of mental representations developed during the discourse. Each enunciation produces such a poly-operation and is also by nature an ostensive behavior, which is accompanied by multimodality: gestures, looks and other contextual parameters (Groupe de Fribourg 2012: 29). From a praxeological perspective, any enunciation constitutes a communicative action; as such, the verbal component is only one modality among many. To illustrate:

(2)	*Moi*	*ma thèse de doctorat*	*<geste traduisant la fatigue>*
	'Me	my Ph.D. thesis	<tired hand gesture>'
	$[C^1]$	$[C^2]$	
	$E_1(C^1)^p$	$E_2(C^2)^p$	G_1

In Example (2) the sequence is realized by two enunciations delimited by the lack of governing relation beyond their clauses, and by a gesture, a multimodal occurrence, corresponding approximatively to a verbal behavior like *I am tired of it*. Each enunciation actualizes a clause to which they attach a rising intonative curve, as well as a reference to the speaker who produced that clause, etc. When saying *my Ph.D. thesis*, the speaker might have turned his eyes away, which would be attached to the enunciation; by contrast, the tired gesture constitutes a separate behavior with its own multimodality. That tired gesture, although not actualizing a clause nor containing any verbal content, is pragmatically comparable to enunciations and of the same nature.

We will not discuss here either prosody or multimodality, other than to mention that a prosodic contour can perform more functions than just the actualization of a clause, such as a demarcative one to inform other participants whether more units will follow or not, and that prosodic contours do exist at the morphosyntactic level (Berrendonner 2011: 88). From a neurolinguistic perspective, the LH seems to be more specialized in linguistic prosody (demarcative functions, detection of intono-prosodic contours related to production modalities, grammatical accentuation on constituents), whereas the RH is crucial for other prosodic functions (emotional prosody) that are nonetheless just as important for the comprehension of a speaker's communicative intent (Blake 2017: 249–251).

4.4.2 *Discursive memory*

As said previously, enunciations are the "incrementation of mental representations developed during the discourse". However, those mental representations are not the ones held by the participants but those made manifest in the discourse: whereas a shared knowledge would include all knowledge that speakers share on the world, the relevant representations here are only those that appear, implicitly or explicitly, in the course of the discourse. Accordingly, such as conceived by the model's authors, the discursive memory (M) represents the information made manifest by the chain of enunciations.

The morphosyntax, with its significative function, produces at its semantic level 'literal' instructions whose signification should always be identical for all speakers sharing the same set of linguistic signs. In turn, the 'actualization' of signs, i.e. their realization in a discursive context, allows for their interpretation: an ostensive-inferential mode implies that interactants must make hypotheses on the meaning of the actualized linguistic signs. However, whereas the morphosyntax can only produce more or less complex linguistic signs, it is the role of the pragma-syntax to translate them as various 'discourse-objects' into a given state of M. Please note that the concept of 'discourse-objects' relies on a logical model where all information is stored as class-objects representing concepts, events, propositional attitudes. In the end, a communicative act is the actualization of a linguistic sign so as to make one infer shared mental representations or discourse-objects.

The enunciation (E) is thus the minimal pragma-syntactic unit at which point information starts being added to the discursive memory M, with each of those units transforming its previous state: M^{i}, M^{i+1}… M^{i+n}. A discourse is therefore a succession of enunciations that creates a series of M states:

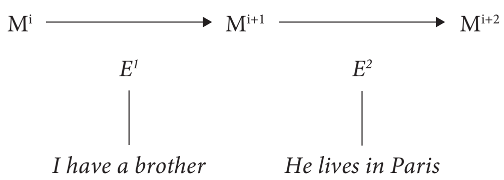

Figure 6. Transformation of M during discourse activity

In Figure 6 the enunciation E^1 contains a clause, with the verb *to have* governing two constituents. Each constituent denotes a discourse-object O, with the actual object being signified: the speaker and the brother are denoted respectively as O^1 and O^2. Another discourse-object, O^3, is the clause itself: the situation described and the state-of-affairs. In other words, O^3 encompasses the fact for O^1 of having O^2: O^3<O^1, O^2>. We must add yet another object, O^0, which represents the information made manifest by the actualization of E^1: the very fact that O^1 realizes O^3. The same happens with E^2 with the state-of-affairs that discourse-object O^2, which already exists in the memory state M^{i+1}, lives at O^4, meaning Paris. It does not matter here what the interactants know about Paris: what matters is what is made manifest in the discourse (see also Example (11) in Section 5.2).

The information stored in M, which makes it transit from the state M^i to the state M^{i+1}, is more than simply the sum of available semantic information: each enunciation can introduce (+O), eliminate (−O), determine (^O) or (re)activate discourse-objects (↑O), allowing access to the most probable inferences (for greater detail on these elementary transformations of M, see Groupe de Fribourg

2012: 129). To conclude this section, it should be emphasized that, from the perspective of the Fribourg pragma-syntax, all interaction goes through a series of succeeding enunciations or a "scheme of actions applied to the discursive memory" (Groupe de Fribourg 2012: 188, translated from French). That is to say, each enunciation constitutes an operator meant to transform the previous memory state M^i.

4.4.3 *Macro-syntactic routines*

Thus far we have described a succession of enunciations that, for each of them, updates the previous state of the discursive memory M. To reiterate, the enunciation corresponds to a communicative action below which no unit can operate on M. Furthermore, various enunciations potentially give rise to basic binary combinations, also known as 'macro-syntactic routines', in which the occurrence of one enunciation implies, at the pragma-syntactic level, the cooccurrence of the other. From a purely pragmatic perspective, one could view a macro-syntactic routine as an 'elementary communicative program' intended by the speaker, although some communicative acts can consist just of a single enunciation (Berrendonner 2002b: 27). In English, for which we provide here the reader with some artificial examples, these routines can be listed as follows:

(3) Preparation + Action (Fr. *Préparation + Action*):
The carpets… I have no idea what to do with them.

(4) Action + Confirmation (Fr. *Action + Confirmation*):
I can't find them, my glasses.

(5) Action + Continuation (Fr. *Action + Continuation*):
Paul arrived in New York, it was early in the morning.

(6) Action + Repair (Fr. *Action + Réfection*):
Jenny came back with some… she came back empty-handed.

In the case of the *Preparation + Action*, the routine is made up of an action that creates the expectation of one or more further actions. This is illustrated in Example (3) where the first enunciation *the carpets* has no dependency relation with the second and introduces a discourse-object that is subsequently determined by the latter *I have no idea what to do with them*.

Regarding the *Action + Confirmation*, the routine is made up of an action that contains an ambiguous discourse-object, followed by a second action aimed at determining it further. That is illustrated in (4) where *them*, potentially human, is further determined by a non-human discourse-object *my glasses*, thus solving the ambiguity.

For the *Action + Continuation*, illustrated in Example (5), two successive actions create the inference of a logical relation such that the second one *it was early in the morning* details the first *Paul arrived in New York*, meaning that it determines the discourse-object that the previous one introduced.

Finally, for the *Action + Repair* (Fr. *réfection*), a previous communicative action is partly or fully eliminated as a discourse-object in M by another: in (6) the clausal content introduced by the first enunciation *Jenny came back with some…* is rewritten and replaced with a new one *she came back empty-handed*.

4.4.4 *Model of the world vs model of communicative actions*

As stated previously, the discursive memory M does not contain the actual knowledge of interactants but only information generated by the discourse activity. Moreover, all mental representations shared by interactants fall within two distinct domains of M: the model of the world (MW, Fr. *modèle du monde*) and the model of communicative actions (MCA, Fr. *modèle des actions communicatives*). Essentially, the MW corresponds to the basic semiotic information provided by the morphosyntax and completed by the inferences it made accessible. In addition, as long as the pragma-syntax considers that a verbal enunciation is just one among other modalities, a nonverbal or paraverbal behaviour can also update the state of the MW. The MCA, in turn, records operations (i.e. transformations of M) meant by a set of enunciations or communicative actions, including praxeological relations between them, and crucially what the enunciator *does* with their discourse.

The existence of the two distinct domains of mental representations allows the speakers to talk about their own discourse, for example, *I didn't use that word*, as well as generate variable figures of speech such as a preterition like *we won't say that…* which negates the fact of saying, while the speech act is still fully validated in the MCA. In such cases, the speaker is playing a "double game": while the clausal content validates in the MW a state-of-affairs of the type <*we won't say X*>, their enunciative behaviour ends up endorsing the opposite of that content. Therefore, with such rhetorical processes the MCA keeps recording enunciations that talk of *X*, even though the MW evidences the opposite (Groupe de Fribourg 2012: 139–140). Other figures of speech that result from "putting in conflict" these two domains of M would be irony, sarcasm and paradoxes (Berrendonner 2002c). The ambiguities resulting from these language phenomena are resolved through accessing the *metacommunicative cues* encompassed in the enunciation, that are, for their part, incorporated at the level of the MCA. It is worth mentioning that it is the same phenomena whose recognition is established via access to the MCA that are reputed for causing comprehension difficulties in individuals with RH dysfunction (see Section 5.2).

5. Linking pragma-syntax with hemispheric asymmetry

While the Fribourg Macro-Syntax has no psycholinguistic aim and does not establish any parallel (we insist on clarifying this point) between itself and neurological aspects, we are of the opinion that some interesting implications can be made regarding the hypothesis of cerebral asymmetry and a dual processing of language activity.[7]

5.1 On the necessity to find an appropriate equilibrium between both operational domains

The first implication resulting from the Fribourg pragma-syntax is that regardless of the form of discourse or language activity, each speaker must find an optimal balance between these two operational domains, micro-syntactic and macro-syntactic, given that different modes of interaction do not take place under the same enunciative conditions (Berrendonner 2004).

According to Berrendonner (2004), written activity tends to favour micro-syntactic operations and spoken communication macro-syntactic ones. Indeed, unlike spoken communication, as is the case in Example (7), which contains various traces of discursive elaboration, including hesitation (*euh*), repetition (*c'est c'est*) and correction (*une fois que tout…une fois qu'on a construit le sujet*), any written activity represents a "finished product" (Béguelin et al. 2000: 233) and does not therefore necessarily bear the traces of the enunciator's cognitive investment (Guryev 2019); in (7), '| _ |' symbols indicate pauses:

(7) où ben c'est c'est plus pauvre en images et ça doit être plus complexe au niveau du commentaire | _ | donc euh une fois que tout s euh une fois qu'on a construit le sujet | _ | euh commentaire et | _ | et euh | _ | et images | _ | euh le journaliste | _ | va dans une cabine son | _ |
(ofrom, Avanzi et al. 2012–2019)
'where well it's it's poorer in pictures and it must be more complex with comments | _ | so uh once all th- uh once we built the project | _ | uh comment and | _ | and uh | _ | and pictures | _ | uh the journalist | _ | goes in a sound booth | _ |'

7. When helping us with some theoretical issues regarding the Fribourg Pragma-Syntax, Alain Berrendonner made the following remark: "Le modèle n'a aucune visée psycho-linguistique, et se borne à être un embryon de grammaire des discours possibles, sans former aucune hypothèse sur la façon dont les sujets parlants s'y prennent pour produire ou pour interpréter ces discours". We must therefore insist on the following: the parallels we seek to establish here are separate from the Groupe de Fribourg's aims, as they only sought a grammatical model to describe discourse productions as observable in authentic interactions.

That is to say, spoken interaction takes place *in praesentia* and thus is subject to time pressure or planning constraints, keeping in mind that any lengthy pause may be interpreted as abandoning one's turn to speak. It follows that the speaker must find the best way to achieve their communicative program's goal, even if it means to simplify, at the expense of micro-syntactic processing, the morphosyntactic structure of discourse, with implicit information taking over at the macro-syntactic level (Berrendonner 2004). It is self-evident that, in everyday spoken communication, a large amount of information is shared through complex mime and gesture behaviours.

Writing, on the other hand, usually involves a spatiotemporal separation, meaning that an enunciator has plenty of time to plan their discourse. However, it means at the same time that the writer must do their best to avoid any potential ambiguities, which will be pragmatically more costly to repair afterwards. Hence, this leads the writer to code their discourse more explicitly, that is to say, to rely more on micro-syntactic operations (Berrendonner 2004: 257).

It follows that each enunciator must find an appropriate equilibrium between micro-syntax and macro-syntax by adapting their discourse to the relevant enunciative parameters. Evidently this balance can be altered in individuals with deficits in either cerebral hemisphere. This is well illustrated in a study by Akhutina et al. (2012), in which the researchers assessed the performance of two groups of Russian-native children with impaired left brain or right brain functioning. The children's performance was evaluated using a picture-story telling task (see Figure 7).

Figure 7. Set of drawings interpreted as a story by two groups of children with either impaired LH or RH functions (from Akhutina et al. 2012)

In Example (8), the discourse is produced by a child with impaired LH functions (a period corresponds roughly to a one second pause; the translation is our own):

(8) Child: *Дядя…пошел…выкидывать…мусор … Испачкался*
'A man … went … to take out … a trash bin… he got dirty.'
Interviewer: *Почему?*
'Why?'
Child: *Он намусорил*
'He littered.'
Interviewer: *Почему он намусорил?*
'Why did he litter?'

Child: *У него не получилось*
'He failed.'
Interviewer: *Что не получилось?*
'What happened?'
Child: *Был ветер . . и ему все в лицо*
'There was wind . . and all on his face.'
(from Akhutina et al. 2012)

We see here at least two major difficulties encountered by that child: not did only the child struggle to build up morphosyntactic and lexical clause components, but he also had difficulty accomplishing a series of narrative actions on his own, if it were not for the assistance of the interviewer in the form of guiding questions. Notwithstanding these speech impairments, the child correctly reproduced the narrative scenario, truthful to the state-of-affairs (Akhutina et al. 2012: 13).

In contrast, in Example (9), we observe a child's discourse with impaired RH functioning. It is interesting to note that this time the tendencies are inverted: although the child had trouble reconstructing a plausible narrative scenario, he was more comfortable with clausal content elaboration:

(9) Child: *Сначала дядя нёс гвозди. Потом хотел высыпать эти гвозди. Потом он их высыпал, и они высыпались из этого, из бочки.*
'First a man carried nails. Then he wanted to throw those nails. Then he threw them, and they fell all over from the thing, the barrel.'
Interviewer: *Почему они высыпались?*
'Why did they get spilled?'
Child: *Потому что их там много было.*
'Because there were lots of them.' (from Akhutina et al. 2012)

Likewise, as can be seen from Example (10), another child with RH dysfunction struggled to choose an appropriate communicative program that would lead to a cohesive or truthful picture. While he begins with one program (*a man wanted to feed the chicken*), he drops it then in favour of another (*wanted to throw a cigarette in the bucket*), which is not realistic either (Akhutina et al. 2012: 13):

(10) Child: *Дядя хотел курам… нес сигарету бросить в ведро. Потом… загорелось. Затем… понес…песок. И сразу засыпал. Потом… его… его высыпался песок.*
'A man wanted to feed the chicken … wanted to throw a cigarette in the bucket. Then … it caught fire. Then … he came back with … some sand. And he immediately poured some. Then … he … he spilled the sand.'

Interviewer: *Почему песок высыпался?*
'Why did he spill the sand?'
Child: *Потому что он туда бросил сигарету*
'Because he threw his cigarette.' (from Akhutina et al. 2012)

To summarize, all three examples illustrate effectively how the balance between micro-syntax and macro-syntax can be compromised following LH or RH dysfunction: while the children with LH dysfunction suffer poor performance with micro-syntactic operations, the children with impaired RH functions encounter difficulties in maintaining a narrative cohesion and are likely to come up with imaginary or fictitious scenarios.

5.2 Effects on discursive memory: Primary cues vs meta-enunciative cues

The second implication derives from the central concept of the theory of pragma-syntax which is called discursive memory (M). We have already seen in the previous section that this component can be described as shared mental representations generated by interactants' discourse activity. As noted by Joanette and Goulet (1994: 5), the ability to explain language disorders due to impaired RH functioning is often limited in those theoretical approaches which fail to integrate the concept of shared knowledge in their considerations.

To reiterate once again, according to the Fribourg Macro-Syntax, M designates a set of shared knowledge considered as being valid for all interactants and whose state is constantly updated during the interaction. From this follows that:

i. All interaction between interactants L_1 and L_2 takes place through M, rather than directly between them.
ii. All enunciation, being defined as a communicative action, modifies the previous state of M. In other words, saying something implies applying a certain kind of operation on M with a goal to update its previous state, be it incorporating new discourse-objects (O) or editing a previously validated O, which designate all sorts of facts, events and beliefs.

In accordance with these assumptions, one can compare interaction between L_1 and L_2 to playing a game of chess with the chessboard being the speakers' discursive memory (Berrendonner 2005: 147). More importantly, the transformations made in the state of M by each enunciation do not only result from its verbal or clausal content, but also from other non-verbal features. This is due to the fact that each enunciation is made up of an original set of converging cues (whether verbal, paraverbal or multimodal) and acts as a poly-operator designed to change the previous state of M (Berrendonner 2002c, Groupe de Fribourg 2012). For instance, producing the utterance in Example (11) consists in validating three types of discourse-objects (Groupe de Fribourg 2012: 130):

(11) *I know how to play piano*

a. It forces the validity of the content O as publicly manifest;

b. It shows the validity the speaker assigns to O;

c. It provides metacommunicative cues about the utterance itself and the relevant communicative action, including the speaker's communicative goal.

To speak in logical terms, with O^1 being the speaker and O^2 the property of knowing how to play piano, type (a) would be the introduction of the discourse-object $O^3<O^1, O^2>$, signifying the state-of-affairs that the speaker has that property; type (b) would then be $O^1<O^3>$ with a validity operation on that object, meaning the speaker is responsible for O^3; finally, type (c) would be $O^0<O^1<O^3>>$ where O^0 is the discourse itself, meaning the enunciation as a discourse event is added to the discourse representation. At the end, it is up to L_2 to proceed to a series of inferential calculations and to revise accordingly the shared mental representations.

From the above-mentioned assumptions it follows that the applied transformations to M depend not only on elementary lexico-semantic components composing the enunciation, or on its literal clausal content, but also 'metacommunicative cues' that, through inferences or implicitly manifested information, inform us on the speaker's communicative intentions. For instance, in Example (11), **primary cues** simply state the fact: <*the speaker KNOWS how to play piano*>, and **metacommunicative cues** are: <the speaker *WANTS TO SHOW* how she plays>. As noted in Section 4.4.4, the former would be recorded in the MW (model of the world), whilst the latter would be most likely stored in the MCA (model of communicative actions).

In addition, it is important to underline that "the same significant material can be invested with a double relevance and consist of both primary and metacommunicative information" (Berrendonner 2002c: 20, translated from French). As a result, both types of cues can be equally realized by verbal and multimodal conducts. For example, in (12) the metacommunicative cues that inform us of the speaker's communicative goal are the result of the realization of two clausal contents, with their discourse-objects causing a contradiction:

(12) *Pas la peine de m'apprendre le français, je le savons* (Berrendonner 2002c: 6)
'No need to teach me French, I *knows* it.'

Here the first clause's content is the primary cue and its grammatically valid realization is the metacommunicative cue; however, the second clause manifests a grammatical invalidity which contradicts the first clause's content. To go even further, the prior manifestation of grammatical validity lets us infer the speaker's intent to have caused the second clause's grammatical invalidity. In this case, more is communicated than simply clausal content. In a nutshell, the hearer must go beyond the primary cues in order to correctly assess the speaker's communicative goal, since enunciations do not just communicate basic semiotic information, handled by the MW, but also metacommunicative cues, handled by the MCA, that inform us on the speaker's communicative intention and on what they are *doing* with their discourse (Berrendonner 2002c; Groupe de Fribourg 2012):

> In sum, each enunciation appears as a poly-operator applying on M a particular set of elementary transformations. Those transformations depend not just on cues inherent to the enunciation, and on 'literal' semantic content from the enunciated clause, but also on context, and on the inferences that context allows concerning the speaker's intents. In other words, the notion of communicative action covers implicit cognitive operations, and not acts that would be explicitly printed in clauses' signified, and typed in language, if not coded in the lexical component. **It describes what the enunciation *does*, not what the enunciated clause *says it does*.'** (our emphasis) (Groupe de Fribourg 2012: 130, translated from French)

Following these assumptions of the Fribourg pragma-syntax, we can hypothesize that the role of the LH of the brain will become crucial to access what "the enunciated clause *says it does*" (i.e. assessing primary cues), and that of the RH to understand "what the enunciation *does*" (i.e. assessing metacommunicative cues). Hence, from a praxeological perspective, we could talk of individuals with LH dysfunction as having difficulties accessing the verbal content of clauses through primary cues (Section 5.2.1), and of individuals with RH dysfunction as having difficulties accessing the metacommunicative information manifested by the speaker's enunciation (Section 5.2.2).

5.2.1 *LH dysfunction and impaired access to verbal content of clauses*

It is of course a well-known fact that LH dysfunction can jeopardize the access to micro-syntactic processing specialized in discourse structuring according to basic morphosyntactic principles. From the perspective of pragma-syntax, impaired LH functioning would mainly disturb access to those enunciative operations on M that are directly produced through verbal means, meaning that an individual will have trouble comprehending or producing clausal content (with its primary cues). Clinical studies show that the degree of access to verbal content in aphasic individuals is subject to variation: although the individual in question may be more comfortable with certain linguistic tasks (picture-to-object matching, recognizing possessive syntactic constructions, etc.), he or she may struggle with others (multiple objects reference resolution tasks, multiple clause sequences comprehension, word reading, etc.) (Nebes 1978: 109).

Some studies also showed that aphasic individuals may have a reduced access to short-term memory (Nebes 1978; Mann and Liberman 1984; Salis et al. 2018). This, in turn, could explain why these individuals can only partially access the morphosyntactic component of enunciation, given that during micro-syntactic processing the speaker's cognitive operations are heavily invested in the elaboration of a set of multiple phono-syntactic combinations that form the clausal structure, and hence rely significantly on short-term memory resources (Berrendonner 2004: 256).

5.2.2 *RH dysfunction and impaired access to metacommunicative cues*

Throughout this chapter, we have aimed to show that language disorders resulting from RH dysfunction may block, albeit to varying extents, access to macro-syntactic operations in general. However, we will hypothesize here that RH dysfunction significantly alters access to the **model of communicative actions** (MCA, see Section 4.4.4), to the extent that individuals with RH deficits are reputed to have difficulty accessing the metacommunicative information or "second-order representation of a representation" (Bryant 2012: 675). More precisely, the comprehension difficulties in such individuals will likely arise from such discourse phenomena where the literal or primary content of the enunciation becomes more or less distant, or even somewhat discrepant, with respect to the speaker's genuine communicative intention, retrieved via metacommunicative cues. This is typically the case of some language phenomena that we consider below, such as irony and indirect speech acts.

5.2.2.1 *Irony.* As has been previously reported in a number of studies (Section 3), individuals with RH dysfunction may struggle to understand figures of speech, such as irony or humour. From the pragma-syntactic perspective, these discourse elements can give rise to conflicting judgements since the enunciator plays a "double game". In other words, the hearer is faced with a dilemma, since multiple cues that define the enunciation's configuration, either verbal or multimodal, are in contradiction with each other and lead to discrepant inferences (Berrendonner 2002c: 6). As suggested earlier, the 'irony dilemma' facing the hearer must be resolved at the level of the MCA, necessitating in turn the intact activity of the RH. A couple of examples incorporating irony are illustrated below:

(13) *Il n'y a plus de cannibales dans la tribu: nous avons mangé le dernier hier soir.*
'The tribe has no more cannibals: we ate the last one yesterday evening.'
(Olbrechts-Tyteca, < Berrendonner 2002c: 37)

(14) *Ce que j'aime chez elle, c'est ses grands yeux bleus <geste des mains décrivant des rondeurs pectorales>* (Olbrechts-Tyteca, < Berrendonner 2002c)
'What I like about her are her big blue eyes <hand gesture mimicking breast shapes>'

In (13), the content of Clause 2 *we ate the last one yesterday evening*, while logically supporting Clause 1 *the tribe has no more cannibals*, ends up contradicting it. That is to say, Clause 2 simultaneously provides an argument for and against the presence of cannibals, meaning the speaker's position goes against their verbal attitude, hence the "double game" that characterizes irony. Regarding Example (14), the clausal content of the speaker's enunciation is again contradicted, this time by co-verbal gestures. Realized through a pictorial or iconic gesture, the communicative intention of the speaker calls into question the intended verbal meaning and thus gives rise to a hypocritical speech attitude. For detailed account of irony and paradoxes, see Berrendonner (2002c).

It is worth noting that while RH damaged individuals are reputed to have difficulties with figures of speech like irony or sarcasm, studies on their comprehension of metaphors and idiomatic phrases lead to rather contradictory findings (Blake 2017). It seems that the comprehension of irony generally requires more access to metacommunicative information, while this might be less important for the comprehension of metaphors. Remarks by Blake provide meaningful support for this conclusion:

> For metaphors and most types of idioms there is a semantic relationship between at least some of the linguistic elements and the non-literal meaning. Thus, using a decomposition strategy, a comprehender may be able to get close to the intended meaning. In contrast, in sarcasm the intended meaning is the opposite of the literal meaning and interpretation typically relies on comparing the statement to the surrounding situational context. (Blake 2017: 254)

It follows that the LH would be more comfortable with processing inferences, provided that they can be retrieved in an abstract way by implementing preconceived schemes or discourse strategies (McNeill and Pedelty 1995; Federmeier et al. 2008). However, as previously illustrated in Figure 7 (Section 5.1), when unbalanced by the impaired functioning of the RH, the LH's recourse to schematic reasoning, with its own internal logic, is capable of generating discourse scenarios lacking authenticity and incorporating an unreliable conception of reality (McGilchrist 2019: 79–83).

5.2.2.2 *Indirect speech acts.* Indirect speech acts provide another example of language phenomena whose comprehension relies on recognizing metacommunicative cues, among other verbal and multimodal features that comprise the enunciation's configuration. For instance, in Example (15) primary cues from the enunciation are attributed to asserting a fact, when in reality the speaker is suggesting to close an open window:

(15) *It's cold here* (while the window is wide open)

Once more, individuals with RH dysfunction are likely to take indirect speech acts literally and thus will fail to understand the speaker's communicative intention (see Stefanowitsch 2003 for a review of different studies). More generally, difficulties encountered by those individuals in correctly assessing indirect speech acts may reflect their relative insensibility to the contextual parameters of a given interaction (Stefanowitsch 2003; Johns et al. 2008; Blake 2017; McNeill and Pedelty 1995).

To some extent, the indifference to the contextual parameters could be the consequence of the limited visuo-spatial perception attested in individuals with RH dysfunction (McNeill and Pedelty 1995; Cummings 2019). According to McNeill and Pedelty (1995), the individuals in question tend to have difficulties with performing complex co-verbal gestures, knowing that the performing of these gestures, often meant to illustrate the enunciative position of the speaker, requires a perfect spatial mastery of the communicative space. Interestingly, as noted by Cummings (2019), communicative deficits resulting from perceptual deficits may even be observed in those RH-damaged individuals who were not primarily diagnosed with visuo-spatial or perceptual disorders (i.e. these deficits were not assessed using a standard battery of tests). Moreover, the problem of managing contextual features can be further accentuated by the fact that individuals with RH dysfunction tend to develop *aprosodia*. This neurological condition, which seems to affect RH-damaged individuals with acute syndromes more often than unilateral neglect (Blake 2017: 250 who cites Dara et al. 2014), alters the processing of contextually relevant prosodic contours. Nonetheless, the same individuals (with their LH's activity intact) seem able to comprehend some types of multimodal cues, whose processing does not require access to contextual discourse parameters: this would be the case for linguistic prosody, specialized in the syntactico-semantic marking of utterances (Blake 2017: 249–250), as well as sign language or abstract and conceptual gestures (McNeill and Pedelty 1995: 82).

Admittedly, given that the contextual information provided by the interaction is often implicit, it should be retrieved at the level of the MCA as with other metacommunicative cues. That is to say, contextual parameters would be just a particular case among other metacommunicative representations. We shall see below, for example, that the processing of some verbal features, like discourse markers or connectives, also demands access to the MCA and thus potentially poses difficulty for individuals with RH dysfunction. Both contextual information and connectives fall within this category of metacommunicative features.

5.2.2.3 *Connectives.* Finally, the other linguistic phenomena individuals with RH dysfunction are likely to encounter difficulties with are connectives and discourse markers; these can be characterized as grammaticalized interactional features that gradually become specialized through the processes of 'grammaticalization' (Traugott 1995) and 'pragmaticalization' (Dostie 2004) in interaction management.

Procedural in nature, connectives not only reflect the dynamic dimension of discourse, but are also associated with phenomena "linked to the co-presence of and adjustment between interactants" (Gadet 2017: 121, translated from French). In other words, their purpose is to ensure discursive coherence (Fraser 1990) or to facilitate coordination between participants at the interactional level (Schiffrin 1987; Hansen 1998). Given that connectives perform metadiscursive functions that specialize in discursive coherence and/or interaction management, one can therefore assume that their cognitive processing is generally handled at the level of MCA.

For instance, in their experimental study, Dipper et al. (1997) found that, contrary to expectations, individuals with RH damage have more difficulty correctly drawing inferences from discourse when the inferences are reinforced by the presence of connectives, such as *still*, *indeed*, *after all*, *so*, *besides* and *however*. Crucially, this finding is perfectly in line with other studies which have revealed that RH damaged individuals are prone to making more errors in establishing discourse connections, and that their discourse exhibits a reduced use of connectives or discourse markers (Marini et al. 2005; Sitdis et al. 2009; Marini 2012; Sherratt and Bryan 2012; Barker et al. 2017). It must however be acknowledged that the LH will probably be more at ease with processing those connectives "characterized by a lesser degree of intersubjectivity" (Giacalone Ramat and Mauri 2011: 5). This would be the case of connectives expressing conjunction *and* or disjunction *or*, that are mostly used for the logical structuration of textual sequences (Giacalone Ramat and Mauri 2011).

To summarize, individuals with RH dysfunction are likely to be bad at those language phenomena whose normal processing demands access to metacommunicative cues, since these are taken charge of by one specific component of the discursive memory, known as the model of communicative actions. As we have argued in this chapter, an impaired access to this component may result in discourse deficits affecting the understanding of irony, indirect speech acts and connectives.

6. Concluding remarks

In this study, by adopting a linguistic perspective, we have argued that there is good evidence supporting the hypothesis that the cognitive processing of human grammar is twofold: whereas the brain's LH activity is crucial for micro-syntactic processing, the RH intact activity is a prerequisite for macro-syntactic processing. As such, both types of cognitive operations are equally vital for any type of interaction, although it is up to the speaker to find an optimal balance between the two, by adapting their discourse to the enunciative parameters of a given interaction. Moreover, we have tried to demonstrate how impaired cerebral hemispheric functions can compromise this balance, either through a disturbed access to the verbal content of clauses (LH dysfunction) or through an inability to integrate metacommunicative cues in the discourse representation (RH dysfunction). Finally, we have also suggested, in line with the findings made by McGilchrist (2010, 2019), that the different and complementary roles each hemisphere fulfils in language activity should, at a deeper level, reflect their neurological structure's differences.

It is of course naive to think that clear-cut conclusions can be drawn in such a complex domain of study as the brain (Joanette and Goulet 1994: 19–20), particularly since the brain is not a machine whose performance could be predicted according to a set of algorithms, but is in fact a very dynamic and complex system. Therefore, in concluding this research, we would like to make note of some possible limitations:

First of all, there is a relatively important interindividual variation that must be kept in mind, and which characterizes not only the brain but also other aspects of human beings. For example, in the case of language, linguists would agree that, thus far, no perfect model or theory has been possible for the prediction of a speaker's language behaviour in absolute terms. Akin to a biological system in constant evolution, human language is subject to significant variation that can be observed at different levels. This includes the lexical entries or grammatical means selected by individuals, as well as the unique phonological features characterizing the diatopic variation among linguistic areas and social communities. In addition, we can also note the presence of *intra*-individual variation, the same person making different choices by adapting their language to a given discourse genre, as well as *inter*-individual variation, to the extent that each individual's speech production is influenced by a myriad of factors: linguistic environment, socio-educational level, professional activity, age, gender, etc. In short, no two individuals speak strictly in the same way.

Likewise, no two individuals share a strictly equivalent brain since, on that matter, the variation will be even wider due to each individual living a unique experience connected to a multitude of factors, just to cite a few: genetic, biological, environmental, socio-professional. All these factors and experiences contribute to a highly individual brain configuration. In turn, this might explain why not all right or left brain damaged patients show exactly the same symptoms; in some, discourse production abilities are affected to a lesser degree than in others, whilst other patients with LH lesions but no aphasia can develop symptoms normally related to right brain damage (Joanette and Goulet 1994: 20). Hence, the more interindividual differences exist, the more possible scenarios we come across.

Secondly, it is equally important to relativize the two hemispheres' delimitations given that the existence of overlapping areas seems highly probable. The LH can be involved in the treatment of some types of inferences or metaphor understanding, even though we think that the RH tends to be more prevalent when dealing with more complex discourse scenarios, especially in those where "an initial semantic construal must be revised" (Federmeier et al. 2008: 9, see also Joanette and Goulet 1994: 14). With respect to the RH, the latter can be involved in the treatment of micro-syntactic clauses through the semantic priming of lexical constituents with a high semantic distance, source of ambiguity (Beeman and Chiarello 1998b: 4–5; McGilchrist 2010: 506) or special lexical status: for instance, Kim and Pylkkänena (2019) have found increased activation in the RH for 'agentive' adverbs (*the painter reluctantly paints*) but not 'resultative' adverbs (*the painter vividly paints*). Likewise, as reported by Beeman and Chiarello (1998b: 6), this hemisphere can participate in the recognition of certain morphosyntactic operations such as agreement in number.

This illustrates that there can be an overlap in hemispheric functions in the case of both micro-syntactic and macro-syntactic processing. However, what matters here is the fact that damage to one of the hemispheres can have dramatic consequences for the organization of a well-balanced discourse; while an impaired micro-syntactic processing is strongly associated with LH dysfunction, macro-syntactic processing is more likely to be compromised in individuals with RH dysfunction. In this way, McGilchrist is rather insightful when he notes that "we should not expect absolute differences in order for the differences to be substantial, even dramatic […]" (McGilchrist 2019: xvi).

To conclude, what we have sought to demonstrate is that further exploration of hemispheric asymmetry in the brain could prove fruitful with regard to the study of language activity. Some researchers have recently been shifting away from the 'hemispheric specialisation' approach towards a more detailed cerebral topography, where they seek to identify different cognitive functions at the microscale. However, specialists such as Mitchell and Crow (2005: 972) and Federmeier et al. (2008: 10) have made it clear that any theory focusing on the neurological foundations of linguistic activity cannot be complete without a consideration of hemispheric differences. In the end, for those who have touched on the question of cerebral asymmetry, it is hard to ignore that there are "pervasive and consistent differences between the hemispheres, existing at many levels" (McGilchrist 2019: 33).

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CHAPTER 4

Dual processing in a functional-cognitive theory of grammar and its neurocognitive basis

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Functional-cognitive linguists are typically more interested in what is shared between grammar and other aspects of language than in what is special about grammar. Construction grammar as the currently most prominent functional-cognitive theory of grammar explicitly downplays the grammar-lexicon distinction and suggests a model based on the notion of 'constructicon' as a unified inventory of linguistic expressions. In a neurocognitive perspective, this goes naturally with the idea of a single processing mechanism. Neurolinguistic evidence does not support this extreme position, however, but rather suggests a significant difference between lexical and grammatical processing. There is thus a need for a more well-developed functional-cognitive theory of the neurocognitive underpinning of the grammar-lexicon distinction. In this chapter we present a theory of the specific nature of grammar, which integrates three recent theories: a usage-based linguistic theory of the grammar-lexicon distinction (Boye & Harder 2012), a theory of the distinction between declarative and procedural memory (Ullman 2001, 2004), and a theory of brain organization (Mogensen 2011).

Keywords: grammar, procedural knowledge, functional-cognitive linguistics, construction grammar

1. Introduction

Our background for addressing the topic of this volume is a cross-disciplinary project carried out in the years 2012–2017 in the University of Copenhagen, between linguistics, neuroscience and (neuro)psychology. The key theoretical basis for the project was a linguistic theory of what constitutes the special and defining properties of grammatical expressions (as opposed to lexical expressions), cf. Boye and Harder (2012). The aim of the project was to throw light on the neurocognitive implications of the linguistic theory (outlined in Section 5).

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The theory we propose is not a ‘theory of grammar’ in the sense that versions of generative grammar or cognitive grammar are rival theories of grammar. It is, instead, a theory of what it is that constitutes the defining features of grammar, a theory of ‘what grammar really is’. This is something much more limited, but at the same time also rather fundamental. We believe all ‘theories of grammar’ need to address this issue, but we do not claim that all features of existing theories must be changed as a result of our theory of the specific nature of grammar.

The theory is conceived within a functional-cognitive approach to linguistics. In a linguistic context this puts the aim of identifying special characteristics of grammar in a mildly surprising position. Functional and cognitive linguists tend to be oriented towards minimizing the difference between lexicon and grammar, in contrast to the radical distinction between grammar and lexicon that is a centrepiece of formal, generative linguistics. One of the current key theoretical positions, construction grammar, makes a point of having a single format of description for both grammar and lexicon: they are all ‘constructions’ with a place in an overall ‘construction’ listing all expressions in the language as part of an overall inventory of linguistic resources available to the speaker. More generally, functional-cognitive linguists tend to be sceptical of the dichotomies that have been so prominent in linguistics, stressing instead the place of language in a unified picture based on general functional and cognitive factors.

In looking for the special features of grammar, our aim goes against the grain of this position. While we do not share generativist assumptions that grammar is a formal module isolated from the rest of language, including the lexicon, we base our account on a dichotomy that has also played a role in the generative discussion (cf. Ullman et al. 1997: 266–267), the distinction between two neurocognitive ‘(sub)systems’: the ‘procedural’ vs the ‘declarative’ system. In our view, this distinction lends itself equally well to a functional-cognitive approach, and the chapter develops this idea. The key argument for this is that the procedural system does not constitute a modular, encapsulated neurocognitive unit, but has links with many different neural functions. The anchoring of the procedural system, for instance, includes links with the motor system – and we believe this provides a cue for what is special about the ability to form syntactic combinations (cf. Section 6 below).

We thus partially agree with the generative insistence on the significance of the lexicon-grammar division, without agreeing with the radical generative divide – cf. Pinker (1999: 2), who claims that in language “there are only two tricks”, corresponding to the title *Words and Rules*, where grammar is ascribed to the Chomskyan module. We also partially agree with the functional-cognitive orientation towards placing grammar and lexicon within a unified framework – without agreeing that a “single mechanism” is adequate (as suggested e.g. in

Dabrowska 2004: 267), Rather, we place ourselves as arguing for a version of a 'dual mechanism', but one that is different from that of the generative approach.

In the context of our project, we specifically based the account we argue for on the so-called REF-model of neurocognitive architecture (Mogensen 2011). The key advantage for us was the fact that this model includes a procedure whereby the brain constructs 'quasi-modules', i.e. neurocognitive routines that have a tightly integrated set of operations without being 'encapsulated' and isolated from the rest of cognition – which is fully compatible with a usage-based, functional approach to grammar (cp. also Bates 1999).

Such modules are distinct both from innate so-called 'elementary' functions and from acquired holistic routines (e.g. for tying one's shoelaces). They arise when subroutines are used as parts of more than one complex whole routine. This allows for a theory that is usage-based while recognizing the existence of quasi-modular properties of grammar vis-a-vis the lexicon in the neurocognitive system.

Like other dualities in this volume, our account has grammar as one of the two linguistic poles. However, our account contrasts grammar with the lexicon, while others contrast it with for instance 'discourse', 'narrative' , 'macro-syntax', or 'formulaic language'. Even though there is a certain affinity between all these dichotomies and the division of neurological labour between the left and right hemispheres, they clearly do not coincide neatly into one simple polarity. Beyond our own main point, we would therefore also like to offer suggestions for what our specific dichotomy may imply for a picture that includes the other dichotomies. The general flow of the argument thus begins by rejecting a theory based on one undifferentiated mechanism. Subsequently, we argue for why a dual view of grammar and lexicon is necessary, and we end up by suggesting ways in which necessary dualities, when taken together, result in a differentiation where the dichotomies in themselves are not enough.

The argument is structured in the following way. In Section 2, we discuss construction grammar in order to make clear in what ways we believe our theory can provide something that is not yet taken care of within that framework. In Section 3 we discuss the basic conception of grammar on which our approach is based. In Section 4 we take up the classic modularity issue; in Section 5 we present the neurocognitive framework in terms of which we understand the linguistic theory we present; in Section 6 we present the centrepiece of the argument, which turns on the difference and the mutual relations between the ability to retrieve items and the ability to combine them productively into whole utterances, based on Ullman's findings about declarative and procedural memory. In Section 7 we discuss perspectives for other dualities than the grammar-lexicon divide. In Section 8, we sum up.

2. Construction grammar and the distinction between lexicon and grammar

Functionalists (especially in America) tend to define their theoretical position in opposition to Chomskyan generative grammar, as the dominant theoretical position. This has led to a tendency to minimize attention to what is special about grammar (as opposed to the lexicon) – because that was the heartland of generative theory. Instead, attention has been devoted to the functional properties of language which are regarded as marginal in a generative approach.

In recent decades, however, functionalists have taken a renewed interest in grammar, while at the same time maintaining that grammar has to be understood as an integrated part of language description, rather than as something with unique, special properties. In this development, construction grammar (CxG) is the dominant position. The core descriptive format is an extension of a lexical format of description: Instead of a lexicon, what is proposed is an enriched inventory, a 'constructicon' consisting of a list of all expressions in a language, including more or less schematic grammatical expressions. Such an inventory is regarded as replacing a description based on separate linguistic subcomponents such as syntax, morphology, semantics and phonology (e.g. Croft 2007).

Construction grammar is singled out for discussion here both because it has a quasi-hegemonic status in cognitively oriented linguistics and also because its uncompromising position provides the most clear-cut antithesis to the point we wish to make. For that same reason it should be stressed, however, that other functionalist and cognitive approaches take stances that are compatible with the one adopted in this article, recognizing at the same time the special features of grammar and its embedding in a wider functional-cognitive context. This is true, e.g., of Role and Reference Grammar (Van Valin 1993) and Functional Discourse Grammar (Hengeveld and Mackenzie 2008). It should also be pointed out that we are not alone in emphasizing the importance of the procedural dimension: the distinction between declarative and procedural features of language is central also in Relevance Theory (Sperber and Wilson 1995).

To make our position clear, it should be emphasized that we regard CxG as a completely valid and also revealing descriptive approach. What we suggest is just that a CxG based on those principles does not capture *all* the specific properties of grammar as a design feature of human languages. We need to go a little further into the features of construction grammar to be able to show what we hope to add.

For our purposes, the key issue is the way CxG handles combinations between items in the inventory. The central mechanism is 'unification', an operation whereby two constructions with compatible specifications are combined into one as part of making an utterance, cf. the discussion in Croft (2007: 484, exemplifying the operation with the unification of *she* and *sings*).

This format can accommodate syntactic combinations, because the constructicon specifies for each construction on the list what the construction's own (syntactic, semantic and phonological) properties are, but also, as part of the syntactic specification, what slots that particular construction enters into combinations with. In other words, the syntactic properties are part of the description of each item on the list and serve as constraints on unification.

In this way, all conventionalized syntactic relations can be covered as part of the list. What we would like to point out is that this constitutes a 'static' format of description. Syntactic relations (like 'transitive verb + object') are captured in a way that is strongly reminiscent of relations between simple and complex lexical items, such as *website* – which arises by compounding two lexical nouns into a new lexical item, which 'inherits' properties from both compound elements (*web* and *site*). One can also illustrate the static nature by an analogy with pieces of a jig-saw puzzle: They fit together in ways that can be read off each individual piece.

What we would like to point out is that CxG presupposes (but backgrounds) a dynamic, procedural mechanism that is not reducible to static componential relations. The difference between the grammatical and lexical aspects of human languages is thereby downplayed (cf. Trousdale 2014). Our aim is not to challenge the positive insights of CxG (including pervasive similarities between lexical and grammatical expressions) – what we say is that something is at risk of falling through the cracks. This point has also been brought up in the neurocognitive literature (cf. Pulvermüller et al. 2013).

3. Our proposal: Secondary prominence and dependency

This brings us to the basic theoretical issue: What is so special about grammar? We have argued that grammatical elements have two interconnected properties that distinguish them from lexical items (cf. Boye and Harder 2012). The first property is secondary prominence: whereas lexical elements have the potential to convey the primary or foreground point of an utterance, grammatical elements are conventionalized as carriers of secondary or background information. The second is dependency. This property follows from the first one: since grammatical elements have secondary prominence, they depend on host elements in relation to which they are secondary (in *chair-s*, for instance, the plural *-s* is dependent in relation to *chair*).

This proposal provides a rationale for distinguishing between uncontroversial cases of lexical items (such as *chair*) and grammatical ones (such as plural

-*s*), but can also throw light on cases that are not equally obivios. For instance, it provides a rationale for distinguishing between lexical and grammatical prepositions (*of* comes to stand as a grammaticalized congener of the lexical preposition *off*) and between lexical and grammatical pronouns in French (*me* vs. *moi*; more on this below). An important feature is that lexical and grammatical expressions can have exactly the same conceptual content. For instance, both the plural affix -*s* (as in *chairs*) and the expression *more than one* (as in *more than one chair*) indicate 'cardinality above 1', but the affix is grammatical, whereas *more than one* is a lexical expression.

There is psycho- and neurolinguistic evidence for both properties. As for secondary prominence, it has long been known that grammatical words attract less attention than lexical ones (e.g. Rosenberg et al. 1985). Recent studies based on the theory in Boye and Harder (2012) confirmed this finding. In a letter detection experiment, Vinther, Boye and Kristensen (2014) found that participants detected fewer target letters (*r* or *t*) in grammatical words than in closely matched lexical words while reading texts for the purpose of answering questions about the texts. In a change blindness experiment, Christensen et al. (under revision) found that participants detected and identified fewer omissions of grammatical words than of closely matched lexical words. Both the decreased letter detection rates and the increased change blindness associated with grammatical words can be straightforwardly accounted for as a result of decreased attention to – and a more shallow processing of – grammatical words relative to lexical words.

As for the dependency property, it is to some extent incorporated in prominent psycholinguistic models of language production (Garrett 1975; Bock 1987; Levelt 1989) – in the sense that according to these models, planning of grammatical elements presupposes planning of lexical elements. As noted in Michel Lange et al. (2017), these models are based on error analysis or on experiments focusing on the production of single words, but recent multi-word production experiments support the models and provide evidence for the dependency property. Michel Lange et al. (2017) contrasted the production of near-homonymous grammatical and lexical Danish verbs (corresponding to *have* in *Marie has stolen a bicycle* and *Marie has a stolen bicycle* respectively). They elicited repetitions of these verbs in entirely identical contexts (e.g. 'so has Anne') and found that the production of grammatical verbs was associated with longer response times and higher error rates than the production of the lexical counterparts. (It should be pointed out that these findings depend on our interpretation of response times and error rates as indicative of the dependence of the planning of grammatical items on that of lexical items; other interpretations are possible).

In a parallel study, Michel Lange, Messerschmidt and Boye (2018) elicited the production of articles (grammatical) and numerals (lexical) in identical contexts

('I have a yellow letter' vs. 'I have one yellow letter') and found that in the fastest half of the participants, who can be assumed to represent canonical processing most accurately, grammatical article production was associated with longer response times than lexical numeral production. Ishkhanyan, Boye and Mogensen (2019) used the same elicitation task, but added a complex span task in order to induce a working memory load. They found that the production of grammatical articles was associated with higher error rates than the production of lexical words.

In a third series of studies based on Boye and Harder (2012), distinctions were made between grammatical and lexical members of the same word classes. It follows from the secondary prominence property that grammatical elements cannot be foregrounded by means of e.g. focalization (outside corrective contexts where conventions are overridden; see Boye and Harder 2012 for discussion). As argued in Messerschmidt et al. (2018), moreover, it follows that grammatical elements cannot be elaborated on through modification. Based on these diagnostics, distinctions were made between grammatical and lexical pronouns (e.g. French *me* 'me' (grammatical) vs. *moi* 'me' (lexical)), verbs (e.g. Dutch *hebben* 'have' + participle (grammatical) vs. *hebben* + NP (lexical)) and prepositions (e.g. Danish *for* 'for' (grammatical) vs. *før* 'before' (lexical)). Subsequently, these distinctions were confronted with speech data elicited from persons with grammar impairment in order to test whether they are significant for the description of such data. Ishkhanyan et al. (2017) showed that French persons with agrammatic aphasia have more problems with French pronouns classified as grammatical than with pronouns classified as lexical. Similarly, Boye and Bastiaanse (2018) found that Dutch persons with agrammatic aphasia have more problems with verbs classified as grammatical than with verbs classified as lexical. In contrast, persons with fluent aphasia (which can be roughly characterized in terms of problems with lexical retrieval) had more problems producing verbs classified as lexical than verbs classified as grammatical. These studies, together with similar studies of Spanish verbs, prepositions and pronouns (Martínez-Ferreiro et al. 2017, 2019) and of Danish prepositions (Messerschmidt et al. 2018), support Boye and Harder's (2012) theory by showing that the theory makes correct predictions about grammatically impaired speech.

The dependency property entails that the speaker's cognitive system can only master grammatical items by simultaneously combining them with their lexical hosts. The dynamic aspect that is missing in the descriptive format of CxG lies in the combinatory operation, without which lexical items cannot be transformed into full-fledged, syntactically complete utterances. To put it differently, a CxG format would be most seamlessly combinable with a speaking competence that consisted purely in selecting an appropriate item from the constructicon list. Combining is 'extra'.

In certain cases, lexical items can be used as potential full utterances (but cp. Section 7 below): Utterances like *fire, tomorrow* or *run* may be used without being combined with other linguistic expressions. This is not the case for grammatical expressions. In order to be operational, they need an additional combinatory procedure to be usable by the speaker. The 'dependency' property introduced above as a characteristic of grammatical expressions translates into the property 'obligatory procedural linkage' with a lexical 'host'. Human languages, as grammatically structured, thus constitute an essentially combinatory system – in contrast to all known animal systems of communication, where all expressions constitute complete utterances.

As generally recognized, this is a design feature of human languages. To master a human language, you need to combine your way to complex expressions. This requirement is a condition of use analogous to the one that goes with IKEA furniture, as expressed in the warning 'some assembly required'. This design feature, however, becomes invisible (although it is not excluded) if grammatical expressions are described simply as items in a generalized constructicon.

Crucial to our theory, however, is that grammatical items are also part of the stored inventory (cf. Section 7). The point is that when it comes to using grammatical expressions 'competently', the language ability involves more than simply retrieving them from the stored inventory.

4. Modularity vs. parallel distributed processing

Ever since Chomsky launched the innateness thesis, the question of 'what grammar really is' has been bound up with the question of its neurocognitive anchoring. In Chomsky's view, the special status of grammar is bound up with the assumption of an innate, purely formal 'module' (see Curtiss 2013 for the core argument and Berwick and Chomsky 2016 for a recent version of the theory). In this theory, grammar is at the core, divorced from functional relations. Functional-cognitive linguists have (rightly, in our view) attacked this assumption and the autonomous status of grammar that it embodies – and have instead stressed parallels and homologues between lexicon and grammar, with grammaticalization clines as a core example. The discussion has to some extent been subsumed under the dichotomy between a 'dual mechanism' and a 'single mechanism.'

The neurocognitive counterpart to a non-modular linguistic theory of grammar is that grammar is part of 'cognition-in-general', rather than a special encapsulated module. Much of the discussion has posited Parallel Distributed Processing (PDP) (cf. Rumelhart and McClelland 1986), as a generalized formula – the 'single mechanism' to replace the duality between lexical and grammatical mechanisms.

However, a purely PDP model ('language is everywhere') is not plausible (e.g. Pinker and Prince 1988). On the neurocognitive side, findings involving localization, including types of aphasia, strongly suggest that there is more to the story of grammar in the brain.

But the Chomskyan modularity theory is also looking increasingly implausible (cf. Ibbotson and Tomasello 2016). One issue is how innate modularity can account for the re-acquisition of grammar after lesions. We thus need a theory that can show how the neurocognitive system that endows speakers with grammatical capability combines two properties that belong on opposite sides of the polarized picture. On the one hand, grammar is integrated into the larger cognitive apparatus, and on the other, it has its own special properties that are different from generalized PDP networks.

We suggest that an account that combines the dualist features with an overall integrated picture can be developed based on the distinction – plus the collaboration – between two memory systems: the declarative (= explicit) and the procedural (= implicit) memory system (e.g. Ullman 2001, 2004, 2016).

The declarative memory is specialized for things that are stored from conscious experience ('episodic' plus 'semantic' memory). The declarative memory has (more transparently than procedural memory) an affinity with a basic idea in cognitive linguistics: Conceptualizations are distilled from human experience. The declarative memory is thus the plausible site of all those conceptual resources that arise on a trajectory from mental representations of encounters with individual exemplars to differentiated conceptual networks, including metaphorical mappings.

Procedural memory, on the other hand, is inaccessible to consciousness. It is involved in motor routines (e.g., remembering how to ride a bicycle). It allows you to re-enact stored routines – but it does not allow you to recall explicit representations of those stored routines. More generally, procedural memory underlies 'knowing-how' rather than 'knowing-that'. The informal term 'muscle memory' illustrates the link with motor routines – the feeling is that your muscles know what to do, but your conscious mind does not.

Experimentally, there is double dissociation between procedural and declarative memory. An anecdote (comp. Ellis 2007: 22–23) may serve to illustrate this: A doctor who was treating an amnesiac patient once covertly gave the patient a slight pin-prick while shaking hands with the patient. The next time they met, she refused to shake hands with the doctor – but denied ever having seen him before! This does not mean that the two systems are isolated from each other; there is extensive linkage between the two; but the existence of the dissociation shows that collaboration does not entail complete integration.

Ullman (2001, 2004, 2016) has developed a research program examining relations between language and the procedural and declarative systems. One interpretation of the role of the procedural system for grammar is that it can underpin a generative-style separation between grammar as rule-based and inaccessible to consciousness, and lexical meaning as consciously stored mental content (cf. Ullman et al. 1997: 266–267).

However, crucial to the position argued here is the fact that the procedural system is not modular. As already indicated, procedural memory is involved in a host of different cognitive operations, with motor operations in a central role. Hence, an association between the language ability and the procedural system is more plausibly understood as an example of the functional-cognitive view that the language ability is supported by general neurocognitive abilities (as also pointed out in Ullman 2016).

Recent research in Ullman's program indicates that there is some overlap between the contents of the declarative and the procedural memory system. In testing similar phenomena, it turns out, for instance, that L2 has a stronger relation with declarative memory than L1. This would be compatible with an assumption that the procedural system gets a stronger role with increasing automatization. More generally, it suggests that full complex expressions may be compiled with assistance from both systems, with variable forms of division of labour between them. It should thus not be taken for granted that even fully competent native performance always works by consciously inaccessible, automatized routines. The experience is familiar from writing, especially collaboratively (as we are doing now): Some passages emerge out of well-oiled procedural routines, while others give problems and have to be compiled by conscious effort in order to achieve a formulation that is deemed to do the job adequately. In the latter case, stored declarative representations and formulations tested by conscious effort play a greater role.

5. A neurocognitive framework: The REF model

The framework we worked with was developed by a collaborator in the research program, Jesper Mogensen. The REF model (Mogensen 2011, 2014) assumes a brain that is basically plastic but also has some division of labour at birth.

Certain innate functions are associated with very specific brain areas and cannot be rebuilt after injury (an example of such an innate function is vision). Other functions come into being after prompting from experience, and get 'implemented' in the most innately suitable areas – but are not innately limited to those areas. As a salient example, parts of the language ability will gravitate towards implementation in Broca's area – but not if that area is missing at birth (Danelli et al. 2013).

Functions that are developed in the course of experience come in different levels of complexity. Simple functional routines, once automatized, are implemented as holistic structures bound to that specific task (e.g. tying one's shoelaces).[1] Such routines have 'modular' characteristics in that they do not interact with other neurocognitive functions – but they also have characteristics that are reminiscent of behaviourist thinking: They are triggered directly by the functional task they are designed to serve. Certain language routines (swearing, greeting, etc) may be analogous to tying one's shoelaces, and constitute 'fossilized' neural subroutines of this type (more on this below).

More complex tasks are handled by structures that contain sub-components that can be used for more than one task. Language, including grammar, is of the latter type: Grammar is not tied down to specific functional tasks. Grammatically structured utterances are used for an open-ended set of purposes – and have sub-components that recur across different purposes.

