The importance of features and exponents

Dissolving Feature Reassembly

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Formal approaches to bi- and multilingual grammars rely on two important claims: (i) the grammatical architecture should be able to deal with mono- and bi-/multilingual data without any specific constraints for the latter, (ii) features play a pivotal role in accounting for patterns across and within grammars. In the present paper, it is argued that an exoskeletal approach to grammar, which clearly distinguishes between the underlying syntactic features and their morphophonological realizations (exponents), offers an ideal tool to analyze data from bi- and multilingual speakers. Specifically, it is shown that this framework can subsume the specific mechanism of *Feature Reassembly* developed by Donna Lardiere since the late 1990's. Three case studies involving different languages and language combinations are offered in support of this claim, demonstrating how an exoskeletal approach can be employed without any additional constraints or mechanisms.

Keywords: exoskeletal, exponent, feature, Feature Reassembly, late-insertion

1. Introduction

Two foundational questions are at the heart of current investigations into bi- and multilingual (henceforth bilingual, which should be taken to also encompass multilinguals) grammatical competence (cf. Natvig et al. to appear):

1. Is it possible to model bilingual grammars in a systematic and constrained way?
2. What sorts of architectural changes/adjustments from those assumed for monolingual grammars (if any) are necessary in order to achieve this goal?

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We adopt the view that bilingual grammars are just as systematic and constrained as any monolingual grammar, making them equally important in trying to understand the nature of our linguistic capacity. In this keynote, we argue that the answer to the first question is *yes*, and we seek to illustrate the importance of linguistic representations in capturing larger-scale generalizable trends in bilingual grammars (cf. also Goldrick et al. 2016; Jackendoff 2017; Lohndal et al. 2019).

A related, though separate question is whether a separate grammar or set of constraints is needed to account for the grammatical representations in bilingual speakers. For instance, in early work on code-switching, there was a substantial amount of discussion regarding whether separate constraints were needed (MacSwan 1999, 2000, 2013, 2014). The Null Theory approach developed by Mahootian (1993), which was originally proposed to account for code-switching, argues that no separate constraints are needed to account for these data. This appeal to the Null Theory has since been extended to research in other bilingual populations, such as heritage speakers (Lohndal 2013; Lohndal et al. 2019). If we extend this assumption to hold for any bi- and multi-lingual speakers, a Null Theory approach is one in which the same kind of theory accounts for the grammatical competence of L*n* speakers. We adopt this view, which is to say that our answer to the second question above is that no architectural changes/adjustments are necessary. Specifically, we will argue that a theoretical framework that distinguishes between syntax and morphology where morphology happens *after* syntax and is realizational, has the required agility to handle grammatical structures in L*n* populations. Work in theoretical linguistics over the past three decades has now made sufficient progress to enable a unified formal approach to grammar regardless of whether we are dealing with a monolingual acquired L1, a heritage language, or a late L2 or L3. In important ways, this work related strongly to Donna Lardiere's work on *Feature Reassembly*, which was originally developed to handle L2 grammars. We will demonstrate how this overall way of thinking can be generalized and merged with ongoing theoretical work in syntax and morphology, which essentially dissolves the need for a specific theory or mechanism such as *Feature Reassembly*. In the pages that follow, we will make the case that although the original instantiation of *Feature Reassembly* provided a useful platform for developing and testing hypotheses in connection with the development of L*n* grammars across the lifespan, certain aspects of the original proposal were never fully formalized. Furthermore, it relies on an older view of the competence of bilingual speakers where grammars can be fully individuated (see e.g., Putnam, Carlson, & Reitter (2018) for arguments in favor of an integrated modular architecture of bilingual competence). We demonstrate how an exoskeletal approach to grammar encompasses and subsumes the core theoretical assumptions of *Feature Reassembly*, demonstrating that a specific and ded-

icated mechanism such as *Feature Reassembly* is unnecessary. A major strength of the current approach is that the mechanisms that were suggested as essential components of *Feature Reassembly* are all available as primitives of the exoskeletal architecture, making *Feature Reassembly* superfluous as a separate theory or mechanism. From the point of view that bilingual grammars are just as systematic and constrained as monolingual grammars, this is a major and welcome consequence, as theoretical machinery should be as slim and explanatory as possible (cf. Chomsky 1995, 2005).

This keynote is structured as follows. Section 2 introduces the theoretical backdrop and framework for the keynote. Here we highlight the core facets of *Feature Reassembly* and exoskeletal models of grammar. Section 3 argues that exoskeletal models provide all the necessary tools that Feature Reassembly requires. In Section 4, we turn to three case studies that illustrate how exoskeletal models can account for phenomena where *Feature Reassembly* has typically been utilized. Section 5 provides a general summary, theoretical precis, and broader outlook for the application of exoskeletal models moving forward.

2. Theoretical framework

In this section, we present the theoretical context and framework of *Feature Reassembly* and exoskeletal models of grammar. We start with a brief introduction to *Feature Reassembly* since our aim is to develop and ground this framework on a clear theoretical footing. Such a theoretical foundation will be presented in Section 2.2, drawing on recent work within the family of exoskeletal approaches to grammar. If successful, we have a general model that can cover multiple populations and their grammatical representations.

2.1 Feature reassembly

As a starting point, let us consider formal research on syntax and morphology in second language (L2) speakers. The acquisition of these properties has been an important topic for a long time, as Slabakova's (2016) monumental overview demonstrates. A core insight is that morphological accuracy does not equate with syntactic knowledge. Slabakova (2016: 190) puts it as follows:

> Under this view, there may be no representational deficits in learners whose language production of the morphology is not optimal. However, there may be a mapping problem between abstract features and surface morphological forms, such that incorrect production underrepresents underlying knowledge. In a nut-

> shell, some rupture occurs between syntax and morphology such that the morphology is somehow missing, but only on the surface.

Multiple frameworks have been developed and used to capture this insight: Syntax-before-morphology (White 2003; see also Lardiere 1998a, b), the *Missing Surface Inflection Hypothesis* (Haznedar & Schwartz 1997; Prévost & White 2000a, b), and *Feature Reassembly* (Lardiere 2005, 2008, 2009; Frasson 2022; see also Hicks & Domínguez 2020).[1] Despite their differences, the key point all of these approaches converge on is that the absence of overt morphology does not necessarily entail the absence of functional categories in the syntax. The most recent framework, Feature Reassembly, utilizes the focus on syntax-semantic (syn-sem) features within the Minimalist Program. In the words of Lardiere (2009: 173),

> [a]ssembling the particular lexical items of a second language requires that the learner reconfigure features from the way these are represented in the first language into new formal configurations on possibly quite different types of lexical items in the L2.

Importantly, these features are disconnected from their associated exponents:

> [...] the available data suggest that the abstract features which motivate syntactic computations are modularly "insulated" from the specific details of morpho-phonological spell-outs. Rather, the morphological component "reads" the output of this computation, identifying the features which condition morphological operations [...] (Lardiere 2000: 121–122)

Although one of the main components of *Feature Reassembly* is based on the separation of syn-sem features and exponents, these incipient proposals were never fully integrated into larger scale architectures that advocated for similar principles. An important point here that cannot be overstated is the shift initiated by proposals that employed some version of Feature Reassembly to adopt a feature-based (as opposed to a then more