We are now approaching a point where we can provide an account of grammar that can accommodate both its characteristic differences in relation to other aspects of language and at the same time show how it is an integrated part of the larger cognitive system. This complex relationship is illustrated by the fact that grammar on its own is of no use to the speaker – but at the same time most linguistic tasks cannot be solved without grammar.

This suggests that as part of the neurocognitive system there could be a specific, well-defined grammatical system of operations to be called upon when needed. This system arises in the process of language acquisition, rather than being innate – but once it has been set up (based on usage), grammatical operations are no longer understandable via 'general brain functioning'. Instead, the grammatical system constitutes an internally integrated piece of neurocognitive machinery whose core properties are best understood by reference to other aspects of the machinery – an 'algorithmic module' in Mogensen's terminology'.

This claim is really no more mysterious than it is to say that the parts of a car need to be understood in relation to other parts of a car, instead of being directly linked with the whole world. For example, the choice between the brake pedal and the accelerator pedal constitutes a classic case of a 'paradigmatic choice' that is immanent in the car 'system'.

At the same time, the properties of grammars and cars – while they constitute internally coherent systems – naturally have to be linked up with the purposes they serve. The (system-internal) choice between accelerator and brake can only be properly understood by reference to the (external) function of the car as a means of transportation – and the two options are only called upon to do their jobs when that function is in process. Similarly, speakers of English only choose subjects for their clauses while engaged in the process of formulating contentful

1. Mogensen uses the term 'algorithmic strategy' for such holistic, purpose-specific routines.

messages. There is no contradiction between the two forms of linkage – they are both necessary in sufficiently complex systems. And without the functional anchoring of such systems – transportation and formulation of meaningful utterances, respectively – the structural complexities would not arise.

One of the pre-existing systems that such grammatical modules draw upon is the procedural system. This system does not constitute an anatomical unit, but constitutes a network "for the learning and processing of motor, perceptual and cognitive skills. It is subserved by basal ganglia circuits connected largely with frontal cortex" (Ullman et al. 1997: 267). In drawing upon motor skills, the ability to assemble linguistic expressions thus shares resources with the ability to assemble IKEA furniture (cf. Krifka 2007 on the analogy between bimanual co-ordination and syntax). Suggestively, the ability to combine simple motor programs to complex movements is located close to the parts of Broca's area that support grammar, and there is an obvious parallel between combining linguistic items into complex messages and combining simple actions into complex ones (Fadiga, Craighero and D'Ausilio 2009). At the same time, before those shared resources can solve linguistic assembly tasks, the brain needs to build up a special 'algorithmic module' for it – you cannot directly transfer the 'IKEA ability' to the ability to speak a language. Such a module would rely not only on the classic Broca area, but also on the basic motor system in the basal ganglia as described above.

This general architecture can accommodate the linguistic distinction between lexicon and grammar sketched above. A usage-based division of labour between different types of expression corresponds to a usage-based division of labour between different neurocognitive routines and subroutines. Such subroutines can have their own internal integrity – but at the same time be recruited for a range of different functional tasks. As such, they are part of an overall division of neurocognitive labour that arises as part of an always ongoing process of brain differentiation.

6. Two aspects of the language ability: The ability to retrieve from the cognitive store – and the ability to combine retrieved items

The preceding sections have laid the groundwork for suggesting how our functional theory of what is special about grammar can be linked with an appropriate neurocognitive underpinning. The division of labour between the declarative and the procedural system, plus the REF-model, provide the basis for a new theory of neurocognitive architecture, which is different from both Chomskyan modularity and theories based on generalized parallel processing. Its main features are as follows:

> The declarative system is the chief repository of the store of linguistic expressions – distilled out of conscious experience (in CxG terms, the 'constructicon'). The procedural system is the chief repository of the ability to combine the stored linguistic expressions into complex expressions – trained by usage events, but inaccessible to conscious experience.

According to this model, when you acquire a language new neurocognitive structures come into being (one set for each language) – beginning with simple holophrastic routines directly linked to specific functional tasks (*Mummy!*), but then proceeding to grammatically complex utterances where each linguistic operation is no longer tied to a specific communicative function. Once that has happened, such complex structures have modular properties – i.e. internal integrity and detachment from specific functions – but remain at the same time usage-based.

The theory of the grammatical-lexical distinction in Boye and Harder (2012) was developed for the purpose of understanding what exactly grammaticalization is, and grammaticalization may serve to illustrate the double linkage we suggest. The development by which a lexical expression gives rise to a grammatical one may plausibly be understood to have both a procedural and a declarative dimension. The standard pathway starts with a lexical expression (such as Spanish *mente* 'mind') which then gives rise to a grammatical marker (in this case of adverbial function, as in *lentamente* 'slowly'). In the course of this development, a discursively secondary variant (typically, a meaning variant) of *mente* gets more and more closely associated with the combinatory procedure that attaches it to a lexical host. As a thought experiment, one might imagine that in a future brain scanner, one might be able to trace such a process over time. In this imagined condition, lexical *mente* would light up in the declarative system and remain almost dark in the procedural system. As grammaticalization got under way, however, the variant of *mente* undergoing grammaticalization would gradually grow less bright in the declarative system and glow more brightly in the procedural system.

One issue that could be raised from this perspective, which in principle would be empirically addressable, concerns the status of fully abstract (open-slot) constructions such as the interrogative construction or the Adj-N construction. Are they stored in the declarative system at all – or do they exist only as procedural routines?

Above, the discussion was based on an item perspective: what happens when an item becomes increasingly grammatical? It should therefore be stressed that (as maintained throughout this article) the item perspective does not exhaust what there is to say about grammar. A grammar is both a sign system and a set of procedural options, and the two sides can only be understood with reference to each other. Mastery of the grammaticalized version of *mente* involves both a store of items and a procedure for encoding-and-understanding adverbial modification. So in a sense we argue for adding two 'sub-dualisms' to the unitary approach of CxG: a distinction between grammatical and lexical items, which in turn depends on a distinction between the procedural and the declarative side of grammar.

Item retrieval and item combination are not the only abilities required by human language, of course. The ability to combine simple items into complex messages comes with an increased processing load and thus requires capacities for handling such a load. The theory in Boye and Harder (2012) highlights one such capacity: prioritization. According to the theory, the distinction between grammatical and lexical elements is essentially a means for prioritizing complex linguistic messages. Grammatical elements are low priority elements, while lexical elements have the potential to be high priority. It remains an empirical question how the prioritization capacity relates to other language abilities in terms of neurocognitive architecture, but as is the case with the ability to combine elements, there is reason to think of the issue in terms of a compromise between modularity and parallel distributed processing. On the one hand, prioritization is a capacity required not only by complex linguistic communication, but by all sorts of interactions that involve a complex mental input, including visual perception (cf. Bundesen's 1990 competition model of visual attention). On the other hand, there are substantial differences between language processing and, for instance, visual attention, which suggests a neurocognitive dissociation.

7. Grammar in a differentiated spectrum of 'dualities'

The duality we have discussed is not identical to the other dualities represented in this volume. Like most other dualities, it has hard-core grammar as one of the two poles of the framework we offer; however, while we contrast grammatical with lexical expressions, other dichotomies mostly involve phenomena that have to do with alternative pathways towards complex expressions or utterances. As heralded above, we would like to offer some suggestions for what our account implies for a wider picture that rejects a simple undifferentiated view, but includes more than one dichotomy.

The first point we wish to make has to do with types of linguistic signs. So far, we have focused on two types: lexical and grammatical signs. However, our theory operates with a typology of linguistic signs that contains three rather than two basic types: in addition to lexical and grammatical signs, also holophrases, such as *hurrah, hello,* and *mummy!*. While lexical and grammatical signs represent a division of labour between parts of complex signs, holophrases are simple signs in the sense that they do not entail a division of labour, but constitute whole utterances in themselves. The three-fold distinction is illustrated in Figure 1.

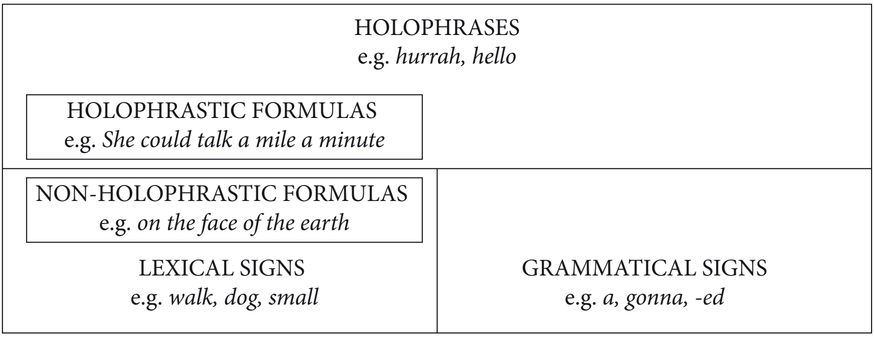

Figure 1. Three types of linguistic signs

Holophrases may at first glance appear to be merely a type of lexical items, but their special status is recognizable if they are viewed in an ontogenetic perspective: Children speak in holophrases before they master the division of labour between lexical and grammatical items. Thus, mastery of lexical items like nouns and verbs develops alongside mastery of grammar, while the ability to use holophrases does not presuppose any such division of labour. The discussion of this type of item has implications for the understanding of formulaic language in a neurocognitive perspective.

In the REF model, as we have seen, there is a key distinction between purpose-specific routines (implementing whole monofunctional routines like tying one's shoelaces) and algorithmic modules (implementing complex subsystems, such as grammar, which can be called upon for different functional purposes). We have suggested that what we call holophrastic signs would be implementable as purpose-specific routines – i.e. free-standing monofunctional routines, which are not essentially bound up with any other linguistic elements or processes. Being able to say *hurrah* or *cheers* on appropriate occasions is analogous to being able to tie one's shoelaces on appropriate occasions.

In terms of the discussion based on Ullman's framework, such holophrases are unique in being usable purely by retrieval – with no element of combination being involved. They could in principle be stimulus-controlled in the classic behaviourist fashion, and as such represent a type of linguistic competency that is maximally simple, both in terms of linguistic structure and in terms of neurological implementation. As noted by Sidtis et al. (2018), persons with aphasia often rely on such unstructured routines:

> Prominent aphasiologists in the 20th century invariably mentioned the dramatic contrast between these preserved, well-articulated unitary utterances and disordered, newly created speech. (Sidtis et al. 2018: 190)

We would like to focus on the fact that such expressions (as also indicated in the cited passage) have two significant properties, not just one. The property which Sidtis et al. focus on is their formulaic character: instead of being built by grammatical rules, the expressions are preserved (and retrieved) as wholes. Their other property is that they constitute whole utterances – and this is not the case for all formulas (cf. Kaltenböck, this volume).

The fact that the difference between the two properties is not always salient for the research program pursued by Sidtis et al. comes out in the fact that they (cf. Sidtis et al. 2018: 191) list three examples of formulaic expressions (taken from informants' free monologues), of which two are not obviously suited to serve as free-standing whole utterances:

(1) On the face of the earth

(2) She could talk a mile a minute

(3) Vanishes in a puff of Smoke

While (2) is an obvious candidate for a full utterance, (1) is unlikely, and (3) would most obviously have to be combined in a regular syntactic fashion with a subject expression chosen as a 'novel' element.

For our purposes, a tempting hypothesis would be that formulas like (2) above (which stand as whole utterances) have the same status as single-word holophrases of the kind discussed above (*hurrah!* and *mummy!*) – and that they are implemented as holistic routines stored independently of syntax, i.e. independently of the 'algorithmic module' that constitutes the grammatical capability of the speaker.

Expressions like (1) and (3), on the other hand, would by our hypothesis share properties with ordinary lexical items. Thus, a distinction can be made between holophrastic formulas (2) and non-holophrastic, lexical ones – (1), (3) – as illustrated in Figure 1 above. That there is a neurocognitive difference between holistic routines in general and the lexical ability is brought out in the findings of Van Lancker et al. (2003), which contrasts the brain activities associated with two classic language tasks: counting from one to ten, and mentioning animal names. While the ability to count from one to ten was the same for informants with and without aphasia, the generation of animal names was problematic for informants with aphasia. Localisation findings shows a left anterior bias for the naming task, thus associating this purely lexical task with localization patterns found in grammar-related tasks. The association of the lexicon with grammar is also brought out by Damasio (1992), where lexical knowledge is grouped together with grammar and phonetics:

> In short, the right-hemisphere cortices are not concerned with the core phonetic, lexical, and grammatical processes whose impairment hallmarks aphasia. But they contribute critical aspects of normal language processing: automatic idioms, prosody, and discourse (Damasio 1992: 537)

We suggest that once again, we can set up a pathway of analytic progression: (1) An undifferentiated picture with only a single format is not adequate. (2) We therefore have to set up a duality, in this case involving novel (i.e 'grammatically constructed') combinations on the one hand and formulaic sequences on the other. (3) When this duality is brought to bear on more specific cases, it turns out that the duality in itself is not sufficient to account for everything about the two categories that it establishes. In this case, the extra differentiation is required by the existence of sequences that are internally formulaic but have properties calling for being integrated in 'novel' expressions in ways that link them up with particular grammatical procedures.

The second point we would like to make concerns the neurocognitive aspect of our account. The claims we have made above crucially involve an association between grammar and the procedural system and an association between the lexicon and the declarative system. However, claiming that grammar is underpinned by the procedural system alone, and that the lexicon is underpinned by the declarative system alone would be simplistic.

Firstly, declarative memory can also handle grammatical combinations in cases when conscious choices are involved rather than automated routines – for instance, when you consciously choose to refer to a noun phrase designating a person by means of a feminine grammatical pronoun rather than a masculine one. Declarative (= explicit) memory may be assumed to be relevant for some discourse-building, combinatory processes as well.

Secondly, the lexicon also has procedural dimensions: lexical retrieval is procedural, and lexical items such as nouns and verbs belong to grammatical classes and thus have links with the grammatical procedures associated with nouns and verbs. More generally, all stored neural routines have to be activated in order to come into play. Thus, there is evidence that even holistic routines with no grammatical anchoring draw on the procedural system. This evidence is provided by findings about the consequences of Parkinson's disease. Parkinson's disease causes impairment of the basal ganglia with consequences for the motor system – and also depletes the ability to draw on stored holistic routines (cf. Van Lancker Sidtis 2012: 71). Interesting light is thrown on the relation between declarative and procedural aspects by comparison with Alzheimer patients, whose basal ganglia are unaffected in the early stages: They have an increased *use* of formulaic language, but impaired *knowledge* of the meanings of formulaic expressions. Parkinson patients, in contrast, have unimpaired understanding of formulaic expressions, although their ability to use them is restricted. As suggested by Van Lancker Sidtis (2012: 72), this would be compatible with an assumption that knowledge of the meanings of formulaic expressions is declarative and cortical, while use depends on motor routines as part of the procedural system, hence affected by basal ganglia impairment.

At a general level, then, the linguistic sign typology (lexical, grammatical, holophrastic) is intertwined with the dichotomy between the procedural and the declarative system. At a more specific level, however, it is possible to distinguish procedural subsystems: while item retrieval and item combination both draw on the procedural system, they are clearly distinct capacities. The fundamental claim that we argue for is that grammar crucially is underpinned by a capacity for item combination which is nested in the procedural system. This claim has its main implications for the nature of linguistic knowledge on which theories of grammar are built.

On the one hand, our claim challenges the claim in generative grammar that grammar in the mind has a special status which is neither 'knowledge' nor 'ability' (comp. Chomsky 1980: 59, as discussed in Harder 2010: 201). What we argue for is that grammars in the mind have a crucial procedural dimension, and thus an element of 'ability'.

On the other hand it challenges the claim in cognitive linguistics (cf. e.g. Langacker 1987: 3) that grammar can be exhaustively described in terms of cognitive representations of the kind that also applies to lexical knowledge. In other words, it challenges the claim that grammar and the lexicon can be handled by a single processing mechanism. We are not disputing that cognitive linguistics in general and construction grammars in particular have a means for capturing the combination aspect of grammar; we are claiming that this means is not sufficient to do the work. In both construction grammars and Langacker's Cognitive Grammar, schematic constructions come with specifications of how they can be filled in or elaborated (cf. Langacker's notion of "elaboration site"). This means that in these approaches, the combination aspect is captured by a specification of the items (or constructions) that other items (or constructions) can be combined with. However, in order to produce a linguistic string it is not enough to know which items can be combined, you also need a capacity for actually combining them. This is analogous to solving a jigsaw puzzle: you both need to know which pieces combine with each other, and to be capable of manipulating them into place. Thus, the combination capacity cannot be reduced to a conceptual property of items stored by means of the declarative system.

8. Summary and conclusions

We have argued that grammar and the lexicon are different aspects of a human language that cannot be exhaustively characterized via a 'one-size-fits-all' unitary descriptive format. At the same time, we suggest that both are aspects of the same overall functional system. From this perspective, we have tried to show how this linguistic duality can be provided with a neurocognitive underpinning that has the same type of complex duality. Just as the linguistic system, the neurocognitive apparatus has a sophisticated division of labour between a strongly integrated and structured subsystem (that implements the grammatical ability of a fully competent speaker of a particular language) and the open set of resources and functional purposes that speakers draw upon in expressing meaningful and consciously accessible messages. Both grammar and lexicon are usage-based – but the ability to use grammatically structured utterances demands neurocognitive resources of a special and additional kind to those that subserve the storage of units of meaning, including those conventionally associated with lexical items.

The division of labour between procedural and declarative memory (a distinction that has previously been viewed as underpinning generative syntax) can be reinterpreted as a framework for a functional and usage-based neurocognitive architecture of the kind envisaged above. Declarative memory, comprising both episodic and semantic memory, is specialized for storing units of consciously available mental content. Procedural memory is specialized for storing routine operations, and is best known in relation to what is known as 'muscle memory': the ability to perform routines such as riding a bicycle. Experimental evidence suggests that there may be double dissociation between the two memory systems.

The language ability draws on both systems. During the process of language acquisition, the neurocognitive system generates grammatical quasi-modules that involve simultaneously the ability to retrieve stored expressions and combine them in conventional and semantically appropriate ways to produce full message meanings. Such modules have an internal structure that does not derive directly from overall cognitive architecture (such as the basic division into declarative and procedural subsystems) or from general knowledge of the world. Instead, based on usage they incorporate specific abilities and types of knowledge into an operational capacity for taking part in linguistic interaction. The predominantly procedural nature of the combination ability means that it is predominantly tacit knowledge in the sense in which all 'knowing how' is basically tacit ("implicit"; inaccessible to consciousness). This is reminiscent of a property that has played an important role in generative Grammar; but this 'tacitness' is not due to modular encapsulation – it is a property of all procedural knowledge (for instance, motor routines).

We have tried to show how the narrow duality between grammar and lexicon can serve as a point of departure for a differentiation of other dualities, including the duality between novel and formulaic language. Formulaic expressions are like the lexicon in being opposed to expressions arising via grammatical combination – but a subset of formulaic expressions, those that constitute full free-standing utterances with special contexts of use, are like the holophrases that children learn to use before their acquisition of grammar. Such holophrases can be understood as implemented in holistic routines, entirely independent of the grammar (quasi-)module. In contrast, lexical items and – we speculate – formulas that do nor constitute full utterances, like *vanishes in a puff of smoke,* are associated with the procedures involved in the grammar module, just like lexical items.

Both the combinatory component and the differential categorisation of constructions that it gives rise to can be revealingly understood in terms of a theory of the interplay between the declarative and procedural systems. In this interplay the usage-based theory of grammatical expressions that we have argued for (based on secondary prominence and dependent status) plays a key role, matched with a correlated neurocognitive architecture predicated on the REF model as outline above.

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PART II

Dualistic approaches to the analysis of forms and structures in languages

CHAPTER 5

Dichotomous or continuous?

Final particles and a dualistic conception of grammar

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This article demonstrates that final particles (more broadly markers) in four East Asian languages (Japanese, Korean, Chinese, and Mongolian) and three West European languages (English, Spanish, and German) follow a similar semantic/discourse-functional ordering principle when they occur in sequence: more intersubjective particles follow more subjective or less intersubjective particles. These particles can be largely classified into two types: sentence-final and utterance-final types. A detailed description of both types in languages like Japanese reveals that the sentence-final type has some properties of BOTH domains postulated in a dualistic conception of grammar (thetical grammar and sentence grammar, *inter alia*, in Kaltenböck et al. (2011) and Heine et al. (2013); macrogrammar and microgrammar in Haselow (2016a) among others). Japanese sentence-final particles, *par excellence*, are microgrammartical and sentence-grammatical elements on formal grounds but macrogrammatical and thetical-grammatical elements in functional terms. This fact requires us to recognize that the two domains do not comprise a dichotomy but form a continuum to a greater degree than assumed thus far.

Keywords: sentence-final, utterance-final, macrogrammar, microgrammar, thetical grammar, sentence grammar

1. Introduction

For nearly the last decade a series of studies have (re-)emphasized the importance of positing two major domains of grammar in its broadest sense, encompassing the principles of discourse organization and language processing (Kaltenböck et al. 2011; Heine et al. 2013, 2014; Kaltenböck and Heine 2014; Haselow 2016a, 2016b). Two such domains are referred to as "sentence grammar" and "thetical grammar" in a dualistic conception of "discourse grammar" (Kaltenböck et al.

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2011: 854; Heine et al. 2013: 155) and as "microgrammar" and "macrogrammar" in "a dualistic organization of language processing" (Haselow 2016a: 80–81).

Sentence grammar "is organized in terms of propositional concepts and clauses, and (…) the nucleus of the clause is the verb with its argument structure, optionally extended by peripheral participants (or adjuncts)" (Heine et al. 2013: 155). Likewise, microgrammar "is a serialization principle that refers to the formal means employed by speakers to structure a unit of talk based on internal hierarchization, embedding, constituency, and dependency relations" (Haselow 2016b: 386).

On the other hand, thetical grammar "is shaped by the network of components characterizing the situation of discourse" (Kaltenböck et al. 2011: 882) and "serves the organization of discourse as a whole" (Heine 2018: 7). Similarly, macrogrammar "refers to relational functions outside micrgrammatical (e.g., phrase-, clause-, and sentence-internal) dependency relations" (Haselow 2016b: 386) and is based on "knowledge of how to assemble different kinds of units expressing information relevant on different levels of the general communicative system (interpersonal, pragmatic, discourse-structural level) into a coherent unit of talk" (Haselow 2016a: 80). Thetical grammar and macrogrammar pertain to expressions that are neither "licensed by canonical rules of syntax" (Kaltenböck et al. 2011: 858) nor "based on knowledge of morphosyntactic dependency relations, constituency and ways of syntactic embedding" (Haselow 2016a: 80).

These two groups of scholars share a similar basic assumption for a dualistic conception of grammar. Heine et al. (2013: 155) assume that thetical grammar elements are "outside the confines of SG [sentence grammar]," and Haselow (2016a: 78) also notes that macrogrammar elements are "thus 'outside' core grammar." This relationship "outside" appears to presuppose a dichotomous view, which excludes the principles of sentence grammar and microgrammar from thetical grammar and macrogrammar, respectively.

However, one familiar kind of expression points to the possibility of continuity between the two domains of grammar in each theory. English question tags, which typically instantiate a kind of thetical grammar element ("thetical" in Kaltenböck et al's (2011) terms), can be viewed as being both shaped by the situation of discourse and determined by a morphosyntactic rule. They are used for conversational purposes such as facilitating speaker-hearer interaction or seeking a hearer's confirmation (Tottie and Hoffmann 2006). At the same time, they "may not precede their anchor clause" as in **Didn't he John went to Paris on Sunday?* (Kaltenböck et al. 2011: 871) and usually observe the rules of interrogative-tag formation (Huddleston and Pullum 2002: 892–894).

Along with question tags, final particles serve as a point of departure for our discussion of the dualistic conceptions of grammar. This study centers on two questions, which would arise as a reaction to the two dualistic theories of grammar. The first question is: What are "grammatical" aspects of thetical grammar and macrogrammar, which are suggested by the remarks given by Haselow (2016a), such as "constrained," "a syntax of its own," "serialization principles," and "patterned"? We will answer this question with respect to the form and meaning/function of sentence-final particles in Japanese, Korean, Chinese, and Mongolian, followed by a further support from English, Spanish, and German.

The morphosyntactic and semantic/functional coverage of the two domains in each dualistic conception of grammar can be diagramed as a four-cell matrix of Table 1 below. Elements of thetical grammar and macrogrammar can be characterized as being "syntactically unintegrated" (Heine et al. 2013: 191) or "morphosyntactically isolated" (Haselow 2016a: 82), indicated in the leftmost column, and as being "determined by the situation of discourse, most of all by the nature of speaker attitudes and speaker-hearer interaction" (Heine et al. 2013: 177) and "based on serialization principles that rest upon speech planning, processibility, textual coherence, speaker-listener relationship, and contextual embeddedness" (Haselow 2016b: 386), represented on the top row. In contrast, sentence grammar and microgrammar can be described as syntactically or morphologically "integrated" (Haselow 2016a: 82), shown in the column, and "organized in terms of propositional concepts and clauses" (Heine et al. 2013: 156) or "internal hierarchization, embedding, constituency, and dependency relations" (Haselow 2016b: 386), seen in the row.

Table 1. Morpho-syntax and meaning/function matrix

	"determined by the situation of discourse" or "speech planning, processibility, textual coherence, speaker-listener relationship, and contextual embeddedness"	organized in terms of "propositional concepts and clauses" or "internal hierarchization, embedding, constituency, and dependency relations"
"syntactically unintegrated" or "morphosyntactically isolated"	**thetical/macro-grammatical elements**	
syntactically or morphologically "integrated"		**sentence/micro-grammatical elements**

Our second question is: Are there any grammatical elements that occupy the blank cells in the matrix (the bottom-left and top-right blanks) of Table 1? In other words, are there any cases that are both morphosyntactically integrated and affected by the situation of discourse, and are there any cases where neither is true? The answer to the first part of this question is in the affirmative. We will below demonstrate that sentence-final pragmatic particles in Japanese, Korean, Chinese, and Mongolian can be viewed as occupying some place in the bottom-left cell.

Section 2 first demonstrates that the sequential order of the East Asian sentence-final particles is not simply governed by a morphosyntactic rule but also reflects a semantic/discourse-functionally motivated principle: a more intersubjective (or interactive) particle follows a more subjective or less intersubjective one. Section 3 argues that a comparable ordering principle can also be found in English, Spanish, and German sentence/utterance-final elements. Section 4 elaborates on our discussion of Japanese sentence-final particles in comparison with another type (utterance-final pragmatic particles) and points out that the particle sequences of each type follows the same ordering principle with some difference in its rigidity or looseness. Finally, Section 5 recapitulates the whole discussion to clarify the evidence that the two domains of each dualistic conception of grammar are not dichotomous but continuous.

2. Sequences of sentence-final particles in East Asian languages

2.1 Japanese sentence-final particles and their ordering principle

The Japanese sentence-final particle *-yo* emphasizes that the speaker deliberately gives information, while the particle *-ne* focuses on the speaker's intention to solicit the addressee's agreement or confirmation (Shibatani 1990: 386). The two particles can be used in combination like *-yo-ne* in (1a) but cannot be reversed, as in (1b).[1]

(1) a. *kanari kanasii zyookyoo-dat-ta-**yo-ne**.*
   rather be.sad situation-COP-PST-FP-FP
   '(It) was a rather sad situation, I think, right?'
 b. * *kanari kanasii zyookyoo-dat-ta-**ne-yo**.*
   rather be.sad situation-COP-PST-FP-FP
   '(It) was a rather sad situation, right, I think?'

As Table 2 below shows, there are a wide variety of sentence-final particles in Japanese. They are classified into three types (layers), based on the observations of previous studies (Saji 1957; Watanabe 1974; Minami 1993; Shinzato 2007). Each layer can be characterized with the notion of "Common Ground" (shared

1. We basically follow *Leipzig Glossing Rules* (https://www.eva.mpg.de/lingua/resources/glossing-rules.php) for labeling the meaning or function of morphosyntactic units in example sentences but also employ some additional abbreviations: ACC(usative), AUX(iliary), CAUS(ative), COM(itative), COP(ula), DAT(ive), F(inal)P(article), MOD(ality), NEG(ation), NOM(inative), POL(ite), PASS(ive), P(a)ST (tense), and TOP(ic).

knowledge) (Clark and Brennan 1991). The particles in the first layer marks a speaker's judgment about proposition (*p*), those in the second layer help to establish *p* as part of knowledge space (common ground), and those in the third layer serve to confirm or cancel *p* as part of common ground. If more than one particle concur in sequence, the particles in layer 1 precede any of the particles in the other layers, thus placed in the leftmost position of a particle sequence, and the particles in layer 3 follow any of the particles in the other layers, thus occupying the rightmost position.

Table 2. Sentence-final particle ordering in Japanese (Izutsu and Izutsu 2017)

Layer 1 **A speaker's judgment about proposition (*p*)**	**Layer 2** **Establishing *p* as part of knowledge space (common ground)**	**Layer 3** **Confirming/cancelling *p* as part of common ground**
-ka/kke (less certain)	*-sa* (weakly involved)	*-na(a)* (cancelling)
*-wa/no** (certain, mostly by women) *-zo/ze* (certain, mostly by men)	*-**yo**/i* (strongly involved)	*-**ne**/na* (confirming)

(cf. Saji 1957; Watanabe 1974; Minami 1993; Clark and Brennan 1991)

Most of these particles can be used alone or combined with other final particles. The particles in the same layer are not combined with each other, but combinations of particles across different layers are sometimes possible, as seen in Table 3.

Table 3. (Im)possible final-particle sequences in Japanese (Izutsu and Izutsu 2017)

1	**2**	**3**	**other sequences**
-ka	*-yo*		**-yo-ka*
-ka	*-i*		**-i-ka*
-wa	*-yo*		**-yo-wa*
-no	*-sa*		**-sa-no*
-ka		*-ne*	**-ne-ka*
-wa		*-ne*	**-ne-wa*
-no		*-ne*	**-ne-no*
	-yo	*-ne*	**-ne-yo*
	-ka	*-naa*	**-naa-ka*
-no	*-yo*	*-ne*	**-yo-ne-no* (**-no-ne-yo*, **-ne-no-yo* etc.)
-wa	*-yo*	*-ne*	**-yo-ne-wa* (**-wa-ne-yo*, *-ne-wa-yo* etc.)

Hence, *kanari kanasii zyookyoo-dat-ta-**yo-ne*** in (1a) is acceptable, but **kanari kanasii zyookyoo-dat-ta-**ne-yo*** in (1b) is unacceptable.

As shown in Figure 1, the three layers can be placed on a cline of subjectivity and intersubjectivity with final particles ordered from subjective to intersubjective ones. Making a judgment about *p* underlies communicating it to others (updating or establishing common ground), and establishing *p* as part of common ground precedes the confirmation or cancellation of it.

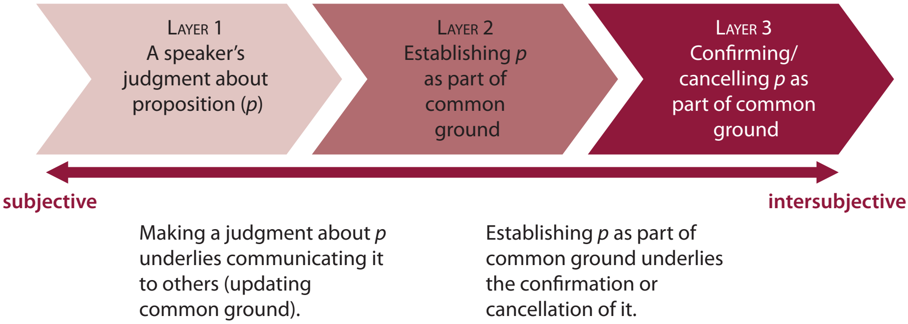

Figure 1. Common ground based SFP ordering (Izutsu and Izutsu 2017)

The cline of (inter)subjectivity is succinctly described by Shinzato (2007: 175) as a generalization that "intersubjectivity entails subjectivity." This leads us to propose an ordering principle of final particles in Japanese: more intersubjective particles follow more subjective or less intersubjective particles.

2.2 Sentence-final particle sequences in Korean, Chinese, and Mongolian

Final particle sequences like those attested in Japanese can also be found in some other East Asian languages, one example of which is Korean. The sentence-final particle *-ji* specifies that the speaker confirms the knowledge or judgment referred to in the utterance (Paik 2007: 406).[2] The final particle *-yo* denotes the speaker's intersubjective attitude of "being familiar with and polite to the addressee" (Paik 2007: 375; our translation from Korean). Here as well, the two particles can be used in combination, as illustrated by *-ji-yo* in (2a), but cannot be reversed, as exempli-

2. Paik explains that the final particle *-ji(yo)* "has the meaning that (the speaker) confirms the fact which he or she already knows, asking for the addressee's agreement" (2007: 406: our translation from Korean). However, the nuance of 'asking for the addressee's agreement' arises with interrogative sentences but does not necessarily accompany declarative and imperative sentences (Yong-Taek Kim, p.c.). Such a negotiating attitude should be viewed as stemming from the second particle *-yo* instead.

fied in (2b) (Yongtaek Kim, p.c.; our gloss and translation); a more intersubjective particle follows a more subjective or less intersubjective particle.

(2) a. *ggwae seulpeun sanghwang-i-eoss-**ji-yo**.*
rather be.sad situation-COP-PST-FP-FP
'(It) was a rather sad situation, I think, right?'
b. * *ggwae seulpeun sanghwang-i-eoss-**yo-ji**.*
rather be.sad situation-COP-PST-FP-FP
'(It) was a rather sad situation, right, I think?'

Similar phenomena can be seen in Chinese as well. Li and Thompson (1981: 238) report that the sentence-final particle *le* "can co-occur with certain other particles, such as *a*, *ou*, and the question particle *ma*, all of which, if they occur, must follow *le*." The particles *le* and *a* are glossed as CRS ('Currently Relevant State') and RF ('Reduced Forcefulness'), respectively, as instantiated in (3). The particle *le* conveys that the speaker identifies the content of the clause as having "special current relevance" to some particular situation, typically the speech event situation (Li and Thompson 1981: 240). Thus, "[w]hen no other situation is mentioned, then it is always assumed that the statement signaled by the sentence with the *le* is relevant to *now*, that is, to the situation of the speech context in which the speaker and hearer are engaged" (*ibid.*). On the other hand, the particle *a/ya* serves to reduce "the forcefulness of the message conveyed by the sentence" (Li and Thompson 1981: 313). The two particles can be used together in the combination of *le a* in (3B), which is normally contracted as *la*. However, they cannot be reversed, as seen in (3B') (Lingfei Wu, p.c.).

(3) A: *Lǎo Wáng yě shì xuéshēng?*
Old Wang also be student
'Is Lao Wang also a student?'
B: *tā dāngrán shì **le** **a***
3sg of:course be CRS RF
'Of course s/he is!' (Li and Thompson 1981: 239; our emphasis)
B′: * *tā dāngrán shì **a** **le***
3sg of:course be RF CRS

We can also find comparable final-particle sequences in Mongolian. The sentence-final particle *shüü* specifies the speaker's intent to communicate information firmly, while the particle *dee* functions to soften the utterance's effect on the addressee (Jin 2009: 145–146). Each of the two particles can be used not only on its own, as in (4a–b), but also in a combination like *shüü dee*, as in (4c) (Yamakoshi 2012: 212–213; our romanization, gloss, and translation). However, they cannot be reversed, as shown in (4d) (Batochir Baljinnyam, p.c.).

(4) a. *Ta tegj khelsen* ***shüü***.
you so said FP
'I say you said so. (Why did you forget?)'

b. *Tiim biz* ***dee***.
such will.be FP
'That will be right.'

c. *Ta tegj khelsen* ***shüü dee***.
you so said FP FP
'You said so, didn't you? (Are you forgetting?)'

d. * *Ta tegj khelsen* ***dee shüü***.
you so said FP FP

Some studies have attempted to summarize the ordering of Chinese and Mongolian final particles, as in Tables 4 and 5 (e.g., Paul 2014; Jin 2009), in which the particles in the same slot are not combined with each other, but combinations of particles across different slots are sometimes possible, as is the case with Japanese sentence-final particles.

Table 4. Sentence-final particle ordering in Chinese (Paul 2014 cited in Simpson 2014: 165)*

(low C) C_1	**C_2 (force)**	**C_3 (attitude)**
le currently relevant state	*ma* interrogative	*ou* warning
laizhe recent past	*ba* imperative	*(y)a* astonishment
ne_1 continued state	*ne_2* follow up question	*ne_3* exaggeration

*"C" stands for a category postulated as including Chinese sentence-final particles in a generative grammar framework.

Table 5. Sentence-final particle ordering in Mongolian (Based on Jin 2009: 143)

yum (description)	*dag* (negative description)	*syüü* (assertion)	*daa** (appropriation)
	shiv (negative assertion)		

*Note that *daa* alternates among *daa*, *dee*, *doo*, and *döö* with vowel harmony.

As has been discussed so far, the Korean, Chinese, and Mongolian as well as Japanese sentence-final particles mentioned above are "determined by the situation of discourse, most of all by the nature of speaker attitudes and speaker-hearer interaction" (Heine et al. 2013: 177), not "organized in terms of propositional concepts and clauses" (Heine et al. 2013: 156). They are "based on serialization principles that rest upon" discourse factors like "speaker-listener relationship" and "contextual embeddedness" rather than logico-semantic features like "internal hierarchization" and "constituency" (Haselow 2016b: 386). Therefore, the final particles in the four

East Asian languages are categorized as elements of thetical grammar and macrogrammar on functional grounds. In formal terms, however, they are also inclined more or less towards units of sentence grammar and microgrammar because they are ordinarily morphosyntactically integrated into the host clause. Their existence blurs the boundary between the two domains of grammar in a dualistic conception.

2.3 "Grammatical" aspects of sentence-final particles

The sentence-final particles used in the above examples of the four East Asian languages can be seen as distributed along the cline of subjectivity and intersubjectivity, as shown in Figure 2 below. The Korean particle *-ji* and the Chinese particle *le* are concerned with 'the speaker's confirming his or her own judgment on the proposition denoted,' which is located in the most subjective part of the cline. In contrast, the Japanese particle *-yo* and the Mongolian particle *syüü* refer to the aspect of 'the speaker's communicating the proposition to the addressee.' Their meaning and function are less subjective but more intersubjective than Korean *-ji* and Chinese *le* to their left on the cline. On the other hand, Japanese *-ne*, Korean *-yo*, Chinese *a*, and Mongolian *dee* can all be viewed as serving to 'adjust the communicative effect of the utterance on the addressee.' Their meaning and function are the most intersubjective on the cline.

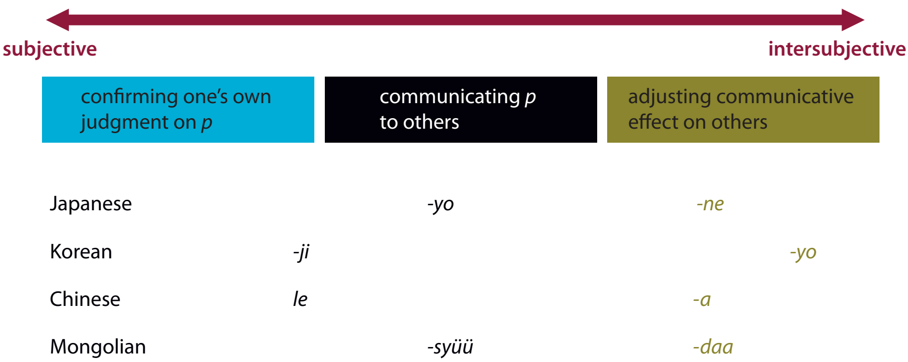

Figure 2. Communicative procedures motivating final particle sequencing

The "combinability" (Haselow 2016a: 95) of these East Asian final particles can be seen as regulated by the ordering principle that we proposed above for Japanese: more intersubjective pragmatic particles follow more subjective or less intersubjective pragmatic particles.

Now we are in a position to answer the first question we raised in Section 1: What are "grammatical" aspects of thetical grammar and macrogrammar? As Haselow (2016b: 386) claims, macrogrammar "is based on serialization principles that rest upon speech planning, processibility, textual coherence, speaker-listener relationship, and contextual embeddedness." As demonstrated above, Japanese, Korean, Chinese, and Mongolian have a semantic-functionally motivated "serialization principle" (Haselow 2016b: 409, also Haselow 2019) of sentence-final particles with more intersubjective particles following more subjective or less intersubjective particles. We can see that this morphosyntactic regulation comprises a "grammatical" aspect of those thetical grammar and macrogrammar elements. This answer accords with Haselow's (2016a: 95) remarks on macrogrammar elements in British English): "The combinability of final field elements is not unconstrained: some combinations seem to be excluded as they do not occur in the ICE-GB and intuitively appear unnatural, such as an independent *if*-clause followed or preceded by a question tag."[3]

As noted above, sentence-final particles in the four East Asian languages can be regarded as elements of thetical grammar and macrogrammar on the functional grounds, but they do not necessarily satisfy some of the formal defining properties of those elements. By definition, thetical grammar elements are "syntactically unintegrated or detached from the host clause or any other SG structure" (Heine et al. 2013: 191); macrogrammatical units are "morphosyntactically isolated" (Haselow 2016a: 82). However, sentence-final particles in Japanese and Korean are morphologically integrated into the host clause, more precisely the verbal predicate, as will be detailed in Section 5.1. Those in Chinese and Mongolian cannot be phonologically (prosodically) isolated from the host clause. Therefore, final particles in these four languages are fixed to sentence-final position and at least syntactically integrated into the host clause.

At this point we can answer the second question raised above: Are there any grammatical elements that occupy the blank cells of the matrix given in Table 1? Yes, final particles in Japanese, Korean, Chinese, and Mongolian occupy the bottom-left slot in the matrix. They can be seen as having a FORMAL property of sentence grammar and microgrammar (morphosyntactically "integrated") as well as some FUNCTIONAL characteristics of thetical grammar and macrorgrammar (shaped by "the situation of discourse," "speaker-listener relationship," and

3. More recently, Haselow (2019) has proposed "the DM Sequencing Hypothesis," which states that "the extreme ends of a turn (i.e. the very initial and very final slot) tend to serve the production of DMs that display orientation to the preceding or upcoming speaker and serve functions in the domains of INTERACTION" (p. 14). On the basis of this hypothesis, final DMs are ordered like: DMs in the DISCOURSE STRUCTURE domain > DMs in the COGNITION domain > DMs in the INTERACTION domain. The first two types of DMs have backward (retrospective) orientation, while the last type has forward (prospective) orientation. This sequencing hypothesis seems to be similar to the ordering principle proposed in this paper, but we are not sure whether we need to postulate the two opposite orientations to explain the sequential strings of DMs.

"contextual embeddedness").[4] Then we will have to recognize that the two domains in each dualistic conception of grammar (sentence grammar and thetical grammar; microgrammar and macrogrammar) should be viewed as having an intersection and thus can form a continuum by way of linguistic categories like sentence-final particles. The next section will demonstrate that final particles in English, Spanish, and German exhibit similar syntactic regulation and integration to some extent.

3. Final particle sequences in West European languages

3.1 English final particles (pragmatic markers) and their sequences

Haselow (2012) is the first systematic study of final particles in English.[5] Recognizing *then*, *though*, *anyway*, *actually*, and *even* as such, he argues that final particles in English form an independent syntactic category with clearly definable grammatical properties and pragmatic functions (p.183). Referring to the final particle uses of *then*, *though*, and *anyway* in (5) as "final connectors," Haselow (2011: 3617) even makes the point that they "form a paradigm where each connector indicates a different type of relation between the utterance it accompanies and the preceding unit" and "can usually not be coordinated or combined, but are in complementary distribution."

(5) a. He doesn't care *then*.
b. He doesn't care *though*.
c. He doesn't care *anyway*. (Haselow 2011: 3617)

In his later articles, however, he notes that utterance-final elements including final particles ("units in the final field" in his own terms) "can occur in combination" (Haselow 2016a: 95) or "in two- or multipart sequences" (Haselow 2019: 1), as illustrated by *then* and *though* in (6). The successive occurrence of these particles, at least, reveals that they are not in a paradigmatic relationship with each other.

(6) 157 B: we should=maybe just leave a message here saying head over.
(.)
158 A: she won't bother <u>coming</u> **then though**.
[ICE-GB S1A-039] (Cited from Haselow 2016a: 95)

4. The English question tag can be a candidate to be located in the top-right cell, as will be mentioned in 3.1 below.

5. He claims: "the use of particles in utterance-final position, which are devoid of any propositional meaning, is a rather recent phenomenon" (2012: 189).

Haselow (2016a: 95) further points out that the combinability and serialization of utterance-final elements including final particles are "often constrained"; a final particle can be followed, but is usually not preceded, by a comment clause (e.g., *He's not invited then I think*/**He's not invited I think then*). Thus he argues that the final field (utterance-final time slot for elements like a final particle) "has a syntax of its own that requires further investigation" (*ibid*.).[6]

Similar serialization is observed with so-called questions tags, a kind of pragmatic marker. They can generally follow final particles (or more broadly, pragmatic markers) such as *though*, *then*, *really*, *indeed*, and *anyway*, as seen in (7) through (11); yet they can hardly precede those particles, as indicated by the hash mark (#) (Charles Mueller, p.c.). Our prosodic analysis (Izutsu and Izutsu 2017, 2019) showed that each (b) example is only acceptable when the question and the preceding clause form two different utterances. For instance, (7b) will be acceptable if it is read as: *It was a rather sad situation.* ***Wasn't it though****?*

(7) a. It was a rather sad situation **though wasn't it**?
b. # It was a rather sad situation **wasn't it though**?

(8) a. It's true **then isn't it**?
b. # It's true **isn't it then**?

(9) a. It's cool **really isn't it**?
b. # It's cool **isn't it really**?

(10) a. It's annoying **indeed isn't it**?
b. # It's annoying **isn't it indeed**?

(11) a. That's the hope **anyway isn't it**?
b. # That's the hope **isn't it anyway**?

Haselow (2016a: 94) maintains that final particles "express the speaker's perspective on the relation between an aspect of prior unit of talk (its content or implied meanings) and a current one" and "thus have relational structure that qualifies them as macrogrammatical elements with two different pointing fields, namely connectivity (between discourse units) and subjectivity (pointing to the speaker's perspective)." In these respects, some English final particles such as *though*, *then*,

6. English final particles do not stand in such a rigid paradigmatic relationship found in Japanese final particles because at least some of them do concur in an utterance like (6) without exhibiting a complementary distribution. As far as we have been informed so far, *then* and *though* in a conversation like (6) can be permuted with little change in meaning, though possibly accompanied by some difference in intonation (Martin Hawkes, p.c.; Martin J. Murphy, p.c.). Similar permutation is possible in some sequences of Japanese utterance-final particles that will be seen in 4.3.

really, *indeed*, and *anyway* can basically be viewed as "subjective" (or less intersubjective) in meaning and function.[7]

Question tags, on the other hand, can be characterized as being more intersubjective in that the speaker is supposed to negotiate with the addressee for a confirmation of the content denoted in the clause the tags accompany (cf. Tottie and Hoffmann 2006). Here we can see some degree of syntactic regulation in which more intersubjective question tags follow more subjective or less intersubjective final particles (Izutsu and Izutsu 2019), as is modeled in Figure 2 above. Such syntactic regulation comprises a grammatical aspect of macrogrammar.

English final particles are phonologically though not necessarily morphosyntactically integrated into the host unit; they may thus fall within canonical elements of thetical grammar and macrogrammar, the top-left cell of Table 1, given in Section 1. However, English question tags exhibit a sentence-grammatical and microgrammatical property: anchor-tag concord in person, number, and tense as well as strong propensity to the final position. They could be seen as located partly in the top-right cell of Table 1, at least, to the extent that they are subject to some sentence-grammatical or microgrammatical constraints.[8]

3.2 Sequence of final pragmatic markers in Spanish

Spanish is not commonly recognized as a language with final particles, but at least a few pragmatic markers or particles can be used sentence- or utterance-finally.[9] Some examples can be retrieved by a Google search, as exemplified in (12). The temporal adverb *entonces* 'then' and the noun *verdad* 'truth' are also employed as pragmatic markers that largely correspond to *(if) so/then* and a question tag in English, respectively. Like the sequence of *then* and a question tag found in (8a) above, they can occur in succession as in (12) and cannot be reversed, as in (13) (Jose Alfredo Jimenez Lopez and Sandra Juarez Pacheco, p.c.).

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7. Haselow (2012: 203) claims that many of the final particles share similar functions: (i) "strengthening the illocutionary force of an utterance," (ii) "indicating an implicit correction," and (iii) "directing the hearer in the interpretation of an utterance including a specific *p*." As far as the addressee is involved in this third point, such final particles could also be seen as exhibiting some degree of intersubjectivity.

8. English question tags are actually organized in terms of "propositional concepts and clauses" (Heine et al. 2013: 155) or "internal hierarchization, embedding, constituency, and dependency relations" (Haselow 2016b: 386) but are "syntactically unintegrated" (Heine et al. 2013: 191) into or "morphosyntactically isolated" (Haselow 2016a: 82) from the host unit.

9. Sections 3.2 and 3.3 are based on the findings of the research supported by JSPS KAKENHI (Grant-in-Aid for Scientific Research (C) 18K00563).

(12) a. *No me vas a recoger en el aeropuerto* ***entonces verdad***.[10]
not me go to pick.up in the airport then right
'So you are not gonna pick me up in the airport, right?'

b. *Ojalá pudiera decir que se trata de Joyce. Qué fácil sería todo*
may could say that itself treat of Joyce what easy will.be all
entonces, verdad.[11]
then right.
'I wish I could say it's about Joyce. It'll all be easier then, right?'

(13) a. * *No me vas a recoger en el aeropuerto* ***verdad entonces***.
not me go to pick.up in the airport right then
'You are not gonna pick me up in the airport, right, so?'

b. * *Qué fácil sería todo,* ***verdad, entonces***.
what easy will.be all right then.
'It'll all be easier, right, then?'

As is the case with English question tags and final particles, *verdad*, a question-tag equivalent in Spanish, can be regarded as being more intersubjective than *entoces*, a final-particle counterpart in the language. The speaker is supposed to negotiate with the addressee (intersubjective) for a confirmation of the clausal content accompanied by *verdad*, while *entoces* mainly indicates that the speaker newly infers the clausal content from a prior discourse unit (subjective).

Insofar as some restriction is observed in the ordering of utterance-final elements, these thetical grammar and macrogrammar elements in Spanish can also be seen as manifesting a degree of syntactic regulation. However, as long as our observation of such utterance-final elements is limited to *entoces* and question tags such (*(es) verdad* '(is) truth' or *o no* 'or no(t)'), we need to admit that this regulation in the Spanish syntax of utterance-final elements may be only a partial, not global, phenomenon.

3.3 Final-particle sequences in German

Whereas German has "a rich particle system that consists of two major classes of particles, modal particles and discourse particles (Diewald 2006, 2013)," the notion of final particle "has not (yet) become established in German linguistics" (Haselow 2015: 80). Haselow (2015: 81) demonstrates that *aber*, *dann*, *ja, jetzt*, and *sogar* "are usually monomorphemic and have partly modifying, partly relational functions, indicating in what way the utterance they accompany is to be

10. https://twitter.com/andercortes/status/985836633470722049 (our gloss and translation)

11. https://www.elmundo.es › Inicio › Cultura › La esfera de papel (our gloss and translation).

related to the preceding discourse segment," and thus argues that final particles "form an independent category in German as they are characterized by a clustering of particular formal and functional features" (p.104).

Since the category of final particle *per se* has not been fully recognized as a word class in German, our discussion must also remain on a hypothetical level of analysis, but a Google search can bring us some examples of final particle sequences such as (14). Final-particle *jetzt* "has no time deictic but a discourse-structuring function, contextualizing a discourse unit within a dialogic sequence" (Haselow 2015: 95). On the other hand, final *aber* "links the utterance it accompanies to an implied proposition" which is "usually pragmatically given in the communicative situation and thus cognitively accessible to the hearer, but has not necessarily been expressed in the preceding discourse" (Haselow 2015: 89). Besides, *oder* serves as a final particle on one of the three developmental stages (I, II, and III) that Heine et al. (2015: 124–127) postulate.[12]

(14) *Wissen wir aber alles schon. Und bedanken uns herzlich*,
know we but all already and thank ourselves cordially
dass wir immerhin seit Mitte 2005 einen gesetzlich verankerten
that we anyway since middle 2005 a legal anchored
Mutterschafts"urlaub" von 14 Wochen kennen.
maternity"leave" of 14 weeks know
"Das reicht ***jetzt aber, oder****? Hört auf zu jammern!"*
that suffice now but or stop on to complain
'But we already totally know. And are cordially thankful that we have anyway known a legally established maternity leave of 14 weeks since mid 2005. "That's enough now though, right? Stop complaining!"' (*Anyworkingmom*;[13] our emphasis, gloss, and translation)

As with English final particles, it is hard to see *jetzt* and *aber* as being in a paradigmatic relationship because they can co-occur in an utterance like (14), not exhibiting a complementary distribution. Moreover, *jetzt* and *aber* in examples like this can be reversed as shown in (15a), which implies that they are not subject to any kind of ordering restriction. However, as far as neither *jetzt* nor *aber* can be permuted with *oder*, as in (15b–c), the final particles on the one hand and *oder* on the other can be seen as syntactically regulated in ordering.

12. Heine et al. (2015: 126) note that the final particle *oder* of Stage III "appears to be widespread in Swiss German-speaking areas of Switzerland." In fact, the passage that includes (14) seems chiefly concerned with an aspect of Swiss life.

13. https://www.anyworkingmom.com/elternzeit-vs-steinzeit-38-wochen-oder-vierzehn-tage/.

(15) a. *Das reicht **aber jetzt**, **oder**?*
b. * *Das reicht **jetzt**, **oder aber**?*
c. * *Das reicht, **oder jetzt aber**?*

As Haselow (2015: 98) notes, final particles "mark an utterance as a particular kind of reaction to a preceding utterance or to the illocutionary goal of that utterance (…) and thus index several aspects of the speaker's cognitive processes that brought the utterance they accompany into existence, such as surprise/unexpectedness, plausibility, or inferentiality." In this sense, they can be viewed as serving for a subjective meaning and function. In contrast, final particles like *oder* "invite the hearer to contribute to ongoing talk" (Haselow 2015: 88); they can thus be seen as assuming a more intersubjective meaning and function. Here again, as with English, German final particles are to some extent subject to the ordering principle: more intersubjective *oder* follows more subjective or less intersubjective final particles.

One thing that we must beware when we discuss German final particles is that the distinction between final particles and modal particles can be vague in certain syntactic conditions. This may account partly for why the notion of final particle is not established in German linguistics. Modal particles (MP) "can only occur in the 'Mittelfeld' (determined by the finite and non-finite parts of the verb phrase, see (2) [(16) here]) and not in the 'Vorfeld' or the 'Nachfeld' (cf. (2) a-c [(16a–c) here])" (Lindner 1991: 166). As Diewald (2013: 30) states concisely, "the middle field criterion is a robust and testable criterion for class membership as it separates MPs from all other non-inflecting word classes."

(16) a. *Du kannst **ja** nach Hause laufen.*
'(Well,) You can walk home.'
b. * ***Ja** kannst du nach Hause laufen.*
c. * *Du kannst nach Hause laufen **ja**.* (Lindner 1991: 166: emphasis added)

Since most studies earlier than Haselow (2015) did not postulate the category of final particle in German grammar, the status of final particles might not necessarily have mattered. However, it seemingly does matter in such a schematic representation of sentence structure as summarized in Table 6, which Fischer and Alm (2013: 53) propose to analyze German *also* and Swedish *alltså*.

The elements that Haselow (2015) identifies as German final particles can be understood as occupying either the "End field" or "Post field" in this representation. In fact, Fischer and Alm (2013: 68) note:

> For Swedish, a final position of *alltså* at the end of a sentence-formed host unit is already non-integrated, i.e. it is in the post field. This is shown in Table 7 [Table 6 here].

Table 6. Schematic representation of German and Swedish sentence structure (Fischer and Alm 2013: 53)

	Positions of the inner clause of a declarative clause					
Prefield	**Front field**	**1st verbal position**	**Middle field**	**2nd verbal position**	**End field**	**Post field**
optional	obligatory	finite verb	optional	non-finite parts of the predicate	optional	optional
Any other syntactic host-unit type, including non-sentential units: single words, phrases, other main clauses or sub clauses						

> For German, the position at the end of a sentence-formed host unit could still be a sentence-integrated position since the German end field is open to sentence constituents normally placed in the middle field. On the other hand, *also* could also be positioned in the post field, which is a sentence-peripheral position just as in Swedish.

In addition to this ambiguity between the two final positions, the absence of the "2nd verbal position" can induce a further ambiguity between final particles and modal particles. About 40 items "are generally acknowledged to belong to the class of MPs," whose "core group consists of the following items: *aber*, *auch*, *bloß*, *denn*, *doch*, *eben*, *eigentlich*, *etwa*, *halt*, *ja*, *mal*, *nur*, *schon*, *vielleicht*, *wohl*" (Diewald 2013: 27). Some items like *aber* and *ja* are used as both modal and final particles; *aber* in (14) and (17), for instance, can structurally be interpreted as either a modal or final particle. The possible structural ambiguity (between Middle and End fields in Fischer and Alm's terms) might be partly resolved by means of prosodic differences. In addition, Diewald (2013: 27) argues: "Membership of a peripheral candidate in the class of MPs can be tested via its replaceability by core items."

(17) *Du kaufst sie nur, weil sie dir besser gefallen. Auf den Zettel, wo*
you buy them only because they you better please on the note where
die Sachen herkommen, schaust du doch meistens nicht. Sollten wir ***aber****,*
the things come look you though usually not should we but
oder?
or
'You just buy them because you like them better. You usually don't look at the tag that says where the things come from. We should though, right?'
(*Die Baz*;[14] our emphasis, gloss, and translation)

In comparable particle sequences like (18), however, *ja* will plausibly be interpreted as modal rather than final particle if the ensuing *doch* does not have a

14. https://www.diebaz.com/alles-fair/

final-particle use but can only be interpreted as modal particle.[15] Final particles are not supposed to precede modal particles.

(18) *Solche Listen sind doch bedeutungslos, ohne Auswirkung auf das*
such lists are though meaningless without effect on the
Weltgeschehen, sinnlos, überflüssig, Zeitverschwendung…!!! Aber
world.event senseless supurfluous time-wasting but
IRGENDWIE interessiert es einen ***ja doch****, oder?!*
somehow interests it one yes though or
'Such lists are meaningless, with no influence on world events, senseless, unnecessary, and time-wasting!!! But it's interesting SOMEHOW, isn't it?!'
(*ZAG online*;[16] our emphasis, gloss, and translation)

We can conjecture that the structural ambiguity of Middle/End fields may partly bridge between final and modal particles with a higher propensity of frequent items of the former to join the latter. Haselow (2015) only recognizes a small inventory of final particles. Fischer and Alm (2013: 68) indicate that *also* has a modal particle use but, "[i]n spoken German, the final position of *also* is rare." These observations suggest the possibility that more or less provisional occurrences in End or Post field are regularized into Middle field as the particles become recognized as modal particles.

3.4 Syntactic rather than morphological regulation of final particles

Sections 3.1 through 3.3 demonstrate that English final particles and question tags, and their comparable pragmatic markers in Spanish and German show syntactic regulation in that their sequences largely follow a semantic or discourse-functional ordering principle similar to the one that regulates Japanese, Korean, Chinese, and Mongolian sentence-final particles: more intersubjective particles follow more subjective or less intersubjective particles. Meanwhile, the ordering is rather strict in the East Asian languages but much looser in the West European languages; in the latter, it may not necessarily shape a global syntactic phenomenon but may be limited to particular pragmatic marker sequences, as in Spanish.

Sentence-final particles in East Asian languages like Japanese are integrated into the verbal morphology of predicate structure so that their permutation is ordinarily impossible, as shown in Section 2. West European final particles are syntactically appended or tagged to the preceding host unit and their permutation is occasionally possible. In this sense, sentence-final particles in languages like

15. Note that *doch* is not included in Haselow's (2015) discussion of German final particles.

16. http://www.whv.shuttle.de/whv/kaethekollwitz/alte-homepage/zag/listen.htm

Japanese are governed by some morphological regulation, while West European final particles are susceptible, more or less, to some syntactic regulation.

4. Further testimony to continuity in dualistic conceptions of grammar

4.1 Syntactic regulation and morphological integration

As shown in Sections 2 and 3, East Asian languages like Japanese, Korean, Chinese, and Mongolian have sentence-final particles, while West European languages like English, Spanish, and German have final particles, which are tantamount to utterance-final particles. This presupposes that what are called final particles are classified into two types: sentence-final particles and utterance-final particles. Although Japanese and Korean also have utterance-final particles like those found in West European languages, as will be seen in 4.2 below, they are, first and foremost, representative of languages with sentence-final particles. Japanese and Korean sentence-final particles comprise part of the sentence structure, more precisely predicate structure, and are thus dealt with in grammar books of the languages (e.g., Matsumura 1971; Shibatani 1990; Sohn 1999; Paik 2007). This section (4.1) sees how such sentence-final particles form part of the predicate structure.

Shinzato (2007) is a pioneering study that introduced a discourse-functional perspective of Japanese sentence structure into Western discourse of linguistic study. She outlines a historical development in the research on the Japanese sentence structure: "In Japanese traditional linguistics, the linear predicate order has been adopted and extended in layered models" proposed in the earlier studies (2007: 177). Referring to Noda (1997: 209), she remarks that an example like (19) "can be captured by the layered structure" (2007: 177); *henji wo* and *dasa-*, *Yukiko ga* and *nakat-ta*, *doomo* and *yooda*, and *Nee* and *yo* are, respectively, located on the two opposite ends of each layer, and each pair is nested to the next, roughly representable by bracketing as: [$_{D}$ *Nee* [$_{C}$ *doomo* [$_{B}$ *Yukiko ga* [$_{A}$ *henji wo dasa-*]$_{A}$ *nakat-ta*]$_{B}$ *yooda*]$_{C}$ *yo*.]$_{D}$.[17]

(19) *Nee doomo Yukiko ga henji wo dasa-nakat-ta yooda yo.*
IP somehow SBJ reply OBJ send-NEG-PST seem FP
'It seems that Yukiko didn't send a reply, (I tell you).'
(Shinzato 2007: 175; her adoption from Noda 1997)

17. Shinzato (2007) explains that layers A, B, C, and D amount to "*dentatsu* 'communication' = *intersubjectivity*," "*handan* 'judgement' = *subjectivity*," "*jitai* 'events'," and "*doosa* 'acts'," respectively.

This explication by Shinzato succinctly shows the principle behind the ordering of Japanese sentential elements that has been elucidated through the earlier literature. It also provides a very useful analytical tool for the studies thereafter concerning semantic and discourse-pragmatic notions such as subjectivity and intersubjectivity.

Unfortunately, however, this explication could miss one important feature of Japanese: the sentence structure described by the layered model is, in fact, constituted of two distinct types of structural units. As Minami (1993) has clarified, the elements preceding the verb basically comprise syntactic units, while those following the verb form morphological units. In a sentence like (19), for instance, *Nee doomo Yukiko ga henji wo* stands for the syntax of the sentence, but *-nakat-ta yooda yo* constitutes the verbal morphology. Therefore, sentence (19) would more appropriately be represented, with each morphological element connected with a hyphen, as the following: *Nee doomo Yukiko-ga henji-o dasa-nakat-ta-yooda-yo*.

Putting together the understandings obtained from the previous studies, Minami (1993: 53–62) proposes an analysis of four types of predicate-headed sentences (i.e., sentences headed by a verb, adjective, noun, or pseudo-noun), each of which is given a slightly different diagram with the chief difference lying in the absence of some elements in the nominally or adjectivally headed sentence.[18] We will here show Minami's (1993: 54) diagram of verb-headed sentence structure, which can be represented with our English translations and square-bracketed glosses, as in Figure 3.

The sentence structure largely consists of two parts: "*jutsubu no yooso*" (elements of a predicate) and "*jutsubu igai no seibun*" (constituents other than the predicate) (Minami 1993: 54, 56). The predicate is comprised of post-verbal elements that are called *jodooshi* 'auxiliaries' and *shuujoshi* 'final particles' in the traditional Japanese linguistics. On the other hand, the constituents other than the predicate correspond to so-called arguments (subjects and objects), adjuncts, and other adverbials.

What should be noticed here is that the elements comprising a predicate are morphological units, while the constituents other than the predicate are syntactic units.[19] Shibatani (1990: 224) points out that the Japanese verbal morphology

18. In sentences with a nominal or adjectival head, the part that consists of verb, CAUS, and PASS in Figure 3 is replaced by a noun(+COP[AUX of affirmation, in traditional terms]) or an adjective/adjectival verb, respectively; those sentences lack the ablative- and accusative-marked nominals; in addition, the part enclosing *mai*[MOD] in the figure is occupied by *(aru) daroo/mai* in the nominally headed structure and by *(aru) (y)oo/mai* in the adjectivally headed structure (Minami 1993: 56, 58, 61).

19. Of course, each syntactic unit can be something that consists of some morphological units (e.g., case- or topic-marked nominals are formed of a nominal and a particle). What distinguishes syntactic from morphological units of a sentence is the absence or presence of their integration into the verbal morphology.

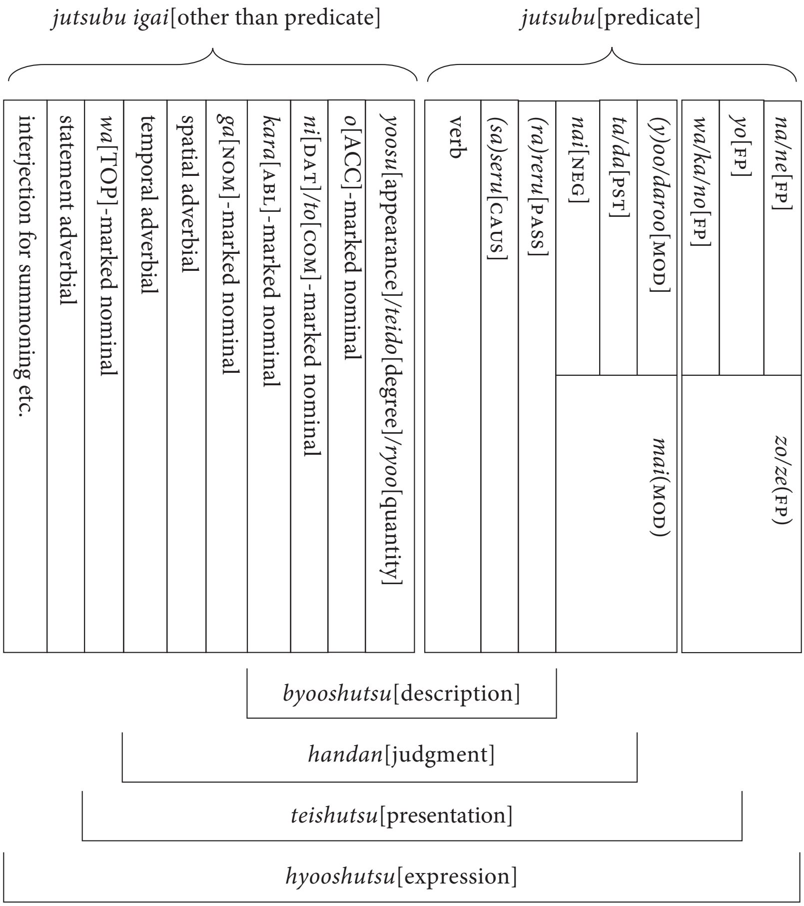

Figure 3. Verb-headed sentence (Minami 1993: 54; translated and glossed)

involves the composition of elements depicted in (20), which corresponds to the verb and whole series of post-verbal elements in Figure 3.

(20) $\underbrace{\text{Root + Inflectional ending}}_{\text{Stem}}$ (+ Auxiliary) ¦ (+ Particle)

(Shibatani 1990: 224)

The principles for ordering the post-verbal elements are part of the rigid grammatical system of the language. As seen in Figure 3, the markers (auxiliaries in traditional terms) of voice, tense, and modality conform to a strict ordering principle. For example, the passive marker *-(ra)re* follows the causative marker *-(sa)se* for the intended meaning (literally 'We were made to cry by Yukiko'), as in (21a), and their sequence of reversed order is not possible, as in (21b).

(21) a. *Yukiko-ni-wa naka-**sa**-**re**-ta-yo-ne.*
Yukiko-by-TOP cry-CAUS-PASS-PST-FP-FP
'Yukiko made us cry (over her behavior), right?'
b. * *Yukiko-ni-wa naka-**re**-**sase**-ta-yo-ne.*
Yukiko-by-TOP cry-PASS-CAUS-PST-FP-FP
c. *Yukiko-ni-wa naka-sa-re-ta-**yo**-**ne**.*
Yukiko-by-TOP cry-PASS-CAUS-PST-FP-FP
d. * *Yukiko-ni-wa naka-sa-re-ta-**ne**-**yo**.*
Yukiko-by-TOP cry-PASS-CAUS-PST-FP-FP

Sentence-final particles also compose the predicate structure of the sentence; they are also governed by a similar ordering principle. Just as the ordering of causative *-(sa)se* and passive *-(ra)re* cannot be reversed, neither can the final particles *-yo* and *-ne*, which comprise the verbal morphology with the preceding markers/auxiliaries, as in (21c–d).[20]

As noted in Section 2.1, Japanese final particles, such as *-yo* and *-ne*, are "determined by the situation of discourse" (Heine et al. 2013: 177) and "based on serialization principles that rest upon discourse factors" (Haselow 2016b: 386). In these functional terms, they can be viewed as elements of thetical grammar and macrogrammar. On the other hand, macrogrammatical elements in languages like English are "not integrated into the morphosyntactic dependency relations of a microgrammatical unit" (Haselow 2016a: 82), but sentence-final particles in languages like Japanese clearly exhibit such morphosyntactic integration. On these formal grounds, Japanese final particles can be seen as elements of sentence grammar and microgrammar. These functional and formal features lead us to recognize the Janus-faced identity of Japanese final particles. Such an ambiguous identity of these particles casts doubt upon the distinct dichotomy between the two domains in dualistic conceptions of grammar.

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20. The morphological status of *-yo* and *-ne* can be shown by the fact that sentences like (i)a–b become unacceptable if a syntactic element like *demo* 'but' or *yappa* 'still' intervenes in the morphological structures as in (i)c–d:

(i) a. *sore-tte tukareru-yo-ne **demo**.*
that-top get.tired-FP-FP but
'That makes us tired though.'
b. *sore-tte tukareru-yo-ne **yappa**.*
that-top get.tired-FP-FP still
'That makes us tired, you know.'
c. **sore-tte tukareru-yo-**demo**-ne.*
d. **sore-tte tukareru-**yappa**-yo-ne.*

4.2 Utterance-final particles and "final field" in Japanese

The morphological nature of Japanese sentence-final particles reveals that they are essentially different from final particles as in Western European languages. The former are morphological units while the latter approximate to some syntactic units. It is notable here that Japanese also has such syntactic units that can occupy the final part of an utterance, as illustrated in (22).

(22) a. *sore-tte okane-ga kakaru-yo-ne **demo**.*
that-TOP money-NOM cost-FP-FP but
'That costs a lot though, you know?'

b. *sore-tte tukareru-yo-ne **yappa**.*
that-TOP get.tired-FP-FP still
'That makes us tired though, you know?'

Connectives like *demo* 'but' or adverbials like *yappa* 'still' can be used in final position as well as initial or medial positions (Izutsu and Izutsu 2014: 87–88; Shinzato and Masuda 2009: 823–824). They are not integrated into the verbal morphology but are attached to the end of an utterance for discourse-functional purposes, hence termed utterance-final particles in distinction from sentence-final particles of verbal morphology.

Utterance-final particles like *demo* and *yappa* can be located after the whole verbal morphology. This utterance-final position can be safely equated with what Haselow (2016a: § 2.2) calls "final field." As Haselow (2016a: 82) correctly observes as to English macrogrammar elements, Japanese utterance-final particles also appear "in the loose sequence of units that are held together by discourse-structural and pragmatic, often also prosodic factors." Insofar as they are "syntactically unintegrated" (Heine et al. 2013: 191) or "morphosyntactically isolated" (Haselow 2016a: 82), they can be identified as elements of thetical grammar and macrogrammar. As with West European final particles, they can be located somewhere in the top-left cell of Table 1 in Section 1.

The continuity between microgrammar and sentence grammar on the one hand and macrogrammar and thetical grammar on the other can also be substantiated with an example of sentence-final particles that have developed or been developing from utterance-final particles, as exemplified in (23), both cited from Izutsu and Izutsu (2014: 89).

(23) a. *Omae dare-nimukatte kabati tare-toru-n-nara-**hoidee**.*
you who-toward complaint flow-PERF-FN-COP-and
'Who are you complaining to?'
(qb5.2ch.net/test/read.cgi/sakud/1095421468/)

b. *Nantyuu kotoo yuu-n-nara-**hoitee**.*
what:sort:of thing say-FN-COP-and
'What a stupid thing you say!' (Fujiwara 1993: 182)

In the Hiroshima dialect of Japanese, *hoide* or *hoite* can serve as a connective for 'and' that corresponds to *sosite* in Standard Japanese. They are comparable with final *demo* 'but,' also found in (22a) above. However, since *hoide* and *hoite* are now morpho-phonologically combined with the preceding copula *-nara* 'be,' *-n-nara-**hoidee*** and *-n-nara-**hoitee*** can be viewed as 'one larger sentence-final particle' (Fujiwara 1993: 183).

Here *hoide* and *hoite* can be seen as occupying a status located between utterance-final particles like *demo/yappa* and final particles like *-yo/ne*, both used in (22): they are originally utterance-final discourse markers but are now merging into the verbal morphology including *-n-nara*.[21] The prolonged final vowel of *hoi**dee*** or *hoi**tee*** implies some deviation from a mere discourse-marker status. In structural terms, they can be understood to have left the final field of an utterance and are now joining the verbal morphology. Thus, *hoidee* and *hoitee* can appropriately be located somewhere between the top-left and bottom-left cells of Table 1 above.

As just noted above, some utterance-final particles can come to be integrated into the verbal morphology to join sentence-final particles. This sort of gradual integration implies the continuity between utterance-final particles (macrogrammatical and thetical-grammatical elements in both functional and formal terms) and sentence-final particles (functionally macrogrammatical and thetical-grammatical but formally microgrammatical and sentence-grammatical elements). This endorses the continuity between the two domains in each dualistic conception of grammar.

4.3 Ordering principle and degree of morphosyntactic integration

As discussed in 2.1, Japanese sentence-final particles exhibit strict ordering when they occur in sequence. On the other hand, we can observe some looser ordering among utterance-final particles in Japanese. As illustrated in (24a–b), utterance-final particles like *yappa* and *demo* can be sequenced. They can further be followed by another utterance-final particle *desyo*, which is derived from *des-yoo* 'COP.POL-will' and functions like a question tag. Whereas the order of *yappa* and *demo* can

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21. This gradual change from looser sequences of utterance-final particles to tighter sequences of sentence-final particles is an instantiation of "grammaticalization" (Heine et al. 1991), "syntacticization" (Givón 1979: 208), "fixation" (Lehmann 1985: 309), morphologization (Klausenburger 1979), "sedimentation" (Günthner 2011: 157), and so forth.

be reversed, a permutation between them and *desyo* results in awkward utterances, as in (24c–d). This is not governed by such a morphological ordering principle as seen with Japanese sentence-final particles. Yet even this kind of looser ordering is to some extent motivated by the principle that we argued so far: more intersubjective particles follow more subjective or less intersubjective particles.

(24) a. *sore-tte tukareru-yo-ne* ***yappa demo, desyo***?
that-TOP get.tired-FP-FP still but innit
'That makes us tired though, you know, doesn't it?'
b. *sore-tte tukareru-yo-ne* ***demo yappa, desyo***?
that-TOP get.tired-FP-FP but still innit
c. ?*sore-tte tukareru-yo-ne,* ***desyo yappa demo***?
that-TOP get.tired-FP-FP innit still but
'That makes us tired, doesn't it, though, you know?'
d. ?*sore-tte tukareru-yo-ne,* ***desyo demo yappa***?
that-TOP get.tired-FP-FP innit but still

The looseness (or conversely, rigidity) of the ordering principle can be analyzed as the degree of morphosyntactic integration, which ranges from syntactic (looser) integration to morphological (tighter) integration. As argued in Sections 2 and 4.1, the morphological integration of sentence-final particles reinforces a strict ordering principle, hence formally leaning more toward sentence grammar and microgrammar. In contrast, being "integrated syntactically and prosodically" (Haselow 2012: 185) only accounts for a looser ordering principle.

Haselow (2016a: 78) postulates that microgrammar and macrogrammar are two distinct cognitive serialization principles. Remember, however, that the serialization principle regulating morphological, sentence-final particles (half microgrammatical elements) largely coincides with the principle motivating the loose ordering of syntactic, utterance-final particles (genuine macrogrammatical elements). This implies that microgrammar and macrogrammar of final particles can be at least partially based on a similar serialization principle of intersubjectivity following subjectivity. Their difference lies in the degree of their morphosyntactic integration and the corresponding looseness/strictness of their ordering principle. As far as languages like Japanese are concerned, microgrammar and macrogrammar are not necessarily based on different kinds of serialization principle, which encourages us to emphasize that the two domains of the dualistic conceptions of grammar are continuous.

5. Final particles in dualistic conceptions of grammar

We have so far discussed the sequential order of final particles of different languages. As clarified in Section 4, there are two major types of final particles in East Asian languages (especially, Japanese and Korean). Sentence-final particles form morphological units and follow a strict ordering principle, while utterance-final particles amount to syntactic units and are organized on a looser ordering principle. In these respects, West European final particles, discussed in Section 3, can be identified with the utterance-final type; they are basically syntactic rather than morphological units and rest upon a less strict serialization principle.

We can summarize the distribution of different final particles as in Table 7. Utterance-final particles (UFPs) in East Asian languages can be located in the (potential) top-left cell of the four-cell matrix (originally presented as Table 1) because they manifest some thetical-grammatical and macrogrammartical properties of being "syntactically unintegrated" or "morphosyntactically isolated" and "determined by the situation of discourse" or "speech planning, processibility, textual coherence, speaker-listener relationship, and contextual embeddedness." West European final particles (WEFPs) can also be understood as occupying the top-left cell.

Table 7. Final particles in morpho-syntax and meaning/function matrix

	"determined by the situation of discourse" or "speech planning, processibility, textual coherence, speaker-listener relationship, and contextual embeddedness"	**organized in terms of "propositional concepts and clauses" or "internal hierarchization, embedding, constituency, and dependency relations"**
"syntactically unintegrated" or "morphosyntactically isolated"	**thetical/macro-grammatical elements** WEFPs/UFPs (esp. Japanese and Korean)	?
syntactically or morphologically "integrated"	*hoidee/hoitee* (Japanese) SFPs	**sentence/micro-grammatical elements**

In contrast, Japanese sentence-final particles (SFPs) can be situated in the bottom-left cell in that they have sentence-grammatical and microgrammatical properties of being syntactically or morphologically "integrated." Some particles like *hoidee/hoitee* (mentioned in 4.2) can be viewed as a hybrid of the two types (UFP and SFP), placed on the region that strides the top- and bottom-left cells since they are under/after the development from utterance-final to sentence-final particles. Korean final particles can be equated with Japanese sentence-final particles because both languages show a comparable morphological integration of the particles into the predicate structure (Minami 1993: 37) or (post)verbal elements (Yap et al. 2014: 179). On the other hand, Chinese and Mongolian final particles seem to waver between such utterance-final particles and the *hoidee/hoitee*-type of ambivalent value because they are syntactically though not necessarily morphologically integrated into the predicate or sentence structure.[22]

We have so far treated macrogrammar on a par with thetical grammar. However, they seem to differ in their coverage of morphosyntactic units. In formal terms, syntactic integration can serve as a property that more or less separates macrogrammar from thetical grammar. In this regard, attention must be paid to Haselow's (2012) description of English final particles (*then*, *though*, *anyway*, *actually*, and *even*), which are later treated as macrogrammar elements in Haselow (2016a). Acknowledging that those particles are only loosely attached to the preceding unit, Haselow (2012: 185) states: "[h]owever, since they are not autonomous clausal constituents, they cannot occur independently of a clause, but need a host structure into which they are integrated syntactically and prosodically."

The characteristic of "integrated syntactically" in this description is not congruent with a defining property of thetical grammar: "syntactically independent from the rest of the utterance" and "prosodically independent from the rest of the sentence" (Heine et al. 2013: 159). This suggests some discrepancy between macrogrammar and thetical grammar.[23] Therefore, Table 7 may suitably be modified by adding a proviso about each grammar's coverage on the four-cell matrix: Thetical grammar falls within the top-left cell, whereas macrogrammar does not only occupy that cell but also overlaps the bottom-left cell.

With respect to semantics too, macrogrammar differs from thetical grammar. Thetical elements "are fairly independent from the sentence meaning" and "the sentence meaning is largely independent from them" (Heine et al. 2013: 160). However, Haselow himself acknowledges that macrogrammar modifies "various aspects of the content expressed in a microgrammatical unit, such as its epistemic value or illocutionary force." (2016: 82). Thetical grammar is independent of but macrogrammar is dependent on the sentence meaning. As long as thetical grammar and macrogrammar cover different parts of a whole system (discourse grammar or organization of language processing), sentence grammar and micrOgrammar as their respective complementary sets will naturally differ from each other.

22. Yap et al. (2014: 182–189) see sentence-final particles of Chinese as well as verb-final (SOV) languages as products of "semantic scope expansion and syntactic restructuring" within a clausal structure, which presupposes that those particles are syntactically integrated into the host clause.

23. For example, English final particles in Haselow's (2012) sense are elements of macrogrammar but not of thetical grammar because they are "integrated syntactically and prosodically" (2012: 185).

This diversity between the two theories of grammar could also give an indirect piece of evidence that the boundary of one domain is not discrete but forms a continuum with another domain.

A dualistic conception of grammar itself must be a reasonable assumption for any discourse-functional pragmatic approach to linguistic structures and language production. However, the differentiation between the relevant two domains can hardly be recognized as discrete. We have to acknowledge a considerable degree of continuity especially when we face linguistic facts about different final particles of not only West European but also East Asian languages.[24]

6. Conclusion

This chapter demonstrated that elements of thetical grammar and macrogrammar, broadly called "final particles" in some East Asian and West European languages, exhibit a very similar ordering principle when they occur in sequence: more intersubjective particles follow more subjective or less intersubjective particles. Such an ordering principle operates much more strictly in East Asian sentence-final particles but more loosely in West European (utterance-)final particles. Insofar as they are susceptible to a similar principle, either rigid or looser, in their sequential order, they can be viewed as being syntactically or morphologically regulated.

We further showed that languages like Japanese have two types of final particles: sentence-final and utterance-final particles. The first type comprises morphological units that compose the structure of a predicate, while the second type amounts to syntactic units loosely connected to the preceding utterance just like West European final particles. Both types follow a similar ordering principle when particles of each type occur in sequence, but the ordering is strict in the first type and looser in the second type.

We can here recapitulate our discussion in reference to the questions we posted in Section 1: (i) What are "grammatical" aspects of thetical grammar and macrogrammar? and (ii) Are there any grammatical elements that occupy the blank cells in the matrix (the bottom-left and top-right blanks) of Table 1? For the first question, we can say that the ordering principle working on final

24. Lohmann and Koops (2016: 441) argue that "a syntax or grammar of DMs" (discourse markers) "is characterized by functional principles but also inherits combinatory constraints from sentential syntax." As to the question of whether ECCs (extra-clausal constituents) need to be described in a grammar separate from sentence grammar, they remark: "constraints on DM sequencing uncovered so far seem to point to a considerable degree of interaction between the two, rather than to two separate systems."

particles represents one of the grammatical aspects of macrogrammar (and possibly of thetical grammar).

Our answer to the second question is partly provided by our observation on sentence-final particles in East Asian languages like Japanese. We argued that such sentence-final particles occupy the bottom-left cell of the matrix. They are categorized as elements of thetical grammar and macrogrammar in functional terms but as elements of sentence grammar and microgrammar on formal grounds. They are "determined by the situation of discourse" (Heine et al. 2013: 177) and based on "textual coherence, speaker-listener relationship, and contextual embeddedness" (Haselow 2016b: 386), but constitute part of the verbal morphology of a predicate. On the other hand, whether there are any linguistic elements or units to be located in the top-right cell is left to future research, alongside of the grammatical status of units like English questions tag.

In more general terms, so-called final particles of East Asian and West European languages can be largely classified into the sentence-final and utterance-final types. The utterance-final type is a macrogrammatical and thetical-grammatical element in both formal and functional terms, whereas the sentence-final type is a formally microgrammartical and sentence-grammatical (though functionally macrogrammatical and thetical-grammatical) element. Chinese and Mongolian sentence-final particles can be located between the two types because of their syntactic but not obviously morphological integration. This in-between type further testifies the continuity between macrogrammar and microgrammar, and thetical grammar and sentence grammar

Another piece of evidence for continuity is that some Japanese utterance-final particles can come to be morphologically integrated and constitute the verbal morphology, as is the case of *hoide(e)/hoite(e)* in the Hiroshima dialect. The gradual development from utterance-final into sentence-final particles also implies the continuity between the two domains of each dualistic conception of grammar.

We have argued that final particles either strictly or loosely follow a similar ordering principle when they occur in sequence. This grammatical aspect (or regularity) points to the continuity between the two types (and the in-between type also) of final particles, which covers the region from the left half of the matrix in Table 7. Along with this continuity, the fact that the post-verbal elements of languages like Japanese constitute a morphological sequence starting from a verb root through auxiliaries or markers of voice, aspect, negation, tense, and modality to sentence-final particles leads us to conclude that either microgrammar or sentence grammar is not discrete but continuous to macrogrammar or thetical grammar, respectively.

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CHAPTER 6

The semantics, syntax and prosody of adverbs in English

An FDG perspective

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In the extensive literature on parenthetical (non-propositional, disjunctive) adverbs, it is often assumed that, on the basis of their semantic, syntactic and prosodic properties, a binary distinction can be made between integrated (non-parenthetical) and non-integrated (parenthetical) adverbs. This paper aims to demonstrate that such a dualistic view is oversimplified, since semantic, syntactic and prosodic (non-)integration need not coincide. On the basis of a detailed analysis of the adverbs *frankly* (as an illocutionary and manner adverb) and *cleverly*, *stupidly* etc. (as subject-oriented and manner adverbs), it is argued that the distinctive features of Functional Discourse Grammar make it possible to capture both the differences and the interaction between these three dimensions of (non-)integration in an insightful and consistent manner.

Keywords: parentheticals, truth-conditionality, prosodic integration, English adverbs, levels of analysis, Functional Discourse Grammar

1. Introduction

The literature on what have been referred to as parenthetical (peripheral, non-propositional, disjunctive or comment adverbs; e.g. *frankly*, *fortunately*, *allegedly* or *briefly*) is extensive, and linguists of different theoretical persuasions have described these adverbs in various degrees of detail. Most previous accounts, however, are concerned primarily with one particular aspect of these adverbs. A considerable amount of attention has been paid to their discourse-pragmatic functions (e.g. Strawson 1973; Bach and Harnish 1979; Palmer 1986; Fraser 1996; Halliday and Matthiessen 2014: 190–193), while other accounts have focused on their semantic properties, in particular their non-truth-conditionality (e.g. Bellert 1977;

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Ifantidou 1993, 2001; Rouchota 1998; Asher 2000). Other linguists have been concerned with their syntactic behaviour, such as restrictions on clefting, questioning and scope of proforms/ellipsis/negation (e.g. Quirk et al. 1985: 612–631; Pullum and Huddleston 2002: 575–576; Huddleston et al. 2002: 1350–1362; Espinal 1991) and clausal position (e.g. Jackendoff 1972; Cinque 1999; Ernst 2002; Haumann 2007). Finally, there are some contributions on the prosodic features of these adverbs (e.g. Allerton and Cruttenden 1974), although these typically tend to be mentioned in passing (see comments on their prosodic non-integration in e.g. Pullum and Huddleston (2002: 575–576), Huddleston et al. (2002: 1350–1362) and Halliday and Matthiessen (2014: 190–193)). Relatively little attention, however, has been paid to the interaction between these different functional and formal aspects (which are often assumed to relate in a more or less one-to-one fashion), and so far no unified, theoretically based analysis has been proposed.

The first aim of the present is to demonstrate that, despite the fact that in clear instances of parenthesis, syntactic non-integration, prosodic non-integration and non-truth-conditionality go hand in hand, parentheticality is not a homogeneous notion. Instead, it will be shown that, from a linguistic point of view, we are dealing with three separate but interacting dimensions, and that these need to be analysed separately in order to find out how exactly they interact.[1]

Secondly, it will be argued that the distinctive features of the theory of Functional Discourse Grammar (FDG; Hengeveld and Mackenzie 2008), in particular its distinction between four interacting levels of analysis (interpersonal, representational, morphosyntactic and phonological), and the fact that it takes the Discourse Act (a functional unit), rather than the sentence (a formal unit), as its basic unit of analysis, can be used to capture both the differences and the interaction between these three dimensions of (non-)integration in an insightful and consistent manner.

Using data from two large corpora of spoken and written English, the Corpus of Contemporary American English (COCA; Davies 2008), and the News on the Web Corpus (NOW Corpus; Davies 2016), the chapter will illustrate the overall FDG approach to parenthetical adverbs by examining the use of the illocutionary adverb *frankly* and the class of subject-oriented adverbs including *cleverly, stu-*

1. This chapter will not present or discuss any neuro- or psycholinguistic evidence, and will not make any claims about how and where (in the brain) these adverbs are processed. It will, however, be clear that the linguistic evidence presented here does not support a dualistic approach in which linguistic phenomena can be relegated to one of the two hemispheres.

pidly, wisely, etc.; in both cases, a comparison will be made with the manner use of the adverbs in question.[2]

Attention will also be paid to the difference between the prosodically integrated and non-integrated uses of illocutionary *frankly* and subject-oriented (evaluative)[3] adverbs like *cleverly*. Some examples are given in (1) and (2):

(1) a. No woman had ever spoken so *frankly* to him in his life. (COCA, fiction)
b. And, *frankly*, that's what we all should be doing. (COCA, spoken)
c. I *frankly* don't have the kind of memory that would allow me to remember just what was said. (COCA, spoken)

(2) a. They operate very *cleverly*, just below the level of major war or major provocation … (COCA, spoken)
b. *Cleverly*, Ginn seems to have installed a genuinely nice guy. (COCA, magazine)
c. Orlando *cleverly* introduces the nineteenth century in terms of climate. (COCA, academic)

In particular it will be shown that the syntactic constraints on parenthetical adverbs fall into three categories: (i) those that follow from the non-truth-conditionality of the adverbs in question (i.e. constraints on clefting, questioning; scope of pronominalization/ ellipsis/negation); (ii) those that do not follow from the non-truth-conditional status of these adverbs, and that are sensitive to their prosodic (non-)integration (i.e. clausal position and constraints on occurrence in the complementation of certain verbs; Hengeveld and Mackenzie 2008: 363–365; see also Bach 1999: 358; Potts 2005: 145–146) and (iii) other features that vary with the level of analysis of these adverbs (i.e. modification and coordination). It will be shown that prosodically integrated, non-truth-conditional adverbs are still to

2. As will be clear from the fact that these adverbs can be modified (e.g. *quite frankly*) or may themselves consist of more than one word (*in a frank manner*, *in all frankness*, *frankly speaking*), all these expression are, morphologically speaking, adverb phrases rather than adverbs. Since, for reasons of simplicity and comparability, the discussion in this chapter is (largely) restricted to single word expression like *frankly* and *cleverly*, the term adverb will be used to refer to these expressions. Within the framework of FDG, this has the advantage that the term can also be used to characterize these elements at the Interpersonal Level (where lexemes are assigned word classes, but where there are no phrases).

3. Note that the term "subject-oriented" is inappropriate, as the adverbs in question need not function as subjects (Mittwoch et al. 2002: 676; see also Quirk et al. 1985: 576). Following Keizer (2019), I will refer to these adverbs as "predicative-evaluative" adverbs (evaluative adverbs for short) from now on (except when discussing previous accounts that make use of the term "subject-oriented").

some extent syntactically integrated, and only become truly non-integrated when they are prosodically independent (realized as a separate Intonational Phrase).

The chapter is structured as follows. Section 2 provides a brief overview of some previous comments on the interaction between the semantic, syntactic and prosodic (non-)integration of parenthetical adverbs, Section 3 presents the criteria used in the literature to determine semantic, syntactic and prosodic (non-)integration, and applies these criteria to the different uses of the adverbs *frankly* and *cleverly*, *stupidly*, *wisely*, etc. Section 4 subsequently shows how the differences between these uses can be coherently and consistently captured in FDG. Section 5 concludes the chapter, and considers some wider implications.

2. The relation between the semantic, syntactic, and prosodic features of "parenthetical" adverbs

In Speech Act theory, illocutionary adverbs like *frankly*, *confidentially*, *honestly*, and attitudinal adverbs like *unfortunately*, *sadly*, *luckily* were regarded as not contributing to the proposition expressed in an utterance, but instead as indicating the speaker's attitude towards the speech act or the proposition it contains (e.g. Urmson 1963; Strawson 1973; Allerton and Cruttenden 1974: 7–8; Bach and Harnish 1979; Chafe 1986; Palmer 1986; Fraser 1996). These adverbs are, in other words, not truth-conditional (semantically non-integrated).

Others, however, stress the specific syntactic properties of these adverbs. Quirk et al. (1985: 612–631), for instance, include adverbs like *frankly*, *personally*, *wisely* in their class of disjuncts which "have a superior role as compared with the sentence elements" and "are syntactically more detached and in some respects 'superordinate', in that they have scope over the sentence as a whole" (Quirk et al. 1985: 613). Disjuncts differ from adjuncts in the fact that they are syntactically more constrained: they cannot be clefted, cannot be elicited by question words like *when*, *where*, *why* or *how*, do not come within the scope of ellipsis or pronominalization and cannot be made the basis of contrast in alternative interrogation (**Did the storm destroy the crop sadly or …?*) (Quirk et al. 1985: 504, 612–613). In distinguishing disjuncts from adjuncts, however, no mention is made of truth-conditionality, nor (explicitly) of their prosodic features (although in all the examples provided, the adverbs are separated from the rest of the sentence by commas).

Generative grammarians similarly focus on the syntactic features of these adverbs, but often do explicitly mention the relation between syntax and prosody. In an influential article Haegeman (2007 [1991]) distinguishes between adverbial and peripheral clauses, primarily on the basis of syntactic behaviour (clefting, questioning, scope of negation, etc.). However, she also includes a phonological property, claiming that "[u]nlike central adverbial clauses, peripheral adverbial clauses are set off by comma intonation from the clause they relate to" (2007 [1991]: 333). Because of this formal independence, Haegeman analyses parenthetical clauses as being syntactically independent from the host sentence ("orphans") (Haegeman 2007: 333). Although De Vries (2007) offers a different analysis of parenthetical expressions, arguing for some degree of syntactic integration, he follows Haegeman's claim that parentheticals are prosodically non-integrated.

In her discussion of parenthetical adverbials (disjuncts), Espinal (1991) relies primarily on syntactic properties (she presents a long list of syntactic properties characterizing parentheticals, only some of which apply to adverbs). However, she also includes a semantic property in her list, by stating that adding or deleting parentheticals does not "[affect] the grammaticality *or meaning* of the rest of the syntactic structure" (Espinal 1991: 730; emphasis added). Moreover, Espinal acknowledges that there is no one-to-one relationship between phonological non-integration and syntactic non-integration:

> [...] having an independent intonational unit is neither a sufficient nor a strictly necessary property to identify parentheticals: not all syntactic units with independent intonation [...] correspond to independent syntactic units, as illustrated by subject-oriented adverbs, modal and evaluative adverbs, etc.
>
> (Espinal 1991: 734–735)

The idea that parenthetical adverbs like illocutionary *frankly* need not be prosodically non-integrated is also clearly reflected in generative accounts of the linear word order of adverbs (e.g. Cinque 1999; Ernst 2002). In these accounts, these adverbs, when prosodically integrated into the host clause, are shown to be constrained in terms of clausal position, which may be taken as evidence that they are still, to some extent, syntactically integrated (part of the clause).

In Systemic Functional Grammar a link is established between the discourse function of an adjunct and its prosodic realization. Halliday and Matthiessen (2014: 190–193) distinguish between propositional comment adjuncts (e.g. attitudinal *(un)fortunately*, as well as subject-oriented adverbs like *wisely*; Halliday and Matthiessen 2014: 190) and speech functional comment adjuncts (e.g. *frankly* and *confidentially*). Being "less integrated into the mood structure" (Halliday and Matthiessen 2014: 190), these adjuncts tend to occur at the boundary between information units and are often preceded and/or followed by commas in writing. Apart from some very general observations concerning their clausal position, however, no further characteristics (concerning semantic or syntactic integration) are mentioned.

Other linguists actually take the prosodic (non-)integration of an element as the basis for their categorization. Pullum and Huddleston (2002: 575–576), for instance, acknowledge that all adverbs (i.e. both VP-oriented adjuncts, like those indicating manner, means, degree, duration, frequency etc., and clause-oriented adjuncts, including modal, evaluative and speech-act related adverbs) can be "prosodically detached, i.e. set off from the rest of the clause by intonational phrase boundaries" (Pullum and Huddleston 2002: 577). These prosodically detached elements do not function as adjuncts but as supplements. Supplements, in turn, are characterized as not being syntactically integrated into the clause (as they cannot be coordinated with clausal constituents) (Huddleston et al. 2002: 1350). This, they claim, directly affects the truth-conditional status of these elements: "[b]y virtue of not being integrated into the syntactic structure, supplements are necessarily semantically non-restrictive" Huddleston et al. (2002: 1352). They also point out, however, that the reverse does not hold, i.e. that not all syntactically integrated modifiers are restrictive (Huddleston et al. 2002: 1353; cf. Bolinger 1967, 1989: 198; Quirk et al. 1985: 1239; Biber et al. 1999: 242; Huddleston et al. 2002: 1353; Alexiadou, Haegeman and Stavrou 2007: 334–335; Matthews 2014: 168).

In natural language semantics, Potts (2005) also uses the term "supplement" to refer to prosodically non-integrated expressions. Taking Grice's (1975) distinction between conversational and conventional implicatures (CI) as a point of departure, Potts (2005: 6–7; see also p. 11) characterizes supplements (i.e. parenthetical expressions) as CI expressions, "used to guide the discourse in a particular direction or to help the hearer to better understand why the at-issue content is important at that stage." These conversational implicatures are triggered by an underlying COMMA feature, "a signal to isolate the subtree it dominates intonationally, accounting for the commas in print and the intonational boundary marks in speech. Semantically, it performs a type shift: it takes at-issue content to CI content" (Potts 2005: 98). Potts thus explicitly links the semantic non-integration of an expression (its "not-at-issue" status) to its prosodic detachment. Syntactically, however, he regards these expressions as regular, fully integrated modifiers (more specifically, as right-adjoined adjuncts).

Other linguists, however, see a direct relation between semantic, syntactic and prosodic (non-)integration. In her Relevance Grammar account of illocutionary (*frankly*) and attitudinal adverbs (*unfortunately*), Ifantidou (1993: 88), for instance, characterizes these as "phonologically, syntactically and semantically independent from their host clause" (see also Rouchota 1998: 97, 102). Similarly, in distinguishing between Sentence Grammar and Thetical Grammar, Heine et al. (2013) distinguish a class of "thetical expressions", consisting of elements that are not part of a sentence or phrase, but are (in most cases at least) loosely related to some other sentence or phrase (the host). Generally speaking, thetical expressions have the following properties (Heine et al. 2013: 159):

(3) a. They are syntactically independent from their environment.
b. They tend to be set off prosodically from the rest of the utterance.
c. Their meaning is non-restrictive.
d. They tend to be positionally mobile.
e. Their internal structure is built on principles of [Sentence Grammar] but can be elliptic.

Thus, syntactic (non-)integration, prosodic (non-)integration and (non-)restrictiveness are all assumed to be linked; note, however, that whereas the strictest criteria are syntactic and semantic, prosodic and positional features are presented as tendencies (see also Heine et al. 2013: 165).

From the above it is clear that most accounts of parenthetical adverbs concentrate on (provide criteria for) one dimension only (typically discourse-pragmatics, semantics or syntax); and even when more than one dimension is taken into consideration, the exact interaction between these dimensions is typically not discussed in much detail. Thus, although the relation between syntax and prosody has received quite some attention, any criteria given typically concern the syntactic criteria for parentheticality.[4] Moreover, as we have seen, there is no agreement on the nature of the relation: where some linguists assume syntactic and prosodic (non-)integration to go hand in hand (e.g. Haegeman 2009 [1991]; Heine et al. 2013), others only explicitly state a relation in one direction (e.g. Pullum and Huddleston 2002, for whom prosodic non-integration implies syntactic non-integration). Others do not acknowledge any direct relation: for Espinal (1991) prosodic non-integration is neither a sufficient nor a necessary property of parentheticals, while for Potts (2005) prosodically non-integrated expressions are still syntactically integrated.

The relation between semantic and prosodic features is briefly mentioned in Huddleston et al. (2002: 1353), who assume all prosodically non-integrated elements (their supplements) to be non-restrictive, although the reverse is not necessarily true. Neither of these notions is, however, discussed in much detail, and no further attention is given to the question of how exactly they interact. Potts (2005) does see a direct relation between the supplementary, non-at-issue (CI)

4. Systematic research into the prosodic realization of elements in spontaneous speech has of course only become possible relatively recently (e.g. Wichmann 2001; Dehé 2009, 2014), and has shown that the exact prosodic realization is not only determined by the (semantic or syntactic) parentheticality of an expression, but is also influenced by other factors (e.g. speech rate, complexity of the parenthetical expression, emphasis and processing factors (see Dehé 2014 for a study of the prosodic (non-)integration of six types of parenthetical expressions; see also Section 4.2 below).

status of an expression and its realization as a prosodically detached unit;[5] his focus is, however, more on the semantics of these expressions than on their prosodic features (the same is true for Bonami and Godard's (2008) analysis of French attitudinal (their evaluative) adverbs).

Finally, there is the relation between semantic and syntactic features, which, surprisingly, has been accorded little attention. Where it is mentioned (e.g. Espinal 2001; Ifantidou 1993; Heine et al. 2013), the relation is often assumed to be straightforward, in the sense that syntactic non-integration implies non-restrictiveness (non-truth-conditionality) and vice versa (once again, with the exception of Pullum and Huddleston 2002 and Potts 2005). In what follows this relation in particular will be discussed in more detail.

3. Criteria and application

In the rest of this chapter it is argued that the three dimensions of (non-)integration discussed so far need to be kept apart, as different combinations of semantic (non-)integration, syntactic (non-)integration and prosodic (non-)integration are indeed possible. The examples in (1), repeated here for convenience, illustrate some of these combinations for the adverb *frankly*:

(1) a. No woman had ever spoken so *frankly* to him in his life. (COCA, fiction)
b. And, *frankly*, that's what we all should be doing. (COCA, spoken, Fox)
c. I *frankly* don't have the kind of memory that would allow me to remember just what was said. (COCA, spoken)

In (1a), *frankly* is used as a prosodically integrated manner adverb, modifying the manner in which the action denoted by the verb is performed. This is typically assumed to go hand in hand with both semantic integration (restrictiveness, truth-conditionality) and syntactic integration (the adverb is part of the clause in which it occurs). In example (1b), *frankly* is used as a prosodically non-integrated illocutionary adverb,[6] commenting on the manner in which the illocution is performed, stressing the speaker's frankness in performing the speech act. In this use *frankly*

5. Note, however, that although there is a clear relation between the notion of non-restrictiveness and Potts' notion of supplementation (in the sense that supplements (CIs) cannot restrict the at-issue content; Potts 2005: 113), the two notions do not fully coincide (Potts 2005: 95).

6. Bach & Harnish (1979) regard these adverbs as modifying an implicit illocutionary verb ("I frankly tell you that"; see also Hengeveld and Mackenzie (2008: 81)); Fraser (1996: 181) refers to them as manner-of-speaking adverbs. In addition, these adverbs my express related implied meanings (e.g. concession; see Keizer 2018a).

is generally agreed to be semantically non-truth-conditional. In both (1a) and (1b) there is, therefore, a straightforward, one-to-one relation between the three dimensions of (non-)integration; as a result, manner *frankly* in (1a) can safely be qualified as non-parenthetical, and illocutionary *frankly* in (1b) as parenthetical. In (1c), however, the illocutionary (non-truth-conditional) *frankly* is prosodically integrated. In these cases, the syntactic status of the adverb is unclear: whether it is regarded as syntactically non-integrated depends on the kind of criteria used for syntactic integration, as well as on the exact nature of its interaction with the other two types of (non-)integration. This clearly makes it difficult to determine its parenthetical status.

As shown in Example (2), the same combinations of semantic (non-)integration, syntactic (non-)integration, and prosodic (non-)integration are can be found in the case of adverbs like *cleverly*, *stupidly, viciously* etc.[7] These adverbs can be used as manner adverbs, in which case they are typically prosodically integrated, as in example (2a). They can, however, also be used to express the speaker's evaluation of an event, as well as of the Actor involved in this event (cf. Quirk et al. 1972: 465; Haumann 2007: 201); in (2b), for instance, the speaker assigns the property 'clever' to the entire State-of-Affairs ("Ginn installing a genuinely nice guy was a clever thing to do"), as well as to the Actor for performing the State-of-Affairs ("it was clever of Ginn to install a genuinely nice guy"). These evaluative adverbs are often prosodically independent (example (2b)), but may equally well be prosodically integrated (as in (2c)). In both cases, however, they do not have a restrictive function (are semantically non-integrated), whereas the manner adverb *cleverly* in (2a) does.

(2) a. They operate very *cleverly*, just below the level of major war or major provocation … (COCA, spoken)
b. *Cleverly*, Ginn seems to have installed a genuinely nice guy. (COCA, magazine)
c. Orlando *cleverly* introduces the nineteenth century in terms of climate. (COCA, academic)

In other words, we cannot assume a simple distinction into two classes of adverbs (integrated vs. non-integrated; adjunct vs. disjunct, or supplement; sentence vs. (paren)thetical), with corresponding semantic, syntactic and prosodic behaviour; nor is it very helpful to discuss one, or even all three, of these distinctions separately. Instead, for a proper analysis of all the formal and functional properties of

7. Other adverbs in this group are: *apologetically*, *bravely*, *characteristically*, *cheekily*, *courageously*, *crazily*, *cunningly*, *(un)fairly*, *foolishly*, *graciously*, *(in)appropriately*, *recklessly*, *selfishly*, *selflessly*, *sensibly*, *sheepishly*, *shrewdly*, *sneakily*, *thoughtlessly*, *viciously*, *wickedly*.

adverbs (of any kind), we need consider all three dimensions, as well as the interaction between them. Since it is clearly beyond the scope of a single chapter to discuss all of these relations (in both directions), I focus on the interaction between semantic (in)dependence (in the sense of (non-)truth-conditionality) and syntactic behaviour, and the influence of prosodic (non-)integration on this interaction.

In order to do so, criteria for determining the semantic, syntactic and prosodic (non)integration of an adverbs are needed. In the rest of this section, I discuss and evaluate the criteria that have been suggested in the literature, and apply them to the adverbs *frankly* and *cleverly*. Starting with the semantic and prosodic criteria, I then proceed to a more detailed discussion of how these criteria interact with the relevant syntactic features of the adverbs in question.

3.1 Semantic (non-)integration

It is generally accepted that illocutionary adverbs like *frankly* are non-truth-conditional; the same is true for evaluative adverbs like *cleverly* (e.g. Bellert 1977). Manner adverbs, on the other hand, are clearly truth-conditional. In what follows this will be confirmed by applying two well-known tests for truth-conditionality: the assent-dissent test and the scope ("embedding") test (cf. Ifantidou 1993; Papafragou 2006; see also Cohen 1971; Wilson 1975).[8]

3.1.1 *The assent-dissent test*

According to this test, non-truth-conditional adverbs cannot be denied or affirmed, whereas truth-conditional adverbs can. Consider examples (4) and (5) (cf. Hengeveld and Mackenzie 2008: 128–129):

(4) And I *frankly* failed. (COCA, newspaper) [illocutionary]
   a. That's true. (meaning: You did.); No, that's not true (meaning: You didn't.)
   b. *That's true. (meaning: You are being frank.); *No, that's not true (meaning: You are not being frank.)[9]

---

8. For problems with the second test, especially in dealing with epistemic adverbs, see Keizer (2018a, 2018b).

9. Note, however, that "indirect" (explicit) negation is possible, as shown in the following example (from Ifantidou 1993: 84):

(i) Peter: *Frankly*, this party is boring.
    Mary: You're not being frank. I've just seen you dancing with the blond beauty in blue.

(5) I *frankly* discuss my sex history (COCA, fiction) [manner]
  a. That's true. (meaning: You did.); No, that's not true (meaning: You didn't.)
  b. That's true. (meaning: You are being frank); No, that's not true. (meaning: You are not being frank.)

In (4) the proposition as a whole can be affirmed or denied (see (4a)), but the information conveyed by the illocutionary adverb *frankly* cannot (see (4b)). The same holds for other high-level adverbs, like discourse-organizational/stylistic and attitudinal adverbs (e.g. *briefly*, *unfortunately*). In (5), where *frankly* is used as a manner adverb, it is possible to affirm or deny the contribution made by the adverb (see (5b)). The same holds for other lower-level adverbs, such as domain and aspect adverbs, which, like manner adverbs, are truth-conditional (propositional).

Evaluative adverbs like *cleverly*, *wisely* and *foolishly*, however, seem to form an exception. These adverbs are typically analysed as low-level adverbs (modifying the predication; e.g. Quirk et al. 1985; Cinque 1999; Ernst 2002; Hengeveld and Mackenzie 2008), since they are used to express a speaker's evaluation of an event (as well as of the agent involved in this event; cf. Quirk et al. 1972: 465; Haumann 2007: 201). Thus, in example (2c) above, the speaker assigns the property 'clever' both to the entire State-of-Affairs ("Orlando's introducing the nineteenth century in terms of climate was a clever thing to do"), and to the agent for performing this State-of-Affairs ("it was clever of Orlando to do this"). Nevertheless, these adverbs do not affect the truth-conditional value of the proposition (see Keizer 2019), as confirmed by the fact that they fail the assent-dissent test (example (6b)). As shown in (7), manner *cleverly* is truth-conditional.

(6) Peter *cleverly* avoided the question. [evaluative]
  a. That's true. (meaning: He did.); No, that's not true. (meaning: He didn't.)
  b. *That's true. (meaning: It was a clever thing to do.); *No, that's not true. (meaning: It was not a clever thing to do.)

(7) Peter avoided the question *cleverly*. [manner]
  a. That's true. (meaning: He avoided the question.); No, that's not true. (meaning: He didn't avoid the question.)
  b. That's true. (meaning: He did so cleverly.); No, that's not true (meaning: He didn't do it cleverly.)

Although non-truth-conditional, these adverbs are still lexical (in FDG) or conceptual (in Relevance Theory); as such the content (or applicability) of the adverb itself can still be evaluated (affirmed, denied or questioned) (cf. Rouchota's (1998: 115) distinction between truth-conditional and truth-evaluable; see also Asher (2000: 33)).

3.1.2 *The scope ("embedding") test*

The scope (or "embedding") test (e.g. Ifantidou 1993; Asher 2000; Papafragou 2006; see also Cohen 1971 and Wilson 1975) consists in embedding the sentence containing the adverb into a conditional to see if the adverb falls within the scope of *if*; if it does, the adverb is truth-conditional; if not, it is non-truth-conditional. Ifantidou (1993: 69) argues that application of the standard test for truth-conditionality confirms that illocutionary and attitudinal adverbs are indeed non-truth-conditional. For *frankly*, this is shown in Example (8), where the truth of the proposition in the main clause (they will not renew his contract), does not depend on whether or not the speaker was frank in uttering the embedded clause.

(8) a. John's book has *frankly* sold very little.
b. ??If John's book has *frankly* sold very little, they will not renew his contract.

If, however, *frankly* is used as a manner adverb, the test can be applied without problems, as shown in (9). Since here the adverb does contribute to the truth-value of the proposition in the main clause (the proposition expressed in the main clause in (9b) is true when John speaks to them and does so frankly), manner *frankly* is truth-conditional.

(9) a. John spoke to them *frankly*.
b. If John speaks to them *frankly*, they will be willing to listen.

However, despite the fact that the outcome is as expected, the test is problematic since the sentence in (8b), with the adverb *frankly* embedded in the *if*-clause, is distinctly odd.[10] This indeed reveals the weakness of this test, namely the fact that it requires embedding of an adverb in an *if*-clause. *If*-clauses, however, do not contain a proposition (they do not assert, and as such cannot be affirmed or denied). As such they can only include adverbs belonging to levels below the proposition (e.g. aspect or manner adverbs). Embedding an attitudinal or illocutionary adverb thus inevitably leads to ungrammatical results.[11]

Application of the test to evaluative adverbs confirms that they are non-truth-conditional (Keizer 2018a, 2019): in (10a), the consequence (that they are going to have to reenact it later) will take place irrespective of whether the antecedent (letting it lapse because of what the statute says) is considered to be foolish by the

10. Ifantidou (1993: 75) concedes that this is the case, and solves the problem by placing the adverb between commas; this, however, clearly changes the relation between the adverbs and the embedded clause.

11. The same is true for modal adverbs; see Keizer (2018a, 2018b). Moreover, the test is difficult to apply to non-integrated adverbs; I will not discuss this issue here (see Keizer 2018a).

speaker or not; the same holds for *graciously* in (10b): what matters is that the request is granted, not whether doing so can be considered gracious.

(10) a. If they *foolishly* let it lapse because of a misunderstanding of what the statute says, they are only going to have to reenact it later. (COCA, newspaper)
b. If they will *graciously* grant our request, it will indeed make possible the transmission of the Buddhist Law to the eastern realm Japan. (COCA, academic)

Note, however, that unlike *frankly* in (8b), embedding evaluative adverbs in the *if*-clause is unproblematic, suggesting that, although non-truth-conditional, they are still part of the proposition.

Finally, as can be seen from Example (11), when used to indicate manner, adverbs like *cleverly* and *recklessly* are truth-conditional (with the truth of the proposition expressed in the main clause depending on the manner in which the antecedent is performed):

(11) a. and they can be chased if they are driving *recklessly* or appear intoxicated (COCA, newspaper)
b. At a spa you have treatments, and you have a lot of rest. If you combine these *cleverly*, you'll feel occupied, you won't feel bored, (COCA, magazine)

3.2 Prosodic (non-)integration

In theoretical phonology various hierarchies of intonational constituents have been proposed, from syllables up to utterances, with a number of intermediate levels. Although the different proposals vary in the number of intermediate constituents they distinguish, there is general agreement on the existence and identification of (full) Intonational Phrases (IPs), situated between the Utterance and a lower phrase variably characterized as Intermediate Intonational Phrase, Phonological Phrase or Major Phrase (see e.g. Shattuck-Hufnagel and Turk 1996: 205–207; Nespor and Vogel 1986; Beckman and Pierrehumbert 1986; Ladd 2008; Dehé 2014).

The last two decades have seen a growth in detailed studies of the prosodic features of certain linguistic constructions, in particular their relation to the syntactic status of the units involved (e.g. Dehé 2009, 2014; Kaltenböck 2008, 2009, 2011; Selkirk 2011) and their role in discourse (e.g. Wichmann 2000). This means that the theories proposed can be applied and tested, and, where necessary, refined and/or qualified on the basis of recorded data. The success of such pursuits of course depends on the ability to identify prosodic boundaries. This is typically done on the basis of a combination of external and internal criteria, including the following (see also Keizer 2018a):

(12) a. The presence of a complete intonational contour, i.e.
  i. The presence of minimally one accented syllable
  ii. Pitch movement on at least one of the accented syllables
b. The presence of prosodic boundary markers preceding and following the unit in question; i.e. the presence of edge tones (L% or H%) in Autosegmental-Metrical analysis, as evidenced by one or more of the following features:
  i. pitch reset after a boundary (e.g. Gussenhoven 2004: 113–116) or a "change in pitch level and/or pitch direction among unaccented syllables" (Cruttenden 1997: 34)
  ii. pauses preceding and following the unit in question (see e.g. Nespor and Vogel 1986: 188; Dehé 2014: 93);
  iii. absence of certain processes of connected speech (e.g. assimilation, elision, gemination of stops, contraction);
  iv. syllable lengthening;
  v. change in speech rate.

However, researchers do not always agree on which of these features are criterial (i.e. which ones/how many are necessary and/or sufficient; see e.g. Crystal 1969: 205–206; Bolinger 1989: 185–189; Cruttenden 1997: 30–34; Nespor and Vogel 1986; Gussenhoven 2004; Dehé 2009, 2014). And even if specific criteria are selected, recognizing an IP is far from easy, due to the gradience involved in any of the features.

The next, and crucial, question is what triggers the occurrence of these boundaries. In many cases they can be claimed to be intentional, serving some communicative intention of the speaker (varying from indicating the background status of an expression to providing it with extra emphasis). As is well known, however, such communicative intention may be overridden by other factors (e.g. complexity, speech rate, processing factors, etc.).

A discussion of these issues falls outside the scope of this chapter; for the purposes of the current discussion, it will suffice to acknowledge that adverbs (of any kind) can either be prosodically integrated or prosodically non-integrated, and that this distinction, in many cases at least, serves some communicative purpose. For the examples presented in this chapter, it will therefore be assumed that IPs can be identified and that their IP status does serve a communicative function.

3.3 Syntactic (non-)integration

In the literature on parenthetical expressions several (and often the same) criteria for syntactic non-integration are mentioned. As we will see, however, applying these criteria does not always yield an unequivocal result, suggesting that syntactic (non-)integration is not a clear-cut, all-or-nothing phenomenon. What most accounts of adverbs fail to recognize is that some syntactic features follow directly from the non-truth-conditionality of the adverb in question, i.e. from the fact they are not part of the proposition, while other features do not; and that it is precisely the latter that may (but need not) interact with prosodic integration. This means that we need to distinguish three subsets of criteria for syntactic (non-)integration:

1. Those that are directly related to the truth-conditionality (or non-propositional nature) of an adverb (clefting, questioning, scope of proforms, ellipsis, negation);
2. Those that are unrelated to the truth-conditionality status of an adverbs, but which are affected by prosodic integration (clausal position; embedding; inversion);
3. Additional properties that vary according to kind of adverb (level and layer of analysis), and which are not affected by prosodic integration (coordination, modification).

In what follows, each of the subsets will be discussed in more detail.

3.3.1 *Subset 1: Syntactic features following from semantic non-integration*

One feature that, as we have seen, is repeatedly mentioned as being characteristic of parenthetical adverbs is the fact that they cannot be clefted, whereas manner adverbs can (although they rarely are). As shown in examples (13)–(16), this does indeed hold for the adverbs *frankly* and *cleverly*:

(13) a. I read the transcript and she did speak *very frankly*. (COCA, spoken) [manner]
b. It was *very frankly* that she spoke.

(14) a. and *very frankly* our first and foremost job is not to advance social causes, (COCA, spoken) [evaluative]
b. *it is *very frankly* that our first and foremost job is not to advance social causes

(15) a. They operate *very cleverly*. (COCA, spoken) [manner]
b. It is *very cleverly* that they operate.

(16) a. and she very cleverly commanded that they should get divorced [evaluative]
b. #it was *very cleverly* that she commanded that they should get divorced (possible, but only on a manner reading)

Clefting of adverbs, however, turns out to be generally very restricted, with many truth-conditional and syntactically integrated adverbs (e.g. modal, evidential or factual adverbs) not allowing clefting either (see also Allerton and Cruttenden 1974: 4; Quirk et al. 1985: 504; Keizer 2018a).

(17) It was **probably*/**evidently*/**actually* that Peter avoided the question.

In fact, it appears that only parts of the (extended) predication (or State-of-Affairs) can be clefted, i.e. the *who*, *what*, *when*, *where*, *how* and *why*. Illocutionary *frankly*, as a non-propositional adverb, is not part of the predication, and can, therefore, not be clefted. As for evaluative adverbs, the fact that they cannot be clefted suggests that they, too, are not part of the predication – even though these adverbs are typically regarded as modifying the predication, and other predication modifiers (e.g. location) can be clefted. We will return to this issue in Section 4.

The same explanation can be given for the fact that, unlike manner adverbs, illocutionary *frankly* and evaluative *cleverly* cannot be questioned (as shown for *frankly* in examples (18) and (19)) and fall outside the scope of predication proforms, ellipsis and negation (in Example (20), evaluative *cleverly* falls outside the scope of the proform *do-so*, while in (21) manner *cleverly* falls within the scope of *do-so*). Questioning, like clefting, is restricted to adverbs that are part of the (extended) predication, and the same is true (by definition) for the use of predication proforms, ellipsis and negation; as such they cannot be applied to, or scope over, illocutionary *frankly* and evaluative *cleverly*, which, being non-propositional, are not part of the predication.

(18) a. When I came here, I did try to implement those ideas. And I *frankly* failed. (COCA, newspaper)
b. A: #How did you fail?[12] (B: *Very frankly).

(19) a. I read the transcript and she did speak *very frankly*. (= (13a))
b. A: How did she speak? B: Very frankly.

(20) a. Putin is *cleverly* not taking the bait, (NOW Corpus, US) [evaluative]
b. And neither is Obama (= 'Obama is not taking the bait either')

(21) a. They operate *very cleverly*. (= (15a)) [manner]
b. So do we (= 'we also operate very cleverly')

12. Note that there is no way to elicit the adverb *frankly* here.

Thus in all these cases, there is a clear difference in syntactic behaviour between manner *frankly/cleverly* on the one hand and illocutionary *frankly* and evaluative *cleverly* on the other; a difference that can be traced back directly to their non-propositional (non-truth-conditional) status.

3.3.2 *Subset 2: Syntactic features unrelated to semantic non-integration*

Non-truth-conditional adverbs, however, also have a number of syntactic properties that are not related to their non-truth-conditional status, but which follow from the level and layer at which they operate. Some of these features (their (relative) clausal position, the restrictions on their occurrence in embedded clauses, and the fact that they can trigger inversion) strongly suggest that with regard to these properties, these adverbs are still to some degree syntactically integrated.[13] It is only when they are prosodically non-integrated that these adverbs also become syntactically fully non-integrated. In what follows, the three properties in question will be discussed in turn.

As is well known there are restrictions on the linear position of adverbs, in the sense that, in English at least, prosodically integrated high-level adverbs occur more peripherally at the left-hand side of the clause, whereas low-level adverbs (in particular manner adverbs) tend to occur towards the end of the clause, in the vicinity of the verb (e.g. Jackendoff 1972; Cinque 1999; Pullum and Huddleston 2002: 579–580; Ernst 2002; Haumann 2007; Keizer 2018a).[14] As shown in the following examples, this is indeed the case for the adverbs *frankly* and *cleverly*: where illocutionary *frankly* and evaluative *cleverly* prefer the pre- or post-subject position (examples (22a&b)), manner *frankly* and *cleverly* can, and often are, used in post-verbal position (examples (23a&b)).[15]

13. Compare also Potts (e.g. 2005: 90, 97, 103), who argues that semantically non-integrated elements (his supplements) behave as regular modifiers (right-adjoined adjuncts), as their placement is restricted (to a position immediately adjacent to their host), they are assigned case (e.g. nominal appositions in German), and they do not occur in languages (like Turkish) that do not allow right-dislocation.

14. In the COCA, for instance, illocutionary *frankly* has a clear preference for more leftward positions (initial (28%) and post-subject (28.8%)), and is virtually absent in final position; manner *frankly*, on the other hand, predominantly occurs in post-verbal (including final) position (90%).

15. Manner adverbs can also immediately precede the main verb. Since this position is also available for illocutionary and evaluative adverbs, this may (and in the case of evaluative sometimes does) lead to ambiguity. In most cases, however, context rules out one of the readings

(22) a. And the state *frankly* couldn't afford to build a new prison every year. (COCA, spoken)
b. Mourinho *cleverly* has not stayed longer than 3–4 seasons at one club. (NOW Corpus, IE)

(23) a. Rabnaara met her gaze *frankly*. (COCA, fiction)
b. They operate very *cleverly*, just below the level of major war or major provocation … (COCA, spoken, PBS) (= example (2a))

More specific information concerning the kind of adverbs we are dealing with, and the appropriate level of analysis, comes from their relative position within the clause. As shown in the following examples, higher-level adverbs tend to precede lower-level ones. Thus, in (24a), illocutionary *frankly* precedes the manner adverb *explicitly*, while in (24b), where both adverbs occur pre-verbally, it precedes the adverb *cynically*, which could be given either an evaluative or a manner interpretation (see footnote 11). In example (24c), the evaluative adverb *wisely* precedes the manner adverb *gently*.

(24) a. though I think, *frankly* we could *explicitly* state that as a mandatory circumstance (COCA, academic)
b. You know I think the Gateway ad *frankly cynically* shows that. (COCA, spoken)
c. Our waitress *wisely* led us in *gently* by guiding us through a selection of starters before we had to get to grips with anything too conceptual.

These differences in behaviour between adverbs (or between different uses of one and the same adverb) in terms of clausal position can be used to distinguish between a class of parenthetical adverbs (higher-level) adverbs, with wide scope (e.g. illocutionary *frankly* and evaluative adverbs), and non-parenthetical (lower-level) adverbs (e.g. manner adverbs), with narrower scope. The fact that both are restricted when it comes to linear placement does, however, suggest that even parenthetical adverbs have a certain degree of syntactic integration.

The conclusion that even high-level adverbs like illocutionary *frankly* are to some extent syntactically integrated into the clause in which they appear is supported by the fact that they may trigger inversion in V2-languages, i.e. in languages which only allow one constituent to precede the finite verb. In those languages, placement of an element other than the subject in clause-initial position triggers inversion of subject and finite verb. The fact that all prosodically integrated adverbs, irrespective of their function or scope, trigger inversion, shows that all these adverbs are indeed to some extent syntactically integrated (see Espinal 1991: 734; Ackema and Neeleman 2004: 97 for similar arguments). An example from Dutch is given in (25), where the illocutionary adverb *eerlijk gezegd* 'frankly' and the evaluative adverb *stom genoeg* 'stupidly' lead to inversion when placed in clause-initial position:

(25) a. *Eerlijk gezegd* vond ik de film nogal saai.
frankly spoken found I the film rather boring
'I frankly (speaking) found the film rather boring.'
b. *Stom genoeg* heb ik niet naar haar geluisterd.
stupidly enough have I not to her listened
'Stupidly I didn't listen to her.'

Finally, as in the case of relative clausal position, the restrictions on the use of adverbs in the complements of different kinds of verbs can tell us something about their particular level of analysis. Thus, a high-level adverb like illocutionary *frankly* can only occur in the complements of verbs that take as their complement a high level of analysis (one including the illocution). An example is given in (26), where *frankly* occurs in the complement of the verb *add*:

(26) The Secretary then *added* that he *frankly* did not know whether anything could be done in the matter of reaching a satisfactory agreement with Japan (https://www.mtholyoke.edu/acad/intrel/WorldWar2/ballan.htm)

However, when *frankly* occurs in the complements of a low-level verb, like the aspectual verb *continue*, it can only be interpreted as a manner adverb, as in the following example:

(27) "I'm not sure I have the time or inclination to go through the full ins and outs of this piece of crap so if in doubt please presume all parts of the car are either broken, rusty, or covered in some kind of dubious residue." # "That way you won't be disappointed. Actually you probably will," the advert continues. # Harris *continues* to *frankly* list the different features of the vehicle. (NOW Corpus, GB)

Since evaluative adverbs are typically assumed to modify a State-of-Affairs (a relatively low level of analysis), they may be expected to be more flexible when it comes to their appearance in the complements of verbs. This indeed turns out to be the case: they can occur in the complements of verbs taking a high-level complement, such as *add*, but also in complements of verbs taking a proposition (*know*, *believe*, *assume*) or a State-of-Affairs (e.g. *see*, *want*) as their complement:

(28) a. Oh how I fear that our Vicki *believes* she is *cleverly* laying the groundwork to become the next Suze Orman (NOW Corpus, US)
b. which I assume means she *wants* to *stupidly* trust people who'll only vote her out again. (NOW Corpus, CA)

Interestingly, however, evaluative adverbs can also occur in the complement of the aspectual verb *continue*, which (in FDG at least, see Section 4.1.2.1) takes a level lower than the State-of-Affairs as its complement:

(29) a. they *continue* to *recklessly* lump all drug-related deaths together, (NOW Corpus, CA)
b. However, to the great credit of the people of Europe, in keeping with their secular ideology, they *continue* to *wisely* differentiate between true Islam and Islamic terrorism. (NOW Corpus, IN)
c. Harvey started having trouble gripping and feeling the baseball and *began* to *uncharacteristically* tire early in starts, (NOW Corpus, US)

Once again, these restrictions on the occurrence of illocutionary *frankly* and evaluative adverbs in the complements of different kinds of verbs shows that both types of adverbs have a certain degree of syntactic integration, which argues against an analysis of these adverbs as fully parenthetical. Note, however, that all the restrictions mentioned in this section are lifted when these adverbs are prosodically independent. Thus, in (30) prosodically non-integrated illocutionary *frankly* and evaluative *cleverly* occur in clause-final position, while in (31), illocutionary *frankly* occurs within (or rather, interrupts) the complement of the aspectual verb *continue*:

(30) a. That doesn't surprise me, *frankly*. (COCA, spoken)
b. "You're lying," I say, *cleverly*. (COCA, fiction)

(31) a. The difficulty is in trusting in a system that has *continued* to produce, *frankly*, no results, (NOW Corpus, Daily Mail, GB)
b. And then the leisure elements in Charlotte *continue* to, *frankly*, outperform many other markets (Internet, Charlotte Business Journal)

Finally, the V2-restriction does not apply to prosodically independent adverbs; under these circumstances, two constituents may precede the finite verb, as shown for Dutch in (32):

(32) a. *Eerlijk gezegd*, ik vond de film nogal saai.
frankly (speaking) I found the film rather boring
"Frankly, I found the film rather boring."
b. *Stom genoeg*, ik heb niet naar haar geluisterd.
stupidly enough I have not to her listened
"Stupidly, I didn't listen to her."

3.3.3 *Subset 3: Syntactic features unrelated to semantic and prosodic non-integration*

The additional properties that make up the third subset of syntactic properties used as criteria for allocating adverbs to a certain level of analysis, modification and coordination, will not be discussed in detail here (but see e.g. Keizer 2018a, 2018b). A few examples will suffice to show how these properties can help us to distinguish between different uses of the same adverb.

Starting with *frankly*, we clearly see a difference between its illocutionary and its manner use when it comes to coordination and modification. These differences do not follow from the truth-conditional status of the adverb, do not provide evidence for syntactic (non-)integration, and are not affected by prosodic integration. They do, however, help to distinguish between the illocutionary (interpersonal) adverb *frankly* (as a subjective, specialized element)[16] and the manner (representational) adverb *frankly* (as a – more or less – objective descriptive element). As an adverb with a very specific discourse-pragmatic function, illocutionary *frankly* does not easily coordinate, but when it does, it is with other illocutionary adverbs (Example (33)); it cannot, however, be coordinated with manner adverbs (cf. Quirk et al. 1985: 504–505, 612–631), nor with any other type of adverb (Example (34)):

(33) What do they have in common? They're blue, *quite frankly and bluntly*. They vote Democratic. (COCA, spoken)

(34) a. I *frankly* hated the whole project.
b. *I *frankly* and *openly* / *always* / *unfortunately* hated the whole project.

Manner *frankly*, on the other hand, easily coordinates with other manner adverbs, as shown in (35):

(35) a. 'I wouldn't want to do that,' he adds *frankly but anonymously*, 'because I'm afraid that what I might blame somebody else for might come back to haunt us in a similar case against us.' (COCA, newspaper)
b. What did soothe him, however, was the prize money, as he *frankly and cheerfully* admits. (COCA, magazine)

Similarly, illocutionary and manner *frankly* differ with regard to the type of modification they accept. Thus, whereas illocutionary *frankly* only accepts a limited number of highly bleached and subjectified[17] modifiers (*quite*, *very* and *just*),

16. Subjective in the sense of serving the function of "subjective expression of self", as opposed to "objective expression of content" (e.g. Lyons 1982: 102; 105; Traugott 1989, 2010; Cuyckens et al. 2010); specialized in the sense of having obtained a unique interpersonal function.

17. In the sense of expressing mitigation or reinforcement at the Interpersonal Level, rather than (more or less objective) degree or precision at the Representational level.

manner *frankly* can also be modified by degree modifiers like *so*, *too*, and *how* and is acceptable in *as*-comparatives. Examples are given in (36) and (37), respectively:

(36) a. We know very little about what works and *quite frankly* they do not want to be treated. (COCA, spoken)
b. …, and *very frankly* our first and foremost job is not to advance social causes, however meritorious they may be. (COCA, newspaper)
c. And what was questioned there was a case of one of the assumptions, but *just frankly* the other scientists didn't agree with one of his assumptions. (COCA, spoken)

(37) a. No woman had ever spoken *so frankly* to him in his life. (COCA, fiction)
b. You think I speak *too frankly*. (COCA, fiction)
c. But a couple of brave souls told Bush *as frankly* as they dared that he was getting bad advice from his economists. (COCA, magazine)

Not surprisingly, evaluative and manner adverbs also differ when it comes to the kinds of adverbs they coordinate with. Thus, when used as evaluative adverbs, *cleverly* coordinates with other evaluative adverbs (Example (38)); when used as a manner adverb, it coordinates with other manner adverbs (Example (39)):

(38) a. Holland is satisfied that not only have they a better squad this time round but the fact that in this campaign, they have been *cleverly and wisely*resting players by making wholesale changes from week to week. (NOW Corpus, GB)
b. Wisconsin's moratorium *cleverly but unfairly* created an artificial standard that does not allow for the Flambeau Mine at Ladysmith, Wis., to be cited as an example of a mine that was operated successfully in our state. (NOW Corpus, US)

(39) a. The watchdog groups who look at these products and test them have really called it just an overpriced vitamin pill that's been really *cleverly* but *deceptively* marketed. (COCA, spoken)
b. All over the mountain domes are opening as professional astronomers prepare to catch photons as *cleverly* and *efficiently* as possible. (COCA, academic)

When it comes to modification, however, evaluative and manner adverbs both allow the same range of modifiers (as long as they are compatible with the meaning of the adverb), including degree modifiers like *so*, *too* and *almost*. For evaluative adverbs this is shown in (40); for manner adverbs in (41):

(40) a. he'd found the still and silent epicenter of all that fatal action he had *so wisely* avoided. (COCA, fiction)
b. They *too recklessly* reduce the myriad complexities of the Christian world into a bogus behemoth, (https://www.hoover.org/research/can-iran-become-democracy)
c. "They have *almost recklessly* continued to proceed on a path that is going nowhere," Dr Ferguson said. (NOW Corpus, JM)

(41) a. It's such a good storyline and it's *so cleverly* done and well written by Tim Firth. (NOW Corpus, GB)
b. but officers called it off because the pair was driving *too recklessly* (NOW Corpus, US)
c. Gus and his band came on *almost sheepishly* and introduced themselves to a cheering room. (NOW Corpus, CA)

On the basis of the preceding, we can conclude that coordination can help to establish which adverbs belong to the same level, whereas the presence of absence of constraints on modification serves as an indication of which adverbs belong to higher (pragmatic) levels and which to lower (semantic) levels of analysis.

3.3.4 *Summary*

As shown in the previous sections, there is no one-to-one relation between truth-conditionality and syntactic behaviour, and despite the many efforts to distinguish a set of parenthetical expressions on the basis of syntactic criteria, syntactic (non-)integration is not a well-defined notion. More specifically, it has been argued that the criteria for syntactic (non-)integration fall into different groups. Thus, certain aspects of the syntactic behaviour of illocutionary *frankly* and evaluative *cleverly* (the fact that they do not allow clefting and questioning, and that they fall outside the scope of proforms, ellipsis and negation) are triggered by the non-truth-conditional status of these adverbs. Other syntactic features (clausal position and constraints on occurrence in the complements of verbs) indicate differences in scope between different kinds of adverbs, but at the same time also show that all prosodically integrated adverbs (whether truth-conditional or non-truth-conditional, high-level or low-level) are still to some extent syntactically integrated into the clause; this is confirmed by the fact that, when prosodically integrated, they trigger inversion in V2-languages. This means that it is only when they are prosodically detached that so-called parenthetical adverbs become fully (i.e. semantically and syntactically) non-integrated.

In addition, it has been shown that although high-level adverbs like illocutionary *frankly* are non-truth-conditional, this does not mean that low-level adverbs are all truth-conditional. Thus, whereas most (prosodically integrated) low-level adverbs (not only manner adverbs, but also aspectual, time and domain adverbials) are both truth-conditional and syntactically integrated, this does not hold for the evaluative adverbs *cleverly*, *wisely*, *recklessly*, which are both low-level and non-truth-conditional.[18]

4. FDG analysis

In this section it is shown that the differences between different types of adverbs, as well as the interaction between their discourse-pragmatic, semantic, syntactic and prosodic properties, can be accounted for in FDG by making use of three basic features of the theory: its top-down, function-to-form approach, the fact that it takes the Discourse Act as its basic unit of analysis, and its distinction of hierarchically organized levels and layer of analysis (Section 4.2). First, however, Section 4.1 describes in some detail the relevant features of the model.

4.1 Introduction to FDG

4.1.1 *Overall characterization*

Functional Discourse Grammar is functional in that it is concerned with the relation between the functional and the formal features of linguistic expressions. More specifically, FDG takes a "function-to-form" approach, based on the assumption that (both synchronically and diachronically) the shape of a linguistic utterance (or, more generally, of a language as a whole, is largely (if not exclusively) determined by the communicative function it fulfils (e.g. Hengeveld and Mackenzie 2008: 29, with reference to Dik 1986)). At the same time, however, FDG is "form-oriented", in that it only captures those pragmatic and semantic, as well as contextual, phenomena in underlying representation that are systematically reflected in the morphosyntactic and phonological form of an utterance (e.g. Hengeveld and Mackenzie 2008: 39, 40).

These assumptions are reflected in some of the distinctive features of the model. Thus, first of all, the model is organized in a top-down manner, starting with the Speaker's communicative intention and ending with the articulation of a linguistic

18. Opinions differ as to whether prosodically non-integrated adverbs are still truth-conditional and/or syntactically integrated. As we have seen in Section 2; Huddleston et al. (2002) maintain that non-prosodically integrated adverbs are per definition syntactically and semantically detached, while Potts (2005) claims that prosodically detached modifiers are semantically non-integrated (non-at-issue), but still syntactically integrated. According to Espinal (1991), some adverbs (e.g. modals and subject-oriented adverbs) can be syntactically integrated when prosodically detached. I will not pursue this issue here (see Keizer 2018a).

utterance. In this process, pragmatics takes precedence over semantics, while pragmatics and semantic together (i.e. all meaningful aspects) take precedence over (morphosyntactic and phonological) form (see Hengeveld and Mackenzie 2008: 13). The privileged role of pragmatics is further reflected in the fact that, rather than the sentence or the clause, FDG takes the Discourse Act as its basic unit of analysis. This means that FDG can accommodate not only regular clauses, but also units larger than the clause, such as complex sentences, and units smaller than the clause, such as interjections or phrases.

4.1.2 *Four levels of analysis*

In order to represent all pragmatic, semantic, morphosyntactic and phonological features of a linguistic expression, FDG analyses Discourse Acts in terms of four independent (but interactive) levels. Together, these four levels, and the primitives feeding into these levels, form the grammatical component of the model (the FDG proper). The grammatical component interacts with three other components: a conceptual component, which consists of the speaker's communicative intentions and forms the driving force behind the grammatical component (see e.g. Connolly 2017); a contextual component, containing non-linguistic information about the immediate discourse context that affects the form of a linguistic utterance (see also Connolly 2007, 2014; Cornish 2009; Alturo et al. 2014; Hengeveld and Mackenzie 2014); and an output component, consisting of the spoken, signed or written realization of a linguistic utterance. An overview of the model is given in Figure 1.

4.1.2.1 *The Interpersonal and Representational Levels.* The four levels of representation are the outcome of two types of operations: formulation, which deals with meaning, and encoding, dealing with form. The first two levels, representing pragmatic and semantic aspects of a linguistic expression, are the outcome of an operation of Formulation. The operation of encoding subsequently takes care of an expression's morphosyntactic and phonological properties. Each of the four levels is hierarchically organized into a number of different layers. The highest level of representation is the Interpersonal Level (IL), which deals with "all the formal aspects of a linguistic unit that reflect its role in the interaction between the Speaker and the Addressee" (Hengeveld and Mackenzie 2008: 46). The most inclusive layer at this level is the Move (M), which forms "the largest unit of interaction relevant to grammatical analysis" (Hengeveld and Mackenzie 2008: 50). Each Move consists of one or more Discourse Acts (A), defined as "'the smallest identifiable units of communicative behaviour" which, unlike Moves, "do not necessarily further the communication in terms of approaching a conversational goal" (Kroon 1995: 85; Hengeveld and Mackenzie 2008: 60). These Discourse Acts, in turn, consist of an Illocution (F), the Speech Participants (P_1 and P_2) and a Communicated Content

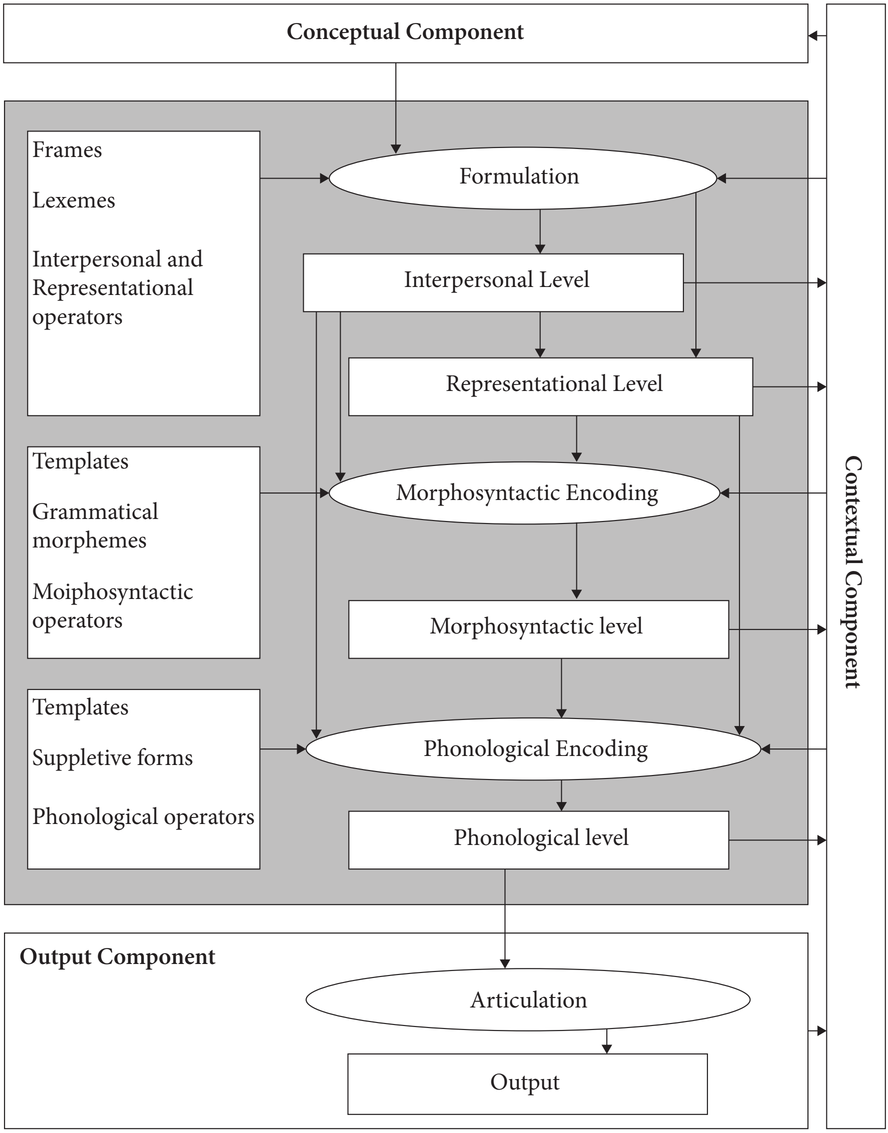

Figure 1. General layout of FDG (based on Hengeveld & Mackenzie 2008: 13)

(C), where the Communicated Content "contains the totality of what the Speaker wishes to evoke in his/her communication with the Addressee" (Hengeveld and Mackenzie 2008: 87).[19]

19. The Communicated Content, in turn, consists of one or more Subacts of Reference (R), evoking entities, and Subacts of Ascription (T), evoking the properties the Speaker wishes to

Each of these layers is provided with a slot for operators and modifiers, providing additional grammatical and lexical information respectively, about the layer in question. Modifiers at the Interpersonal Level often take the form of interpersonal adverbs,[20] which are necessarily speaker-bound and non-truth-conditional (Hengeveld and Mackenzie 2008: 130, 144). Different groups of interpersonal adverbs are distinguished, which, depending on both their function and their formal behaviour, are analysed as belonging to (scoping over) different interpersonal units: adverbs like *frankly*, expressing the manner in which the speaker performs the illocutionary act, are analysed as modifiers of the Illocution; adverbs like *(un)fortunately* and *(un)surprisingly*, expressing the speaker's attitude with regard to what is communicated, as modifiers of the layer of Communicated Content; and stylistic adverbs like *briefly*, indicating stylistic features of an expression, as modifiers of the Discourse Act or Move (depending on their exact scope) (e.g. Hengeveld 1989, 1997; Hengeveld and Mackenzie 2008).

By way of illustration consider the following example, where (42b) provides an Interpersonal Level analysis of B's answer in (42a):[21]

(42) a. A: What did Dave give you?
B: He *unsurprisingly* gave me a book.
b. (M_I: (A_I: [(F_I: DECL (F_I)) $(P_I)_S$ $(P_J)_A$ (C_I: […] (C_I): unsurprisingly (C_I)) (A_I)) (M_I))

In (42b) we find a Move, consisting of a single Discourse Act, which in turn consists of a declarative Illocution, the two Speech Participants, and a Communicated Content. The Communicated Content is modified by the attitudinal adverb *unsurprisingly*.

The Representational Level (RL) deals with the semantic aspects of a linguistic expression, i.e. with those aspects of a linguistic expression that reflect the way in which language relates to the (real or imagined) world it describes. The units at this level represent the different linguistically relevant types (or orders; Lyons 1977: 442–447; Hengeveld and Mackenzie 2008: 131) of entities in the

assign to these entities. Since these Subacts do not play a role in the rest of the chapter, they will not be included in the analyses.

20. Only lexical adverbs are analysed as modifiers; grammatical(ized) adverbs express an operator at the Interpersonal Level (e.g. *just*/*only* when used to mitigate the force of the Illocution, *really* to add emphasis or *truly* as an intensifier). All adverbs discussed in this chapter are considered to be lexical, as they can be both focalized and themselves modified (see Keizer 2007; Hengeveld 2017).

21. For the sake of simplicity, the internal structure of the Configurational Content has not been represented.

extra-linguistic world. The highest layer at this level is that of the Propositional Content (p), which represents a mental construct which can be evaluated in terms of its truth. The Propositional Content consists of one or more Episodes (ep), i.e. sets of States-of-Affairs (e) that are coherent in terms of time, space and participants. Each State-of-Affairs is in turn characterized by a Configurational Property (f^c), typically consisting of a verb (analysed as a verbal Property) and its arguments.

Once again each layer is provided with a slot for operators and modifiers, the former expressing grammatical information (tense, aspect, modality, number), the latter providing additional lexical information concerning the layer in question. Representational modifiers often take the form of lower-layer adverbs, which, as we have seen, are typically truth-conditional. The clearest examples are adverbs that are part of the predication, e.g. manner adverbs (modifying a verbal Property), frequency adverbs (modifying the State-of-Affairs) and time adverbs (modifying the Episode); modal and evidential adverbs like *probably* or *evidently* (modifying the Propositional Content) are also included in the set of representational adverbs. Note that although these adverbs can be speaker-bound (e.g. modal adverbs when the subject of the clause is first person), this need not be the case (an adverb like *probably* can also be used to express other people's degree of commitment to the truth of the Propositional Content, as in *Pat believes that Jane probably won't come tonight*, where the epistemic adverbs expresses Pat's degree of commitment, not the speaker's).

A Representational Level analysis of sentence in (43a) is provided in (43b):

(43) a. Dave will *probably* give me a book tomorrow.
b. (p_i: (fut ep_i: (e_i: (f^c_i: […] (f^c_i)) (e_i)) (ep_i)) (p_i): probable (p_i))

The highest layer of analysis here is the Propositional Content p_i. This Propositional Content contains a single Episode ep_i, which in turn consists of a single States-of-Affairs e_i. This State-of-Affairs is headed by a Configurational Property f^c_i, consisting of the verb *give* and its three arguments (not represented). The representation further contains the tense operator 'future' at the layer of the Episode, and two modifiers: *probable* at the layer of the Propositional Contents and *tomorrow* at the layer of the Episode.

Finally, the layered structure of the two higher levels, and the fact that modifiers are assigned to a particular layer of analysis, allows for predictions about which adverbs can occur in which verbal complements. On the assumption that different types of verbs take different layers as their clausal complement (i.e. have different selectional or subcategorizational properties), there are constraints on the occurrence of adverbs in the clausal complement of a verb, in the sense that a complement cannot contain adverbs that function as modifiers at a higher layer than that of the complement itself (Hengeveld and Mackenzie 2008: 363–365; see also Bach 1999: 358; Potts 2005: 145–146). For instance, since verbs of knowing take a Propositional Content as their complement, their complements can contain propositional modifiers like *probably* in (44), but not higher-layer adverbials, like *reportedly* (which modifies the Communicated Content):

(44) Somebody back there was smart enough to know that Nairam *probably* (**reportedly*) had the line tapped. (COCA, fiction; adapted)

4.1.2.2 *The Morphosyntactic and Phonological Levels.* The output of the operation of formulation forms the input to the operation of encoding. The first level of encoding, the Morphosyntactic Level, accounts for all the linear properties of a linguistic expression, using the same placement rules for clauses, phrases and complex words. These placement rules are functionally inspired, applying in a top-down, outside-in manner, with operators, modifiers and functions belonging to the highest layer at the Interpersonal Level (that of the Move) being placed first, and those from the innermost layer at the Representational Level (the Property) being placed last. In the case of multiple modifiers this means that higher adverbs are more likely to be placed in more peripheral (pre-verbal) positions, and lower adverbs in more central or post-verbal positions. By way of illustration, consider the following example:

(45) She will *unfortunately probably* leave for Brazil *again tomorrow*.

Cross-linguistically, languages make use of one or more (up to four) absolute positions for the placement of (in this case clausal) elements. English has three absolute positions: an initial, a medial and a final position. As soon as one of these positions is filled, one or two relative positions are created. In Example (45), the attitudinal adverb *unfortunately*, as the only interpersonal modifier, is the first element to be placed, ending up in the absolute medial position. The adverb *probably*, as the highest representational modifier, is the next element to be placed, going to a newly available relative position immediately following *unfortunately*. Next the Episode modifier *tomorrow* is placed in the absolute clause-final position, and the frequency adverb *again* in the newly created pre-final position.

Finally, the Phonological Level converts the input from the three higher levels into phonological form. Once again the layers at this level are hierarchically organized. The highest layer, the Utterance (u) consists of one or more Intonational Phrases (ip), which in turn consist of Phonological Phrases (pp) (which divide into Phonological Words, which are made up of Feet, which contain Syllables). The layer that is most relevant for the current discussion is that of the Intonational Phrase, which, in the default case, corresponds to a Discourse Act at the Interpersonal Level. Intonational Phrases are characterized internally by the presence of a complete intonational contour, and externally by the presence of intonational boundaries.

4.2 A (partial) classification of adverbs in FDG

In what follows it will be shown that, through its unique combination of distinctive features, FDG can offer an insightful and comprehensive analysis of the different classes of adverbs discussed in this chapter, interpersonal adverbs (e.g. *frankly* and *(un)fortunately*), evaluative adverbs (e.g. *cleverly* and *foolishly*), and manner adverbs (e.g. *frankly*, *cleverly*). It will be argued that this can be done on the basis of three major distinctions:

1. The distinction between interpersonal and representational modifiers
2. At the Representational Level, the distinction between adverbs used as modifiers within a Propositional Content, and adverbs used as separate Propositional Contents (Keizer 2019)
3. At the Interpersonal Level, the distinction between adverbs used as modifiers within a Discourse Act, and adverbs used as separate Discourse Acts (see also Keizer 2018a).

Each of these distinctions, and their relevance for the classification of adverbs, will be discussed in turn.

4.2.1 *The distinction between interpersonal and representational modifiers*

This distinction allows us to distinguish between illocutionary *frankly* and manner adverbs (*frankly*, *cleverly*) when these adverbs are used as part of a more complex Discourse Act, i.e. as modifiers at a particular interpersonal and representational layer. Interpersonal modifiers, such as illocutionary *frankly*, attitudinal *(un)fortunately*, discourse-organizational *finally*, etc., are speaker-bound and non-truth-conditional (not part of the Propositional Content; see Section 3.1); as we have seen (Section 3.3.1), their non-truth-conditional status triggers a number of specific syntactic features (these adverbs cannot be clefted or questioned and fall outside the scope of (predication) proforms, ellipsis and negation).

In addition, these adverbs exhibit a number of syntactic features that are not directly related to their non-truth-conditional status, but which follow simply from the fact that they are interpersonal. Thus, evidence of their interpersonal status, as well as of their specific interpersonal layer of analysis, can be found in their preferred clausal position, as well as their (non-)occurrence in the complements of specific types of verbs (Section 3.3.2). The fact that these adverbs are restricted in terms of both their clausal positon and their distribution clearly indicates that these adverbs, despite their interpersonal status, are still to some extent syntactically integrated; this is further confirmed by the fact that in V2-languages, they trigger subject-verb inversion when placed in clause-initial position. Finally, due to their semantically bleached, pragmaticalized nature, modification (or specification) of these adverbs is highly restricted to elements that are themselves interpersonal, in particular reinforcing and mitigating adverbs like *quite* and *just* (Section 3.3.3).

Representational modifiers, including modal, domain, frequency and manner adverbs, on the other hand, are truth-conditional, and need not be speaker-bound. These adverbs function as modifiers at a particular representational layer (epistemic adverbs like *probably* at the layer of the Propositional Content, frequency adverbs at the layer of the Episode or State-of-Affairs, manner adverbs at the layer of the Configurational or verbal Property). Those that are part of the Episode or a lower layer of analysis (i.e. part of what is traditionally known as the (extended) predication) allow clefting and questioning, and fall within the scope of predication proforms, ellipsis and negation. Furthermore, these adverbs allow various kinds of representational modification, and readily coordinate with other representational adverbs modifying the same layer of analysis. Finally, the clausal position, as well as the occurrence in the complements of verbs taking a representational complement, clearly show that these adverbs do indeed belong to a layer at the Representational Level.

The differences between interpersonal and representational adverbs lead to different analyses in FDG. Thus, illocutionary *frankly* is analysed as a modifier of the Illocution at the Interpersonal Level (IL), whereas manner *frankly* is analysed as a modifier at the Representational Level (RL), at the layer of the verbal Property:

(46) a. John's book has *frankly* sold very little. (= example (8a))
b. IL: (F_I: DECL (F_I): frankly (F_I)) (Hengeveld and Mackenzie 2008: 82)

(47) a. John spoke to them *frankly*. (= example (9a))
b. RL: (f_i: speak (f_i): (f_j: frank (f_j)) (f_i))[22]

Finally, as modifiers of a layer within the Discourse Act, both interpersonal and representational adverbs are (typically) prosodically integrated, as part of the overall prosodic contour of a single Intonational Phrase.

4.2.2 *Adverbs as separate Propositional Contents at the Representational Level*

Keizer (2019) proposes that evaluative adverbs like *cleverly*, *wisely* and *foolishly* be analysed as separate Propositional Contents, an analysis that accounts for the fact that these adverbs are both non-truth-conditional (see Section 3.1) and

22. In the case of regularly derived manner adverbs, the correct form is determined at the Morphosyntactic Level, where addition of the suffix *-ly* is triggered by the (non-default) use of an adjectival property functioning as a modifier of a verbal predicate.

representational (see Section 3.3). Thus, at the Representational Level, a sentence like (48a) would be analysed as in (48b), with two Propositional Contents, p_i and p_j (corresponding to a single Communicative Content at the IL):

(48) a. Having *wisely* said their good-byes *in the wagon*, she and Sister Ida exchanged a chaste kiss, though tears were pouring down the nun's cheek. (COCA, fiction)

b. $(p_i$: $(ep_i$: (ant $\mathbf{e_i}$: $(f^c_i$: [-- say their goodbyes --] $(f^c_i))$ (e_i): $(l_i$: -- in the wagon -- $(l_i))$ $(e_i))$ $(ep_i))$ $(p_i))$
$(p_j$: $(f^c_j$: $[(f^l_k$: wise $(f^l_k))$ $(\mathbf{e_i})_U]$ $(f^c_j))$ $(p_j))_{Add}$[23]

In (48b), we have two Propositional Contents, p_i and p_j (corresponding to a single Communicative Content at the Interpersonal Level). The second Propositional Content (p_j) consists of a Configurational Property (f^c_j) in which the Property 'wise' (f^l_k) functions as a non-verbal predicate taking the SoA (e_i) contained in the first Propositional Content as its argument (indicated by co-indexation). The fact that the adverb *wisely* has scope over the place adverb *in the wagon* (l_i) shows that the argument of the non-verbal predicate must (at least) take the form of an SoA (cf. Cinque 1999; Ernst 2002; Hengeveld and Mackenzie 2008). The second Propositional Content cannot be used independently; it merely provides additional information about the unit in question (namely that saying their goodbyes in the wagon was a wise thing to do, and that it was wise of them to do this). Therefore, it is analysed as a dependent Propositional Content with the semantic function Addition.

As shown in Section 3.3.2, however, evaluative adverbs can also have narrower scope, as in (49), where the argument takes the form of a Configurational Property $(f^c_j$, undergoing the process of evaluation)

(49) a. they continue to *recklessly* lump all drug-related deaths together (= example (29a)).

b. $(p_i$: (pres ep_i: $(\mathbf{e_i}$: $(f^c_i$: $[(f_i$: continue $(f_i))$ $(1x_i)_A$ $(\mathbf{f^c_j}$: [-- lump all drug-related deaths together --] $(f^c_j))_u]$ $(f^c_i))$ $(e_i))$ $(ep_i))$ $(p_i))$
$(p_j$: $[(f_l$: reckless $(f_l))$ $(\mathbf{f^c_j})_U]$ $(p_j))_{Add}$

Note finally that the second Propositional Content cannot be used independently; it merely provides additional information about the unit in question. Therefore, it is analysed as a dependent Propositional Content with the semantic function Addition.

23. The operator 'ant' stands for anterior (triggering the auxiliary *have*). The argument of a non-verbal predicate is assigned the semantic function Undergoer, since the argument undergoes a process of predication (more particularly classification, similar to classifying copular constructions; Hengeveld and Mackenzie 2008: 204).

As argued in Keizer (2019), there is evidence (from linear position, as well as distribution) to suggest that these evaluative adverbs may also scope over the Episode and the Propositional Content (in keeping with other accounts of these adverbs, e.g. Dik et al. 1990; Haumann 2007: 160); it will be clear that this behaviour can easily be accounted for in the analysis proposed here, by assuming that the argument of the non-verbal predicate can also take the form of a higher representational layer.

Analysing evaluative adverbs as separate Propositional Contents does more, however, than explain the contradictory accounts of these adverbs provided in the literature; in addition, it helps us to distinguish these adverbs from manner adverbs on the one hand, and from interpersonal adverbs on the other. Thus, whereas manner adverbs, as representational modifiers, are truth-conditional (propositional), evaluative adverbs are not. This is reflected in the analysis proposed: as separate Propositional Contents, they do not affect the truth-conditions of the main Propositional Content, and since they do not form part of the Episode contained in the main Propositional Content, they cannot be clefted or questioned, and do not fall within the scope of proforms relating to parts of the main Propositional Content. Like other representational modifiers, however, they allow all kinds of (representational) modifiers, can be coordinated with other representational adverbs (at the same layer), and, in terms of linear placement, follow interpersonal adverbs.

4.2.3 *Adverbs as separate Discourse Acts at the Interpersonal Level*

Finally, since Discourse Acts need not be expressed as full clauses, but may also consist of single phrases or words, adverbs (of all types) can be used as separate Discourse Acts (i.e. as supplements; cf. Pullum and Huddleston 2002: 575–577; Potts 2005). In that case they exhibit the typical properties of Discourse Acts. Thus, they either make up a Move by themselves (example (50b)), or combine with other Discourse Acts to make up a single Move (example (51a–c)). In the latter case, there typically is a relation of dependence between the two Discourse Acts, with the Discourse Act corresponding to the clause (the host) functioning as the Nuclear Discourse Act (i.e. the communicatively more important Discourse Act), and the Discourse Act consisting of the adverb serving as a Subsidiary Discourse Act. To express the specific dependency relation between the Nuclear and the Subsidiary Discourse Act, the latter is provided with a rhetorical function (Hengeveld and Mackenzie 2008: 52–58; Keizer 2018a: 82), determining the linear position of the adverbs (see Example (51)): the function Prelude (for adverbs preceding the host), Asides (for adverbs interrupting the host),[24] and Afterthoughts (for adverbs following the host).[25]

(50) a. KOTB: OK, this one is frustrating.
b. GIFFORD: *Unfortunately*. (COCA, spoken)
b′. $(M_I: (A_I)\ (M_I))$

(51) a. *Cleverly*, Ginn seems to have installed a genuinely nice guy. (COCA, magazine) (= example (2b))
a′. $(M_I: [(A_I)_{Pre}\ (A_J)]\ (M_I))$
b. The difficulty is in trusting in a system that has *continued* to produce, *frankly*, no results, (NOW Corpus, GB) (= example (30b))
b′. $(M_I: [(A_I)\ (A_J)_{Aside}]\ (M_I))$
c. "You're lying," I say, *cleverly*. (COCA, fiction) (= example (29b))
c′. $(M_I: [(A_I)\ (A_J)_{Afterthought}]\ (M_I))$

In terms of internal structure, each Discourse Act contains an Illocution (Hengeveld and Mackenzie 2008: 63). This also holds for holophrastic Subacts, which typically have a declarative Illocution (see examples in (50) and (51)), but which may also function as Interrogatives, like the interpersonal adverbs *frankly* in (52a), or as Imperatives, like the manner adverb *quietly* in (52b):

(52) a. I've worked with award winning male AND female directors, *and frankly?* The women actually work harder. (NOW Corpus, US)
b. Just get down here… *quietly*, *quietly*! (COCA, fiction)

Finally, phonologically, like all Discourse Acts, these adverbs typically form their own Intonational Phrase (as evidenced in spoken language by the presence of a complete intonational contour and prosodic boundary markers preceding and following the unit in question, and in written language by the presence of punctuation marks).

In all these ways, adverbs functioning as separate Discourse Acts clearly differ from those functioning as modifiers within a single Discourse Act. Moreover, it is only when adverbs function as separate Discourse Acts that they become syntactically fully non-integrated, as shown by the fact that they are no longer

24. In the case of an Aside, the adverb usually targets a specific element within the host (e.g. *no results* in (51b)), determining its specific position.

25. Note that the functions Prelude and Afterthought do not exist in standard FDG; they have been introduced because in cases like these none of the existing Rhetorical functions (e.g. Motivation, Orientation, Concession or Correction; Hengeveld and Mackenzie 2008: 53–56) really capture the rhetorical relation between the two Discourse Acts (see Keizer 2018a).

(syntactically) restricted in terms of linear placement and distribution, and no longer trigger subject-auxiliary inversion (Section 3.3).

4.3 Summing up

As shown in the preceding sections, FDG is able to systematically capture the specific discourse-pragmatic, rhetorical and semantic properties, as well as its specific syntactic and prosodic features of different types of adverbs (or modifiers in general). In doing so, the model clearly distinguishes between the three dimensions of semantic, syntactic and prosodic integration, while at the same time reflecting the interaction between them. The relevant distinctions and the resulting classification are visualized in Figure 2:

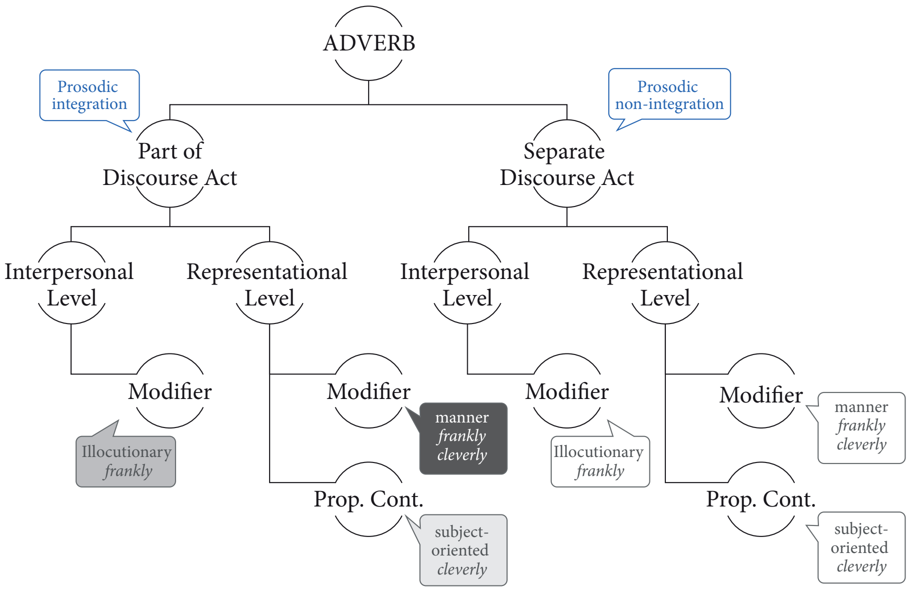

Figure 2. A partial classification of adverbs in Functional Discourse Grammar

As can be seen from Figure 2, proceeding in a top-down manner, the first major distinction to be made is that between adverbs that are used as modifiers within a single Discourse Act and those functioning as separate Discourse Acts (typically as subsidiary Discourse Acts commenting on another Discourse Act (the host)). This distinction is reflected prosodically; whereas adverbs functioning as modifiers are prosodically integrated, those functioning as Discourse Acts are prosodically independent. When functioning as modifiers, adverbs belong to (scope over) a particular layer of analysis at the Interpersonal Level (in the case of non-truth-conditional and necessarily speaker-bound adverbs, such as illocutionary *frankly*), or at the Representational Level, where we find truth-conditional, potentially non-speaker-bound adverbs like manner *frankly* or *cleverly*. However, some representational adverbs, like evaluative *cleverly*, *foolishly* etc. are non-truth-conditional. Since the syntactic evidence clearly shows that these are nevertheless lower-layer adverbs (Section 3.3), and since adverbs are potentially non-speaker-bound, they are analysed at the Representation Level, though not as modifiers (i.e. as part of the Propositional Content), but as separate Propositional Contents. Adverbs functioning as separate Discourse Acts also belong to a particular layer of analysis; these Discourse Acts are, however, holophrastic, in that the unit within the scope of the adverb is not expressed.

What has also transpired from the preceding discussion is that there are different degrees of integration (or, conversely, of parentheticality); this is reflected in Figure 2 in the different degrees of transparency of the boxes. Thus, interpersonal adverbs functioning as separate Discourse Acts are fully non-integrated; they are non-truth-conditional and both prosodically and syntactically non-integrated. Manner adverbs functioning as modifiers, on the other hand, are fully integrated: they are truth-conditional and syntactically and prosodically integrated. Illocutionary adverbs functioning as modifiers, as well as evaluative adverbs functioning as separate Propositional Contents, however, are situated somewhere in between these two extremes: they are non-truth-conditional, but have some degree of syntactic integration, and are prosodically independent (whereby evaluative adverbs, as lower-layer (representational) adverbs, can be claimed to be more integrated than any of the interpersonal adverb).

The conclusion, therefore, is that there is no coherent concept of integration (or parenthesis) as such: the different dimensions of (non-)integration mentioned in the literature ((non)-truth-conditionality, syntactic (non-)integration and prosodic (non-)integration) do not necessarily go hand-in-hand, and even within one dimension adverbs may exhibit different degrees of (non-)integration (as shown here for the syntactic dimension).

5. Conclusion

In the (quite extensive) literature on parenthetical elements, including parenthetical (non-propositional, disjunctive) adverbs, there is no consensus on the semantic, syntactic and/or prosodic criteria for parentheticality. Thus, most studies look at only one or two types of criteria, while even in those studies that do discuss different types of (non-)integration, the exact relation between these types of criteria is hardly ever examined (and they are often assumed to go hand in hand). In this chapter I have tried to show that there is no straightforward, one-to-one relation between the different dimensions of (non-)integration, and that they sometimes interact in unexpected ways. In addition, it has become clear that even within the single dimension of syntactic (non-)integration, there seem to be different degrees on parentheticality, with prosodically integrated non-truth-conditional adverbs exhibiting a considerable measure of syntactic integration, which only disappears when the adverbs in question become prosodically independent.

The second part of the chapter has presented a Functional Discourse Grammar analysis of three groups of adverbs (illocutionary *frankly*, evaluative adverbs like *cleverly* and *wisely*, and manner adverbs), to show (i) that the differences and the interaction between the three dimensions of integration can be systematically captured in the model; (ii) that the model allows us to analyse different types and/or uses of adverbs in different ways, accounting for their specific semantic, syntactic and prosodic features, and (iii) that the analysis neatly reflects the different degrees of integration exhibited by these types/uses of adverbs.

Finally, by questioning the possibility of finding straightforward, converging criteria for establishing the parentheticality of elements, this study raises the question of whether it is possible – or helpful – to distinguish between elements that are part of the clause (or more generally, part of "sentence grammar") and elements that are not part of the clause, but somehow related to (parts of) it. Such a strict division may be feasible when relying on one set of criteria only, but, as argued here, this fails to account for much of the behaviour of these elements, and fails to capture the larger picture. Instead, the evidence presented here suggests that these elements can be more fruitfully dealt with in a model that is not sentence- or clause-based, but which starts from the discourse-pragmatic functions of a linguistic element and then works its way downwards, allowing for different kinds of distinctions to be made during this process.

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CHAPTER 7

Formulaic language and Discourse Grammar

Evidence from speech disorder

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This chapter proposes a dualistic classification of formulaic sequences based on the assumptions of Discourse Grammar, which distinguishes two components of language organisation and processing, viz. Sentence grammar and Thetical grammar. Accordingly, we can distinguish between Sentence grammar formulaic sequences (SG-FS) and Thetical grammar formulaic sequences (TG-FS). This classification is in line with some of the main taxonomies of formulaic language in the literature and corresponds with hemispheric differences identified for brain function. The proposed classification is tested in an empirical study of speech data from speakers with either left-hemisphere disorder (Broca's aphasia) or right-hemisphere disorder. The results show that the two types of speech disorder differ significantly with regard to the frequencies of each formulaic type, thus providing evidence for the classification proposed.

Keywords: formulaic language, Discourse Grammar, thetical, brain lateralisation, aphasia, right hemisphere disorder

1. Introduction

This chapter shows how a dualistic model of language organisation and processing, Discourse Grammar, allows for a fresh look at the classification of formulaic language. More specifically, the chapter proposes a distinction of two main categories of formulaic sequences, each corresponding with one of the two domains of Discourse Grammar: 'Sentence Grammar formulaic sequences' (SG-FS) and 'Thetical Grammar formulaic sequences' (TG-FS). This distinction is in line with some of the main taxonomies proposed for formulaic language in the literature and also correlates closely with hemispheric differences identified for brain function. Put briefly, SG-FS operate within the clausal-propositional domain and are associated with the left hemisphere, while TG-FS are extraclausal units (i.e. outside

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the clause structure) and as such respond to the requirements of the immediate situation of discourse and are associated with the right hemisphere.

The proposed classification is put to the test in an empirical study of speech data from patients with either left- or right-hemispheric disorder. The aim is to find answers to two somewhat puzzling questions in the study of formulaicity, namely (i) why formulaic sequences, which are generally assumed to be right hemisphere phenomena, are still relatively frequent in the speech of Right Hemisphere Disorder (RHD) patients, despite a clear reduction in frequency, and (ii) why patients with aphasia (i.e. left hemispheric disorder) can produce some formulaic sequences and not others. The results show that the answers may lie in the internal stratification of formulaic sequences into two main types, SG-FS and TG-FS, with each being underwritten by a different hemisphere. A dualistic view of grammatical organisation may thus provide us with a more fine-tuned analysis of language data from speech disorder.

The chapter is structured in the following way. Section 2 discusses the concept of Discourse Grammar and how its two domains, Sentence Grammar and Thetical Grammar, can be related to brain lateralisation. Section 3 investigates formulaic language, focussing on questions of delimitation (3.1), hemispheric association (3.2), and taxonomy (3.3), with Section 3.4 providing an interim conclusion, which puts forward the central hypothesis of the paper. Section 4 reports on an empirical study testing the hypothesis. Section 4.1 outlines the aim of the study, Section 4.2 focuses on the data analysis in terms of operationalising the identification and classification of formulaic sequences, Sections 4.3 and 4.4 present and discuss the results. Section 5 offers a brief conclusion.

2. Discourse Grammar and hemispheric differences

The concept of Discourse Grammar provides the basis for a new take on formulaic language to be discussed in Section 3. The present section therefore briefly outlines the two domains of Discourse Grammar (2.1) and their assumed neurolinguistics correlates (2.2).

2.1 The concept of Discourse Grammar

The concept of Discourse Grammar, as discussed for instance in Kaltenböck et al. (2011) and Heine et al. (2013), essentially proposes a dualistic view of grammar, which distinguishes between two organising principles or grammatical domains: Sentence Grammar and Thetical Grammar, as illustrated in Figure 1. The domain of Sentence Grammar is restricted to the structure of sentences in a propositional format where the verb is at the centre of the clause together with its argument structure, which may optionally be extended by adjuncts. It operates with the traditional constituents of phrases, words and morphemes and a syntactic and morphological machinery to relate these to one another. The domain of Thetical Grammar, on the other hand, comprises elements that are generally seen as being outside the confines of Sentence Grammar. They include elements traditionally referred to as "parenthetical" (e.g. comment clauses, sentence adverbs; called "conceptual theticals" in Figure 1) and various extra-clausal units such as vocatives, formulae of social exchange (*good morning*), imperatives,[1] and interjections.

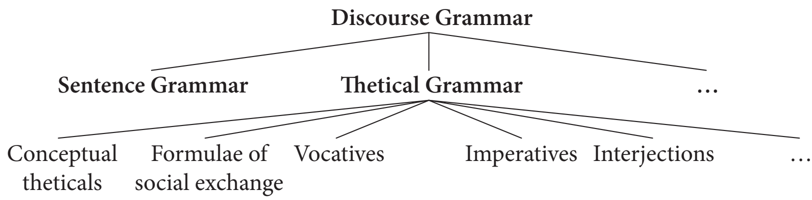

Figure 1. A sketch of the architecture of Discourse Grammar

Typical examples of theticals are given in (1) below.

(1)	a.	He was a man who, **unaccountably**, had few friends.	Conceptual thetical
	b.	**Good morning**!	Formula of social exchange
	c.	Today's topic, **ladies and gentlemen**, is astrophysics.	Vocative
	d.	**Hold on**, are we late?	Imperative
	e.	**Damn**, we've missed the bus.	Interjection

What sets theticals apart from elements of Sentence Grammar are a number of formal and semantic properties, listed in (2), which are prototypical rather than based on necessary and sufficient criteria (see Kaltenböck et al. 2011; Kaltenböck & Heine 2014 for further discussion).

(2) Properties of theticals
  a. They are syntactically independent from their environment (extra-clausal, disjunct)
  b. They are prosodically set off from the rest of the utterance by a separate intonation contour and pauses
  c. They have non-restrictive meaning.

1. Not all imperatives are necessarily thetical. As discussed by Heine (2016), imperatives are arranged on a continuum ranging from syntactically complex, modally marked constructions to holophrastic canonical imperatives. For the present study only clearly formulaic cases (e.g. *hold on!*) are included.

d. They tend to be positionally mobile
e. Their internal structure is built on principles of Sentence Grammar but can be elliptic

Functionally, theticals differ from Sentence Grammar elements in that they relate to the immediate situation of discourse, mainly to text organisation, speaker-hearer interaction, and the attitudes of the speaker.

The concept of Discourse Grammar thus suggests a division of labour between two rather distinct principles of organising and processing grammatical information. On the one hand, Sentence Grammar, which – operating within the confines of constituent structure and morphosyntactic conventions – is able to create its own textual world, largely independent from situational context. On the other hand, Thetical Grammar, which affords much greater syntactic independence, but at the expense of greater situational dependence. To borrow a formulation from McGilchrist (2009), Sentence Grammar can be seen as a means of *'re-presenting' the world*, while Thetical Grammar enables the speaker to *be 'present' in the world*. This division of labour also corresponds with Jakobson's (1980) distinction of "mediate" and "immediate forms", with Sentence Grammar elements qualifying for the former and theticals for the latter.

2.2 Neurolinguistic correlations

Support for the distinction of two domains of grammatical organisation, Sentence Grammar and Thetical Grammar, comes from neurolinguistic research on hemispheric differences of the human brain. As detailed in Heine et al. (2014, 2015), the dualistic organisation of Discourse Grammar shows a number of correlations with brain lateralization, particularly the dual process model proposed by Van Lancker Sidtis (2009), which will be discussed in more detail in Section 3. More specifically, the speech phenomena characteristic of Thetical Grammar correspond to a large extent with brain activity in the right hemisphere, while Sentence Grammar correlates mainly with left hemisphere activity. To illustrate, Table 1 gives a brief and incomplete overview of some of the functions identified for the right hemisphere in the neurolinguistic literature and their correspondence with the main functions of Thetical Grammar (for further discussion see Heine et al. 2014, 2015).

The two domains of Discourse Grammar also correspond closely with McGilchrist's (2009, 2015) account of hemispheric differences in terms of two different types of attention, that is, two different ways in which we attend to the world. In his view, which is based on a large-scale survey of existing neurolinguistics studies, the left hemisphere is associated with narrow, focussed attention, which sees things abstracted from context and broken into parts from which it

Table 1. Some correspondences of Thetical Grammar and right hemisphere functions

Thetical Grammar	Right hemisphere
Text organisation	– Cohesive ties in narratives, integration of parts as a coherent whole, “macrostructure” of discourse (e.g. Sherratt & Bryan 2012) – Words associated in a large, diffuse semantic field (e.g. Beeman 1998) – Pragmatics, inferences derived from situational context (e.g. Carol et al. 2001)
Speaker-hearer interaction	– Adequate social interaction (e.g. Berman et al. 2003) – Establishing and maintaining contact with other speech participants (e.g. Hird & Kirsner 2003) – Providing the social context of linguistic communication (e.g. Berman et al. 2003)
Attitudes of the speaker	– Linguistic and non-linguistic comprehension and production of emotions (e.g. Borod et al. 2000; Karow & Connors 2003) – Paralinguistic information (e.g. prosody) (e.g. Devinsky 2000, Beeman & Chiarello 1998)

reconstructs a ‘whole’. A lot is left out in this experience of the world, but its value is that of a re-presentation (i.e. something that is no longer present to us), comparable in its nature to a map, which is a more effective guide to the terrain it maps by leaving much out. The right hemisphere, by contrast, is seen as underwriting broad, flexible, vigilant attention, which sees things whole and in their context and helps us form bonds with others. The world as experienced by the right hemisphere is thus, in Heidegger’s terms, constantly ‘presencing’ to us (rather than re-presented). It is one in which newness and uniqueness are more evident than generalised familiarity, one of possibility rather than certainty, where there are no fixed parts but flowing and interconnected wholes embedded in context.

In McGilchrist’s (2009: e.g. 91) view, then, the brain is a system of opponent processors whose incompatibility allows, in a dialectic synthesis, for something new to arise: “their contrary influence make possible finely calibrated responses to complex situations” (McGilchrist 2009: 9). The essential difference between the two hemispheres is summarised by McGilchrist in the following way: the left hemisphere “pays attention to the virtual world that it has created, which is self-consistent, but self-contained, ultimately disconnected from the Other” (McGilchrist 2009: 93), while the right hemisphere “pays attention to the Other … with which it sees itself in profound relation. It is deeply attracted to, and given life by, the relationship, the betweenness, that exists with this Other” (ibid.). This underlying difference applies to all levels of experience including language and it is clear that there is considerable overlap in the descriptions of the two hemispheres and the two domains of Discourse Grammar: Sentence Grammar correlates with narrow-focus attention directed towards an already established 'closed' system (i.e. left hemisphere), and Thetical Grammar with broad-focus attention directed towards context and 'the other' (i.e. right hemisphere).

3. Formulaic language and brain lateralization

Having outlined a dualistic approach to language in the previous section, viz. Discourse Grammar, along with its neurolinguistics correlates, this section now turns to the question of formulaic sequences and how they can be related to hemispheric differences. Before doing so, it is necessary, however, to clarify the notion of formulaic sequences and highlight some challenges in delimiting the concept (Section 3.1). The subsequent sections discuss formulaic sequences as a possible right hemisphere phenomenon (Section 3.2) and review existing taxonomies of formulaic language in the light of hemispheric differences (Section 3.3). Section 3.4 provides an interim conclusion.

3.1 What are formulaic sequences?: Delimiting an elusive concept

The term formulaic sequence, coined by Alison Wray, refers to "a sequence, continuous or discontinuous, of words or other elements, which is, or appears to be, prefabricated: that is, stored and retrieved whole from memory at the time of use, rather than being subject to generation of analysis by the language grammar" (Wray 2002: 9).

Despite its wide-spread use, the concept of formulaic language is notoriously difficult to pin down. For one thing, it is a heterogeneous category which subsumes diverse subcategories, ranging from idioms, proverbs, collocations to word lists, expletives, and discourse markers. As noted by Wray (2002: 66), "formulaic sequences are not a single and unified phenomenon". To illustrate this, some of the linguistic phenomena identified in the literature as formulaic are listed in (3) (e.g. Buerki 2016; Van Lancker 1988; Van Lancker Sidtis & Postman 2006; Wray 2002, see also Section 3.3).

(3)	Idioms	*pull someone's leg*
	Collocations	*hugely successful*
	Multi-word terms	*dual carriageway, Eastern Europe*
	Formulas	*good morning, I'm sorry*
	Proverbs	*look before you leap*
	Expletives	*bloody hell!*
	Fillers	*uh, uhm*
	Discourse markers	*you know*

Proper names	*Osama Bin Laden*
Interjections	*wow, yuck*
Word lists	*lock, stock and barrel*
Lexical bundles	*for some reason, all of a sudden*
Compound nouns	*driving test, party-piece*

In addition to the heterogeneous nature of formulaic language, the boundary to novel language is far from clear cut. This has prompted the proposal of different degrees or continua of formulaicity (e.g. Pawley and Syder 1983; Van Lancker Sidtis 1988; Howarth 1998). The distinction from novel language is even more of a challenge in a constructionist view of language (e.g. Goldberg 2003, 2006; Croft and Cruse 2004), which sees all of language as being organised in the form of relatively fixed form-meaning templates, called constructions. These constructions may be of varying degrees of schematicity and complexity, but crucially, in the words of Goldberg (2006: 18), "it's constructions all the way down". This includes not only typical formulaic language but also, what is generally referred to as novel language: for instance, argument structures such as transitive constructions, which are highly abstract form-meaning templates (constructions, frames) to be realised by a wide range of lexical items. This raises the question whether in such an approach to language formulaic sequences still have special status at all. One possible answer is offered by Buerki (2016), who concludes that they represent a specific type of construction, viz. one that is predominantly lexically substantive.

From an empirical perspective, the most crucial issue in the study of formulaic language is the lack of a clear-cut and unambiguous way of identifying them in texts (e.g. Wray 2009: 40). Various criteria have been applied for identification, including intuition or shared knowledge, frequency, polylexicality (involving more than one word), fixedness of form, holistic (non-compositional) meaning or idiomaticity, function, phonological coherence and reduction, as well as being stored and retrieved whole from memory (e.g. Buerki 2016: 17–18, Wray 2002: 20–43, 2006, 2009; Wray & Perkins 2000; Van Lancker 1988). All of these parameters are clearly relevant in some form, but none of them is without problems (see e.g. Wray 2002, 2006, 2009 for further discussion of these).

One of the parameters for identification where opinions diverge is the above mentioned polylexicality of formulaic language, i.e. consisting of more than one word. For instance, Wray's (2002: 9) definition given above is comprehensive enough to allow for the inclusion of single words, while Erman and Warren's (2000: 31) definition is clearly restricted to "at least two words". A key problem with polylexicality is its dependence on conventions of orthography and examples such as *somebody* and *anyway* clearly demonstrate the fuzzy boundary between multiword and single-word items (e.g. Moon 1998: 81). What speaks in favour of including single words is that this allows for more comprehensive functional analyses. As Wray (2009: 38) notes, "[i]t becomes possible to view *hallo* as formulaic along with *nice to see you*, and *thanks* along with *thank you very much*. Similarly it permits the inclusion of *into* along with *out of*, and of *well* along with *let me see*". On the downside, the inclusion of single words introduces the necessity of distinguishing between formulaic and non-formulaic single words. This is a considerable challenge in view of single words such as *understand* which consist of more than one morpheme and have non-compositional meaning. From a methodological perspective it may therefore be advisable to allow for single formulaic items but keep them separate from polylexical ones (see Section 4.2).

Given the difficulties with each of the possible parameters for identification, Wray (2009: 40, referring to Wray & Namba 2003) suggests an approach which draws on a range of criteria, "combining intuitive judgment with other approaches to identification". At the same time, Wray (2006: 595, Wray & Perkins 2000: 4) also, quite rightly, points at the risk – prevalent in many definitions and classifications of formulaic language – of confusing form, function, and meaning. For the purpose of the present study a number of different criteria will be applied, as discussed in Section 4.2.

3.2 Formulaic language: A right-hemisphere phenomenon?

In terms of brain activity, formulaic language is frequently associated with right hemisphere activity. Springer and Deutsch (1983), for instance, link the right hemisphere with ritualized formulae and chunks of words and Kaplan et al. (1990) associate it with patterns, configurations, and whole complex gestalts, with more efficient processing of the overall form and content than details or features. More generally, the distinction between left and right hemisphere has been identified as one between analytic and holistic or gestalt mode of processing respectively (Pawley 2009; Hellige 1990, 1993; for a useful overview see Van Lancker 1988).[2]

The role of the right hemisphere in the processing of formulaic speech is given particular attention by Van Lancker Sidtis and associates within the framework of the dual processing model (e.g. Van Lancker 1988, 1990, 1997; Van Lancker Sidtis 2004, 2009, 2012, 2015; Van Lancker Sidtis and Postman 2006; Sidtis et al. 2009, 2018; Van Lancker Sidtis and Sidtis 2018). This model makes a crucial distinction between novel speech (or novel language or newly created language, or propositional speech), on the one hand, and formulaic speech (or formulaic expressions

2. As noted by a reviewer, the distinction between left and right hemisphere is a very general one. It is important to acknowledge that there are differences between the disorders associated with the different left hemisphere areas. In the interest of a homogeneous database the present study is therefore limited to only one type of left hemisphere disorder, viz. Broca's aphasia.

or automated speech), on the other. Based on substantial neurological and linguistic evidence it is argued that novel speech is represented in the left hemisphere whereas formulaic speech is facilitated by a subcortical right hemisphere circuit (cf. also Heine et al. 2014).

However not all formulaic language can be accounted for by the dual processing model. Speakers with right hemisphere damage still show a substantial proportion of formulaic expressions, albeit considerably less than with left hemisphere damage. For instance, a study by Van Lancker Sidtis and Postman (2006), which examines the spontaneous speech of patients with left or right hemisphere damage found the following results (illustrated in Figure 2): subjects with left hemisphere damage (LHD) (viz. expressive aphasia, fluent aphasia) use significantly more formulaic utterances (30%) than subjects with right hemisphere damage (RHD) (17%) or healthy speakers (NC) (25%).

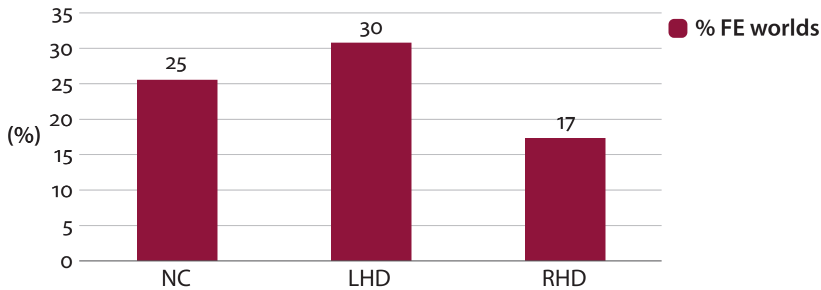

Figure 2. Percentage of words making up formulaic expressions in three subject groups (from Van Lancker and Postman 2006: 418)

This finding compellingly implicates a role of the right hemisphere in the production of formulaic expressions (Van Lancker Sidtis 2009: 452). With 17 percent the proportion of formulaic expressions produced with right hemisphere damage is still substantial, however, and begs the question as to why this should be so. A possible explanation may be found in the type of formulaic expression produced by each hemisphere. The study by Van Lancker and Postman does not make this distinction but only looks at formulaic expressions collectively, i.e. in their sum total, although they include a range of different categories: idioms (*lost my train of thought*), conventional expressions (*as a matter of fact*), conversational formulaic expressions (*first of all, right*), expletives (*damn*), sentence stems (*I guess*), discourse particles (*well*), pause fillers (*uh*), numerals and familiar proper nouns. It would therefore seem necessary to investigate whether the two hemispheres can be associated with different types of formulaic sequences. As pointed out in the introduction, this is precisely the aim of the present study.

3.3 Classifying formulaic sequences

To investigate whether different categories of formulaic sequences can be related to different hemispheres, we need to briefly review existing taxonomies. Given the number of taxonomies proposed in the literature (Wray 2002: 44), the focus here is on those classifications that include not only fine-grained lists of subcategories but also structure them into larger clusters in an attempt to identify the overall internal stratification of the class. The taxonomies that provide the required depth of granularity are the ones by Hudson (1998), Erman and Warren (2000), Cowie (1988), Wray (2002). They are briefly outlined in the following sections.

3.3.1 *Hudson's (1998) fixed expressions*

Hudson (1998: 33) identifies two major subgroups for her "fixed expressions": (i) independent utterances and (ii) subclausal units. Although a distinction made in terms of structural differences (as the names suggest), she points out that "[t]his structural division correlates strongly with functional differences. The independent clause type function primarily as socio-cultural or interpersonal expressions of social identity, relationship structuring or attitude marking" (Hudson 1998: 33). The function of independent utterances is brought to the fore by the various subcategories identified for this class: moral messages, socio-cultural reference, discourse structuring, attitude marking (illustrated in 4). Sub-clausal units, on the other hand, function only within a clause structure, as verb, noun, adjective, adverb, preposition, quantifier, or subordinator (illustrated in 5).

(4) Independent utterances (Hudson 1998: 34)
  a. Moral messages: *A stitch in time saves nine*
  b. Socio-cultural reference: *Bin it!, Drinka pinta milka day*
  c. Discourse structuring: *Have you heard this one?*
  d. Attitude marking: *Thank you, How do you do*

(5) Sub-clausal units (Hudson 1998: 41–46)
  a. Verb: *get up to, send for, keep an eye out for*
  b. Noun: *driving test, party-piece, the cream of the crop*
  c. Adjective: *fed up, great big*
  d. Adverb: *at the front, of course, it seemed, at the time*
  e. Preposition: *in front of, ever since*
  f. Quantifier: *a few, one or two*
  g. Subordinator: *in order that, as far as, so that*

3.3.2 *Erman and Warren's (2000) prefabs*

Erman and Warren (2000: 31) define their category of prefabs as "a combination of at least two words" and identify four different main types: (i) lexical prefabs, which are referring expressions denoting entities, properties, states, events, and situations, (ii) grammatical prefabs, which are text-forming, (iii) pragmatic prefabs, which are textual, interpersonal and metalinguistic in function, do not directly partake in the propositional content of the utterance and may occur outside the syntactic structure, and finally (iv) reducibles, which include contracted forms such as *it's, I'm, you're, let's* and represent a category that, in their view, "may be more debatable" (Erman and Warren 2000: 36). The four categories are illustrated in (6) to (9) below.

(6) Lexical prefabs: referring (Erman and Warren 2000: 39)
  a. Noun phrases: *a waste of time, sexual activity*
  b. Verb phrases: *be in touch with, battle on*
  c. Adjective phrases: *ignorant of, all right*
  d. Prepositional phrases: *for some reason, at midnight*
  e. Adverbial phrases: *straight away, so far*
  f. Clause structures: *I've got to run, where have you been?*

(7) Grammatical prefabs: text-forming (Erman and Warren 2000: 41)
  a. Determiners: *sort of, my own*
  b. Quantifiers: *a lot (of), a little bit*
  c. Proforms: *each other, up here*
  d. Introductors (existentials & identifiers): *there is…, that is….*
  e. Tense-forming: *be going to, have been*
  f. Aspect-forming: *be about to, tend to*
  g. Mood-forming: *may be, have got to*
  h. Links: *as well as, as if, on the other hand*
  i. Intensifiers: *so very, much less, even more*

(8) Pragmatic prefabs: textual, interpersonal, metalinguistic (Erman & Warren 2000: 43)
  a. Text monitors:
    – Discourse markers: *and then*
    – Turn regulators: *well you know*
    – Repair markers: *I mean*
  b. Social monitors:
    – Interactives: *wouldn't it*
    – Feedback signals: *I see*
    – Hesitations: *what's the word*
    – Responses: *yes I think so*

  - Performatives: *do sit down*
c. Metalinguistic monitors
  - Approximators: *and everything*
  - Hedges: *sort of*
  - Epistemological signals: *I should think*
  - Attitudinal markers: *I must say, my dear*

(9) Reducibles (Erman and Warren 2000: 45)
a. Pronouns + *am/is/are/have/shall/will: I'm, it's*
b. Auxiliaries + *not: don't, isn't*
c. Auxiliary + auxiliary: *would've*
d. *Let + us: let's*

3.3.3 *Cowie's (1988) formulae and composites*

Cowie (1988) distinguishes two major categories of formulaic language, which differ in terms of their meaning and "the structural level at which they operate" (Cowie 1988: 132): (i) formulae, such as *good morning, how are you*, *do you know*(signalling of surprise about the following statement) and (ii) composites, such as *a dry run, spill the beans, beat one's breast*. Formulae are "pragmatically specialized" (ibid.) and have discourse and interactional function: They "perform such speech-act functions as greeting, compliments and invitations" and are also "employed in organizing turn-taking, indicating a speaker's attitude to other participants, and generally ensuring the smooth conduct of interaction" (Cowie 1988: 133). Composites, on the other hand, "function as constituents of sentences (as objects, complements, adjuncts, and so on) and contribute to their referential, or propositional, meaning. They are lexical building-blocks" (Cowie 1988: 134–5). He points out, for instance, that *a dry run* can take the function of a subject, object, and complement of a preposition, as illustrated in (10a), (10b), (10c) respectively.

(10) a. *A dry run* has been organized for later that week.
b. We've just completed *a dry run*.
c. There was no more talk of *a dry run*.

3.3.4 *Wray's (2002) heteromorphic distributed lexicon*

In her comprehensive analysis of formulaic sequences Wray (2002: esp. 262–265) proposes a distributed lexicon model with five functionally distinct components (as illustrated in Table 2): (i) Lexicon 1, which comprises grammatical items, (ii) Lexicon 2, which deals with referential expression, (iii) Lexicon 3, which subserves routine interactional functions, whose lexical units are a response to context and serve the "subjective expression of context-bound messages of interactional significance" (Wray 2002: 249), (iv) Lexicon 4, which covers memorised texts such as songs and nursery rhymes, and (v) Lexicon 5, which relates to reflexive expression in the form of exclamations, including swearwords, for the "spontaneous expression of emotion" (Wray 2002: 249) and as such represent "an automatic response to external and psychological stimuli" (Wray 2002: 250).

Table 2. Components of Wray's (2002: 264) heteromorphic distributed lexicon

	LEXICON 1 Grammatical	**LEXICON 2 Referential**	**LEXICON 3 Interactional (routine)**	**LEXICON 4 Memorised**	**LEXICON 5 Reflexive**
Formulaic word strings	*in order to, on account of*	*highly likely, half past*+NUM (1–12)	*great to see you, look out!*	songs, nursery rhymes	*bloody hell! goodness gracious!*
Formulaic Words	*Because*	*kindness unhappy*	*alright, maybe*	Acronyms	*goodness!*
Morphemes	*The un-*	*dog happy*	*hey! hallo!*	Acronyms	*shit! ow!*
Context dependency	low		high		
Hemispheric involvement	left hemisphere		right hemisphere (subcortical)		

As can be seen from Table 2, Wray's model of formulaicity does not only cover polylexical words but also morphemic combinations, i.e. single formulaic words (see Section 3.1).

What is crucial for the purpose of the present study is that Wray's model was developed with a view to accounting for the properties of aphasic language. This means that the different components of the lexicon are associated with different hemispheres (as indicated in Table 2). More specifically, Lexicon 1 and 2 are thought be subserved by the left hemisphere, while Lexicon 3 and 4 are subserved by the right hemisphere and Lexicon 5 is associated with subcortical processing, presumably the right basal ganglia (Wray 2002: 242 referring to Speedie et al. 1993). Interestingly, this distinction in hemispheric involvement for the five lexical components corresponds with different degrees of context-dependence, with Lexicon 1 and 2 showing low contextual dependence and Lexicon 3–5 being highly contextually dependent (see Table 2).

3.4 Interim conclusion

Comparing the different taxonomies of formulaic sequences outlined above, we can note considerable overlap between them. More specifically, all four models provide for a basic distinction of two main types: (i) formulaic sequences operating within the clause structure and (ii) formulaic sequences operating outside the clause structure (see Table 3 for an overview).[3]

Table 3. Comparison of four taxonomies of formulaic language

	Formulaic sequences operating within the clause structure	**Formulaic sequences operating outside the clause structure**
Hudson (1998)	Subclausal units	Independent utterances
Erman & Warren (2000)	Lexical prefabs, grammatical prefabs, reducible prefabs	Pragmatic prefabs
Cowie (1988)	Composites	Formulae
Wray (2002)	Grammatical units, referential units	Interactional units, memorised units, reflexive units

Following Wray (2002), we can further posit a correspondence of these two main types of formulaic sequence with hemispheric processing: Formulaic units operating within the clause structure can be associated with the left hemisphere, while those operating outside the clause structure can be associated with right hemisphere activity.

And the list of correspondences doesn't stop there. The two formulaic types can also be related to a more general plane of grammatical organisation, viz. the two domains of Discourse Grammar outlined in Section 2: Formulaic units operating within the clause structure can be related to the domain of Sentence Grammar and formulaic units outside the clause structure to the domain of Thetical Grammar, both in terms of their formal and functional properties. Thetical elements are, by definition 'extra-clausal' (i.e. outside the clause in formal and semantic terms)[4] and functionally relate to the requirements of the immediate situation of discourse, particularly

3. The correspondence between the different taxonomies is, however, far from perfect. Compare, for instance, Hudson's 'discourse marker' category, which is included as a subtype of Adverbs (i.e. a sub-clausal type), unlike Erman and Warren's classification, which subsumes discourse markers, somewhat more appropriately, under pragmatic prefabs. Also, Wray's Lexicon 4 is not represented in any of the other taxonomies.

4. In this respect the category of theticals may be wider than Hudson's 'independent utterances'. While the former include parentheticals such as *I think, I believe* on account of their syntactic independence from the host clause, it is not clear whether they are also part of the latter, as Hudson defines this category in functional terms (see 3.3.1). It is plausible to assume, however, to speaker-hearer interaction, speaker attitude and text organisation (see Section 2), all of which are functions typically associated with formulaic expressions outside the clause structure, as outlined in the sections above. Sentence Grammar elements, by comparison, are syntactically integrated and play a role in the propositional structure of the clause, as do formulaic elements within the clause structure. In addition to the structural and functional overlap of Sentence Grammar elements with formulaic units within the clause structure, on the one hand, and thetical elements with formulaic units outside the clause structure, on the other, there is also correspondence in the assumed hemispheric involvement for each: the former are thought to be underwritten by the left hemisphere, the latter by the right hemisphere.

The overall conclusion to be drawn is therefore that formulaic sequences fall into two major categories, which will be termed here 'Sentence Grammar formulaic sequences' (or SG-FS for short) and 'Thetical formulaic sequences' (or TG-FS). Each of the two categories is associated with a different hemisphere: the left hemisphere with the former and the right hemisphere with the latter. This distinction will be tested empirically in the following section.

4. Formulaic sequences in aphasia and right hemisphere disorder

To investigate the hypothesis of two distinct functional types of formulaic sequences, as proposed above, this section presents an empirical study which compares formulaic language in the speech of subjects with aphasia or right hemisphere disorder. Section 4.1 first outlines the study, Section 4.2 explains the data analysis, Section 4.3 presents the results, which are then discussed in Section 4.4.

4.1 Outline of the study: Aim and database

What has emerged from the discussion in Section 3.2 is that formulaic sequences are mainly associated with right hemisphere processing. Numerous studies have shown, for instance, that the production of formulaic language is significantly reduced in the speech of patients with right hemisphere disorder (e.g. Van Lancker Sidtis 2009, 2012; Van Lancker Sidtis and Sidtis 2018). It is, however, not reduced to zero. In fact, subjects with right hemisphere disorder (RHD) still produce a substantial amount of formulaic sequences: 17 percent in the case of a study by Van Lancker Sidtis and Postman (2006). Conversely, not all formulaic sequences are equally affected by left-hemisphere disorder (i.e. aphasia), which raises the

that expressions such as these can be included as "interpersonal expressions of … attitude marking" (Hudson 1998: 33).

question, asked for instance by Wray (2012: 246), "why people with aphasia can produce some multiword strings and not others". These are the two research questions pursued in the present study: (i) Why does the speech of RHD patients still show a relatively high proportion of formulaic sequences?, and (ii) Why does the speech of aphasia patients show some formulaic sequences but not others?

The hypothesis put forward in this paper, as a possible answer to these questions, is that formulaic sequences are a heterogeneous category, which on a very general functional level falls into two main subcategories, with each being subserved by a different hemisphere: (i) Sentence Grammar formulaic sequences (SG-FS), which operate within the clause structure and are processed in the left hemisphere, (ii) Thetical formulaic sequences (TG-FS), which operate outside the clause structure and are processed in the right hemisphere (see Section 3.4).

In line with this hypothesis we would therefore expect that aphasic speech contains a higher percentage of TG-FS, while the speech of RHD patients contains a higher percentage of SG-FS. The aim of this study is thus to test whether this predicted outcome is obtained in two samples of transcripted speech, one produced by speakers with aphasia and one, roughly equal in size, produced by speakers with RHD.

The database for the study comes from Talkbank (https://talkbank.org/), more precisely the Aphasia Bank (MacWhinney et al. 2011) and the Right Hemisphere Disorders Bank (MacWhinney 2007). These are collections of spontaneous speech, which are available in the form of written transcripts together with the sound files and video recordings. The format is that of interviews in which subjects are being asked about their stroke and important events in their lives and also includes picture descriptions, and procedural descriptions (e.g. how to make a sandwich). The database selected from Talkbank comprised speech samples from six right-handed, age- and education-matched speakers of American English, which fell into two groups: (i) Three subjects with moderate (WAB AQ 51–75)[5] Broca's aphasia following left hemisphere damage, ranging in age from 41.9 to 69.9 (mean = 55.7, *SD* = 11.4), (ii) three subjects with right hemisphere damage, ranging in age from 62.0 to 68.5 (mean = 66.2, *SD* = 3.0). See Table 4 for more detailed subject information. The total number of words from the Aphasia group comprises 2,043 words and for the right hemisphere damage group 3,121 words, which compares with the overall word number in Van Lancker Sidtis and Postman (2006: 416), which is roughly 2,168 for the former and 3,070 for the latter.[6]

5. The Western Aphasia Battery aphasia quotient (WAB AQ) is a summary score that indicates overall severity of language impairment: 0–25 Very severe; 26–50 Severe; 51–75 Moderate; 76+ Mild.

6. The overall number is calculated from averaged number of words for five left hemisphere subjects (which is 433.6 words) and five right hemisphere subjects (which is 614.6 words).

Table 4. Subject information

Subject-ID	**Age**	**Education**	**Gender**	**WAB-Q severity score**	**Number of words**
AphasiaBank/ACWT01a	69.9	18 years	F	63.9	363
AphasiaBank/tcu03a	41.9	13 years	M	70.1	750
AphasiaBank/elman03a	55.2	20 years	M	66.2	931
RHDBank/Minga02a	68.5	18 years	F	NA	900
RHDBank/nazareth01a	62.0	20 years	M	NA	1,019
RHDBank/nazareth03a	68.1	24 years	M	NA	1,202

4.2 Data analysis

The analysis of the corpus data involved two separate steps: identification of formulaic sequences and their subsequent classification as SG-FS or TG-FS. We will look at each of them in turn in the following two sections.

4.2.1 *Identifying formulaic sequences*

As noted in Section 3.1, identifying formulaic sequences is beset with a number of problems and represents one of the persistent challenges in the analysis of formulaic language (e.g. Wray 2009: 28). The definition by Wray (2002: 9), given in Section 3.1, is a psycholinguistic one, which emphasises processing aspects, and therefore does not lend itself easily for the application to corpus data. Wray (2009: 29) herself points out that for the analysis of data a different type of definition is required, one that ideally combines intuitive judgment with other criteria for identification (e.g. Wray 2009: 40). To operationalise the concept of formulaic sequences the following criteria were therefore used for data analysis.

(i) Conventionality (or stability), understood here as a high degree of fixedness (e.g. Buerki 2016: 17): Although identified by the analyst's intuition in terms of shared knowledge (cf. Van Lancker Sidtis and Postman 2006: 417 for a similar approach), this criterion was subsequently subjected to further scrutiny by the following criterion (cf. Wray 2002 on arguments for and against intuition as a criterion for identification).

(ii) Frequency of occurrence: In an attempt to add a more objective criterion to the identification process the additional parameter of frequency was included (e.g. Wray 2002: 25–31, Wray 2006: 595, Wray 2009: 36–37, Wray and Perkins 2000: 6–7 on the benefits and limitations of this criterion). Thus, a potential candidate for formulaic sequence was also checked against its occurrence in a reference corpus. The corpus chosen for this purpose was the *Corpus of Contemporary American English* (COCA) (Davies 2008–), which can be taken as fairly representative of

American English, given its size of 560 million words and the inclusion of a wide range of spoken and written text types. The required minimum number of occurrences in COCA for a string to be classified as formulaic was 100. This frequency threshold was deemed sufficient to identify a string as a firmly established fixed unit in the language, but it is clear that this essentially represents an arbitrary yardstick. Its purpose is to provide independent evidence for the existence of a word string as a fixed unit in American English.

However, it is well known that not all types of formulaic sequences are high-frequency units. Proverbs, for instance, are notoriously infrequent in corpus data, although there is no doubt about their formulaic nature, and some formulaic strings are prone to occurring more frequently in a corpus than others (e.g. *good morning* vs. *long live the King*; Wray 2006: 595). Therefore, to account for such low-frequency expressions, the frequency threshold of 100 was occasionally suspended with when the formulaic nature of the string in question was beyond doubt, This was the case, for instance with *[making] a mountain out of a mole hill*, which occurs only seven times in COCA and *Call 911*, which occurs only once. Despite their infrequent occurrence in the corpus these expressions are clearly salient enough in the minds of native speakers to warrant inclusion as formulaic. On the other hand, strings such as the following were discarded as formulaic on account of their insufficient frequency in COCA (given in brackets): *severe headache* (63), *rode off with [the prince]* (37), *rehab therapy* (3), *get well card* (58), *thank you card* (78), *doing therapy* (45).

(iii) Polylexicality (multi-word units): As noted in Section 3.1, the idea that formulaic expressions comprise more than one word features prominently in the literature (a notable exception being e.g. Wray 2002). The present study adopts this parameter for identification and reserves the category 'formulaic sequence' for strings of more than one word. At the same time, however, it acknowledges the common practice in many neurolinguistic studies (e.g. Van Lancker & Postman 2006: 417, Van Lancker Sidtis & Rallon 2004: 212) to include single words, such as *well, oh, damn, right* in their analyses and therefore also includes an independent second category of 'formulaic single words'. This category covers single words which have a clearly established interactional, discourse structuring, or emotive function (e.g. *yes, well, shit* respectively). Including single formulaic words in this way allows for better comparability with the results of previous studies while at the same time not automatically conflating the categories of polylexical and single-word formulaic expressions.

Contrary to some neurolinguistic studies however (e.g. Van Lancker Sidtis and Postman 2006) proper nouns were not included in either the category of 'formulaic sequence' or that of 'formulaic single word' in the present study in attempt not to overstretch the concept. Proper nouns have been associated by some neurolinguistic studies with the right hemisphere (e.g. Blanken & Marini 1997; Code 2005), while others have observed an association with the left hemisphere (e.g. Damasio et al. 1996; Semeza et al. 1995). Although many proper nouns may have a meaning which goes beyond a literal reading (cf. e.g. Wray's (2002: 3–4, 60–1) discussion of *Rice Krispies* and *Radio Times*) their formulaic status is not always so clear, particularly in the case of single words. Therefore, to avoid potential overinterpretation, proper nouns such as the following were not included in the category 'formulaic': *Doctor Benesch, Monroe Community Hospital, New England, New York, Penfield High School, United States.*

4.2.2 *Classification as SG-FS or TG-FS*

In a second step of the analysis, a formulaic sequence – once identified as such – required classification as either a Sentence Grammar formulaic sequence (SG-FS) or Thetical formulaic sequence (TG-FS), in accordance with the distinction made in Section 3.4. For this, the criteria identified for Sentence Grammar elements and theticals more generally were applied (see Section 2). Classification was carried out by two independent raters with an excellent interrater reliability (Cohen's Kappa 0.91).[7]

SG-FS are identifiable by their clause-internal status and function. They allow for identification of a syntactic category (e.g. noun phrase, adjective phrase) and specific syntactic function (e.g. subject, object) within a clause. Compare, for instance, Cowie's examples in (10) above. As clause-internal categories they also allow for the usual constituency tests (e.g. movement, substitution, sentence fragment, cf. Aarts 2017). Typical examples of SG-FS from the corpus are given in (11) below:

(11) Examples of SG-FS:
A mountain out of a mole hill, A bunch of, A little bit, A lot of, All of a sudden, All the time, Arts and crafts, As soon as, As to whether, At least, Be able to, Be good at, Blood pressure, Didn't buy it, English teacher, For some reason, Get a kick out of, High school, In front of, In intensive care, In order to, In the way of, It looks as though, Kind of, Look straight ahead, Most of, New Year's Day, Not sleep a wink, Pain killer, Part of, Pass out, Peanut butter, Right now, Run out of, School bus, Seems to, Short term memory, Sign up for, Thank you note, The middle of, Used to, X percent chance, X times a day, …

TG-FS, on the other hand, fulfil the criteria of theticals. As such they have extra-clausal syntactic status (e.g. Dik 1997), which means they are syntactically

7. I am indebted to Elnora Ten Wolde for her help with the data analysis.

independent from their environment.[8] Various tests have been proposed for distinguishing extra-clausal elements from those that are syntactically integrated (e.g. Espinal 1991; Haegeman 1991). For instance, unintegrated elements cannot be the focus of an *it*-cleft, or serve as a response to a *wh*-question.

As a result of their syntactic independence many theticals can also stand alone, such as in (12), but this need not be the case, as illustrated by the comment clause in (13), which pragmatically relates to a host clause.

(12) *And you are?*

(13) John is in London, *I think*.

As a functional concomitant of their syntactic independence theticals do not contribute to the proposition of the host clause but instead relate to the immediate situation of discourse, which comprise three main components: text organisation, speaker-hearer interaction, and the expression of speaker attitude. Typical examples of TG-FS found in the corpus are given in (14).

(14) Examples of TG-FS:
*And then, And you are?, As I told you, I don't know, I don't think so, I figure, I know, I mean, I said, I see, I think, I think so, I thought, I'm*Firstname, *It seems like, It's like, Just a minute, Just amazing!, Lemme see, My name is*Firstname, *No way, Oh god, Oh man, Oh no, Something like that, Stuff like that, Thank you, That's it, Wait a minute, Yeah well, You know, You know what I'm saying?, …*

It should be noted that what matters for classification as SG-FS or TG-FS is the expression's actual use in a given text. Thus, it is possible for one and the same string to be classified as either (cf. Wray's 2002: 252–3 notion of multiple representation). This is illustrated, for instance by *call nine one one*, which in (15) represents a SG-FS and in (16) a TG-FS, owing to its syntactic independence and interactional function.

(15) and she *called nine one one* (Nazareth01)

(16) so I woke my husband and said &=ges:shaking +"/. +" I've had a stroke . +" *call nine one one* (Minga02)

Additional support for the distinction between SG-FS and TG-FS comes from the classifications provided by Hudson, Wray, and Erman and Warren, as outlined in

8. Note that syntactic independence does not necessarily imply that they can stand alone but that they are syntactically unattached to a host clause (i.e. they are not a syntactic constituent of the host clause).

Section 3.3. With regard to Erman and Warren's taxonomy, however, their category of 'reducibles' was not included, except where spelling conventions clearly indicated a formulaic unit, for instance, *gonna, gotta, wanna*. These cases were classified as SG-FS. As for Erman and Warren's lexical prefabs (2002: 39), their subcategory of 'clause structures' was also not included. This subcategory covers essentially complete clauses such as *I've got to leave, where have you been?* Complete clauses such as these (also existential *there* constructions, etc.) were excluded from SG-FS as their holistic meaning is often highly schematic with the boundary to more lexically substantive constructions being difficult to draw.[9] Complete clauses may, however, qualify as TG-FS if their function is clearly interpersonal, as in the case of *I'm so sorry, wait a minute!, How are you?*.

As for the additional category of single formulaic words (see 4.2.1), all of them fall in the domain of Thetical Grammar and are therefore labelled TG-single word. Typical examples of this type found in the corpus are: *Actually, And, Anyway, Darling, Er, God, Hey, Hi, Hm, Huh, Like, Man, Mhm, Nah, No, Nope, Now, Oh, Okay, Phew!, Please, So, Sure, Uh, Um, Wait!, Well, Yeah, Yep, Yes, …*

4.3 Results

With the different categories operationalised as outlined above, we can now proceed to the discussion of their respective frequencies of occurrence in the corpus. The raw figures for the three categories of formulaic sequences are given in Table 5, which shows a roughly equal token frequency for SG-FS (226) and TG-FS (216) overall, that is, across the two forms of hemispheric disorder, aphasia and right-hemisphere disorder. Within each disorder, however, there is a clear predominance of one formulaic type only, as will be discussed further below.

What the raw figures also reveal is a noticeable difference of the token-type ratio for the three formulaic categories, with SG-FS being most balanced (1.3 : 1 overall), followed by TG-FS (2.1 : 1 overall) and TG single words showing a large discrepancy (9.5 : 1 overall). This means that TG single words, not surprisingly, comprise a relatively small number of high-frequency items (e.g. *er, oh, well, yeah*); hence the high overall number of tokens (915). While the token-type ratio for SG-FS and TG-FS is consistent for aphasia and RHD, there is an imbalance for TG-single words, with aphasia patients showing a greater discrepancy (12.8 : 1), i.e. they make high-frequency use of only a small set of words.

9. From the perspective of Construction Grammar they would of course be seen as fixed templates; see Section 3.1.

Table 5. Raw figures for three different types of formulaic language*

	Number of words	SG-FS		TG-FS		TG-single word		TOTAL
		Token	Type	Token	Type	Token	Type	Token
APHASIA/ACWT01a	362	**2**	2	**20**	13	**135**	16	**157**
APHASIA/tcu03a	750	**7**	5	**59**	20	**130**	12	**196**
APHASIA/elman03a	931	**11**	8	**57**	29	**375**	22	**443**
APHASIA TOTAL	2,043	20	15	136	62	640	50	796
RHD/minga02a	900	**58**	48	**26**	13	**59**	10	**143**
RHD/nazareth01a	1,019	**59**	47	**30**	12	**90**	16	**179**
RHD/nazareth03a	1,202	**89**	66	**24**	15	**126**	20	**239**
RHD TOTAL	3,121	206	161	80	40	275	46	561
TOTAL	5,164	**226**	176	**216**	102	**915**	96	**1,357**

*A total of 43 tokens proved difficult to classify as formulaic or as a particular type of formulaic sequence. These indeterminate cases were not included in the analysis. They include instances such as *severe headache* and *rode off with [the prince]*, which, as noted above, do not fulfil the criterion of sufficient frequency in the COCA refer-ence corpus as well as *lock her up* and *I hate you*, whose formulaic status, despite their frequency, was judged as unclear. Occasionally, the classification of a particular string as SG or TG proved difficult too, such as *a big deal, I get by,* and was therefore excluded.

To get a better picture of the relative proportion of the different types of formulaic sequences in the speech data, Figure 3 compares the percentages of SG-FS and TG-FS for each speaker against the baseline of all formulaic sequences (not including TG-single word). It shows a clear preference for TG-FS in the speech of aphasia patients (ranging from 83.8% to 90.9%) and a preference for SG-FS for RHD patients (ranging from 69.1% to 78.8%).

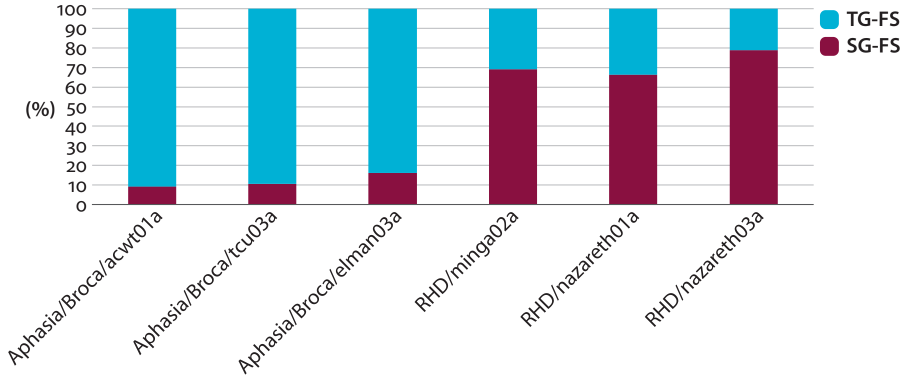

Figure 3. Comparison of Sentence Grammar Formulaic Sequences (SG-FS) and Thetical Grammar Formulaic Sequences (TG-FS) in percent

The average preference for each speech disorder (aphasia vs. RHD) is given in Table 6: viz. 87.2 percent of TG-FS for aphasia and 72 percent of SG-FS for RHD. This difference in preference has tested as statistically highly significant: $\chi^2 = 139.25$, $p < .0001$ (Yates corrected), $\varphi = +0.57$.

Table 6. Average distribution of two types of formulaic sequences in Aphasia and RHD data (figures in square brackets give percentage deviations for each cell)

	SG-FS	TG-FS	Total
APHASIA	**20** (12.8%) [−74.3%]	**136** (87.2%) [+77.7%]	156 (100%)
RHD	**206** (72.0%) [+40.5%]	**80** (28.0%) [−42.4%]	286 (100%)
Total	**226**	**216**	

Let us now take into account also the third type of formulaic category discussed above, namely TG-single words. As shown in Figure 4 and the corresponding Table 7, TG-single word represents the largest category of the three, but is proportionally considerably larger in aphasia than in RHD.

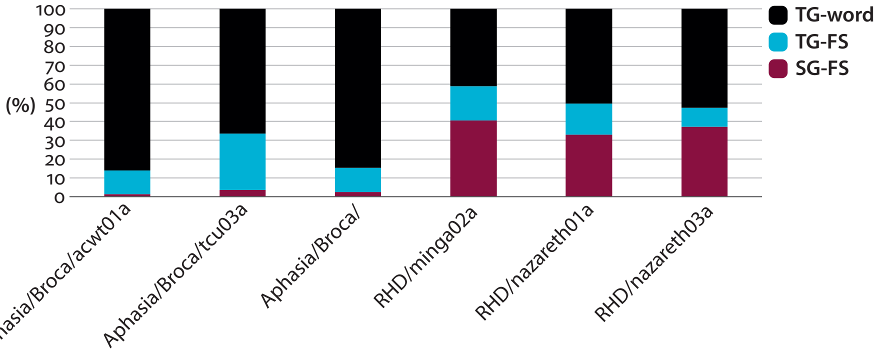

Figure 4. Proportional distribution of the formulaic categories SG-FS, TG-FS, and TG-single word in the different speech samples

Table 7. Distribution of SG-FS, TG-FS, and TG-single word in the different speech samples

	SG-FS	TG-FS	TG-single word	TOTAL
APHASIA/ACWT01a.cha	2 (1.3%)	20 (12.7%)	135 (86.0%)	157 (100%)
APHASIA/tcu03a.cha	7 (3.6%)	59 (30.1%)	130 (66.3%)	196 (100%)
APHASIA/elman03a.cha	11 (2.5%)	57 (12.9%)	375 (84.6%)	443 (100%)
Total	**20 (2.5%)**	**136(17.1%)**	**640 (80.4%)**	**796 (100%)**
RHD/minga02a.cha	58 (40.6%)	26 (18.2%)	59 (41.2%)	143 (100%)
RHD/nazareth01a.cha	59 (33.0%)	30 (16.7%)	90 (50.3%)	179 (100%)
RHD/nazareth03a.cha	89 (37.2%)	24 (10.1%)	126 (52.7%)	239 (100%)
Total	**206(36.7%)**	**80 (14.3%)**	**275 (49.0%)**	**561 (100%)**
TOTAL	**226**	**216**	**915**	

χ^2 (SG-FS vs. TG-FS vs. TG-single word) = 280.93, df 2, p = <.0001, Cramer's V = 0.455
χ^2 (SG-FS vs. TG-FS + TG-single word) = 274.96, df 1, p = <.0001, φ = +0.45

The results above give the distribution of different formulaic types within the category of formulaic language. For a complete picture, however, we also need to look at the results as a proportion of the text samples overall, that is, against the baseline of the total number of words produced by each speaker.[10] These results

10. For the overall word count the following criteria were applied:

i. Contractions are counted as one word.
ii. The count includes: hesitation sounds (*uh, um*, …), interjections (*oh,* …), mispronunciations of words.
iii. It excludes: unclear sounds, laughs, sighs, and repetition as a word finding strategy (e.g. *and it and it and it* was counted as only one *and it*).

are provided in Figure 5 and the corresponding Table 8, which show a distinctive profile in terms of the distribution of formulaic categories for each of the two speech disorders: Aphasia has large proportions of TG-single words followed by TG-FS and hardly any SG-FS, while RHD has substantial proportions of TG-single words (albeit noticeably less than aphasia), followed by SG-FS and very little TG-FS. Overall, the proportion of formulaic language (including TG-single words) is much higher in aphasia than in RHD.

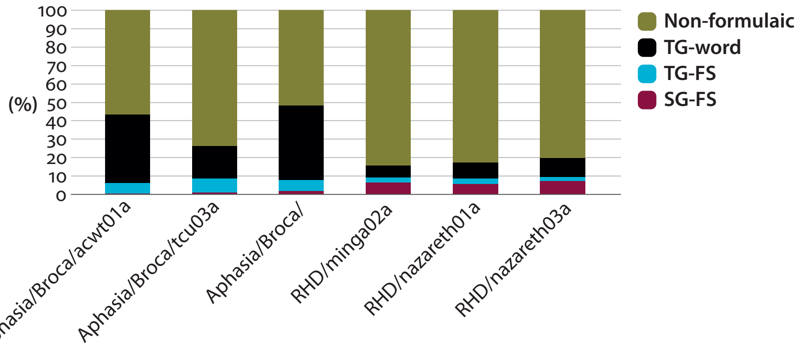

Figure 5. Proportional distribution of formulaic and non-formulaic language in the different speech samples

Table 8. Frequency of formulaic categories as a percentage of the total number of words in the speech samples

	SG-FS	TG-FS	TG-single word	Total number of words
APHASIA/ACWT01a.cha	2 (0.6%)	20 (5.5%)	135 (37.3%)	362 (100%)
APHASIA/tcu03a.cha	7 (0.9%)	59 (7.9%)	130 (17.3%)	750 (100%)
APHASIA/elman03a.cha	11 (1.9%)	57 (6.1%)	375 (40.3%)	931 (100%)
Total	**20 (1.0%)**	**136 (6.7%)**	**640 (31.3%)**	2,043 (100%)
RHD/minga02a.cha	58 (6.4%)	26 (2.9%)	59 (6.6%)	900 (100%)
RHD/nazareth01a.cha	59 (5.8%)	30 (2.9%)	90 (8.8%)	1,019 (100%)
RHD/nazareth03a.cha	89 (7.4%)	24 (2.0%)	126 (10.5%)	1,202 (100%)
Total	**206 (6.6%)**	**80 (2.6%)**	**275 (8.8%)**	3,121 (100%)
TOTAL	**226**	**216**	**915**	**5,164**

χ^2 (SG-FS vs. TG-FS vs. TG-single word vs. non-formulaic) = 565.7, df 3, p = <.0001, 0.33
χ^2 (SG-FS vs. TG-FS + TG-single word vs. non-formulaic) = 562.1, df 2, p = <.0001, Cramer's V = 0.33
χ^2 (SG-FS + TG-FS + TG-single word vs. non-formulaic) = 279.6, df 1, p = <.0001, φ = 0.23

This pattern is fairly consistent across all speakers in the two subcorpora and becomes clearer in the overall results for aphasia and RHD given in Figure 6. The total percentage of formulaic language (including all three subtypes) amounts to

18 percent for RHD and to 39 percent for Aphasia. This corresponds to the results given by Van Lancker Sidtis & Postman (2006), who found 17 percent for RHD and 30 percent for Aphasia.

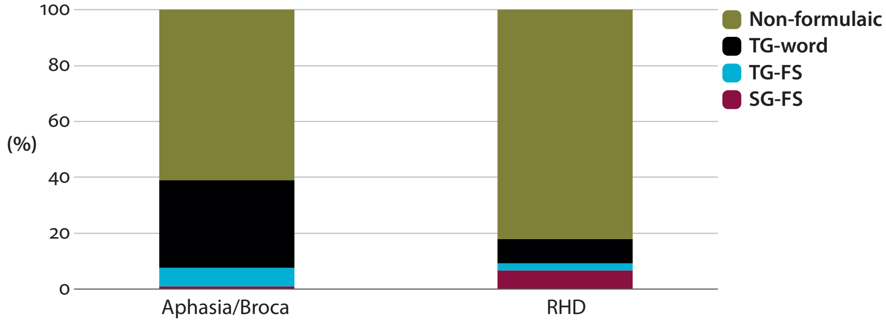

Figure 6. Proportional distribution of formulaic and non-formulaic language in the two subcorpora

4.4 Discussion

The results of the study thus show that the two types of speech disorder differ significantly with respect to the preferred categories of formulaic language: SG-FS are frequent in RHD but rare in aphasia, while TG-FS are frequent in aphasia but infrequent in RHD. TG-single words are frequent in both subcorpora (constituting the majority of all three formulaic categories), but considerably more so in aphasia.

We are now in a position to answer the two research questions formulated in Section 4.1. First, the reason why the speech of RHD patients still shows a relatively high proportion of formulaic language (18% in the present study), can be explained by the high ratio of SG-FS: This ties in with the argumentation in Section 3.4: As left hemisphere phenomena they remain unaffected by RHD. As for the second research question, the speech of aphasia patients has puzzled researchers in that it shows some formulaic sequences but not others. The results from this study allow us to specify more clearly which these are: Aphasia speech affects mainly the use of SG-FS (which are associated with the left hemisphere), while TG-FS (which are associated with the right hemisphere) remain largely unaffected.

As for TG-single words, they are also mainly affected by RHD, which suggests a right hemisphere association. It is noticeable, however, that in RHD speech, although dramatically reduced in frequency, they are still present in a substantial number. A possible explanation for this is the involvement of a subcortical circuit, which would not necessarily be affected by RHD. Various studies have suggested such a subcortical involvement with some types of formulaic language, such as Wray's reflexive lexicon (e.g. *damn, ow*) (e.g. Wray 2002: 242, Van Lancker Sidtis 2012).

It is worth looking also at the proportion of formulaic language overall in the two speech samples, that is, irrespective of formulaic categories. We can see that aphasia, not surprisingly, has the largest percentage of formulaic language, thus confirming the central role of the right hemisphere for formulaicity (Section 3.2). From the perspective of Discourse Grammar (Section 2) the close correlation between formulaic speech units and theticals (associated with the right hemisphere) can be accounted for as an epiphenomenal product of their typical discourse functions: Since they are used frequently for recurring discourse functions,[11] many theticals become highly predictable expressions, they lose their morphosyntactic compositionality and may be shortened, and turn into fixed speech act formulas (Pawley 2009) expressing stereotypic functions grounded in the situation of discourse.

However, what the study demonstrates is that not all formulaic language is equal in terms of hemispheric processing. As we have seen, SG-FS are closely associated with the left hemisphere, while TG-FS are closely associated with the right hemisphere. This, in turn, raises the question why aphasic speech still produces some (if not many) SG-FS and, conversely, why RHD speech still produces some TG-FS (1% and 2.6% respectively)? An answer to this question has to remain speculative at this point. One way of explaining it is by assuming some compensatory mechanism of the other hemisphere (e.g. Wray 2002: 243), that is, the left hemisphere taking over some functions from the right hemisphere after a stroke and vice versa. Such a view would seem to be particularly plausible in light of Wray's (2002: 252–3) proposed model of multiple representation, according to which lexical units can be simultaneously represented in more than one lexicon, for instance *watch your bag* with the individual items stored separately in lexicon I and II (i.e. left hemisphere) and the whole string stored holistically in lexicon III (i.e. right hemisphere). Such multiple representation may prove to be beneficial in the process of recovery after a stroke. On a more general level, it seems advisable therefore to see the distinction between different formulaic categories and their hemispheric processing not in a strict, mutually exclusive may but to allow for overlaps and fuzzy boundaries between them. After all, the two hemispheres appear to have mutually supportive functions (e.g. Helmstaedter et al. 1994: 735).

The above interpretation of the results, of course, cannot rule out other potential factors that may have also played a role in the speech production of the patients, but which are outside the scope of the present investigation. These include, for instance, possible compensatory behaviour of the individual hemispheres over

11. Cf. the relatively unequal type-token ratio of TG-FS and TG-single words.

time as a result of language rehabilitation following speech therapy. However, as reported by Van Lancker Sidtis and Postman (2006: 413), imaging studies investigating the effectiveness of language rehabilitation have produced contradictory findings. A further area of uncertainty for research of this kind is the question, as yet unresolved, "whether preserved aphasic utterances are processed primarily in the undamaged right hemisphere … or by intact areas of the left hemisphere" (Van Lancker Sidtis & Postman 2006: 413). And finally there is the possibility of hyperstimulation of the intact hemisphere which may skew the results. This, in turn, raises the question of what is 'normal' use of formulaic language (cf. e.g. Van Lancker Sidtis & Postman 2006, who found 25% for the healthy control group, and Van Lancker Sidtis & Rallon 2004, who found 16% in a screenplay). It would certainly be desirable to carry out further research along these lines with larger datasets and including a healthy control group.

5. Conclusion

The starting point of this investigation has been a dualistic model of language processing and organisation, namely Discourse Grammar with its distinction of two grammatical domains: Sentence Grammar and Thetical Grammar (Section 2.1). It has been shown in Section 2.2 that this distinction closely correlates with hemispheric functional differences of the brain. Following McGilchrist's (2009) account of brain lateralization in terms of two types of attention, it is possible to identify a considerable degree of overlap of Thetical Grammar with the broad and flexible attention of the right hemisphere, which sees things whole and in their context, and of Sentence Grammar with the narrow, focussed attention of the left hemisphere, which sees things abstracted from context and broken into parts.

In the next step, the idea of a dualistic organisation of language in terms of Discourse Grammar has been explored in the domain of formulaic language. It was suggested that rather than treating formulaicity as a monolithic category or as a random collection of disparate categories, it can be seen as falling into two major categories: Sentence Grammar formulaic sequences (associated with the left hemisphere) and Thetical Grammar formulaic sequences (associated with the right hemisphere). Functionally, the former operate within the clausal-propositional domain while the latter relate to the immediate situation of discourse. This distinction ties in with previous classifications of formulaic language in the literature, which, despite their different subclassifications, allow for a basic distinction of two underlying categories along the lines of Sentence Grammar and Thetical Grammar.

To test this proposal, an analysis of speech data from patients with either left or right hemispheric disorder was carried out, using data from the Talkbank corpus.

The results show that the two types of speech disorder differ significantly with regard to the frequencies of each formulaic type. Sentence Grammar formulaic sequences (SG-FS) are frequent in the speech of patients with Right Hemisphere Disorder (RHD) but rare in the speech of patients with moderate Broca's aphasia, while TG-FS are frequent in aphasia but infrequent in RHD. In addition to formulaic sequences, which were defined as comprising two or more words, single word theticals (TG-single word) were also investigated. They occurred frequently in both subcorpora, but considerably more so in aphasia.

The results throw light on two conundrums in the study of these two disorders: (i) Why is the proportion of formulaic sequences in the speech of RHD patients not reduced to zero, but still relatively high (e.g. 17% in the study of Van Lancker Sidtis & Postman 2006), and (ii) why are people with aphasia able to produce some formulaic sequences and not others? (e.g. Wray 2012: 246). In reply to the first question, the data suggest that the relatively high proportion of formulaic sequences in RDH is accounted for by one particular type, viz. SG-FS, which is associated with the left hemisphere and therefore unaffected by RHD. As for the second question, the results show that aphasia affects mainly SG-FS (as left hemisphere phenomena) and not TG-FS (as right hemisphere phenomena).

The results of the study are also suggestive of a fundamental difference in nature between the two categories, with TG-FS showing a more imbalanced type-token ratio than SG-FS. It can also be speculated that the two categories differ in terms of their diachronic development: SG-FS are the result of a gradual welding together of units into larger chunks through repetition (e.g. Bybee 2010; Newell 1990), while TG-FS result from segmenting an existing larger unit into smaller units, a cognitive operation that has been referred to as "co-optation" (e.g. Heine et al. 2017). But more research is still needed into the nature of each of these formulaic categories.

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CHAPTER 8

Local and global structures in discourse and interaction

Linguistic and psycholinguistic aspects

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Based on the relatively broad evidence for the assumption that language structure and linguistic cognition are organized in a dualistic way, this chapter follows proposals for a distinction between microstructures and macrostructures in language. While the first serve the establishment of morphosyntactic and semantic relationships, the latter are responsible for structuration in terms of discourse structure, interaction management and cognitive alignment. Using "extra-clausal" constituents as an example, it will be shown that there are points in spoken discourse that are highly sensitive for the structuration of language on a macrolevel, namely the beginning and the end of turns, and that expressions serving macrostructure, which tend to cluster in these positions, have a syntax of their own.

Keywords: grammar, discourse structure, spoken language, extra-clausal constituents, turns

1. Introduction

In several approaches to language structure and the neurocognition of language a distinction between a "microlevel" and a "macrolevel" of language structure plays a role, given that many structural-linguistic as well as language-related cognitive and neurological phenomena cannot be properly accounted for without assuming a more complex, that is, a dualistic rather than monolithic organization of language structure and linguistic cognition. This chapter takes up and further develops the idea of dualism in language and cognition that is discussed from different perspectives in this volume and that has been discussed in different academic fields related to language and cognition elsewhere (see Chapter 1), focusing in particular on the notion of *macrostructure* (see van Dijk 1980; Heine 2019) and

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the ways in which this higher-level component of linguistic structure can be approached theoretically and empirically. Using conversational data from English I will focus on the macrostructuring functions of "extra-clausal" expressions, such as interjections, discourse markers, comment clauses, general extenders or response adverbs, focusing on their occurrence in two structural slots that are highly relevant for creating and maintaining the macrostructure of ongoing spoken discourse, namely the beginning and the end of a turn. Extra-clausal expressions are the showcase example for the limits of traditional sentence grammar and the benefits of a dualistic approach to language and linguistic discourse, given that they are syntactically and semantically outside the confines of "core grammar" in mainstream sentence-based approaches to grammar, and thus not subjected to the rules and principles that apply to clausal constituents. Yet, they form part of a structural unit and follow particular distributional patterns. In this chapter I will show that their function and distribution can be systematically accounted for under an approach that considers the creation of macrostructures in language as a domain of grammar of its own, called *macrogrammar*. *Macrogrammar* provides a categorical framework for the description of language structure that integrates interactive, discourse structural and cognitive aspects, each of which has important effects on the ways in which language users build up linguistic structure.

The structure of this chapter is as follows: Section 2 discusses the general idea underlying the distinction between micro- and a macrostructures in language, Section 3 focuses on the ways in which language is processed in real time and argues that, due the incremental character of speech production, structuration on the macrolevel is crucial for maintaining order between structural units and interactional sequences. Section 4 deals with the question how and where macrogrammatical relations are indicated in discourse and what exactly the nature of such relations is, Section 5 provides the results of an empirical study of the serial order of macrogrammatical expressions at turn-beginnings and -endings, which provide reason to assume that extra-clausal, macrogrammatical slots have a syntax of their own. The data are discussed in the light of dualism in Section 6, the conclusions deriving from the proposed distinction between a micro- and a macrostructural domain are presented in Section 7.

2. Micro-and macrostructures in language

The language system does not only provide principles for combining words into structured syntactic units, in which these words become "constituents" and are, as such, formally linked to other constituents within the same structural unit, but also linguistic means and principles of use for the creation of structures beyond such units. This holds particularly for spontaneous spoken discourse, as illustrated in (1).

(1)

159 A: **so** what kind of jobs had you been mainly applying for?
160 B: **well** I started off applying for jobs that I was kind of **like** (.) i- in
architecture really just the sort of jobs that- basically just to earn
just to earn some money i- i- in something that I could perhaps
become quite proficient at.
161 uhm (..) **but** as you probably know the **uhm I mean** the architecture sce-
the the architecture scene at the moment is (.) is pretty [grim.]
170 A: [yeah.]

[ICE-GB S1A-034]

Expressions such as *well, but, like* or *I mean* have long been marginalized in grammatical description and not found a consistent treatment, irrespective of the fact that they play an important role in the process of building up linguistic structure in real time. The main reasons are that they do not contribute to the meaning of the structural units they accompany, i.e. they are semantically non-restrictive, and they are not part of clause-internal morphosyntactic dependency relationships, but organize language beyond the clause level. There are various tests that can be used to demonstrate that these expressions do not form part of an "integrated" morphosyntactic unit with the surrounding forms and segments and thus appear to be "outside" sentence grammar. They are, for instance, unable to be the focus of a cleft-sentence (2a), they cannot be questioned (2b), negated (2c) or coordinated with other expressions or constituents (2d), and they can be omitted without affecting the grammaticality and the meaning of the rest of the structure (2e), as illustrated for *well* in (2).

(2) **well** I started off applying for jobs […]
a. *It is **well** that I started off applying for jobs.
(compare to e.g. it is a **job** that I started off applying for)
b. *How/What is it? – ***well**
(compare to: What is it (that you started off applying for)? – a **job**)
c. *It is not **well** that I started off applying for, but…
(compare to: It is not a **JOB** that I started off applying for, but…)
d. ***well** and **so** I started off applying for jobs
(compare to: I started off applying for **jobs** and **scholarships**.)
e. **ø** I started off applying for jobs.

Thus, expressions like *well*, *so* or *I mean* differ from adverbs, conjunctions or other "grammatical" constituents in that their interpretation does not require access to any other co-occurring form since they neither assign morphosyntactic and semantic properties to another form, nor are they assigned such properties by any other form. Moreover, they express procedural rather than lexical-conceptual meanings (Blakemore 2002), which means that they do not contribute to the propositional content, but provide a processing cue serving utterance interpretation. In this sense, they are an integral part of the unit they accompany as they integrate the structural unit with which they occur in surrounding discourse or the communicative situation in which it is produced in a broader sense, thus doing "metatextual work" (Traugott 1997). Their scope is not restricted to a clause, but usually over units of discourse, which may vary in size. The use of such expressions thus allows for the establishment of more global structural relations between discourse units (Schiffrin 1987; Lenk 1998), i.e. they serve the creation of structure outside formal dependency relationships, linking several segments of discourse into a coherent whole.

These and other expressions "outside" the clause, e.g. interjections, vocatives, formulae of social exchange (e.g. backchannels, greetings, apologies, thanking) or comment clauses, are typically set apart from all other linguistic signs because they operate in a domain of language structure that is difficult to capture with traditional (strongly written-biased) sentence grammar, which is based on the structure of clausal and sentential units and which typically considers only clause- or sentence-internal relationships. This other domain could be dubbed "higher, "meta" or "macro" level of language structure. Yet, expressions "outside the clause" have been accounted for in many functional approaches to grammar, most of which solve the problem of integrating them into grammatical description by distinguishing between a domain referring to clausal grammar, which basically encompasses clausal constituents and the syntactic machinery required for their linearization into clausal configurations, and a domain comprising linguistic material that is not part of this machinery and thus operating "outside" clausal structures. While the first domain typically forms the core of most grammatical-descriptive work, the latter tends to be assigned a more peripheral, supplementary or peripheral status. Table 1 provides some examples of the basic distinctions along these lines proposed in academic grammars and in more recent functional approaches to grammar.

For instance, in his model of *Functional Grammar* Dik (1997: 379–401) distinguishes between clausal constituents and so-called "extra-clausal constituents" (ECCs), which include e.g. interjections, discourse markers, backchannels, tag questions, forms of address or formulae of social exchange (e.g. greetings, summonses). ECCs are defined as linguistic elements that (a) either occur on their own, or are typically marked off from the clause proper by breaks or pause-like inflections in their prosodic contour, (b) are "never essential to the internal structure of the clause with which they are associated"; (c) are not sensitive to the

Table 1. Examples for implicitly dualistic approaches to grammar

	"Core/basic-level" grammar	**"Peripheral/higher-level" grammar**
Blanche-Benveniste et al. (1990)	Microsyntaxe	Macrosyntaxe
Dik (1997)	Clausal constituents	Extra-clausal constituents
Biber et al. (1999)	Clausal units	Non-clausal units
Huddleston and Pullum (2002)	Clause structure	Supplements
Johnstone (2002)	Sentence-level	Discourse-level
Debaisieux (2007)	Dépendence grammaticale	Dépendence macrosyntaxique
Kaltenböck et al. (2011)	Sentence Grammar	Thetical Grammar

grammatical rules of the (host) clause, and (d) can "only be understood in terms of pragmatic rules and principles". The distinction relaxes the strict orientation of grammatical description to clause-internal structuration, but it does not become clear how ECCs and their position within a structural unit can be dealt with in an integrated model of grammar beyond merely admitting their existence and defining their functions with a general catalogue of possible features. Consequently, we end up with a grammar of the clause, which reduces 'grammar' to clausal units that may be optionally accompanied by a relatively diffuse set of extra-clausal expressions. The same problem holds for the category of *supplements* in Huddleston and Pullum's (2002: 1350–1362) grammar, which are morphosyntactically not integrated into the host construction and thus unable to function as a dependent to any head, but interpolated in or appended to a host clause, and also for Biber et al.'s (1999) distinction between clauses and non-clausal units. Another example is the concept of *microsyntax*, which overlaps with *dépendence grammaticale* in that both refer to a system of dependency relationships ("connexités rectionelles") organized around the verb, the noun and the adjective, thus representing a 'grammar of constituents', whereas *macrosyntaxe/dépendence macrosyntaxique* encompasses relationships between structurally autonomous segments and thus relations that cannot be described on the basis of morphosyntactic dependencies ("des relations que l'on ne peut décrire à partir des rections de catégories grammaticales", Blanche-Benveniste et al. 1990: 113), such as those between a left-dislocated noun phrase or a "hanging topic" and a following clausal unit.

What all these approaches have in common is that they rest upon a basic distinction between a domain of language structure associated with syntax and semantics in the structuralist tradition, encompassing morphosyntactic and semantic dependency relationships and propositionality, and a domain that captures units that are formally and functionally unintegrated in such relationships, thus referring to structural "outsiders". The distinction also illustrates that linear order in language is not generally established through hierarchically organized syntactic structures involving binary morphosyntactic and semantic relationships, as it is usually assumed in sentence-based models of syntax, given that expressions outside "core" grammar are typically linked to neighboring units by mere adjacency, that is, by means of linearization without hierarchization.

The tendency to distinuish two domains of grammar thus acknowledges the problem that many syntactic configurations, especially in spoken language, include more than "clausal" constituents, as exemplified in (1). The distinctions in Table 1 are, in this sense, extensions of traditional grammar, one component covering the principles for the internal structure of a "well-formed" clause or sentence and propositionality, which usually forms the core of traditional approaches to grammar, the other one encompassing phenomena that fall outside the confines of clause grammar and that are motivated by structuration principles on a higher level beyond the boundaries of a clause, such as structuration on the utterance or discourse level. One could also speak of a distinction between a microstructural level, which deals with the structuration of basic units of language (e.g. phrases, clauses), and a macrostructural level, where structure is created between units on a higher structural level (e.g. between segments of an utterance, turns, or between discourse units). Such a distinction has been made in the analysis of discourse as early as the 1980s by van Dijk, who developed a model of analysis that distinguishes 'microstructures', i.e. the structure of sentences, from 'macrostructures', which are defined as higher-level semantic and conceptual structures that organize the 'local' microstructures of discourse, interaction, and their cognitive processing and that "establish global meanings and global coherence in a discourse" (van Dijk 1980: 29).

Generally, the main justification for the assumption of a dualistic organization is that speakers do not exclusively deal with the expression of propositional content in morphosyntactically integrated units while producing a clause, but also face a larger set of communicative tasks that do not apply to the internal structuration of a clause. This observation has already been made by Dik, who states that ECCs are best interpreted "in the context of a grammatical model that takes levels of linguistic organization higher than the clause into account" (Dik 1997: 407). In this sense, both components – "core" and "higher-level" grammar – are equally required for successful communication and can be assumed to interact, in various ways, in jointly shaping verbal interaction. The interaction between both components of grammar is still in need of further research. It is, for instance, not quite clear whether or not the second, "higher-level" component has a "grammar" of its own, which principles determine the distribution of ECCs, and how they relate to the "core grammar" of a language. Thus, at the moment some parts of language are treated as fixed-grammatical, based on "classical" grammatical categories and morphosyntactic and semantic relationships, whereas other parts form a kind of grammar-swayed-by-pragmatics under what could be dubbed "clause-plus" (C+) approaches.

What is interesting from a cognitive perspective is that such dualistically organized models of grammar imply that next to the processing of clause-like structures there appears to be a more global perception of structure in language beyond the clause level, which motivates the existence of the second, higher-level domain of grammar. In other words, there is reason to assume that the human mind processes linguistic signs and structural units according to the principles referred to under the heading "core grammar", and at the same time integrates the emergent structures on a different, "higher" level or macrolevel by linking them into a larger whole, which is the basis for the part of grammar referred to under the heading "peripheral grammar".

As cues for processing language beyond the boundaries of clause-internal syntactic structures, ECCs contribute to the development of a coherent mental model of ongoing discourse. We can therefore subsume these expressions under a concept that encompasses structuring principles of language beyond the sentence level, which I have called "macrogrammar" in prior studies (Haselow 2016, 2017), based on a conceptualization of 'grammar' as a knowledge system that allows speakers to engage in interaction with another participant and to produce (spoken or written) *text*, that is, a piece of meaningful, structured language that serves a particular purpose in an individual discursive context. Given that 'discourse', loosely defined as what is said (or written) in a particular communicative context, involves (i) different speakers who need to structure their interaction, (ii) text, and thus textual relations that require overall coherence in order for emergent discourse to be perceivable as an organized whole, as well as (iii) different minds involved in the processing of emergent discourse that need to mentally coordinate the all aspects related to language-based interaction I propose a basic distinction of macrogrammatical relationships into three functional domains within which ECCs establish structural relations: (i) INTERACTION, (ii) DISCOURSE STRUCTURE, and (iii) COGNITION, as shown in Table 2. These domains strongly overlap with van Dijk's (1980) categorical system of analyzing global relations and "macrorules" in discourse, and with Maschler's (2009) categorical system for discourse markers. Note that a single ECC may serve a broader set of functions in different contexts.

The domain DISCOURSE STRUCTURE refers to the relationship between discourse units, which encompasses ideational (semantic) relations (e.g. contrast, concession), rhetorical relations (meta-comments on the kind of relationship between an upcoming unit in ongoing discourse and a preceding one, e.g. an inferential or a resultative relation), and topical aspects (e.g. topic shift, topic resumption) between units of talk (thus structuring a single speaker's turn) or between

Table 2. Overview of the functional domains of macrogrammar

Functional domains of macrogrammar		
Discourse structure (=The structuration or segmentation of emergent discourse)	**Interaction (=The structuration of ongoing interaction)**	**Cognition (=The structuration of real-time processing)**
indicating the type of (local, global) relationship between discourse units or between a discourse unit and implied meanings or inferences	organizing turn-taking and interaction (e.g. facilitating next speaker contribution, setting up the conditions for the successful uptake of an upcoming message)	providing interpretive cues for utterance interpretation (e.g. references to shared knowledge)
e.g. *and, anyway, but, so*	e.g. *listen, …isn't it?*	e.g. *I think, you know*

turns (thus structuring discourse produced by at least two different speakers) (see also Crible and Degand 2019). INTERACTION includes all functions and expressions related to the management of speaker–addressee interaction and the structuration of the periodic change of speaker roles in interaction. The third domain – COGNITION – encompasses functions and the respective expressions that refer to the alignment of the co-participants' cognitive states and thus serves structuration in terms of jointly constructed mental representations of emergent discourse. For instance, some expressions refer to (presumed) shared background knowledge or provide a cue as to how exactly a message is to be interpreted and integrated into the common ground, that is, the set of shared knowledge, beliefs and background assumptions (Stalnaker 2002), e.g. as expressing an opinion rather than a fact (*I think*). Thus, the speaker does not merely relate to the textual relation between segments of discourse, as with rhetorical relations, but establishes relations between knowledge states of the interlocutors involved. When used turn-finally, the ECC *you know*, for instance, instructs the addressee to recognize the implications and "sequential relevance" of an assertion or an expression (Schourup 1985: 105), as illustrated in (3).

(3)

```
262   C:  well this was hoovered yesterday
263       I hoovered my bedroom cos Rosie was coming.
264       I thought I'd better show her a tidy room you know.
265   B:  yeah.
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Turn-final *you know* in line 264 indicates that the utterance it accompanies is linked to what is already shared and thus related to additional implications (see Jucker and Smith 1998: 191–197), e.g. the fact that Rosie is a clean person or that it would generally be embarrassing to show a guest an untidy room. Final *you know* additionally invites the addressee to provide a minimal response (which is produced by B in the ensuing turn) that indicates whether or not s/he has grasped the implication(s).

While we have relatively detailed knowledge as regards the structuring principles on the microlevel of language, structural relations on the macrolevel offer much potential for further research. Such relations have been studied under various frameworks, e.g. in Halliday's (1985) and Halliday and Matthiesen's (2004) systemic *Functional Grammar*, where links are established between sentence-level, propositional elements and discourse-pragmatic functions, or in various approaches to the so-called "peripheries" of an utterance (e.g. Beeching and Detges 2014), which are often related to hypotheses about the (discourse-) functional values of the left and right periphery, e.g. the hypothesis that the left periphery tends to be used for expressions indicating subjective meanings whereas the right periphery correlates with intersubjective meanings. There are also syntactic field models that combine syntax, information structure and the use of "extral-clausal" constituents, such as those proposed for French sentences by e.g. Danon-Boileau et al. (1991) and Morel (2007). I will go a step farther here and look for processing-based, cognitive motivations for structuring principles underlying the use of expressions that serve the macro-structuration of discourse (ECCs). To set the stage for such a study I will first refer to some important psycholinguistic findings on discourse processing (Section 3).

3. Micro- and macrostructures in spontaneous speech: Psycholinguistic aspects

Cognition is an important factor for shaping linguistic structure produced in real time, that is, in the unidirectional flow of time, given that all language processing is bound to temporality and involves working memory activity. Both aspects limit the speaker's and listener's experience of language to the immediate present, given that the ability to look forward or backward in emergent discourse is highly limited in on-line speech production (see also Auer 2009; Mauranen 2016: 79). A forward view is largely limited for both the speaker and the listener since for listeners there is no way to fully anticipate what s/he will hear in a few moments (listeners can only project more or less expectable continuations of a structure in progress, see below), and speakers themselves are often unable to anticipate what they will say and how they will say it in a few moments while holding the turn, given that the time span available for planning an upcoming structural unit is limited to the amount of information a speaker can process in working memory (WM) at a time.

The only way for speakers and listeners to deal with the communicative future is to mentally project what is likely to follow on the basis of what has already been produced in just prior discourse, which means that a certain proportion of speech processing consists in generating hypotheses on what is likely to follow or what should follow, and to process incoming information or upcoming talk against these hypotheses (Pickering and Garrod 2006; Staub and Clifton 2006). Projections can be derived on different levels (Auer 2005), e.g. in syntax (for instance, determiners usually project nouns; the valence of verbs allows for projections on the number and kinds of arguments to follow), in semantics (based on semantic relationships), or on the action level, based on the conditional relevance of certain conversational actions (e.g. in terms of adjacency pairs). Backward views, on the other hand, are constrained by WM capacity, which is highly limited as regards the amount of information and the time span over which incoming information can be maintained at a heightened level of activation. The WM is thus clearly not designed to store larger stretches of speech in their original wording, given that memory traces undergo "rapid fading" in terms of Hockett (1960) and mental representations of speech are subject to interference (Oberauer and Kliegl 2006).

There is wide agreement that the limited capacity of the WM sets important contraints on the kinds of syntactic structures that can be processed in real time (Just and Carpenter 1992; Daneman and Merikle 1996; Roll et al. 2013; Schremm, Horne and Roll 2015), and it is these constraints that support the assumption of two different modes of processing linguistic input. Previous performance-based studies have provided compelling evidence for timing constraints on the integration of linguistic input deriving from WM limitations, which restrict the length of processing frames within which linguistic forms are processed. These timing constraints are likely to derive from a general neurocognitive principle that underlies the processing of sensory information. For instance, Baddeley (1997) proposes a 2–3 second long time limit constraining the duration of information that can be held activated in verbal working memory. Poeppel (1997) suggests that temporally sequenced events such as motion sequences or interactional episodes are integrated and mentally represented as perceptual units within intervals of 2–3 seconds, i.e. successive events are perceived as taking place at a single moment in time during time intervals of 2–3 seconds on average, which represent and delimit the "subjective present" of an individual. The structuration of language in prosodic and syntactic units, i.e. unit-building in language use seems to be adapted to these time-based WM limits in spontaneous speech production: Vollrath, Kazenwadel and Krüger (1992), for instance, report a median length of 2.6 sec for intonation phrases in German conversations; Roll et al. (2012) show that readers parse utterances into 2.7 sec long implicit prosodic phrases, and the average turn-at-talk in a conversation comprises 2–3 sec (Levinson and Torreira 2015). Roll et al. (2013)

found that morphosyntactic agreement violations elicit different brain responses when the temporal distance between the disagreeing words exceeds 3 sec as compared to the processing of mismatching agreement features appearing within a 2.5 sec window. Schremm, Horne and Roll (2015) have shown that subjects tend to analyze embedded clauses whose onset is beyond the time window of about 3 sec (i.e. whose production is delayed) as main clauses if no other cues are given indicating either subordinate or main clause interpretation. All this suggests that WM constraints are an important factor for the placement of prosodic boundaries and play an important role for syntactic and semantic segmentation (Roll et al. 2013; Schremm, Horne and Roll 2015), given that individuals appear to close the processing of a potentially open structural unit at the end of the perceptual time window of 2–3 seconds. These time constraints are congruent with cognitive psychological evidence for general restrictions on the amount of information that can be held in a focal state of memory (usually defined as the number of "chunks" it can hold) and maintained a heightened level of activation (Baddeley 1997; Cowan 2001). Given that activation costs are limited, perceptual units continuously move in and out of a focal state of memory in successive, highly limited time intervals.

Based on these findings, it appears natural that language processing is largely based on shorter structural units that are aggregated into larger units, i.e. structures are processed incrementally in smaller sequences rather than as finished products (Marslen Wilson, Tyler and Seidenberg 1978; Stabler 1994; Christianson and Ferreira 2005; Bornkessel Schlesewsky and Schlesewsky 2009: 89–90). The consequence is that processing is not so much based on far-reaching syntactic structures where all forms are integrated into formal dependency relationships, but largely rests upon the ability to (i) impose a structural–semantic interpretation of current segments of linguistic input (in whatever syntactic shape of whatever size) as quickly as possible, and to (ii) derive a mental metastructure from the succession of such segments, which need to be integrated into a coherent whole. The processing of linguistic structures in smaller, time-based perceptual windows is reflected in the incremental character of turn production, as illustrated in (4).

(4)

```
122   A:   what was the grub like. (..)
123        in France I mean.
124   B:   WELL we had uhm, (.)
125        the people we were staying with they (2.1) uh cooked us a traditional (.)
           Normandy dinner. (..)
126        very very free range chicken. (.)
127        tasted quite dark. (.)
```

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The two turns produced by A and B are based on the aggregation of smaller structural units interspersed with (micro)pauses, which illustrates the extent to which real-time speech processing is bound to cognitive-temporal frames underlying human perception. Expressions with procedural meanings in the sense of Blakemore (2002), such as *well* or *I mean*, serve as interpretive cues that help maintaining a coherent representation of what a speaker is doing.

The periodic move of perceptual units in and out of a focal state of memory and the continuous shift away from most recently perceived items to new processing units means that interlocutors need to recode structural aspects of language into longer-lasting mental representations while the activation level of formal (e.g. phonological, morphological and syntactic) traces in working memory decreases (Sachs 1974; Martin 1993). This can only work if the local structures of e.g. syntax and semantics (or "microstructures") are transferred onto a macrolevel on which language users integrate them into a coherent whole, thus forming more global structures (or a "macrostructure") of emergent discourse. Based on these considerations it makes sense to assume that real-time language processing is organized in a dualistic way:

i. there is short-term processing within time-based perceptual windows (which constrain processing frames), involving microstructures based on morphosyntax and propositionalty;
ii. there is more far-reaching processing that exceeds time-based perceptual windows, involving structuration on a "macrolevel".

(ii) involves the generation of a mental model of discourse, based on coherence relations *within* turns, where single microstructures are linked into an integrated whole, and coherence relations *between* turns, which requires the ability to derive a mental representation of a larger set of subsequent discourse units. Considering the distinction between "core grammar" (or *microstructure*) and "higher-level grammar" (or *macrostructure*) discussed in Section 2, we can postulate a strong connection between the two forms of language processing shown in (i) and (ii) and the way in which these forms shape the structural organization of language.

There is indeed much evidence for such a dualistic organization of language processing coming from psycholinguistic studies on how texts are processed by readers or, more precisely, how readers create a more global mental representation from larger amounts of linguistic input. In some lines of psycholinguistic research dealing with text comprehension two kinds of interrelated representations are distinguished: a *propositional representation* (or textbase) and a *discourse model* (or situation model) (Kintsch 1988; Gernsbacher 1990; Graesser et al. 1994; Greene et al. 1992; McKoon and Ratcliff 1992; Long et al. 2005; Prat, Long and Baynes 2007). The *propositional representation* is organized as a network of the explicit ideas or propositions derived from a text as well as the relations between them on a local-linear level, where each new incoming proposition is linked to those propositions that are active in working memory. The *discourse model* is a second level on which a globally coherent representation of a text is constructed by organizing propositional units into one overarching theme (what a text is about). On this level, explicit text information is linked to relevant world knowledge and subjected to inferential processing in order to derive a mental representation the important features of the real or imaginary situation depicted in a series of utterances or sentences forming discourse. Discourse model is thus the ability to identify main ideas and themes from single processing units.

The processing difference between local (short-term) and global (long-term) structures in discourse is also reflected in a large body of neurolinguistic studies based on hemispheric differences in the human brain, which show that patients with right-hemisphere (RH) damage show seriously impaired abilities as regards the long-term integration of single ideas or propositional units under one coherent, organized whole and the identification or mental derivation of an overall topical structure. For instance, speakers suffering from RH impairment have been shown to produce significantly more violations of discourse coherence than those with an intact RH, whereas their syntactic skills are usually unimpaired (Brady, Armstrong and Mackenzie 2006). These violations mainly surface in problems with topic maintenance and topical coherence (involving e.g. frequent divergences from the main topic, Caplan and Dapretto 2001), and the lack of a coherent macrostructure of discourse, as is reflected in difficulties with the sequential ordering of events (Marini et al. 2005) or the inappropriate use of formulaic expressions and "nonspecific" elements that signal discourse continuity (e.g. *and so on*, Sherratt and Bryan 2012). Generally, RH-damaged speakers tend to produce fewer connectives that indicate the kind of relation between propositions (e.g. causal, temporal, or conclusive relations, Sherratt and Bryan 2012), which is indicative of the speakers' difficulties in reflecting the link between different information units. To conclude, existing evidence points toward difficulties of RH-damaged subjects in building up and applying mental structures that guide discourse processing in terms of production *and* comprehension and that allow them to link discourse segments into a coherent whole (Tompkins et al. 2002: 436). Impairments of this kind affect the speaker's macrogrammatical competence since these aspects are immediately relevant for the ability to assess the relation between subsequent segments of ongoing discourse.

The observation that grammatical competence of speakers with RH damage is relatively intact in one domain, namely the one dealing with the creation of hierarchically organized syntactic and semantic structures, or microstructures, while competence in the macro domain, which concerns the integration of microstructures under a continuously updated global representation of discourse, is impaired, strengthens the idea that linguistic activity rests upon two distinct processing systems. The dualism assumption thus implies parallel processing activities during input flow: participants construct a mental representation of structures that are in the momentary focus of WM activity, and they derive more global structures extending over larger numbers of segments that are produced and processed incrementally, thereby developing an overarching coherent representation of discourse.

4. Structural relations on the macrolevel

Macrolevel processing – or the derivation of mental macrostructures – is supported by different processing cues in language, most of which can be subsumed under Dik's (1997) concept of 'extra-clausal constituents' (ECCs) (see Section 2). In spoken language, many of these cues tend to cluster in particular structural slots, mostly at the beginning and the end of what can be loosely called a "structural unit" in discourse. The kind of unit under consideration depends on the ways in which discourse is segmented and on the criteria taken into consideration (e.g. prosody, syntax, semantics/propositionality, or conversational actions), which vary across authors and research groups and lead to different units of analysis, e.g. prosodic or intonation units (e.g. Halliday 1985), idea units (Chafe 1994: Chapter 4), information units (Raso 2014), discourse segments (Redeker 2006), units of talk (Schiffrin 1987), turn-constructional units (TCU) (Ford and Thompson 1996), or turns (Sacks, Schegloff and Jefferson 1974), most of which are defined as mixed categories based on prosodic, semantic-pragmatic and sometimes also syntactic criteria (see also Degand & Simon 2009). Thus, a detailed functional analysis of ECCs must, in principle, account for the different levels of discourse on which ECCs may establish structural relations, but often a particular choice needs to be made in order to maintain the feasibility of an empirical study. I will focus on the turn as the smallest unit of conversational interaction, leaving it to further research to apply the findings generated here to smaller units of analysis. A 'turn' is defined here in conversation-analytic terms as a stretch of speech occupied by a single speaker who is recognizably claiming the conversational floor.[1]

1. This definition excludes three cases: (i) overlaps through which less than one third (measured in words) is produced "in the clear"; (ii) contributions to conversation that can be subsumed under so-called "choral activities" (Schegloff 2000: 6), which are typically performed simultaneously as a response to a speaker's turn, such as laughter or expressions of emotion (e.g. disgust, shock); and (iii) utterances that serve merely backchanneling functions (McCarthy 2003;

The turn is a suitable analytic unit for the use of ECCs since the beginnings and ends of turns are points in time in real-time discourse production that correlate strongly with the use of expressions serving macrostructure. The reason is that at turn boundaries speakers need to deal with a large set of generic communicative tasks, given that these points represent periodically arising transitional points as regards speaker roles, ideas (expressed by different speakers), and actions, and are thus crucial for the development of discourse. Hence, the need for maintaining order at all levels of the communicative system is very high at such points: speakers need to bridge speaker changes and thus transitions from one speaker's action to another speaker's action, establish relations between action sequences (e.g. question–answer, offer–acceptance/decline), and indicate the relation between discourse units (e.g. propositional, rhetorical, or topical relations). Therefore, these moments carry a high potential for breaks in coherence and thus in the "macrostructure" of linguistic discourse. Empirical evidence for this assumption comes from the observation that the beginnings and ends of turns, also often referred to as the "peripheries" of an utterance, are the main hosts for so-called "pragmatic markers", i.e. a broad set of expressions with procedural meanings in the sense of Blakemore (2002) that guide the interpretation of an utterance, among them discourse markers (DMs) (e.g. Schiffrin 1987; Fraser 1999; Cuenca and Marín 2009; Heine 2013), interjections (e.g. Ameka 1992), comment clauses (e.g. Brinton 2008), tag questions (e.g. Tottie and Hoffmann 2006, 2009), or formulae of social exchange, all of which form the class of ECCs. An example for the frequent occurrence of ECCs and sequences of ECCs at turn-beginnings and -endings in spontaneous speech is given in (5).

(5)

A: **oh actually** Dad asked me if (.) Sarah had phoned me on Sunday
I thought funny thing to ask (.)
and then I remembered of course she had cos that was why we went over
I think that was Sunday **wasn't it**?
B: yeah (..)
A: **but** almost as if she had some sort of message to give me **or** (.)
B: **well** presumably she called him.
A: **well** she'd been down there.
had a very good day.
[…]

[ICE-GB S1A-023]

Rühlemann 2017), i.e. that are produced during or after another speaker's turn and not followed by more talk (e.g. *mhm*, *yeah* or *that's right*), since these are "not construed as full turns, but rather pass up the opportunity to take a turn" (Levinson and Torreira 2015: 8).

At turn-beginnings, both speakers deal with different tasks that can be assigned to the three functional domains presented in Table 2, such as reacting to a prior speaker's turn in the domain of INTERACTION, or indicating that the upcoming turn diverges from the options for coherence offered by the prior speaker's turn (*well*) (Schiffrin 1987: 107–112), e.g. when next speakers lack the required knowledge to provide an "ideal" response (line 128) or when they modify parts of a prior speaker's turn (line 129). Turn-initial ECCs also serve various discourse-structuring tasks, such as projecting the kind of continuation on the textual level, e.g. a sudden shift toward a new topic (*oh*) that is potentially unexpected for the addressee (*actually*), or a reshift in focus relative what has just been said (*but* in line 127). At the end of a turn, a different set of communicative tasks becomes relevant, such as eliciting addressee response (*wasn't it?*) or retrospectively marking what has just been said as being open for semantic modification (*or*), the first of which refers to interaction management, the second one to how the utterance is to be interpreted (COGNITION).

Based on these observations I argue that the occurrence of expressions serving the macrostructure of discourse at particular moments in the step-by-step construction of a turn is relatively systematic, even though they are not subjected to sentence-grammatical syntactic principles. Their distribution arguably corresponds to the temporal logics of communicative tasks to be performed in real-time turn production. Responding to a prior utterance and expressing e.g. acknowledgment or dis/alignment, for instance, is usually relevant at the beginning of a turn (e.g. initial *yeah*), whereas invitations for next-speaker contribution (i.e. tasks relating to turn-taking and upcoming talk) occur at later points in time in the construction of a turn, often at its (preliminary) end.

Generally, we can speak of generic macrostructuring tasks that speakers are faced with at turn-beginnings and -endings, which correspond to the three domains discussed above (INTERACTION, DISCOURSE-STRUCTURE, COGNITION), and many of which have been discussed in the literature (Auer 1996; Deppermann 2013; Heritage 2013; Haselow 2017: Chapter 4). At turn-beginnings, speakers mainly deal with setting up the conditions required for successful uptake of an upcoming turn (e.g. claiming the addressee's attention), linking upcoming talk back to prior talk, and with projections, i.e. with the task of pointing into the discursive future in terms of what will follow in upcoming talk and how this is to be processed or interpreted. At the preliminary end of a turn, speakers usually deal with a variety of communicative, macrostructuring tasks before potential turn transition, such as speaker role management (e.g. marking turn-completion and an opportunity for turn transition) or making adjustments that are necessary according to the speaker's intuition or to contextual demands before possible turn transition or continuing with a new idea.

The beginning and the end of a turn are thus two crucial moments in the linear production of a unit of talk as they "shape the organization of turns at talk" (Schegloff 1996: 54) in a recurrent way. They correlate with the use of ECCs since these represent a routinized communicative resource by which speakers deal with the dense network of recurrent generic tasks. The set of ECCs that are mainly used at turn-beginnings in spoken English for macrostructuring tasks, based on the inspection of transcripts of spontaneous speech in the British component of the International Corpus of English (ICE-GB), is given in Table 3. The expressions are ordered according to their complexity, ranging from single lexical units to units with a more complex internal structure. Note that the classical structuralist categorical and conceptual apparatus (parts of speech, syntactic categories) is difficult to apply to the different expressions since they often do not fit into the established categories of grammatical analysis, neither formally nor functionally, which explains the continuous renewal of labels used to refer to them in the literature. In order to avoid terminological disintegration by postulating entirely new classes or terms I will make use of "established" labels, which are important for identifying the different unit types among analysts. The list also indicates the functional domain in which each of these expressions prototypically creates relations on the macrostructural level.

Table 3. Macrostructuring expressions at turn-beginnings

	Form	**Functional domain**	**Example**
(i)	Interjection	INTERACTION, COGNITION responding to prior talk, indicating emotional or cognitive stance	*oh…, wow…,*
(ii)	Adverb (incl. *response adverb*)	INTERACTION responding to prior talk, indicating stance (e.g. endorsement)	*of course…, really…, yeah…*
(iii)	DISCOURSE MARKER	DISCOURSE STRUCTURE integrating a turn into ongoing discourse, marking transitions between units of discourse	*well…, so…, anyway…*
(iv)	Vocative/Address term	INTERACTION expressing addressee-orientation, strengthening or mitigating illocutionary force	*Jim…, honey…*
(v)	Parenthetical (*comment clause*)	COGNITION expressing how information is to be processed (e.g. in terms of epistemic stance, as a reformulation etc.)	*I think…, I mean…,*
(vi)	Clausal fragment (*chunk*)	DISCOURSE STRUCTURE preparing upcoming talk: transition to a focal piece of information	*the thing/point is…, what I mean…,*

Some of the expressions that may occur at turn-beginnings can also be produced at other points in time in the production of a turn, e.g. at the end of a turn, such as adverb-like units (e.g. *really*), some discourse markers (e.g. *actually*, *anyway*), or vocatives/address terms. Since the tasks to be fulfilled by a speaker in the initial phase of the production of a turn differ from those at its possible end (see Haselow 2017), expressions that are available for use in different time slots serve different communicative functions.

An overview of expressions that occur at the potential end of turns, based on the ICE-GB, is provided in Table 4. As above, the terminology used here is largely based on established formal categories.

Table 4. Macrostructuring expressions at turn-endings

	Form	**Functional domain**	**Example**
(i)	Adverb (incl. *response adverb*)	INTERACTION referring to a prior speaker's utterance	*…of course, …really, …yeah*
(ii)	Linking adverb	DISCOURSE STRUCTURE retrospective linking of turns	*…then, …though, …anyway*
(iii)	Vocative/Address term	INTERACTION expressing addressee-orientation	*…Jim,…mate*
(iv)	General extender	COGNITION referring to shared knowledge, eliciting a mental ad hoc category	*…and stuff, …or something*
(v)	Parenthetial clause (*comment clause*)	COGNITION expressing how information is to be processed (e.g. in terms of epistemic stance, as an opinion etc.)	*…I think, …I believe*
(vi)	Tag question	INTERACTION facilitating addressee involvement, expressing listener-orientation	*…isn't it?, …can you?*
(vii)	(Independent) *If*-clause	INTERACTION, COGNITION establishing contact to the addressee, hedging, providing a comment on the adequacy of expression	*…if you like, …if I may say so*

Turn-final expressions are only interpretable with reference to the unit for which they typically provide an interpretive cue and often improve the perceptibility of transition-relevance places (TRPs, Sacks, Schegloff and Jefferson 1974) as they are conventionalized in this position. Thus, they play a crucial role in the organization of conversational interaction on the macrolevel. Many of the expressions in Table 4 create particular additional pragmatic effects: vocatives, for instance, may be used to soften or to strengthen illocutionary force, and general extenders may serve as “punctors” and thus as merely indicating the end of a conversational activity and thus of a turn (Overstreet 2014).

The different kinds of expressions that are optionally available for use at turn-beginnings and -endings fulfil all the criteria for ECCs in the sense of Dik (1997): they are not morphosyntactically integrated into hierarchical relations with other lexical, phrasal or clausal units, they neither receive their morphosyntactic and semantic properties from any other form nor assign such properties to other forms, and they do not relate clausal constituents to one another. Hence, they are morphosyntactically autonomous and do not contribute to, change or restrict the propositional content of the unit they accompany. They are used to structure language and interaction on a macrolevel rather than creating microstructural (clause-internal) relationships in the sense that they serve as processing cues for a discourse unit, framing a message and integrating it into the communicative context.

Given that the beginning and the end of a turn are highly conventionalized (discourse-) structural positions that serve as hosts for a relatively fixed set of conventionalized expressions serving the establishment and maintenance of macrostructure, it appears useful to consider these slots as (macro)grammatical and thus as structurally relevant positions in their own right. As proposed in Haselow (2017), they may be referred to as macrogrammatical “fields”, which are definable as optional, but regular syntactic positions available for a fixed set of expressions outside microstructural relations serving the creation of macrostructure. We may thus speak of an *initial field* in the case of turn beginnings, and a *final field* when referring to the turn-final slot.

The postulation of macrogrammatical *fields* is a descriptive tool allowing us to subject macrogrammatical expressions to a systematic description, e.g. in terms of positional constraints. However, such a description can, of course, never be deterministic and based on *a priori* rules: a grammar of macrostructural elements is a probabilistic grammar describing the use of macrogrammatical expressions not in terms of (quasi-)obligatoriness, but in terms of abstract schemas that serve the creation of language structure in the linear flow of time. *Fields* are subject to the exigencies of communication in the sense that their occurrence is not projectable, but arising in ad hoc ways in the stream of speech.

An important question is whether these *fields* have a “grammar” of their own in the sense they are not merely hosts for syntactic “outlaws”, but exhibit an internal structure that restricts the acceptability of particular linearization patterns involving expressions with macrostructuring functions (ECCs). I will deal with this question in Section 5.

5. Grammatical principles on the macrolevel of language structure

The question of whether or not the *initial* and *final field* have a grammar of their own can be answered by studying the sequencing behavior of expressions serving macrostructure. Regularities in the linear order of different functional types of macrogrammatical expressions (ECCs) would be indicative of functional-grammatical serialization principles outside traditional sentence grammar or “micro-grammar”, encompassing linguistic forms that occur as “extra-clausal constituents” at turn-beginnings and -endings.

Prior studies of expressions that serve the creation of macrostructure, most of them focusing on discourse markers, have repeatedly shown that they frequently co-occur in conversational speech in various languages (e.g. Pons Bordería 2018; Cuenca and Marín 2009; Fraser 2011, 2015; Dostie 2013; Koops and Lohmann 2015; Lohmann and Koops 2016; Cuenca and Crible 2019). In the *initial field*, for instance, *and* often co-occurs with *so*, as illustrated in (6).

(6)

23 B: and it it faces south and it has big rooms and it’s a nice house (.) and,
24 A: **and so** the sun comes in.
25 B: oh yes (..) yes mm.

[ICE-GB S1A-031]

Speaker A uses *and* to continue or add to the prior speaker’s utterance, and combines *and* with *so*, which in this case signals that the turn expresses an inference drawn from B’s utterance.

In the *final field*, a general extender (GE) can, for instance, be followed by a tag question, as in (7a), or a final linking adverb (or “final particle”) by a second one, as in (7b).

(7)

a. 214 A: well actually smelling salts are really good.
215 uhm uhm I thought it was a liquid.
[…]
220 it’s ammonia **or something isn’t it**?
221 C: oh yeah that smells like urine doesn’t it?

[ICE-GB S1A-046]

b. 175 B: we should=maybe just leave a message here saying head over. (.)
176 A: she won’t bother coming **then though**.

[ICE-GB S1A-039]

In (7a), the GE *or something* marks the validity of the content of the turn as potentially challengeable, while the tag question *isn’t it* serves as a device to implicitly invite a response or contribution by the addressee (which is then delivered). In (7b), speaker A combines two final particles, *then* indicating that the prior message is inferentially related to B's utterance, *though* indicating that the content expressed in the turn goes against the implication of B's proposal, which is that leaving a note and thus sanctioning Vicky's behavior would change anything.

The serialization of ECCs in the two fields is often constrained: a final particle can, for instance, be followed by a parenthetical clause, but it is usually not preceded by it (e.g. **She won't bother coming I think then*). This suggests that the *fields* have a syntax of their own, as also shown by Isutzu and Isutzu (this volume). Empirical evidence for the sequencing behavior of a larger set of turn-initial and -final macrostructuring expressions (ECCs) in spoken English has recently been provided by Haselow (2019), based on which it was possible to identify general patterns that determine their linear order and the functional motivation behind it. I will here briefly present the data of this study in a revised form and interpret them in a new light, using dualism as a descriptive framework.

A 'sequence' of ECCs is defined as a combination of two or more non-identical, immediately adjacent extra-clausal expressions (thus excluding discontinuous co-occurrences), provided that each expression is also used outside such sequences as an independent form. Sequences of identical forms (e.g. *yeah yeah*) are excluded here, based on the assumption that these are either a device to intensify the function expressed by a particular ECC or deriving from overlaps with a prior speaker as a strategy to restart a turn-beginning "in the clear". Moreover, they may functionally differ from the single use of an expression (e.g. *oh oh* vs. *oh* or *well well* vs. *well*) and may thus have a different, non-compositional idiosyncratic meaning.

The data discussed below are based on the spoken section of the British component of the *International Corpus of English* (ICE-GB, sections S1A–S2B), which is based on 1,193 speakers who produced 637,682 words. The ICE-GB offers transcripts of spontaneous (unscripted) speech in private and public contexts (e.g. conversations, broadcast discussions, business transactions), and thus comparatively rich material for sequences of ECCs, which are most frequent in unplanned spontaneous speech produced in interactive contexts.

5.1 Turn-initial and -final extra-clausal constituents

As regards turn-beginnings, 16 turn-initial ECCs were included in the study on the sequential behavior of ECCs as these were the expressions that occurred with the highest frequency in turn-initial use in the ICE-GB and thus with frequencies that were high enough for them to occur in sequences with other expressions and for significance tests. The 16 ECCs (see Table 5) mainly include linguistic devices referred to as backchannels and discourse markers in the literature. The expressions available for use at the potential end of a turn fall into six formal categories:

i. Linking adverb (also *final particles*, FPs) (e.g. Haselow 2013; Hancil, Haselow and Post 2015): *actually, anyway, then, though* (only in final position, where they serve functions that are clearly distinct from their uses in other positions);
ii. General Extenders (GEs) (Overstreet 1999, 2014; Pichler and Levey 2011): *and stuff, and that, and everything, and so on, or whatever, or something, and all…/… that sort of thing/…that nonsense/…sorts/…that stuff/…this/…that*);
iii. Independent *if*-clauses (Brinton 2008: 163–166): *if you like, if I may, if I may say so, if you want, if you don't mind me saying, if you know what I mean*;
iv. Parenthetical clauses (*comment clauses*) (Dehé 2014): *I think*, *you know*;
v. Tag questions (Tottie and Hoffmann 2006, 2009): based on the positive and negative forms of *be, can, could, do, have, may, should,*and *would* plus a personal pronoun (e.g. *isn't it?, shouldn't he?*);
vi. Strengtheners (Haselow 2017: 183–184): *yeah*.

Table 5 shows the frequency of the selected turn-initial and -final ECCs in the spoken sections of the ICE-GB. Note that for FPs the frequency of all single forms (rather than that of the category as a whole) is given since, in contrast to individual forms in other categories (e.g. that of GEs), they are frequent enough to be statistically relevant.

The figures in Table 5 suggest that the most frequent turn-initial ECCs are INTERACTION markers with transitional functions (*yeah, yes, no, oh*) and markers operating in the domain of DISCOURSE STRUCTURE, which indicate a particular kind of progression in discourse, e.g. continuation or conclusion (*and, so*). At the end of turns, tag questions and GEs are clearly the most frequent type of ECC in the corpus and, compared to their overall frequency, almost always used in this position. Other turn-final ECCs occur also in other structural positions, but with different functions (consider, e.g., the uses of *then* in final vs. other positions, Haselow 2011).

5.2 Method

Serialization patterns in sequences of ECCs can be empirically investigated by measuring the likelihood of each single expression to be followed (or not) by any of the other expressions with which it may cooccur, based on *direct transitional probabilities* (DTPs, Gregory et al., 1999; Kapatsinski 2005). DTP is a probabilistic measure developed for bigrams that rates the likelihood of a given word *x* to be followed by another word *y*, and thus of the ordering probability between two consecutive words. The measure was applied to each individual, two-part combination *xy* from the set of turn-initial or -final ECCs included in this study. If the DTP for *x* being followed by *y* is higher than that of *y* being followed by *x*, *xy* is the

Table 5. Frequency of turn-initial and -final ECCs in the ICE-GB (spoken sections)

Turn-initial ECCs			Turn-final ECCs		
Form	**Frequency turn-initial**	**Overall frequency**	**Form**	**Frequency turn-final**	**Overall frequency**
1. *yeah*	2,520	2,746	1. Tags	405	447
2. *yes*	2,149	2,531	2. GEs	302	316
3. *so*	1,848	3,474	3. *then*	191	1,629
4. *oh*	1,596	1,623	4. *though*	162	319
5. *well*	1,518	2,955	5. *anyway*	135	269
6. *I mean*	1,013	1,409	6. *actually*	144	956
7. *no*	701	2,472	7. *I think*	95	1,022
8. *but*	567	4,134	8. *you know*	53	1,005
9. *I think*	542	1,022	9. *if*-chunk	35	35
10. *OK*	452	558	10. *yeah*	23	2,746
11. *because*	446	1,535			
12. *and*	322	12,586			
13. *anyway*	134	269			
14. *then*	109	1,629			
15. *actually*	98	956			
16. *you know*	49	1,005			

more probable order. DTP is defined as the frequency of an individual sequence of macrogrammatical expressions *xy* divided by the frequency of the first expression *x* in all turn-initial *or* turn-final sequences (whether as first or as second element), as shown in (8). Thus, DTP as used here does not measure the *overall* probability of *x* to be followed by *y* in the corpus in general, but only the probability of *x* to be followed by *y* in sequences (bigrams) at the beginning or the end of turns.

(8) $$\text{DTP} = \frac{\text{Frequeny}_{\text{Sequence } xy \text{ at turn-beginnings or -endings}}}{\text{Frequency}_{x \text{ in all sequences at turn-beginnings or -endings}}}$$

If we aggregate all bigram DTPs for a single ECC in all possible two-part combinations including this form, we arrive at a general DTP value for an individual ECC that indicates its overall probability to be followed or preceded by other ECCs. A high overall DTP would thus indicate a high probability for *x* to precede all *y*s in sequences, i.e. such forms are more likely to occur first in sequences. All DTP values are distributed over a [0,1] interval, with values close to 1 indicating high probability. Note that in order to reach highest accuracy all DTPs are based on token frequencies rather than on normalized frequencies (especially since some sequences are very rare, and yet indicative of what speakers do).

A particular sequence *xy* may be part of an even longer sequence *xyz* (e.g. *well I think actually*) or *wxyz* (e.g. *yeah well I think you know*), but in any case the direct transitional probabilities measured for *x* in all *xy* combinations would be indicative of *x*'s probability (e.g. that of *well*) to precede or follow any other *y*. Thus, the DTPs for a single form in two-part sequences lead to a general DTP value that indicates the probability of *x* to be followed (or not) by any *y* from the list in Table 5 in sequences of any size.

5.3 Results

Table 6 shows the token frequency of all turn-initial ECC combinations. The expressions in the left column are the starting point for combinations with expressions from the horizontal axis, i.e. they form the first elements *x* in sequences *xy* involving expressions of type *y* from the horizontal axis, with the frequencies indicated. When the data are read from the top to the bottom, the figures indicate the use of each of the expressions in the uppermost row as a second form *y* in a sequence *xy*. The sums in the rightmost column ('Σ [1st]') are aggregated DTPs and thus indicate the probability of each expression *x* to be used in all *xy* sequences as the first element, that is, to precede all other expressions *y*. The sums in the bottom row ('Σ [≠1st]') indicate the aggregated DTPs for *x* not being the first element in a sequence *xy* in the data. The respective cells also show the ratio of occurrences in first (right colum)/not first position (bottom row) and the overall occurrence of the respective expression in sequences at turn-beginnings.

As the data show, almost all two-part combinations show a bias toward a particular serial order as one order (e.g. *xy*) statistically always predominates over the other one (e.g. *yx*). For example, when *but* and *I mean* are combined, *but* is only attested as the first element (21 tokens, DTP = .1372), whereas the reverse order (*I mean but*) is unattested. This suggests that there are strong preferences for some ECCs to precede and for others to follow the expressions with which they are combined (see also Lohmann and Koops 2016: 439). Some expressions have a high overall probability to occur as the second element when they are combined with others, e.g. *I think*: sequences such as *well I think, oh I think* or *yeah I think* are statistically more probable than the reverse order.

Figure 1 shows the ranking of turn-initial ECCs based on the aggregated probabilities of an individual expression *x* to occur as the first element in all possible combinations *(…)xy(…)* considered here. ECCs with a higher aggregated DTP are more likely to be followed by other ECCs, and thus more often occurring as the first element in sequences than those with lower DTPs. The asterisks indicate the

Table 6. Frequency of ECCs in sequences at turn-beginnings and DTPs (Haselow 2019)

2nd ↓ 1st →	*actually*	*and*	*anyway*	*because*	*but*	*I mean*	*I think*	*no*	*oh*	*OK*	*so*	*then*	*well*	*yeah*	*yes*	*you know*	Σ(1st)
actually		0	0	0	0	0	1	2	0	0	0	0	0	0	1	2	**6:31 .1935**
and	0		0	0	0	3	3	0	1	1	6	7	0	2	1	1	**25:51 .4901**
anyway	0	0		0	0	2	0	1	0	0	1	0	0	1	0	0	**5:15 .3333**
because	0	0	0		0	0	3	0	0	0	0	1	0	0	0	0	**4:25 .1600**
but	3	0	6	0		21	7	2	0	0	0	5	1	1	1	4	**51:153 .3333**
I mean	0	0	0	2	0		8	1	0	1	1	0	0	1	3	6	**23:113 .2035**
I think	0	0	0	0	0	1		0	0	0	0	0	1	1	0	1	**4:110 .0363**
no	1	2	0	7	28	8	7		1	0	2	0	3	0	1	1	**61:149 .4093**
oh	5	0	0	0	7	2	7	45		6	3	0	47	72	39	3	**236:240 .9833**
OK	0	1	0	0	6	0	0	0	0		4	12	9	1	0	0	**33:53 .6226**
so	3	0	2	0	0	5	4	0	0	0		1	0	1	1	3	**20:57 .3508**

(*continued*)

Table 6. (*continued*)

2nd ↓ **1st** →	*actually*	*and*	*anyway*	*because*	*but*	*I mean*	*I think*	*no*	*oh*	*OK*	*so*	*then*	*well*	*yeah*	*yes*	*you know*	*Σ(1st)*
then	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	**0** **0**
well	11	1	2	7	3	27	49	37	0	2	3	0		17	32	11	**202:296** **.6824**
yeah	1	9	0	2	36	13	5	0	2	10	8	0	24		9	1	**120:232** **.5172**
yes	1	12	0	3	22	8	12	0	0	0	9	0	9	15		0	**91:179** **.5083**
you know	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		**1:33** **.0303**
Σ (≠1st)	**25:31** **.8064**	**26:51** **.5098**	**10:15** **.6666**	**21:25** **.8400**	**102:153** **.6666**	**90:113** **.7964**	**106:110** **.9636**	**88:149** **.5906**	**4:240** **.0166**	**20:53** **.3773**	**37:57** **.6491**	**26:26** **1.0**	**94:296** **.3175**	**112:232** **.4827**	**88:179** **.4916**	**32:33** **.9696**	

significance level deriving from a chi-square test, based on observed and expected position-based frequencies in turn-initial sequences.[2]

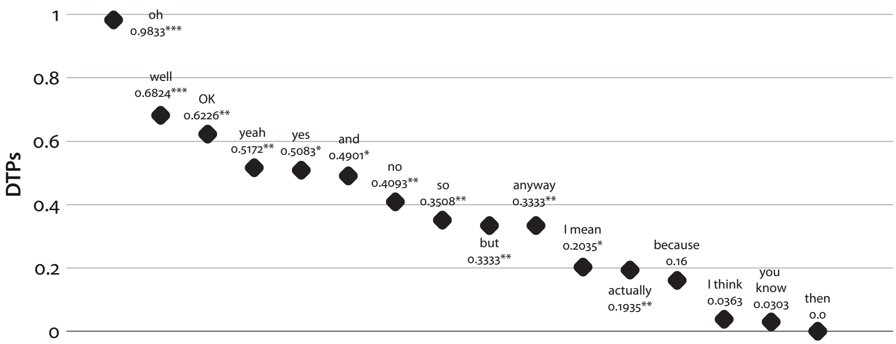

Figure 1. Probability of turn-initial ECCs to be the first element in a sequence, based on DTPs

Figure 1 shows a positional hierarchy that reflects the probability of any given ECC to occur first in a sequence relative to all other forms. *Oh* has the highest aggregated DTP value (.9833), which means that it occurs almost exclusively as the first element in a sequence of ECCs. At the opposite (lower) end we find *then*, which never occurred as the first element in a sequence at turn-beginnings in the corpus. The data show strong similarities to the "optimal sequencing hierarchy for discourse marker sequences" in Koops and Lohmann's (2015) set since those expressions that rank highest, thus having a high probability to precede other expressions, are *oh* and *well*, followed by *and* > *so* > [*or* >] *but* > *because*, *then* and *you know* forming the lower end.[3]

Now, as regards the question whether we can find grammatical principles in the macrodomain of language structure, the observations suggest a positive answer: it appears that the order of DMs is largely determined by their communicative function. The forms with the highest probability to occur first in a sequence in the initial field all serve functions in the INTERACTION domain as they structure the transition from one speaker to another (*oh*, *well*, *OK*, *yeah*, and *yes*), expressing an immediate reaction to prior talk such as acknowledgement and receipt of information (*yeah, okay, yes*) or change of knowledge state (*oh*). These

2. $* = p < .05$, $** = p < .01$, $*** = p < .001$. No indication of the significance level is given in those cases where the frequency in one or more of the cells is too low to yield statistically reliable values (which, however, does not necessarily mean that the relation between DTP and relative position in a sequence is insignificant).

3. Given that the authors operate with a smaller set of expressions, further comparisons cannot be made.

ECCs are typically followed by expressions that serve the organization of discourse as they integrate turns into a coherent whole, i.e. that operate in the domain of DISCOURSE STRUCTURE, namely *and*, *actually, anyway, because, but, I mean, no* and *so*.[4] These ECCs are oriented toward an upcoming, new move in ongoing discourse, e.g. a topical shift or contrast (*but*), a conclusion (*so*), a move into a different direction (*no*), or the continuation with a new aspect (*and*). The last group that statistically tends to follow all other types of ECCs is formed by *I think* and *you know*, which indicate how the upcoming turn is to be interpreted, namely as expressing the speaker's epistemic stance when prospectively marking a turn as conveying an opinion rather than a fact (*I think*) or as inviting the addressee to recognize both the relevance and the implications of the upcoming turn in a given sequential context (*you know*). These functions clearly belong to the domain labeled COGNITION in Section 2.

There is one clear exception to what looks like a fairly robust tendency, namely the distribution of *then*. The DTP for *then*, which clearly has a text-linking function as it creates a relation between two turns based on logical-temporal sequentiality (Schiffrin 1987: Chapter 8; Haselow 2011), is lower than that of all other ECCs operating in the domain of DISCOURSE STRUCTURE and even lower than that of ECCs serving functions in the domain of COGNITION, thus following all expressions in ECC sequences (e.g. *OK then, but then*). A possible reason is that the occurrence of *then* as an ECC (or 'discourse marker') is comparatively low and perhaps bound to co-occurring ECCs in order to distinguish it from the uses as a time adverb, which structures events on a time scale.

The empirical data suggest that when several tasks are given expression to at the beginning of a turn, those tasks that are related to interaction management (turn-taking, transition from one speaker to another) have priority over those tasks that project a particular kind of continuation in discourse, i.e. those indicating the type of textual link between a prior and an upcoming turn, because ECCs operating in the INTERACTION domain all have higher DTPs. After indicating the kind of link between a prior and an upcoming turn, speakers deal with tasks relating to how the upcoming turn is to be understood, e.g. as expressing an opinion (*I think*) or a message whose implications should be recoverable for the addressee (*you know*). These COGNITION-markers have a low probability to

4. Note that *no* may serve to express immediate disagreement in the domain of INTERACTION, but that it is more often used as a device to indicate a shift on the textual level into a different direction than what has been expressed or implied before, thus serving discourse structure (Lee-Goldman 2011). A possible reason is that speakers usually mitigate disagreement (consider the high frequency of *well no*).

precede other ECCs in a sequence and thus occur closest to the communicative core of the upcoming turn.

The empirical observations on ECC sequences in the initial field presented thus far allow us to postulate the macrostructuring principle shown in Figure 2.

SEQUENTIAL ORDER IN THE INITIAL FIELD (TURN BEGINNINGS)

INTERACTION	→	**DISCOURSE STRUCTURE**	→	**COGNITION**
e.g. *oh, yeah, yes*		e.g. *and, but, so*		e.g. *I think*

Figure 2. The sequential order of ECCs at turn beginnings

The sequential order of different types of ECCs in the initial field corresponds to or reflects the temporal logics of communicative tasks that usually become relevant during the transition from one turn to another: tasks relating to a prior turn, such as responding, logically precede those which point into the discursive future by anticipating a particular kind of continuation, which in turn precede those tasks relating to how an upcoming turn is to be interpreted. The empirical findings thus provide indirect evidence for a particular processing order on the discourse level, which drives speakers' routine behavior as regards the performance of one of the most frequent discourse tasks in a speaker's lifetime, namely getting in and out of a turn (the same holds, from a perceptual perspective, for the listener).

Table 7 indicates the frequency and the DTPs of each ECC sequence at the end of turns attested in the ICE-GB, based on the set of expressions presented in Table 5.

As the low figures suggest, sequences of ECCs are much less frequent at turn-endings than at their beginnings, i.e. speakers are less likely to combine different ECCs at the end of a turn. One group of ECCs – independent *if*-clauses – is even entirely unattested in sequences, i.e. these units always occurred on their own in the data. Figure 3 shows the order of single ECCs according to their likelihood of being followed by further ECCs in descending order. Final *then* and *anyway* are most likely to be followed by other ECCs if they occur in a sequence, given that their likelihood of being the first element in a sequence at turn-endings is highest, whereas e.g. tag questions are not followed by other ECCs in the data, so their probability to be the first element in a sequence is zero.

Table 7. Frequency of ECCs in sequences at the end of turns and DTPs (Haselow 2019)

2nd ↓ **1st →**	*then*	*though*	*any-way*	*actu-ally*	tags	GEs	*I think*	*if*-chunks	*yeah*	*you know*	**Σ (1st)**
then		1	0	0	9	7	0	0	3	0	**20:20** **1.0**
though	0		0	0	13	0	0	0	0	1	**14:16** **.875**
anyway	0	1		0	2	2	0	0	0	0	**5:5** **1.0**
actually	0	0	0		0	0	1	0	0	1	**2:3** **.6666**
tags	0	0	0	0		0	0	0	0	0	**0:35** **0**
GEs	0	0	0	0	9		1	0	1	3	**14:23** **.6087**
I think	0	0	0	1	2	0		0	0	0	**3:5** **.6000**
if-chunks	0	0	0	0	0	0	0		0	0	**0:0** **0**
yeah	0	0	0	0	0	0	0	0		0	**0:4** **0**
you know	0	0	0	0	0	0	0	0	0		**0:5** **0**
Σ (≠1st)	**0:20** **0**	**2:16** **.125**	**0:5** **0**	**1:3** **.3333**	**35:35** **1.0**	**9:23** **.3913**	**2:5** **.4**	**0:0** **0**	**4:4** **1.0**	**5:5** **1.0**	

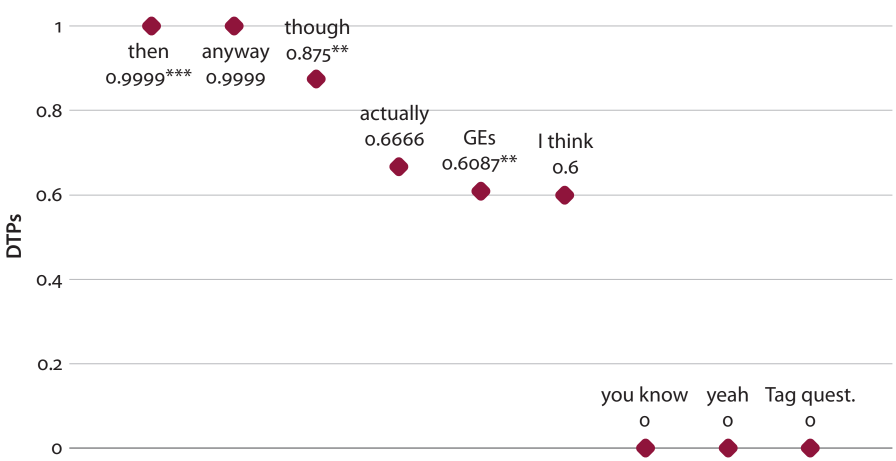

Figure 3. Probability of turn-final ECCs to be the first element in a sequence, based on DTPs

If we assign each of these ECCs to one of the macrostructuring functions discussed above for which they typically serve as expressive devices we can identify the following pattern. Final *then, anyway, though*, and *actually* clearly serve the organization of discourse as they have a retrospective connecting function in the sense that they establish a relation between two adjacent turns. This relational function has been defined as the most important class-defining functional feature of final linking adverbs/final particles in the literature (Biber et al. 1999: 889–892; Haselow 2013; Hancil, Haselow and Post 2015). A second functional class comprises forms that indicate how the turn just produced, or an aspect of it, is to be interpreted – not in relation to preceding talk, but as to the kind of utterance is represents. Their functional domain is COGNITION. This class includes GEs and the parenthetical (or *comment clause*) *I think*. GEs serve as an interpretive cue expressing that there is potentially more to say, i.e. the speaker typically marks "the preceding element as a member of a set" and instructs the listener to interpret this element "as an illustrative example of some more general case" (Dines 1980: 22–23). This way, GEs evoke the existence of more exemplars in addition to the item/s mentioned, the latter of which form(s) the starting point for a mental abstraction process leading to a contextually relevant "ad hoc category" comprising other, unmentioned examples (Barsalou 1983; Mauri and Sansò 2018). *I think* retrospectively marks an utterance as epistemically weak (Thompson and Mulac 1991), usually as an opinion, and thus retrospectively changes the interpretation mode of an utterance from a fact to an opinion or an assumption. The third group of ECCs, which are not followed by other ECCs and thus tend to occur last in turn-final sequences, comprises expressions that relate a turn to different aspects of the interaction between the speaker and the addressee: *you know*, tag questions, and final *yeah*. Turn-final *you know* serves as a device to express the speaker's assumption that, based on shared knowledge or experience, the addressee is able to grasp the implications of a message just produced, and that there is no significant discrepancy between the mental world of the speaker and that of the addressee (Schourup 1985: 102). Its use at the end of a turn implicitly invites the addressee to respond to this assumption. Tag questions invite the addressee to contribute to ongoing discourse ("facilitative tags") or indicate the speaker's expectation that the addressee will agree ("attitudinal tags") (Tottie and Hoffmann 2006, 2009). Final *yeah* reconfirms the content of the prior speaker's utterance or an implied meaning and thus provides confirming support for another speaker's utterance, marking a transition-relevance place. In all these cases, ECCs clearly target the addressee and prepare a next step in conversational interaction, usually opening the floor for next-speaker contribution.

As with turn-initial ECCs, the order of expressions serving macrostructuration in the final field appears to follow a particular pattern, as shown in Figure 4.

SEQUENTIAL ORDER IN THE FINAL FIELD (TURN ENDINGS)

DISCOURSE STRUCTURE	→	COGNITION	→	INTERACTION
e.g. *then, though*		e.g. *I think*		e.g. *isn't it?*

Figure 4. The sequential order of ECCs at the end of turns

ECCs serving the structuration of discourse occur earliest in a sequence, and thus closer to the message they accompany than those serving as interpretive cues and interaction management. The underlying temporal logics behind this order is relatively straightfoward: tasks dealing with interaction management occur at a point in time at which the transition from one speaker to the next is likely to occur, namely at the extreme end of a turn and thus closest to a TRP, whereas linking tasks on the discourse level are dealt with earliest in order to allow for early processing of the message as contributing to the coherence of discourse. Interpretive cues on how to understand or interpret the message of a turn occur in-between these two functional types of ECCs.

The strong bias toward specific orders suggests that "extra-clausal" components of an utterance are not unconstrained as regards their distribution in a turn, even though they occur "outside" microstructural (e.g. clausal) units. Rather, the data provide evidence for the existence of a component of grammar that encompasses forms that are not involved in clause-internal dependency relationships and that serve the structuration of language on the macrolevel. It appears that these tasks are linearized according to their relation to surrounding discourse: what is relevant for structuring interaction (e.g. turn taking) occurs at the fringe of turns, interpretive cues for understanding the type of turn and its link to prior discourse are produced in close vicinity to the message itself. It is important to note that (i) the expression of the different communicative tasks described above is not required in all contexts (hence, the ordering patterns only predict what a sequence involving more than one expression serving different macrostructuring tasks is likely to look like) and that (ii) ECCs are not the only means to deal with these tasks. Moreover, the findings do not account for some patterns that do occur in speech even though they deviate somewhat from the order that derives from the DTPs, such as *no I mean so actually you know* (ICE-GB S1A-029, 158–159). This is natural, given that the ranking order is based on probability measurements, i.e. it indicates a linearization order that is most probable, based on the combination of the 26 ECCs. Probabilities only express *what is most likely* rather than representing fixed rules that exclude other linearization patterns. In this sense, the "macrogrammar" underlying the use of ECCs at turn-beginnings or -endings is not based on the obligatory presence of all "constituents", as in sentence-grammar, but on a probabilistic description of the use of these expressions in terms of sequentially organized communicative tasks accompanying the creation of linguistic structure in the linear flow of time.

6. Discussion

The sequential order of ECCs reflects a functional motivation that is based on speakers' cognitive orientation in discourse processing, and thus lends support to the assumption that the two macrogrammatical fields have a syntax of their own: the linearization order of ECCs corresponds to an underlying temporal logics of macrostructuring tasks to be performed at the beginning and the end of a turn. Taking a dualistic approach to language structure, this would mean that the structuring principles on the microlevel of language differ from those on the macrolevel, each serving a different purpose: while microlevel structuration is based on local relations between single constituents that form a morphosyntactic and semantic unit in the sense that they are all integrated in a dense network of mutual dependency relationships and propositionality, macrolevel structuration serves the creation of global relations between one or more microlevel units, the latter of which may form discourse units of varying size (e.g. intonation units, turns, topical units). Structuring language on the macrolevel thus involves higher-order reasoning processes, given that it is not based on the creation of formally autonomous and propositionally self-contained structural units, but on the integration of segments into a structured whole.

The two levels are not separated, but interact and complement each other in various ways, given that at some point they must converge into one overall structure in natural discourse. We should therefore not be tempted to conceive of micro- and macrostructures in language as forming separate systems, with macrostructures simply "continuing" where microstructures leaves off. For instance, macrostructural principles may affect structuration on the microlevel in that discourse goals often guide speakers in selecting specific microstructural formats at different points in the interaction (see e.g. Ariel 2009). Microstructures may, in turn, be functionalized for macrostructural purposes and thus be interpolated within macrogrammar, e.g. in the case of complex (paren)theticals (Dehé 2014; Heine et al. 2017). In such cases, pieces of syntax formed according to the principles of microstructure are deployed in the service of macrostructure, such as comment clauses (*I think/believe/guess, you know*), some discourse markers (*by the way*), if-chunks (e.g. *if you will, if you like, if you know what I mean*), or general extenders (e.g. *and stuff like that*), which serve different functions such as providing cues for utterance interpretation and interaction management. Such structural units are taken out of microstructuration in the sense that they are no longer anchored in the structure of a sentence (they are syntactically, semantically, and often also prosodically detached from clausal constituents), but rather concern inferential mechanisms that are anchored in the situation of discourse (the 'context'). As the data discussed in Section 5 suggest, such units are integrated in a second system of language structure ("macrostructure"), in which they are subjected to particular positional constraints relative to other elements serving macrostructure.

A second piece of evidence for the close interaction between the micro- and the macrolevel of language structure comes from the study of historical-developmental processes in language: the extensive body of literature on the development of different types of ECCs provides compelling empirical evidence that elements serving macrostructuration typically derive from elements that once served as sentence-internal constituents on the microlevel of language structure (e.g. adverbs, clausal fragments), i.e. structural elements may be transfered from one domain to the other. Some of them represent borderline cases in that they are relevant for establishing sentence-internal (microstructural) relations, but often cross the sentence boundary and indicate structural relationships on the macrolevel, such as the link between two units of discourse (e.g. English *and, but, so*). More recently it has been argued by Heine and colleagues that this transition is based on an operation called "cooptation", which is an instantaneous process whereby pieces of text on the sentence level are deployed for use on the level of discourse processing (e.g. Heine 2013; Heine et al. 2017). This would speak for a very close relation between the two levels of language structure in which the two systems underlying these levels have access to the same linguistic material.

The close interaction between the micro- and the macrolevel suggests that both types of language structure, and thus the two types of language processing underlying these structures, are constantly available during speech production as both are needed for successful communication. In the dualistic model of language structure proposed here, a speaker's structural decisions reflect planning processes in either system, but there is also interaction between the systems. Discourse is thus continuously shaped and limited by principles of structuration on both the microlevel and the macrolevel.

Dualistic models in different language-related disciplines have been developed independently of each other, based on different methods and for different purposes, and yet they point in the same direction. Considering the data discussed above we can, for instance, see interesting parallels between the distinction of a micro- and a macrolevel of language structure and language processing and the psycholinguistic distinction between *propositional representation* and *discourse model* discussed in Section 3. While the first is based on the processing of local relations between structures forming single propositions, the latter requires a representation of the larger discourse context in terms of a discourse model, in which different propositional units are integrated under one globally coherent structure (Prat, Long and Baynes 2007). The mental representation of such a discourse model shows some affinities to the concept of *macrogrammar*, which includes discourse-structural relations and interaction management, both of which are required for speakers to be able to create and maintain global coherence or, more generally, "order at all points" of the communicative system in the sense of Sacks (1984: 22). *Discourse model*, or *macrogrammar*, is therefore naturally more heterogeneous than *propositional representation* or *microstructure* as it spans over larger units of text and involves a larger set of more disparate categories (see also Heine, Kuteva and Long, this vol.) and a more encompassing mental representation of the discourse "matrix", i.e. the overall situation of discourse. This involves, for instance, a representation of the explicit and implicit messages produced in prior talk, textual relations, and shared background knowledge.

Finally, I would like to draw attention to the fact that there are a number of problems, perhaps even pitfalls, inherent in a dual process model of the kind proposed here as well as by other authors in this volume and elsewhere. First, the boundary between the two types is not clearly delineated and there is some vagueness as regards the way in which the two systems interact, especially in those cases where both systems have access to the same linguistic resources. This issue is clearly in need of further research. Secondly, the kinds of evidence brought forward in favor dualism in language structure and cognition are rather disparate, ranging from clinical evidence and experimental data using brain imaging techniques to corpus-based studies of linguistic phenomena. This hampers comparability, given that e.g. neurolinguists usually work with different levels of granularity than linguists and are thus less specific on the kinds of expressions and grammatical forms that are associated with macrostructure.

In spite of such problems, which require further and more cross-disciplinary research, the language-based dualistic models developed thus far are not incompatible and provide an empirically-based alternative to the established monolithic models of language structure and language cognition. The major strength of a dualistic conceptualization of language structure and language processing is that it integrates linguistic, psycholinguistic, and (neuro)cognitive research into a truly integrative model of language structure and mental activity and is thus able to close the *competence-performance* gap and to provide a comprehensive framework for the description of usage-based aspects of language.

7. Conclusion

The analysis of structural relationships in language, especially those found in spontaneous speech, has shown that many phenomena cannot be assigned to the traditional categories and concepts of sentence-based grammatical description. Based on this observation and following other authors and findings from other lines of research, this chapter proposed a conceptualization of 'grammar' as being composed of two different domains, one serving the structuration of language on a microlevel, which deals with the internal organization of emergent syntactic units in terms of formal embedding and hierarchization (*micrograммar*), the other one serving the creation of structures on a macrolevel, encompassing the organization of language in terms of interaction management as well as cognitive and discourse-structural aspects of language use outside hierarchically organized, formally embedded syntactic structures (*macrogrammar*). It has been shown that all of these aspects contribute to the ways in which speakers design a structural unit in order to make if fit to an individual usage context. My case study on the internal structure of sequences of "unintegrated", "extra-clausal" expressions in so-called *fields* at turn-beginnings and -endings has provided evidence for the assumption that *macrogrammar* is a domain with structuring principles of its own, regulating the syntactic behavior of linguistic signs that are usually excluded from the description of "grammatical" or "well-formed" structures in mainstream approaches to grammar.

An important conclusion deriving from the present study as well as from the discussion of similar perspectives on language and language structure presented in this volume is that approaches to grammar that are based on the assumption of a single, monolithic entity do not do full justice to the grammatical facts: if grammars define which structures are possible and representative of a structural norm (and which ones are not), they should also incorporate structural features that are outside the scope of sentence grammar. *Macrogrammar* provides a framework that is particularly apt for this enterprise as cognitively, discourse-structurally and interactionally grounded structural features of language are not neglected, excluded, marginalized, or thrown into the "pragmatics wastebox," but analyzed as an integral part of language structure. Extending the scope of grammatical analysis by considering not only the structure of "well-formed" sentences opens up new pathways for exploring cognitive and communicative aspects relevant for the structuration of language in an integrated way. The analysis of macrogrammatical expressions has shown how soon the established, sentence-based categorical framework and principles for describing structure in language are exhausted. In this sense, dualistic approaches offer a valuable alternative to established approaches in the structuralist and generativist tradition as the spirit underlying dualism is not to replace all the tools and principles that derived from several decades of traditional linguistic research, but to integrate them (perhaps after some modification) under a new, expanded way of thinking about language and language structure.

Transcription conventions

[ ]	overlap and simultaneous talk
=	latching
(.)	micropause
(2.0)	measured pause
:, ::	segmental lengthening according to duration
rea(hh)lly	laugh particles within talk
ABsolutely	strong, primary stress via loudness
<u>really</u>	stress via pitch or amplitude
°word°	produced softer than surrounding talk
.	falling intonation (terminal pitch)
,	continuing intonation
?	rising intonation
¿	a rise stronger than mid-level but weaker than high-terminal pitch

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CHAPTER 9

Agreement Groups and dualistic syntactic processing

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This chapter discusses the dualistic characteristics of the *Agreement Groups* (AG) model of linguistic processing and language acquisition, a usage-based distributional approach building on cognitive mechanisms for storing groups of similar utterances in memory, and mechanisms for mapping utterances onto such groups. AGs, i.e. groups of minimally differing utterances, provide a means for processing novel sequences. Furthermore, AGs may facilitate categorisation (lexical/syntactic, semantic), and might serve as the foundations for 'real' agreement relations. Longer sequences involve a 'coverage' mechanism that processes utterance fragments. I point out three inherently dualistic components of AG processing – familiar/novel utterances, groups/group-combinations, and continuous/discontinuous fragments – that may be relevant for linguistic modelling, and indicate convergences with other fields of research.

Keywords: cognitive/computer modelling, distributional grouping, syntactic mapping mechanisms, usage-based analysis

1. Introduction

The present chapter aims to summarise research on Agreement Groups (AGs) in the context of human cognitive linguistic processing, with specific emphasis on the dualistic properties that the model inherently exhibits. The AG language processing model as proposed in Drienkó (2014) constitutes a kind of distributional approach since the grouping of utterances is determined by the distribution of words they consist of. Distributional methods in linguistics date back at least to Harris (1951, 1952). For Harris the distribution of a linguistic item was determined by all the contexts, or "environments" for that particular item. Kiss (1973) proposed a word categorisation model based on cluster analysis which was extended for larger corpora and computational resources by Redington et al. (1998).

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Finch et al. (1995) adopted a similar method to assign categories to word sequences, i.e. to phrases. Such clustering methods typically operate with "context vectors" as determined by the neighbouring elements of a target item. Mintz (2003) used a different, more direct, formalisation of context. In his work, the immediately preceding and succeeding words provide the context or "frame" for categorising. Mintz employs "frequent frames", i.e. contexts with a frequency larger than an arbitrarily defined threshold. Weisleder and Waxman (2010) consider, besides Mintz's "mid-frames", the usefulness of "end-frames" which take into consideration utterance-end information for categorisation. St. Clair et al. (2010) claim that "flexible frames" exploiting bigram information within frequent frames are more optimal for categorisation than just frequent frames. A kind of framing effect in language acquisition was reported by Cameron-Faulkner et al. (2003) who pointed out that mothers speaking to their children use a rather limited set of item-based phrases, these phrases being framed by their initial words. Such findings were confirmed cross-linguistically by Stoll et al. (2009). AGs can be seen as superimpositions of such framing contexts, as will be discussed in Section 3.1. Wang and Mintz (2010:p.6) propose that "grammatical relations between words are more consistent in individual frequent frames than in bigrams" and that "words within a frequent frame are especially "close" syntactically" (p. 8). This is in accordance with our view that agreement groups represent syntactic (namely, agreement) relations. Bannard and Matthews (2008) suggest that children tend to store word sequences in memory during language acquisition. It could be hypothesized that such word sequences can form the basis of sentence patterns, and that the appropriate grouping of the stored sequences might be a principal element in the emergence of linguistic behaviour. Thus the AG method might also be viewed as a kind of model of the organizational processes concerning stored sequences. More generally, since the model proposed in this chapter primarily builds on the linguistic input that a learner can be exposed to and assumes language to emerge as an output of cognitive mapping mechanisms, the AG framework is in line with usage-based research questioning the fundamental "poverty of the stimulus" argument of Generative Grammar, which claims that natural language is too complex to be acquired from the impoverished stimuli the learner is exposed to (for a discussion of the "poverty of the stimulus" argument see e.g. Evans and Green 2006, as well as the references therein).

The layout of this chapter is the following: in Sections 1.1 and 1.2 we provide a short introduction to AGs and the coverage mechanism. Section 2 highlights the dualistic characteristics of the AG approach. Section 3 explores the theoretical perspectives of the dualistic AG processing system. Section 4 establishes contact points with research on cognitive processing. Section 5 discusses the possible application of the model outside syntax, while Section 6 contains some concluding remarks.

1.1 Agreement groups

An agreement group is a group of utterances differing from a base utterance in only one word.

Formally, an AG can be regarded as a hypothetical table for concatenating symbolic sequences, where columns in the table represent (agreement) categories, and any element (word) in a column can be concatenated with any other in the next column. For instance, the '*the girl can dance*' group in (1) allows generalisation to the novel sentences under (2) via the hypothetical representation shown as Table 1.

(1) <u>the girl can dance</u>
the boy can dance
a girl can dance
the girl can cook

(2) a boy can dance
the boy can cook
a girl can cook
a boy can cook

Table 1. Tabular representation for AG (1)

the	girl	can	dance
a	boy		cook

The term 'agreement' in the AG approach is due to the conjecture (Drienkó 2014: 52) that

> If we replace one word in a grammatical utterance with a word of the same "lexical category", and if the new utterance is grammatical, then we may assume that agreement relations must have been preserved since the new word fulfils the agreement requirements of the original utterance. Furthermore, for unambiguous cases we expect the preservation of the original agreement values.

For instance, if we replace the noun *Adam* with the nouns *Eve* and *people* in utterance *Adam hates football* we get a grammatical and an ungrammatical sentence, respectively. In the *Eve* case the resultant sentence is grammatical and the agreement relation between *Eve* and *hates* is preserved, with the original agreement feature values 3rd person and singular. In the *people* case the resultant sentence is ungrammatical so we do not expect agreement relations to have been preserved. Actually, it is the mismatch of number values – singular versus plural – that causes ungrammaticality.[1]

1.2 Agreement groups coverage

AGs arbitrarily consist of utterances containing minimally two, maximally five words. In principle, it would be possible to allow utterances of any finite length, but we intuit that it would be impractical both for computational reasons and because growing utterance length would decrease the likelihood of finding very similar utterances. Instead of raising the length bound, we employ a coverage machinery for the processing of longer sequences (Drienkó 2013b, 2016a). The basic idea is to break down utterances into shorter (2–5 word long) fragments which can be compatible with AGs. Such fragments then can "cover" the longer utterance. A novel utterance such as *'the boy can cook in a kitchen'*, for example, can be covered by fragments *'the boy can cook'* and *'in a kitchen'* derivable from AG (1) and AG (3), respectively, cf. also (4) and Table 2.

(3) <u>in the school</u>
in the kitchen
in a school

(4) [the boy can cook] [in a kitchen]

Table 2. Tabular representation for AG (3)

in	the	school
	a	kitchen

Note that coverage can be less than 100%. If an utterance contains fragments which cannot be "mapped" onto any AG, the corresponding utterance positions will not contribute to the coverage value. The first four utterance positions of (5a), for instance, can be covered by '*the girl can dance*' which is trivially mappable onto AG (1), but for *'on the table'* no compatible AG can be found, assuming only AG (1) and AG (3) in the processing system. Thus coverage is 4/7 = 57%, since four utterance positions are covered out of the seven. For sentence (5b) coverage is 0%, due to *'always'* inserted between *'can'* and *'cook'*. By allowing discontinuity

1. Of course, if we consider 'people' to belong to a different lexical (or syntactic) category – common noun as opposed to the proper nouns 'Adam' and 'Eve' – we do not expect agreement feature matching in the first place since the "same lexical category" replacement requirement is not fulfilled.

in fragments (Drienkó 2015, 2016a), however, the processing system can find fragment *'the girl can cook'*, which in turn can be mapped onto AG (1) yielding a 4/5 = 80% coverage value.

(5) a. [the girl can dance] on the table
b. the girl can always cook
c. the big girl can always cook

If we appropriately arrange the covering fragments of an utterance in a table, we can visualize the "coverage structure" of the utterance in question, cf. Table 3. Assuming further AGs, say, (6a) and (6b), we have 100% coverage for (5c), with somewhat more complex coverage structure as shown in Table 4.

Table 3. Coverage structure for (5b)

	girl	**can**	**always**	**cook**
the	girl	can		cook

(6) a. <u>small boy</u>
big boy
small girl
b. <u>seldom sleep</u>
seldom cook
always sleep

Table 4. Coverage structure for (5c)

the	**Big**	**girl**	**can**	**always**	**cook**
the		girl	can		cook
				always	cook
	Big	girl			

2. Inherent dualities of the AG model

This section presents results on AGs against a dualistic backdrop. Three inherently dualistic components of the model will be identified along the dimensions (i) familiarity-novelty of utterances, (ii) groups vs. group-combinations involved in the mapping process, and (iii) continuity-discontinuity of utterance fragments.

2.1 Duality 1: Familiar versus novel utterances

Analysing 2–5 word long English mother-child utterances, Drienkó (2012/2014) found that at any stage of linguistic development the AGs extracted from the body of utterances encountered up to that point can account for a certain proportion of the utterances (novel, and non-novel) of the stage in question, i.e. of the immediately following session. Similar results were reported for Hungarian and Spanish in Drienkó (2013a). Figures 1, 2, and 3 plot the percentage of mapped utterances against the developmental stages. At e.g. Stage 1–14 the AGs were extracted from the utterances of sessions 1 through 14 of the Anne files, and 33% of the 2–5 long utterance types in session 15 were mapped on some AGs (cf. Figure 1). All data were taken from the CHILDES database (MacWhinney 2000): Anne files, Manchester corpus (Theakston et al., 2001); Miki sessions, Réger corpus (Réger 1986; Babarczy 2006); Koki data, Montes corpus (Montes 1987, 1992). The highest maximum proportion of utterances that were compatible with AGs was 41%, for the English data.

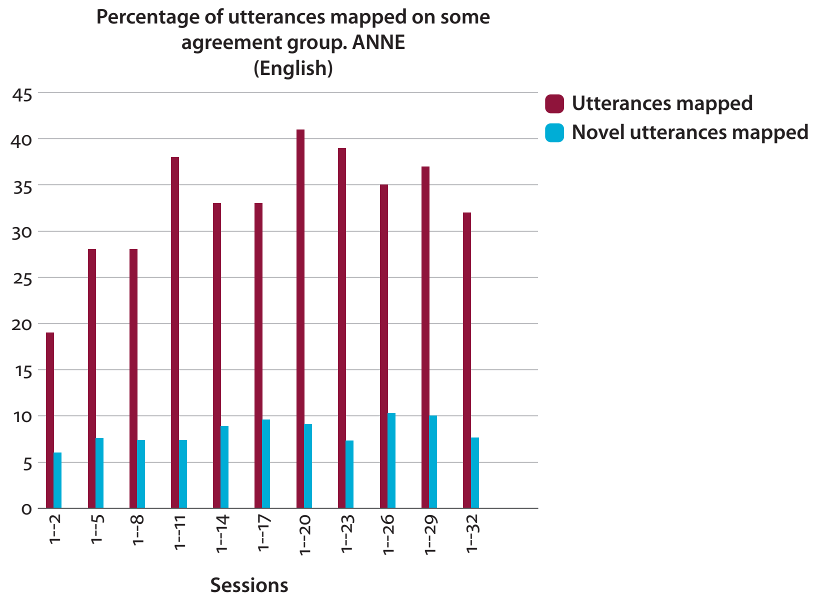

Figure 1. Results from Drienkó (2012) for theAnne data, Manchester corpus. Child's age: 1;10.7 to 2;9.10. Maximum training set size: 17260 utterance types, 2505 word types

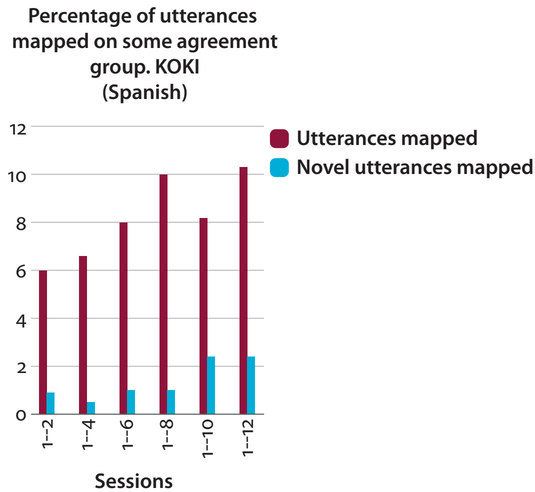

Figure 2. Results from Drienkó (2013a) for the Koki data, Montes corpus. Child's age: 1;7.20 to 2;11.14. Max. training set size: 2150 utterance types, 1200 word types

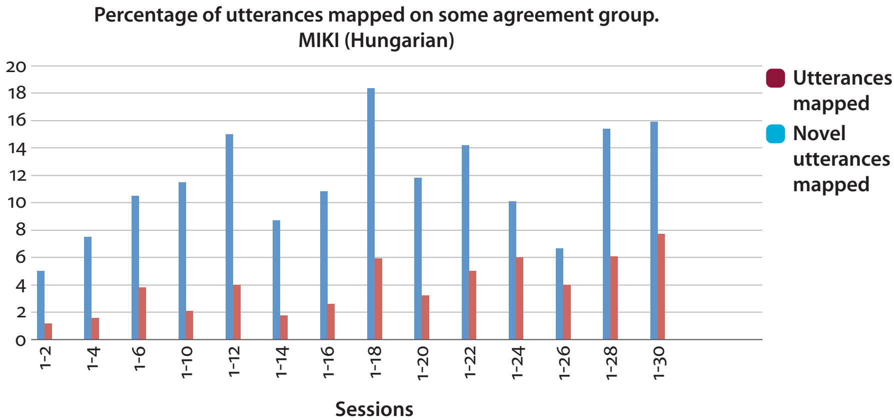

Figure 3. Mapping results from Drienkó (2013a) for the Miki data, Réger corpus. Age: 1;11 to 2;11. Max. training set size: 7122 utterance types, 4724 word types

The figures reveal a clear-cut dissociation of utterances in terms of novelty versus familiarity. The difference between the percentage of all the utterances mapped on some group and the percentage of *novel* utterances mapped on some group gives us the proportion of repeated or "familiar" sequences, i.e. utterances that had already been encountered at least once before the stage in question.[2] Tables 5, 6, and 7 contrast the percentages of novel and familiar utterances at each stage for

2. Accordingly, we use the term 'novel' in the sense of 'not previously included among the child's or mother's utterances'.

the English, Hungarian, and Spanish data, respectively. The ratio of average familiar and average novel utterances is (24.7%) / (8.3%) = 2.98 for English, (7.61%) / (3.93%) = 1.94 for Hungarian, and (6.8%)/(1.37%) = 4.96 for Spanish.

Table 5. Percentages of familiar vs. novel utterances – Anne

Stage	**1–2**	**1–5**	**1–8**	**1–11**	**1–14**	**1–17**	**1–20**	**1–23**	**1–26**	**1–29**	**1–32**	**Avr.**
Fam. (%)	13	20.4	20.6	30.6	24.1	23.4	31.9	31.7	24.7	27	24.3	24.7
Nov. (%)	6	7.6	7.4	7.4	8.9	9.6	9.1	7.3	10.3	10	7.7	8.3

Table 6. Percentages of familiar vs. novel utterances – Miki

Stage	**1–2**	**1–4**	**1–6**	**1–10**	**1–12**	**1–14**	**1–16**	**1–18**	**1–20**	**1–22**	**1–24**	**1–26**	**1–28**	**1–30**	**Avr.**
F (%)	3.8	5.9	6.7	9.4	11	6.9	8.2	12.5	8.6	9.2	4.1	2.7	9.3	8.2	7.61
N (%)	1.2	1.6	3.8	2.1	4	1.8	2.6	5.9	3.2	5	6	4	6.1	7.7	3.93

Table 7. Percentages of familiar vs. novel utterances – Koki

Stage	**1–2**	**1–4**	**1–6**	**1–8**	**1–10**	**1–12**	**Avr.**
Fam. (%)	5.1	6.1	7	9	5.8	7.9	6.8
Novel (%)	0.9	0.5	1	1	2.4	2.4	1.37

The quantitative results echo a duality of the processing potential of AG-mapping: AGs are capable of accounting for both repeated and novel sequences of human speech. In Section 3.1 we will see that the degree of novelty can vary in a continuum-like fashion. Additionally, in spite of the disparate corpus sizes (cf. captions for Figures 1, 2, and 3) the data also reflect the typological differences between the languages in question. Since either Hungarian or Spanish has a richer inflectional morphology than English, in these languages an utterance (or even a word) is less likely to recur in the same form, so a smaller degree of familiarity (7.61% and 6.8%) can be expected than for English (24.7%). Furthermore, since the Hungarian inflectional system is still more complex than the Spanish inflectional system, a larger degree of novelty can be expected for Hungarian (3.93%) than for Spanish (1.37%).

2.2 Duality 2: Direct mapping onto groups versus onto combinations of groups

Duality 2 in the AG model originates from the fact that in addition to the relatively low-level direct utterance-to-group mapping mechanism, higher-level processing can be attained by allowing groups to collectively process fragments that a given utterance consists of.

Recall that AGs, arbitrarily, consist of utterances whose lengths do not exceed five words. For the processing of longer utterances, a coverage machinery has been proposed (cf. Drienkó 2013b, 2013c, and 2016a). Drienkó (2013b) tested the machinery on Anne's data from the Manchester corpus (Theakston et al. 2001), CHILDES database (MacWhinney 2000). The first 64 Anne files, 1a through 32b, provided the agreement groups, whereas the 466 utterance types in File 33a were used for testing. The average coverage value was equal to 78 percent, which means that, on average, 78 percent of a given utterance was covered by AG-compatible speech fragments.[3] When only novel covering fragments were considered for File 33a, average coverage dropped to 49%. Table 8 and Table 9 exemplify different covering structures for the two cases, i.e. for possible coverage by any AG-compatible fragments (Table 8) or coverage by novel, yet unattested, combinatorially produced fragments (Table 9). Five utterance positions of 'shall we do some drawing then" were covered by AG-compatible fragments resulting in a 5/6 = 83% coverage value. Of these five fragments 'shall we' was a familiar utterance, i.e. it had occurred in the previous files, therefore that fragment did not contribute to coverage when only novel, combinatorially mapped fragments were considered, so the value for this case was 4/6 = 66%.

Table 8. Coverage structure for *'Shall we do some drawing then'*. Coverage: 5/6 = 83%

shall	**we**	**do**	**some**	**drawing**	**then**
			some	drawing	
		do	some		
	we	do			
shall	we				

Table 9. Coverage structure for *'Shall we do some drawing then'*. Coverage: 4/6 = 66%. (Novel fragments only)

shall	**we**	**do**	**some**	**drawing**	**then**
			some	drawing	
		do	some		
	we	do			

3. Average coverage is computed as the sum of the coverage values for the individual utterances divided by the number of utterances.

The diagrams of Figure 4 and Figure 5 display the distribution of fragments with respect to their lengths. The average length for novel fragments was 2.11 words, while in the overall case the average value was 2.21 words. The values may be in accord with our intuition that the shorter utterances a group contains, the more probable it is to be compatible with any (familiar or novel) utterance or fragment. This is because AGs of short utterances tend to be larger (i.e. have more utterances) since shorter utterances are more likely to be similar (because fewer words need to match) and to be grouped together. More utterances in a group, in turn, may mean a greater probability for any fragment to be mappable onto that group. So AGs with two-word utterances are more likely to take part in the mapping process than say AGs with five-word utterances. In addition, more utterances in a group may also mean more combinatorial power, i.e. a larger degree of compatibility for novel fragments. This is supported by the fact that the average length for novel fragments was slightly less (2.11 words) than in the overall case (2.21 words). Thus large AGs with short utterances mean (i) greater processing potential in general and (ii) greater potential for novelty in particular.

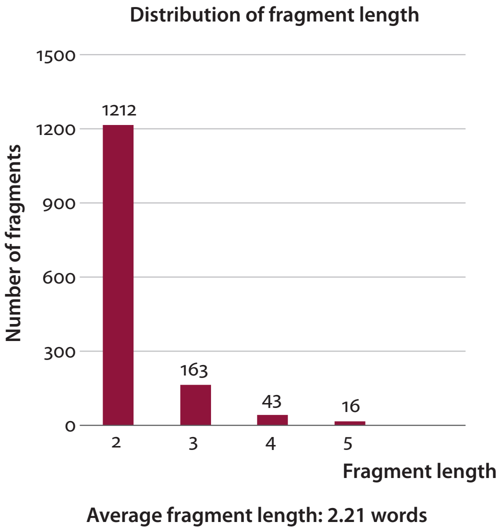

Figure 4. Fragment size statistics for the Anne data. Average fragment length: 2.21 words (Drienkó 2016a)

In order to obtain cross-linguistic insights, the AG-coverage method was applied to Hungarian data in Drienkó (2013c). The Miki files of the Réger corpus (Réger 1986; Babarczy 2006) in the CHILDES database (MacWhinney 2000) were used in that analysis. The first 30 files provided the agreement groups, whereas the 463 utterance types in File 31 were used for testing. The average coverage value was equal to 42 percent. When only novel fragments were considered average coverage was

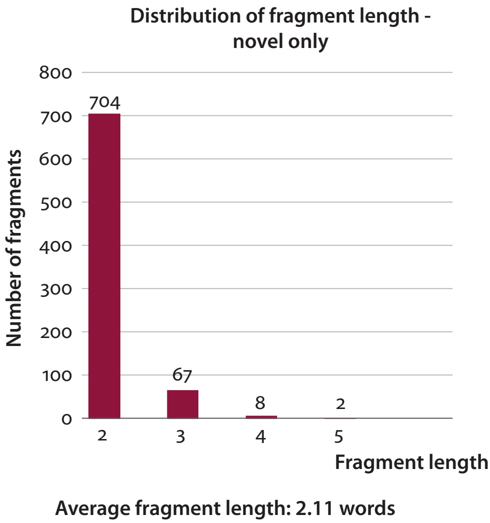

Figure 5. Fragment size statistics for the Anne data, novel only case. Average fragment length: 2.11 words (Drienkó 2016a)

reduced to about 30%. Figure 6 and Figure 7 display the distribution of fragments with respect to their lengths. The average length was slightly over two words: 2.05 words when all legal fragments were considered, and 2.02 words for the novel fragments only case. The Hungarian results suggest that the coverage machinery is applicable not only for English but also for other languages. Although the fragment-length distribution is fairly similar to the English case, there is an obvious loss in the efficacy of processing. Again, the difference is partly due to the dissimilar morphological systems involved (cf. Section 2.1). In Hungarian an utterance (or even a word) is less likely to recur in the same form owing to the complex system of affixes. Furthermore Hungarian word order is nearly free. Both word-form variation and free word order reduce similarities, which in turn reduces AG formation and consequently coverage.

Besides the familiar-novel duality discussed in Section 2.1, we thus find a dissociation of mapping results reflecting the distinction of processing modes 'direct mapping onto AGs' and 'coverage'. When only direct mapping onto AGs is involved, a smaller fraction of only the 2-to-5 word long utterance types in the test file can be mapped onto some group than when all the utterance types in the test file are considered for coverage. For instance, at the last session 32% of the 284 2-to-5 word long English utterance types of File 33a were mapped on some AG. Since File 33a contained 466 multiword utterance types, the percentage of 2-to-5 word long types was 284/466 = 0.61. In other words, 32% of the 61% of all multiword utterances types, some 20%, were directly mappable onto AGs. In

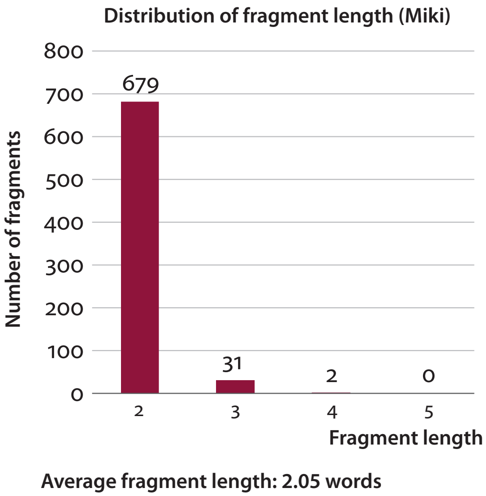

Figure 6. Fragment size statistics for the Miki data. Average fragment length: 2.05 words (Drienkó 2013c)

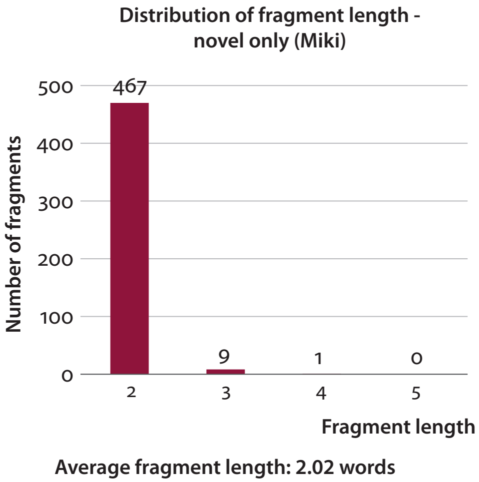

Figure 7. Fragment size statistics for the Miki data, novel only case. Average fragment length: 2.02 words (Drienkó 2013c)

contrast, coverage by AGs seems to be a more robust mapping mode, recall the 78% value for the same test file. We can compare the empirical results in terms of coverage values if we note that, computationally, direct AG-mapping is a special case of coverage: only the 2–5-long utterances are processed, and each utterance is regarded as consisting of a single "fragment". Coverage for an utterance, then, is either 0 or 1 (100%). Thus calculating the proportion of utterances mapped on some group (i.e. adding up all the 1's and dividing by the number of 2–5-long utterances) is equivalent to calculating average coverage (i.e. adding up all 0's and 1's and dividing by the number of 2–5-long utterances). Therefore we can compare the quantitative results for both cases, cf. Table 10.

Table 10. Coverage results from the direct AG-mapping and the AG-coverage experiments

	Direct AG-mapping (2–5-long utterance types)		**AG-coverage (all utterance types)**	
	Familiar + novel	**novel**	**Familiar + novel**	**novel**
English	32%	7.7%	78%	49%
Hungarian	15.9%	7.7%	42%	30%

The duality of processing modes has a visual manifestation in the tabular representation of the coverage structure of utterances. Individual rows represent direct AG-mappings whereas the whole structure represents the higher-level mechanism of coverage outputting an optimal combination of covering fragments, i.e. an optimal combination of AGs onto which the fragments can be mapped.[4] For example, Table 11 can symbolise such an optimal coverage structure for utterance '*we do some drawing*', where 'optimal' means 'facilitating the derivation of a constituent structure as in (7)'. Table 12 is a more precise image of the coverage structure in question because it explicitly identifies the groups involved in mapping by referring to their numbers in the AG collection. Note that the first numbers identify the groups while the second numbers refer to word positions. For instance, 304_1 and 304_2 identify group 304 consisting of two-word utterances, onto which '*some drawing*' can be mapped. Arguably, Table 13 might symbolise a less optimal coverage structure insofar as it contains a superfluous mapping: fragment '*we do some*' is unnecessary for the derivation in (7). Alternatively, we might also say that fragments '*do some*'and '*we do*' are superfluous because the direct combination of '*we do some*' with '*some drawing*' can cover the whole sentence.

Table 11. Coverage structure for '*we do some drawing*'

we	**do**	**some**	**drawing**
		some	drawing
	do	some	
we	do		

4. For some more discussion concerning the optimality of AG combinations see Drienkó (2016a), the paragraphs in Sections 5 and 6 explaining 'combinability constraints', in particular.

Table 12. Coverage structure for '*we do some drawing*' with AGs explicitly indicated

we	**do**	**some**	**drawing**
		304_1	304_2
	379_1	379_2	
55_1	55_2		

(7) some drawing → (some drawing) → do (some drawing) → (do (some drawing)) → we (do (some drawing)) → (we (do (some drawing)))

Table 13. Alternative coverage structure for '*we do some drawing*'

we	**do**	**some**	**drawing**
		some	drawing
	do	some	
we	do		
we	do	some	

The results from the AG experiments thus seem to support a two-mode processing apparatus with coverage being a more robust processing tool than just direct AG mapping. Duality 1 concerning familiarity and novelty carries over to the coverage level. The data additionally show that shorter fragments may be associated with higher coverage efficacy. The collection of fragments that can legally cover an utterance might not be uniquely determined. Fragments may not coincide with phrasal constituents. The notion of 'coverage structure' is aimed at facilitating the understanding of syntactic processing and will be extensively used in our analyses.

2.3 Duality 3: Continuous vs. discontinuous fragments

In order to capture dependencies between words of a fragment possibly separated by words of another fragment (or several other fragments), Drienkó (2015) proposed that discontinuity should be taken into consideration by the coverage apparatus. Allowing for discontinuity naturally increases the number of potential covering fragments. Table 14 shows that besides the fragments found in the non-discontinuous case (printed bold), there are further, discontinuous, fragments that can contribute to the coverage of our example utterance '*shall we do some drawing then*' and due to the fragments containing *then*, the whole utterance is covered.[5]

5. Note that actually one discontinuous fragment, e.g. *do then,* would suffice.

Table 14. Discontinuous coverage of '*shall we do some drawing then*': 6/6 = 100%

shall	**we**	**do**	**some**	**drawing**	**then**
			some		then
			some	**drawing**	
		do			then
		do	**some**		
	we				then
	we			drawing	
	we		some		
	we	**do**			
shall					then
shall			some		
shall		do			
shall	**we**				

In a discontinuous coverage experiment, again, the first 64 Anne files, 1a through 32b, from the Manchester corpus provided the AGs, whereas the 466 utterance types in File 33a were used for testing. Familiar and novel fragments were not distinguished. In accordance with intuition, average coverage became higher, 83 percent. Compared to the 78 percent value of the non-discontinuous case this amounts to some five percent increase. The results may suggest a continuous-discontinuous duality of processing efficiency in the AG model, with discontinuity involving a computationally more complex but more efficient process. The extra complexity in the discontinuous case comes from the fact that the mapping algorithm considers the collection of all possible discontinuous fragments as opposed to the collection of all possible continuous fragments in the continuous case. Generally, the latter collection is much smaller.

3. Theoretical implications for linguistic modelling

To summarize at this point, we have seen three dimensions of the AG model which inherently allow for dualistic characterisation. Duality 1 originates from the model's capacity to process both familiar and novel utterances. Duality 2 concerns the two fundamental components of the processing mechanism, namely direct mapping onto AGs, and coverage by mapping onto combinations of AGs. Duality 3 is in connection with the possibility to differentiate between continuous and discontinuous fragments. This section explores these dualistic dimensions of the

AG framework further with respect to their possible consequences for linguistic modelling. It also points to some parallelisms between the dualistic components of the AG model and findings from other lines of research.

3.1 Familiar-novel 'continuum'

The familiar-novel dichotomy is a fundamental quality of the AG model. Note, however, that the degree of novelty (or familiarity) of utterances can vary in a continuum-like fashion. For instance, the formulaic expression *'Merry Christmas'* can be thought of as a one-member "group". Salutations like '*Good morning/afternoon/evening/night*', a four-member group, can be symbolised by the '*Good X'* frame, *X* representing a slot to be filled by any word from the set *{morning, afternoon, evening, night}*, cf. (8). Group (8c) can be described as "schema" *XYZ* since the four familiar utterances license entirely novel ones like e.g. *'John admires Jane'*.[6] We can further observe a within-group dimension of the familiar-novel continuum, with respect to the base utterance *Jack loves Jill* (underlined). The very sentence '*Jack loves Jill'* would be trivially mappable onto group (8c) as it is its base utterance. *'Jack admires Jill'* is a member of the group so it differs in one word from *Jack loves Jill'*. Sentence '*Jack admires Jane*', however, differs from the base utterance at two positions and is a truly novel sentence since it is not in the group. The mapping of *'John admires Jane'* requires the full generalisation power of the group as it differs from *'Jack loves Jill'* at every utterance position.

(8) a. <u>Merry Christmas</u>
b. <u>Good morning</u>
Good afternoon
Good evening
Good night
c. <u>Jack loves Jill</u>
Jack admires Jill
John loves Jill
Jack loves Jane

The group-internal gradations of familiarity (or novelty) can be explained by viewing AGs as super(im)positions of "frames". The term 'frame' may be reminiscent of the "frequent frames" in Mintz (2003) for categorising words, i.e. contexts with a frequency larger than an arbitrarily defined threshold, where context means immediately preceding and succeeding words. Note, however, that the frequency

6. As throughout this chapter, 'familiar' means already produced or heard by the learner, whereas 'novel' means not previously included among the child's or mother's utterances.

of contexts plays no explicit role in our analyses. Besides Mintz's mid-frames Weisleder and Waxman (2010) consider the usefulness of "end-frames", which also take into consideration utterance-end information for categorisation. St. Clair et al. (2010) claim that "flexible frames" exploiting bigram – i.e. adjacency statistics – information within frequent frames are more optimal for categorisation than just frequent frames. Along the same lines, it is possible to extend the definition of 'frame' to include the start, mid_1, (mid_2, …), and end positions, cf. (9). By substituting words of category *X, Y,* or *Z* into the appropriate position ("slot") in a frame we get a subset of the AG. Clearly, (9a) yields '*Jack loves Jill*' and '*John loves Jill*', (9b) '*Jack loves Jill*' and '*Jack admires Jill*', while (9c) licenses '*Jack loves Jill*' and '*Jack loves Jane*'. By bringing all the utterances together we get the original group (8c). Depending on how many "slots" are active at the same time, i.e. how many utterance positions are involved in mapping, the AG can handle different degrees of novelty. Novelty begins with two slots, like with '*Jack admires Jane*', corresponding to the template *Jack Y Z*, and reaches its maximum when all positions are involved – '*John admires Jane*', in the example, corresponding to template *X Y Z* requiring all the three frames.

(9)	a.	Frame 1. ('start')	X loves Jill	X= {Jack, John)
	b.	Frame 2. ('mid')	Jack Y Jill	Y= {loves, admires)
	c.	Frame 3. ('end')	Jack loves Z	Z= {Jill, Jane}

The 'superposition of frames' interpretation of AGs permits parallelisms with the neurolinguistically grounded dual process (DP) model of Van Lancker Sidtis (2009) based on holistic and analytic levels of processing for formulaic and novel utterances, respectively, and schemata representing the interplay of the two levels. The formulaic-novel continuum in the DP model can be visualised as Figure 8 (Van Lancker Sidtis 2009: 169). Utterances which are identical with a member of an AG are good candidates for being formulaic in our framework. The mapping of utterances that differ from the base utterance at two (or more) positions might correspond to processing by schemata in the DP model, whereas word sequences which differ from the base utterance at every position would be seen as fully novel in the DP model. Van Lancker Sidtis (2009) suggests that holistic and analytic processing play different roles at different stages of language acquisition. This issue will be revisited in Section 4, in the context of availability of category information.

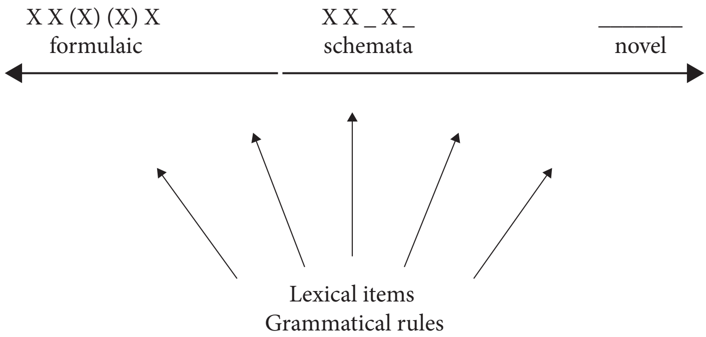

Figure 8. Processing modes in the Dual Process model (Van Lancker Sidtis 2009: 169)

3.2 Groups and group combinations: A dualistic parsing mechanism

The two major processing components of the AG approach, direct AG-mapping and coverage via the combination of groups, suggest a dualistic parsing mechanism. Once the AG-mappable fragments of an utterance have been identified, the next question is: which groups can be combined, and how, for having a legal coverage structure? The fragments covering '*we do some drawing*', for instance, can also cover '**some drawing do some we do*', cf. Tables 11 and 15, or '*we do some drawing*' can be covered without identifying fragment '*do some*', cf. Tables 11 and 16.

Table 15. Coverage structure for '**some drawing do some we do*'

some	**drawing**	**do**	**some**	**we**	**do**
some	drawing				
		do	some		
				we	do

Table 16. Alternative coverage structure for '*we do some drawing*'

we	**do**	**some**	**drawing**
		some	drawing
we	do		

We hypothesise that by memorising a coverage structure – i.e. a word sequence associated with a configuration of fragments, where each fragment, in turn, is further associated with at least one AG – the language learner actually acquires a "schema" of group combinations. Initially, this memorised coverage structure can contain erroneous or superfluous elements, licensing ungrammatical utterances. However, with cognitive development, incorrect schemas will normally be corrected and evolve into full-fledged linguistic templates.[7] Having been stored in memory as a schema, the coverage structure of *'we do some drawing'*, for example, can be used for processing novel utterances, cf. Table 12 repeated as Table 17 for convenience. Assuming the category assignments in (10), the novel *'I got some juice'* sequence can also be mapped onto the very same schema, as Table 18 indicates. Note that the numbers in (10) represent word categories. Category 304_1, for instance, means that the word *'some'* occurs in the first utterance position in group 304. Since *'juice'* has category 304_2, i.e. it occurs in the second position in group 304, and the group consists of two-word utterances, *'some juice'* can be mapped onto group 304.

Table 17. Coverage structure for '*we do some drawing*' with AGs explicitly indicated

we	**do**	**some**	**drawing**
		304_1	304_2
	379_1	379_2	
55_1	55_2		

(10) a. some juice 304_1 304_2
b. got some 379_1 379_2
c. I got 55_1 55_2

Table 18. Coverage structure for '*I got some juice* '

I	**got**	**some**	**juice**
		some	juice
	got	some	
I	got		

With an inventory of memorised utterances organised into groups and further into schemas, the processing system becomes capable of managing still more complex utterances by combining these memorised processing units. Individual utterances, groups, and schemas can interact with other utterances, groups, or schemas. For example, the *I think* group in (11) combined with the schema of Table 17 licenses fragments for covering *'they believe we do some drawing'*, cf. also Table 19. The very same schema interacting (discontinuously) with the more formulaic *'Happy New Year'* can be used for processing *'we do some Happy New Year drawing'*, cf.

7. Drienkó (2016a) defines combinability constraints for formalising the linguistic generalisation mechanisms. That work depicts a more refined system of interacting generalisation objects based on the two processing tools, AG-mapping and coverage.

Table 20. Whether or not an utterance is grammatical or intelligible depends on the speaker's system of cognitive templates.

(11) I think
you think
we think
they think
I believe

Table 19. Coverage structure for *'they believe we do some drawing'*

they	**believe**	**we**	**do**	**some**	**drawing**
				some	drawing
			do	some	
		we	do		
they	believe				

Table 20. Coverage structure for *'we do some Happy New Year drawing'*

we	**do**	**some**	**happy**	**new**	**year**	**drawing**
		some				drawing
	do	some				
we	do					
			happy	new	year	

3.3 Discontinuity enhances processing potential

As supported by data (Drienkó 2015), discontinuous fragments in the coverage mechanism enhance the coverage potential of the AG model (as discussed in Section 2.3). The reported 5% increase may not seem much. However, bearing in mind that mother-child discourse is actually a simplified way of using language, one should not expect mother-child data to include a significant number of complicated linguistic constructions whose analysis would require the more powerful apparatus of discontinuous processing. That said, languages do have complicated constructions like embeddings or crossing dependencies. To illustrate this the Appendix provides an analysis for the English *respectively* construction involving crossing dependency.

The continuous-discontinuous duality of the AG coverage mechanism corresponds with neurological findings suggesting a dissociation of processing modes with respect to sentence types. Bahlmann et al. (2006) documented different Event Related Potential (ERP) components for the processing of sequences of different structural types, namely, $(AB)^n$ sequences from a Finite State Grammar and embedding A^nB^n sequences from a Phrase Structure Grammar. The $(AB)^n$ notation denotes a repeating sequence of A and B category elements (meaningless syllables in the experiment) $a_1b_1\ a_2b_2 \ldots a_nb_n$. A^nB^n stands for embedded AB segments such as $a_1a_2 \ldots a_nb_n \ldots b_2b_1$. In the AG framework this dichotomy could be explained in terms of continuous and/or discontinuous coverage: as for $(AB)^n$ utterances, continuous AB fragments can cover any sequence, whereas A^nB^n sequences require $n-1$ discontinuous fragments. Tables 21 and 22 contrast the coverage structures of the two sequence types for $n = 4$. Since discontinuity involves a computationally more complex process in the AG model, the continuous-discontinuous duality suggests an analogy with the dichotomy of the neurological results. Note that A^nB^n can also be understood as denoting crossing dependency sequences $a_1a_2 \ldots a_nb_1b_2 \ldots b_n$. The AG framework would predict A^nB^n sequences with crossing dependencies to be more complex than embedded A^nB^n sequences since crossing dependencies require n discontinuous fragments whereas the embedded sequences require n-1, cf. Table 22 and Table 23.

Table 21. Coverage structure for $(AB)^4$

$\mathbf{a_1}$	$\mathbf{b_1}$	$\mathbf{a_2}$	$\mathbf{b_2}$	$\mathbf{a_3}$	$\mathbf{b_3}$	$\mathbf{a_4}$	$\mathbf{b_4}$
a_1	b_1						
		a_2	b_2				
				a_3	b_3		
						a_4	b_4

Table 22. Coverage structure for A^4B^4 (embedded)

$\mathbf{a_1}$	$\mathbf{a_2}$	$\mathbf{a_3}$	$\mathbf{a_4}$	$\mathbf{b_4}$	$\mathbf{b_3}$	$\mathbf{b_2}$	$\mathbf{b_1}$
			a_4	b_4			
		a_3			b_3		
	a_2					b_2	
a_1							b_1

Table 23. Coverage structure for A^4B^4 (crossing dependency)

$\mathbf{a_1}$	$\mathbf{a_2}$	$\mathbf{a_3}$	$\mathbf{a_4}$	$\mathbf{b_1}$	$\mathbf{b_2}$	$\mathbf{b_3}$	$\mathbf{b_4}$
a_1				b_1			
	a_2				b_2		
		a_3				b_3	
			a_4				b_4

4. AGs and cognitive processing

We have seen that the AG model operating basically at two processing levels, AG-mapping and coverage, is capable of handling both familiar and novel utterances, and that it can switch from continuous to discontinuous mode. In the previous sections we presented our model, primarily, through its computational features. What follows is a discussion of further parallelisms between the AG model and research on human cognitive processing.

4.1 Usage-based generalisations

The 'AGs as superimpositions of frames' account of the various degrees of familiarity-novelty can also be interpreted in terms of generalisation levels (see Drienkó 2016a). We outlined in Section 3.1 how group-level processing can be graded, in accordance with how many "slots" are allowed in a particular "frame", ranging from zero to the number of all the word positions in the group. Zero slots means no generalisation at all. This is the case when each agreement category – each column in the corresponding table – has only one word, i.e. we have a "one-member group" consisting of a single stored utterance. The other extreme is maximal generalisation when each category has more than one word. Naturally, the group-level gradation of generalisation is inherited by the coverage level.

Such a division of processing levels with respect to degree of generalisation might also be consonant with the three usage-based options for children to produce an utterance as described in Tomasello (2003: 308–309). The first option, just producing an utterance as it was heard – *There-ya-go*, for example – corresponds to zero generalisation. The second option is retrieving a stored utterance and perform some elementary operations on it. These operations can be (i) fitting a new constituent into a slot, (ii) adding a new constituent onto the beginning or the end of a retrieved utterance, (iii) insert a new constituent into the middle of a retrieved utterance. In the AG framework slot-filling would be a group-level operation whereas adding and inserting new elements would involve the coverage level. When 'constituent' means 'more than one word', operation (i) will belong to the coverage level, too. The third option in Tomasello (2003), "combining constituent schemas", points in the direction of "combinability constraints" in the AG model, associated with our highest level of generalisation (cf. Section 3.2 and Appendix). The elementary operations for (ii) and (iii), assigned to the coverage level in our approach, are akin to those in Lieven et al. (2003) who employ five basic operations – substitute, add on, drop, insert, and rearrange – to derive a closest match for a novel utterance. The number of operations is reduced in Dąbrowska and Lieven (2005) who employ only two: juxtaposition and superimposition.

Tomasello (2003, Section 4.3.4) further suggests that the temporal progress of children's early syntactic development in terms of the construction types that are available at subsequent developmental stages is such that the constructions for each later stage become more complex due to the appearance of more advanced cognitive functions. First, holophrases do not exhibit any relevant syntactic features. Second, word combinations, "pivot schemas", can partition events lexically. Third, item-based constructions can mark participant roles syntactically, but syntactic performance depends strongly on the particular constructions. Finally, abstract constructions appear that characterise events in terms of participant roles in a more generic fashion. Broadly, such developmental transition from lower to higher cognitive functions is consonant with the gradual appearance of more and more complex generalisation tools in the AG framework. Initially, the learner has to memorise individual utterances without associating syntactic information with them. In the second stage, AGs begin to form. Depending on the actual utterances, some groups can contain shorter, say two-word long, utterances differing at fewer utterance positions, whereas other groups can contain longer utterances differing at several, maximally at all, positions. Thus, depending on their utterance types, some groups can correspond to "pivot schemas", while others can represent item-based constructions with fixed and open parts, and an AG with full generalisation power can be seen as a sequence of abstract categories like NOUN VERB NOUN, SUBJECT VERB OBJECT, ANIMAL ACTION FOOD, etc. It is also logical to assume, that group building proceeds from smaller and/or less complex groups to groups containing longer utterances with more variable positions. The ultimate developmental stage for the AG model is characterised by the smooth running of the coverage mechanism.

4.2 Categorisation

In drawing parallels between Cognitive Grammar (CG, Langacker 1987), Cognitive Construction Grammar (CCxG, Goldberg 2006), and Radical Construction Grammar (RCxG, Croft 2001), Langacker (2009: 173) claims that

> … CG, CCxG, and RCxG agree that distributional classes do not provide the basis for general characterizations of notions like noun, verb, subject, and object. Even in a single language, there may be no construction in which appear all and only those elements commonly recognized as nouns or verbs.

The AG approach seems to contradict such a view. It is not difficult to find groups where question words are explicitly present, cf. (12), group 6386 in the coverage experiments. The word '*what*' appearing in the fourth utterance position of AG (12), can prompt the learner to consider all the words in position four (*it*, *that*, *penguin*) to belong to category, say, NOUN symbolised by '*what*'. Similarly, '*what*' can appear in other groups with other noun-candidate words. If the distribution of the question word is such that each possible noun is associated with category '*what*' somewhere in some group then, ultimately, all nouns will be assigned their proper category. Thus, in our model, it is unnecessary to expect all nominal words to appear in a single "construction", e.g. in AG (12) in order that their agreement category or "distributional class" be allotted "metacategory" WHAT, i.e. ca. NOUN.

(12)	<u>you can do it</u>	you can do that	you can cuddle it
	you can't do it	you can do penguin	Anne can do it
	you can eat it	you can do ***what***	I can do it

Speculating a bit along the same line could lead to the suggestion that category assignment might be done not just through WH-words but also with the help of some other characteristic or prototypical members of categories. If, for example, *shops, hospital, pub, garden, seaside, car, farmyard,*and *place* belong to the same category within a group, the learner might notice that in other groups where any of these words occur, the word '*place*' is also present in the same position (category). This way, nouns *shops, hospital, pub, garden, seaside, car, farmyard*, and possibly the words they co-occur with in other AG categories, might receive "semantic" category PLACE.

4.3 Errors

Arguing against distributional analysis in language learning Pinker (1979: 240) claims that, given the sentences in (13), the learner would combine 'must' and 'eat' into the same word class, which would lead to the production of '*Hottentots eat survive*' and '*Hottentots must rabbits*'. As was referred to in Section 3.2, AG processing components can contain erroneous elements which can be eliminated with cognitive development. The utterances under (13) would yield AGs (14a)–(14d), of which (14b) and (14c) are erroneous as they would license the incorrect '*Hottentots eat survive*' and '*Hottentots must rabbits*' respectively. A group-correcting mechanism could improve the situation by deleting '*Hottentots eat fish*' from (14b) and '*Hottentots must fish*' from (14c). Alternatively, groups (14b) and (14c) could be deleted completely from the learner's memory.

(13) Hottentots must survive
Hottentots must fish
Hottentots eat fish
Hottentots eat rabbits

(14) a. <u>Hottentots must survive</u>

Hottentots must fish

b. *Hottentots must fish*
Hottentots must survive
Hottentots eat fish

c. *Hottentots eat fish*
Hottentots must fish
Hottentots eat rabbits

d. Hottentots eat rabbits
Hottentots eat fish

Errors are a natural feature of language acquisition. A specific subtype is overgeneralization, when children acquire some "rules" for "generating" regular well-formed utterances, and they also tend to apply those rules where they should not. Brown (1973: 333), for instance, reports mistakes like (15), where the regular *-ed* past form is incorrectly generated for *go*.

(15) *He goed to make another one.

Such mistakes can follow from incorrect grouping in the AG model. Suppose the child has stored the *you play* group of (16) in memory. The group contains both present and past forms of both regular and irregular verbs. Note that all the possible novel utterances, *we help, we helped, we go, we went*, *we played*, compatible with the group are grammatical.

(16)	you play	you help	you go	we play
	you played	you helped	you went	

It is reasonable to expect the child to realise, at some point of development, that the words within the *X={play, help, go, played, helped, went}* category can be differentiated with respect to their endings. Some words have *-ed*, some do not. This may entail, on the one hand, the subdivision of *X* into categories *{play, help, go, went}* and *{played, helped}*. On the other hand, since *-ed* can now be seen as a speech fragment that can combine with the "stems" of the *{played, helped}* category words, it seems necessary to revise the grouping of (16) because originally it consisted of two-unit utterances but now some utterances seem to consist of three units. Thus the two AGs (17a) and (17b) constitute a more rational grouping of the original utterances.

(17)	a.	you play	you help	you go	you went	we play
	b.	you play ed	you help ed			

Next, the learner can notice that the *X_b={play, help}* category of the *you X_b ed* frame, (17b), is actually a subset of the *X_a={play, help, go, went}* category for the *you play* group (17a) and may conclude that *{play, help, go, went}* category words are allowable for the *you play ed* group, too. Thus (17b) will license the overgeneralised utterances *you goed* and *you wented*. The *'wented'* verb form predicted by the AG analysis can also be justified by language acquisition data. Brown (1973: 335), for instance, explicitly refers to '*tored*','*broked*' and *'felled'* indicating that such verb forms do exist in children's language.

Error correction in the AG framework primarily means the regrouping of utterances (i.e. homogenising groups), reorganising schemas, or revising combinability constraints. Viewed from a statistical perspective, such corrections can be connected to the notions of *preemption* – "repeatedly witnessing the word in a competing pattern" – and to a pattern's *degree of openness* – "the variability of the items that occur in a given pattern" – as advocated by e.g. Goldberg (2009). Of the many possible alternative groups, schemas, and combinability constraints, those ones are the most likely to be "finalised" (long-term optimization) or applied in the current speech act (situation-level optimisation) which have been witnessed[8] most often in previous similar communicative situations (preemption) or are compatible with the most linguistic items (degree of openness). Tomasello (2003: 300) considers *entrenchment,* besides preemption, an important constraint on generalisation: *"Entrenchment simply refers to the fact that when an organism does something in the same way successfully enough times, that way of doing it becomes habitual and it is very difficult for another way of doing that same thing to enter into the picture*". From our point of view, only those groups, schemas, and combinability constraints should survive or be dominant which have been used successfully in numerous communicative situations.

4.4 Discourse cues for shaping AGs

The formation of AGs is a key component of our approach. Note that organising utterances into groups is possibly easier for the learner if language is presented to him or her in such a way that supports the organisation process. One possibility is offered by "variation sets" of partially overlapping subsequent utterances (Küntay & Slobin 1996). Waterfall et al. (2010) and Waterfall & Edelman (2009) emphasise the relevance of variation sets in child-directed speech as discourse cues for language acquisition. A variation set is "*… a contiguous sequence of utterances produced by a single speaker in a conversation and each successive pair of utterances has a lexical overlap of at least one element*" (Waterfall et al. 2010: 687). It is easy to see some kinship between AGs and specific variation sets. For instance, the possible sequence of utterances *this is my doll, this is your doll, there is my doll, this is my doggie* constitutes a variation set but the utterances can form an AG, as

8. i.e. have been used successfully for processing.

well, since each utterance differs from *this is my doll* in only one word. “Topical discourse sequences”, i.e. groups of adjacent utterances that centre around a shared topic (Rohde & Frank 2014) might offer another discourse device for facilitating group formation.

4.5 Time course of language acquisition

Newport (1990) claims that the development of certain cognitive capacities may cause a reduction in others. This developmental “less is more” feature seems to be echoed by some of our previous preliminary findings. Drienkó (2017a) found that, for context-free utterances, information on syntactic categories influences group formation and consequently coverage, i.e. the effectiveness of the AG mapping process. Actually, syntactic category information reduces average group size due to the exclusion of non-matching group members. A similar effect was found with respect to semantic category information in Drienkó (2018b, 2020). Thus, the development of syntactic-semantic category processing may cause a reduction in the capacity to freely combine words. Furthermore, the temporary reduction in syntactic processing predicts a three-regime, rise-fall-rise, learning graph with respect to the processing of novel utterances. In the beginning, the growing group space of more and more AGs enables the mapping of more and more novel utterances, until at some point a maximum is reached. At this point the system starts to process category information, i.e. tries to understand utterances “more deeply”. The initially predominantly mechanical, more “formulaic” language integrates elements of compositionality, i.e. the meaning of words begins to play a role. This results in a fall of “syntactic” processing efficiency. The new type of understanding requires modification, reorganisation of the group space. Then with the increasing number of semantically/categorically correct groups, again, more and more novel utterances will be able to be processed.

The emergence of semantic category information processing, as signalled by the ‘fall’ regime of the “syntactic” learning graph, may correlate with what is referred to as “vocabulary spurt” in the developmental literature. Although it is unclear whether there is a sudden transition or gradual growth, it is uncontroversial that after acquiring about 50–100 words, children, as if realising that things must have names, switch to a faster rate of word learning during the second year of life (Ganger & Brent 2004). This period of more semantically focussed processing may condition the reorganisation of syntactic representations, AGs in our framework. The possible correlation between category information and vocabulary growth is also supported by Gopnik & Meltzoff (1987) finding a specific relation between categorisation skills of 18-month-olds and “the naming explosion”, i.e. vocabulary spurt.

The regression in processing skills as represented by the 'fall' region of our learning graph may be reminiscent of the U-shaped learning curve documented in various fields of cognitive development (Strauss 1982). A classic example concerns overgeneralisation where after a period of correctly using words like 'went' or 'feet', children sometimes use the overgeneralised forms 'goed' or 'foots' for a while and after that they resume the correct forms (cf. Section 4.3). In proposing a Dynamic Systems perspective for U-shaped development, Gershkoff-Stowe and Thelen (2004) cite results indicating a brief rise and fall in object naming errors which occurred at about the beginning of vocabulary spurt.

A rise-fall-rise developmental curve might also be linked to localisation issues. Propositional speech is associated with strong left lateralisation whereas formulaic language involves right hemisphere processing and basal ganglia. Normal communication integrates the two language modes (Sidtis, Sidtis, Dhawan, & Eidelberg 2018). As category information gradually becomes available, categorically more precise groups begin to form via a concomitant restructuring of the group space. The appearance of more "specialised" groups may require more computational resources, and may facilitate the foundations of more "analytic" speech. It might be hypothesised, that the unexpected drop in processing capacity, which we ascribe to the emergence of category information, is in connection with a strengthening role of the left hemisphere.

The relationship between category information and AGs may also explain why comprehension precedes production in language acquisition. Although the young learner's linguistic representation is less adequate in the absence of information about syntactic/semantic categories, s/he can still comprehend utterances from the outside world by mapping them on his/her already existing "agreement groups". For instance, utterance *the gir*l can be mapped on group {*big boy, the boy, big girl}*, however the lexical-categorial distinction between the adjective *big* and the determiner *the* is blurred. The resultant uncertainty may block the production of utterances otherwise compatible with the group. This blocking effect may be stronger with "less meaningful" words, like e.g. *the.*

In a nutshell, the AG framework suggests the following developmental process. Acquisition starts by storing utterances, "holophrases" in memory. The stored utterances are arranged into AGs, while the group space gradually increases. Basic syntax emerges via concatenation of words in matching positions. In this phase AGs are possibly "imperfect" or "heterogeneous", containing categorically non-matching elements, and utterances are possibly erroneous. As category information gradually becomes available, categorically more precise groups begin to form via a concomitant restructuring of the group space. The appearance of more specialised groups may require more computational resources, and may facilitate the foundations of more analytic speech. This developmental period may coincide with vocabulary spurt.

4.6 AGs as constructions

In Fillmore (1988: 54) *"grammatical constructions* [are treated] *as syntactic patterns which can fit into each other, impose conditions on each other, and inherit properties from each other"*. This view is largely congruent with AGs pictured as representing simple or primary constructions which can be combined into more abstract schemas. Due to its usage-based stance, however, explicit a priory defined feature ontologies, feature-specifications, or constraints are not part of our model. On the other hand, AGs may indeed symbolise linguistic constructions with inherited properties. For instance, the 3rd-singular agreement between *that's* and *isn't it*, originating from AG 2924 in the AG experiments, is also valid for utterance *that's a good thing isn't it* mapped onto the possible schema Table 24 which is a combination of groups 2924 and 10127 shown under (18) and (19), respectively.

(18)	<u>that's right isn't it</u>	that's easier isn't it	that's better isn't it
	that's good isn't it	that's Roger isn't it	that's nice isn't it
	that's alright isn't it	that's blue isn't it	that's bright isn't it
	that's lovely isn't it	that's Joseph isn't it	

(19)	<u>that's a funny one</u>	that's a funny laugh	that's a funny picture
	that's a good one	that's a red one	that's a funny man
	that's a Daddy one	that's a funny noise	that's a smaller one
	that's a old one	that's a little one	that's a funny thing
	that's a new one	that's a lemon one	that's a funny song
	that's a big one	that's a funny pussy	that's a hard one

Table 24. 3rd-singular agreement inherited in utterance *that's a good thing isn't it* covered by groups 2924, and 10127

That's	*a*	*good*	*thing*	*isn't*	*it*
2924_ 1		2924_ 2		2924_ 3	2924_ 4
10127_ 1	10127_ 2	10127_ 3	10127_ 4		

The notion of discontinuity, subsumed by Duality 3 in the AG framework, may have direct connections to the issue of long-distance dependency (LDD) in natural languages. Dąbrowska (2008) analysing English LDD constructions from a usage-based perspective reported that the most acceptable interrogative LDD utterances were those which fit either template *WH do you think S-GAP* or *WH did you say*

S-GAP.[9] Furthermore, (i) LDD questions disprefer other main verbs than *think* or *say*, other auxiliaries than *do*, as well as complementisers; (ii) LDD questions virtually never involve dependencies longer than one clause. Supposing we want to analyse utterance *When do you think Anne eats it*, and the AG system contains AGs (20a) and (20b), as well as holphrases (20c) and (20d), our model yields the following explanation. Depending on whether *do you think* is treated as a formulaic expression or as a group member utterance, the coverage structure of *When do you think Anne eats it* requires the combination of (20a) with (20b) or (20c), respectively, cf. Table 25. Since the insertion of holophrase (20c), *do-you-think*, requires no mapping on group (20b), it is processed more readily than e.g. utterance *When can they say Anne eats it* requiring AG (20b). Recall that mapping on AGs can be graded, so the processing complexity of *When can they say Anne eats it*, requiring the full generalisation potential of AG (20b) in our example, is higher than e.g. *When do they say Anne eats it* where the auxiliary 'do' is the same as in the base utterance *do you think*.The explanation for the *WH did you say S-GAP* case would be the same except for the involvement of holophrase (20d) instead of (20c). In connection with ii) the AG model predicts that longer dependencies would require the involvement of further groups making the mapping process even more complex.

Table 25. Coverage structure for '*When do you think Anne eats it*'

When	**do**	**you**	**think**	**Anne**	**eats**	**it**
When				Anne	eats	it
	do	you	think			

(20)	a.	b.	c.	d.
	<u>When Anne eats it</u>	<u>do you think</u>	do-you-think	did-you-say
	How Anne eats it	can you think		
	When she eats it	do you say		
	When Anne drinks it	do they think		
	When Anne ate it	did you think		

Christiansen et al. (2009) suggest that subjects who perform better in the distributional learning of non-adjacencies in nonsense words also perform better in the natural language processing of LDD object relative (OR) sentences. Since the nonsense words were formed using frames of type *AXB* with a dependency between the A and B category elements, the words can be represented by AGs corresponding to their respective frames. Thus there seems to be a correlation between

9. 'S-GAP' stands for 'subordinate clause with a missing constituent (gap)'.

group formation capacities and syntactic processing skills. Additionally, since there was no significant difference between bad word-learners and good word-learners on the processing of subject relative (SR) sentences involving a smaller degree of constituent non-adjacency, the results could also support our assumption that a larger degree of discontinuity constitutes a larger degree of processing complexity, cf. Section 3.3. Despite the fact that fragments in the AG model are not necessarily congruent with phrase structure grammar constituents, the results in Christiansen et al. (2009) might be valid for AGs as well. To demonstrate this consider SR sentence *reporters that attacked senators fell* and OR sentence *reporters that senators attacked fell*. Suppose the AG system minimally contains the groups under (21), where (21b) and (21c) are one-member AGs for simplicity. The coverage of the SR sentence requires the combination of (21a) with (21b) whereas the coverage of the OR sentence requires the combination of (21a) with (21c), cf. the bold-face fragments in the respective coverage structures Table 26 and Table 27. Optimally, for both coverage structures the combination of the discontinuous *reporters fell* and the corresponding that-clause would suffice. However the mapping mechanism has to evaluate other possibilities, too. *Reporters attacked* and *senators fell* are also possible mappings for the SR sentence. The processing mechanism should conclude – by consulting the system of combinability constraints – that, while *reporters attacked* is logically acceptable (because it can be combined with the other valid fragments), *senators fell* is incorrect (because it cannot). In the OR case, besides the relevant that-clause, a further fragment *senators attacked* needs to be processed. The mapping mechanism can judge it to be acceptable. However *reporters attacked* and *senators fell* have to be excluded from the coverage structure. The mapping of the SR sentence requires the processing of four fragments, two of which are discontinuous (Table 26). On the other hand, the mapping of the OR sentence requires the processing of five fragments, three of which are discontinuous (Table 27). Thus the larger processing complexity of the OR sentence can be explained by the larger number of fragments involved as well as the larger degree of discontinuity.

(21)	a.	b.	c.
	<u>reporters attacked</u>	<u>that attacked senators</u>	<u>that senators attacked</u>
	senators attacked		
	reporters fell		

Table 26. Coverage structure for '*reporters that attacked senators fell*'

reporters	**that**	**attacked**	**senators**	**fell**
reporters		attacked		
reporters				**fell**
			senators	fell
	that	**attacked**	**senators**	

Table 27. Coverage structure for '*reporters that senators attacked fell*'

reporters	**that**	**senators**	**attacked**	**fell**
reporters			attacked	
reporters				**fell**
		senators	attacked	
		senators		fell
	that	**senators**	**attacked**	

Describing Fluid Construction Grammar, van Trijp et al. (2012) underline the importance of the bidirectionality or reversibility of their implementation, i.e. that it is fit both for parsing and producing utterances. In theory, AGs could also be used in both ways. Mapping utterances onto AGs and/or outputting coverage structures can be viewed as a kind of parsing. However, it might also be possible to produce utterances by selecting words according to certain, say semantic or communicative, criteria and string them together by mapping them onto AGs or schemata. The Embodied Construction Grammar of Bergen & Chang (2013) views constructions as an interface to mental simulation. We suspect that our framework does not contradict such a view since whatever the actual neurological representations of constructions are, the formation of groups should not prevent group-member utterances (and/or the words they are composed of) from having access to or being accessible by other brain modules, the sensory-motor system, for instance. Sag et al. (2012: 19) divide their Sign-Based Construction Grammar framework, *"meant to be compatible with most linguistic analyses that have been developed within CxG of all kinds"*,into three main parts: signature, lexicon and constructicon. Broadly, the AG model might seem to have such components. Our "lexicon" contains words (holophrases) together with their agreement categories. The "constructicon" in our model consists of generalisation objects like AGs, schemas, and combinability constraints. "Signature" for us might mean a description of the computational apparatus underlying the generalisation mechanisms of mapping onto groups and schemas, assembling coverage structure, extracting combinability constraints, and coverage "parsing".

5. AGs beyond syntax

We have seen that an inherently dualistic usage-based, distributional linguistic model based on (i) the cognitive capacity of grouping similar utterances and on (ii) the cognitive capacity of combining such groups, alongside with the corresponding cognitive/computational mapping mechanisms, may account for a considerable portion of syntactic data. Although the AG framework was designed to focus on syntactic processing, it may be compatible with other areas of research, as well. The present section points to some possible fields of application.

5.1 Morphology

Consider the Hungarian morphological groups in (22) formed by combining the verbs *olvas*'read', *számol* 'count', the perfective verbal prefixes *el*'away', *ki* 'out', the definite 1st -singular marker -*om*, the definite 2nd -singular marker -*od*, the causative suffix -*tat,* and the permission suffix -*hat*.

(22)	<u>el olvas</u>	<u>számol om</u>	<u>olvas tat</u>
	el számol	számol od	számol tat
	ki olvas	olvas om	olvas hat

Hungarian morphology prescribes the order of suffixes glued to the word stem. The example in (23) shows how the basic meaning of *olvas,* 'reads', becomes more and more complex via affixation.

(23) a. *olvas*
read-3RD.SING.INDEF
'he/she/it reads/is_reading (something)'

b. *elolvas*
VERB.PREF- read-3RD.SING.INDEF
'he/she/it reads (something to the end)

c. *elolvastat*
VERB.PREF- read-3RD.SING.INDEF-CAUS
'he/she/it makes (somebody) read (something to the end)

d. *elolvastathat*
VERB.PREF- read-3RD.SING.INDEF-CAUS-PERM
'he/she/it may make (somebody) read (something to the end)

e. *elolvastathatod*
VERB.PREF- read-CAUS-PERM-2ND .SING.DEF
'you (singular) may make it be read (to the end)

Besides licensing novel verb forms like *kiszámol*, 'calculates, completes a calculation', *olvasod*, 'you (are) read(ing) it', or *számolhat*, 'he/she/it may (be) count(ing)', the groups in (22) can take part in the morphological coverage process of more complex word forms. The coverage structure of *elolvastathatod* 'you (singular) may make it be read (to the end)', for instance, is sketched as Table 28. In principle, morphological AGs can cover words of any length. The possessive suffix *-é* in Hungarian can be added recursively to the noun's stem. Thus e.g. *Páléé* means 'the possession of the possession of the possession of Paul'. The corresponding coverage structure is outlined as Table 29, assuming an AG like (24).

Table 28. Morphological coverage structure for *elolvastathatod*

el	**olvas**	**tat**	**hat**	**od**
el	olvas			
	olvas	tat		
	olvas		hat	
	olvas			od

Table 29. Morphological coverage structure for *Páléé*

Pál	**é**	**é**	**é**
Pál	é		
Pál		é	
Pál			é

(24) Ingrid é
Pál é
Péter é
…

5.2 Analogical reasoning

Note that generalising to novel utterances in the AG model can be regarded as a sort of analogical inference. Fundamentally, analogical argumentation can be characterised as follows (cf. e.g. Bartha 2019): entity A is similar to entity B (in certain respects) and A has some further feature Q, therefore B also has feature Q. If, for instance, Mars and Venus are similar in that both of them are planets, and Mars orbits the Sun, it might be inferred that Venus also orbits the Sun. This kind of analogy is encoded in AGs. Words occupying the same position in an utterance are similar in that they belong to the same lexical/syntactic category. A further feature that words belonging to the same category have is the contexts in which they occur. If, for instance, *girl* and *boy* are both nouns, i.e. occupy Position 2 in the utterances of group (1) – repeated as (25) for convenience – and both nouns occur in context *the X can dance*, furthermore *girl* also occurs in context *the X can cook*, then it might be inferred that *boy* also occurs in context *the X can cook*, giving rise to novel utterance *the boy can cook*.

(25) the girl can dance
the boy can dance
a girl can dance
the girl can cook

5.3 Concept representation

AGs offer themselves for defining various concepts in the sense adopted in machine learning, for concept learning, in particular. Given a set of training instances described by some attribute values, the learning task consists in finding a hypothesis that best approximates the target function/concept, i.e. classifies *all possible* instances in accordance with the target concept (see e.g. Mitchell 1997). A hypothesis is, basically, a conjunction of attribute values. Thus, for instance, a hypothesis for the concept 'bird' might look like (26), given the attributes *Size, Skin, Legs, Wings*, and their possible values as in (27). Hypothesis (26) assumes that a bird is a '*feathered creature of any size with two legs and wings*'.

(26) C(bird)=(BIG ∨ MEDIUM ∨ SMALL) ∧ FEATHER ∧ TWO ∧ YES

(27) Size: BIG, MEDIUM, SMALL
Skin: HAIR, FEATHER
Legs: TWO, FOUR
Wings: YES, NO

Given the assignment of values in (27), there are $3 \times 2 \times 2 \times 2 = 24$ possible instances that can be described by the attributes. Instance *BIG ∧ FEATHER ∧ TWO ∧ YES*, for example, would be classified as belonging to the concept 'bird', whereas *SMALL ∧ HAIR ∧ TWO ∧ NO*, would not. The size of the hypothesis space containing all the possible hypotheses is the power set of the instance space, i.e. it is 2^{24} for our example.

By applying the concept-learning formalism, it is possible to define concepts via AGs. In order to obtain attributes values for describing instances, we can regard utterance positions, i.e. "agreement categories", as attributes and the actual words as their values. Thus, for instance, the values of the positional attributes for group (1) are given under (28), cf. also the tabular representation of Table 1.

(28) Position1: THE, A
Position2: GIRL, BOY
Position3: CAN
Position4: DANCE, COOK

An utterance in an AG can be considered a positive training example described by positional attributes, whereas the utterances of the group constitute the training set for the concepts definable over the AG. The attribute-value interpretation of group (1) is sketched in (29).

(29) THE ∧ GIRL ∧ CAN ∧ DANCE
THE ∧ BOY ∧ CAN ∧ DANCE
A ∧ GIRL ∧ CAN ∧ DANCE
THE ∧ GIRL ∧ CAN ∧ COOK

The instance space, i.e. all the possible utterances that can be mapped onto the AG as indicated on the tabular representation, can be characterised by the conjunction of the positional attributes with all their possible values. The instance space for e.g. AG (1) is described as (30). It is possible to define several concepts for a given AG, cf. (31). Concept (31a) characterises utterances giving information on people who can dance. Concepts (31b) and (31c) give information on what girls can do and on what boys can do – the same, in principle. However, considering that THE ∧ GIRL ∧ CAN ∧ COOK (*the girl can cook)* is a positive instance, i.e. member of the group, whilst THE/A ∧ BOY ∧ CAN ∧ COOK would belong to concept 'what a boy can do' only by inference, we might say that the two concepts are 'logico-semantically' different.

(30) (THE ∨ A) ∧ (GIRL ∨ BOY) ∧ (CAN) ∧ (DANCE ∨ COOK)

(31) a. 'those who can dance': (THE ∨ A) ∧ (GIRL ∨ BOY) ∧ CAN ∧ DANCE
b. 'what a girl can do': (THE ∨ A) ∧ GIRL ∧ CAN ∧ (DANCE ∧ COOK)
c. 'what a boy can do': (THE ∨ A) ∧ BOY ∧ CAN ∧ (DANCE ∧ COOK)

The coverage mechanism of the AG framework combining groups can be used for expanding instance spaces in order to define more complex concepts. We noted in Section 3.2 that by memorising a coverage structure the language learner can actually acquire a "schema" of group combinations which can be used for processing novel utterances. Hypothesising further that such schemas can also contain information on the 'conceptual structures' of AGs, it becomes possible to have more complex concepts. A memorised conceptual schema like Table 30 for e.g. utterance *'the big girl can always cook'* can facilitate the formation of, inter alia, the concept 'those who can always cook', (THE ∨ A) ∧ (SMALL ∨ BIG) ∧ (GIRL ∨ BOY) ∧ CAN ∧ ALWAYS ∧ COOK, or concept 'what the small boy can do', THE ∧ SMALL ∧ BOY

∧ CAN ∧ (SELDOM ∨ ALWAYS) ∧ (COOK ∨ DANCE ∨ SLEEP). The utterance *'the big girl can always cook'* would be a positive instance for the concept 'those who can always cook', whereas it would be a negative instance for 'what the small boy can do'. The positional attribute values for the most general concept (THE ∨ A) ∧ (SMALL ∨ BIG) ∧ (GIRL ∨ BOY) ∧ CAN ∧ (SELDOM ∨ ALWAYS) ∧ (COOK ∨ DANCE ∨ SLEEP) – ' any person who can ever do anything' – compatible with conceptual schema Table 30 are given under (32). For the sake of comparison we show the coverage structure for '*the big girl can always cook*' as Table 31, cf. also (6a) and (6b).

Table 30. Conceptual schema associated with *'the big girl can always cook'*

the	big	girl	can	always	cook
THE ∨ A		GIRL ∨ BOY	CAN		DANCE ∨ COOK
				SELDOM ∨ ALWAYS	SLEEP ∨ COOK
	SMALL ∨ BIG	GIRL ∨ BOY			

(32) Position1: THE, A
Position2: SMALL, BIG
Position3: GIRL, BOY
Position4: CAN
Position5: SELDOM, ALWAYS
Position6: DANCE, COOK, SLEEP

Table 31. Coverage structure for *'the big girl can always cook'* *

the	big	girl	can	always	cook
1_1		1_2	1_3		1_4
				6b_1	6b_2
	6a_1	6a_2			

*Recall that the first numbers identify the groups while the second numbers refer to word positions. For instance, 6b_1 and 6b_2 identify group (6b) consisting of two-word utterances, onto which *'always cook'* can be mapped.

5.4 Language evolution

Progovac (2016) argues for the two-slot grammars of Bickerton (1990, 1998) as characterising an important stage in the evolution of language and assumes that they might have served as foundation for further structure building. Two-slot grammars generate utterances like (33) according to an AB – AC template. Such utterances can be seen as enumerations of very simple, two-member AGs, where the two member-utterances differ in the second position. Thus two-slot grammars might mirror a cognitive stage in the evolution of language when mental representations of utterances began to be organised into groups. Further structure building might have appeared when the speakers' cognitive system was developed enough for the coverage mechanism to come into play.

(33) a. Easy come, easy go
b. Monkey see, monkey do
c. Like father, like son

Jackendoff (1999) sees traces of protosyntax in the phenomenon of 'adverbial' expressions appearing fairly freely in various positions of an utterance, cf. (34). In the AG framework, this kind of freedom can be interpreted as characterising a stage in the evolution of syntax when the coverage mechanism was already operational, but relatively few constraints on the possible combinability of speech fragments (AGs) had been conventionalised. Since no relevant constraints concerning the utterances in (34) were formed during the later stages, the coverage structures as sketched in (35) are still valid.

(34) a. Sick at heart, Fred left town
b. Fred, sick at heart, left town
c. Fred left town, sick at heart

(35) a. [Sick at heart] [Fred left town]
b. [Fred [sick at heart] left town]
c. [Fred left town] [sick at heart]

6. Conclusions

This chapter demonstrated that the AG model operating basically at two processing levels, AG-mapping and coverage, is capable of handling both familiar and novel utterances, and that it can switch from continuous to discontinuous mode. The three inherently dualistic components of the model were explicitly identified as Duality 1, familiarity-novelty of utterances, Duality 2, groups vs. group-combinations involved in the mapping process, and Duality 3, continuity-discontinuity of utterance fragments. It was shown that such a dualistic model is compatible with a wide variety of phenomena observed in human cognitive processing including linguistic development, the processing of complex structures, lateralisation, or typological differences between languages. Additionally, we hinted at the possible applicability of the model to fields outside the confines of syntax.

The fact that there is an arbitrary length limit on AG utterances may cast doubt on the reliability of the results. However, verification may come from research on short-term memory (STM) storage capacity. Miller (1956) proposes that people can remember seven plus or minus two chunks in STM. Cowan (2000) argues for about four words as “pure” STM capacity limit. If we assume that AGs are built out of stored utterances (cf. also Bannard and Matthews 2008), and that utterances consist of chunks, roughly words, our five-word limit is in good agreement with the storage capacity proposals. Trivially, here we also assume that STM plays a role in the memorisation of utterances (word sequences). From a theoretical perspective, one-word utterances are meaningless in our syntactic analyses of word combinations. They could, nevertheless, be regarded as one-member groups. “Too long” utterances are likewise useless since they also tend to form one-member groups which play no part in the processing of novel utterances. Furthermore, the exclusion of one-word utterances and utterances longer than five words from AGs reduces the processing potential of the system. This means that the results actually underestimate the processing capacity of the AG model.

Besides the perspectives sketched in Section 5, the scope of the AG framework can be widened along further dimensions. Since an utterance can possibly be mapped on several groups, the AG system may exhibit plasticity effects (cf. e.g. Bates 1999). When certain AGs cannot be used for some reason, other AGs can replace them. It could be insightful for future research to investigate how processing changes when certain AGs drop out of the system. Harris (1952) claims that, by establishing equivalence classes of text fragments occurring in similar environments, any text can be broken down into repetitive “intervals” that provide information about discourse structure. By the same token, examining the collection and/or succession of the particular AGs that can appear together in a given discourse could possibly provide discourse-level insight into cognitive linguistic processing. Another prospective line of research concerns a possible link between AGs and cognitive text segmentation. The AG model tacitly assumes that utterance boundaries are readily available to the language learner. However, this may be an overoptimistic attitude. From a usage-based, emergentist perspective it would be especially insightful to see how language can emerge out of a stream of linguistic elements. Drienkó (2016b) proposed the Largest Chunk (LCh) algorithm for inferring boundaries of utterance fragments in unsegmented texts. The algorithm looks for subsequent largest chunks that occur at least twice in a single sequence of linguistic symbols. It was shown that word boundaries can be detected with fairly high precision via the LCh strategy, especially for the syllable-based case (Drienkó, 2017b, 2018a). It could further be possible to segment a single stream of words into speech fragments via the LCh strategy and form AGs out of the fragments so obtained (see Drienkó 2019 for some cross-linguistic pilot results). For such an AG model the training input would be a sequence of words rather than a collection of utterances.

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Appendix

For an example of how the agreement groups coverage mechanism may be applied to complex linguistic phenomena, consider the English respectively construction *Anna, Betty, and Charles ran, jogged, and walked, respectively*. Given the hypothetical agreement groups in (A1), the sentence can be covered by the fragments shown in Table A1. In order to ensure that groups are only combined in syntactically optimal ways we may define "combinability constraints" (CC) which prescribe which groups can be combined and how. CC's may also be read off the coverage structures of grammatical utterances. Formally, a coverage structure is a tabular arrangement of the groups covering a given utterance, where the groups are represented by their "agreement categories". In coverage structure Table A2, for instance, agreement category G2_1 refers to the words occupying the first utterance position in the utterances of Group 2 (i.e. *Anna* and *Betty*). Then a CC can be interpreted as a partial coverage structure. For example, the constraint, CC(2,2), for combining Group 2 with itself in Figure A1 requires that the two fragments involved share the last two words and that the first word from one fragment precede the first word of the other. To have a legal coverage structure for the respectively-construction in question, the CC's of Figure A1 should be fulfilled.

(A1)	Group 1:	Group 2:	Group 3:
	Anna ran	Anna and Charles	jogged and walked respectively
	Anna jogged	Betty and Charles	ran and walked respectively
	Anna walked	Anna and Betty	
	Betty ran		
	Charles ran		

Table A1. Fragments covering ***Anna, Betty, and Charles ran, jogged, and walked, respectively***

Anna	**Betty**	**and**	**Charles**	**ran**	**jogged**	**and**	**walked**	**respectively**
	Betty	and	Charles					
Anna		and	Charles					
					jogged	and	walked	respectively
				ran		and	walked	respectively
Anna				ran				
	Betty				jogged			
			Charles				walked	
Anna					**jogged**			
Anna							**walked**	
	Betty			**ran**				
	Betty						**walked**	
			Charles	**ran**				
			Charles		**jogged**			

Table A2. Coverage structure represented by agreement groups

Anna	Betty	and	Charles	ran	jogged	and	walked	respectively
	G2_1	G2_2	G2_3					
G2_1		G2_2	G2_3					
					G3_1	G3_2	G3_3	G3_4
				G3_1		G3_2	G3_3	G3_4
G1_1				G1_2				
	G1_1				G1_2			
			G1_1				G1_2	
G1_1					**G1_2**			
G1_1							**G1_2**	
	G1_1			**G1_2**				
	G1_1						**G1_2**	
			G1_1	**G1_2**				
			G1_1		**G1_2**			

CC(1,1)

G1_1		G1_2	
	G1_1		G1_2

CC(2,2)

	G2_1	G2_2	G2_3
G2_1		G2_2	G2_3

CC(3,3)

	G3_1	G3_2	G3_3	G3_4
G3_1		G3_2	G3_3	G3_4

CC(2,3)

G2_1	G2_2	G2_3				
			G3_1	G3_2	G3_3	G3_4

Figure A1. Combinability constraints

Note that the crossing dependency effect is due to CC(1,1) which cannot be fulfilled for the boldface elements of Table A1 or Table A2.[10] Thus the legal coverage "parse" structure for our example construction is given asTable A4 corresponding to the fragments in Table A3.

10. It could be possible, for instance, that Betty ran and Charles jogged, but then 'Anna walked' should be necessary, in which case 'Anna walked' would embed the other two fragments thus violating CC(1,1) twice.

Table A3. 'Legal' fragments for ***Anna, Betty, and Charles ran, jogged, and walked, respectively***

Anna	**Betty**	**and**	**Charles**	**ran**	**jogged**	**and**	**walked**	**respectively**
	Betty	and	Charles					
Anna		and	Charles					
					jogged	and	walked	respectively
				ran		and	walked	respectively
Anna				ran				
	Betty				jogged			
			Charles				walked	

Table A4. 'Legal' groups for coverage structure

Anna	**Betty**	**and**	**Charles**	**ran**	**jogged**	**and**	**walked**	**respectively**
	G2_1	G2_2	G2_3					
G2_1		G2_2	G2_3					
					G3_1	G3_2	G3_3	G3_4
				G3_1		G3_2	G3_3	G3_4
G1_1				G1_2				
	G1_1				G1_2			
			G1_1				G1_2	

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This volume brings together linguistic, psychological and neurological research in a discussion of the *Cognitive Dualism Hypothesis*, whose central idea is that human cognitive activity in general and linguistic cognition in particular cannot reasonably be reduced to a single, monolithic system of mental processing, but that they have a dualistic organization. Drawing on a wide range of methodological approaches and theoretical frameworks that account for how language users mentally represent, process and produce linguistic discourse, the studies in this volume provide a critical examination of dualistic approaches to language and cognition and their impact on a number of fields. The topics range from formulaic language, the study of reasoning and linguistic discourse, and the lexicon–grammar distinction to studies of specific linguistic expressions and structures such as pragmatic markers and particles, comment adverbs, extra-clausal elements in spoken discourse and the processing of syntactic groups.

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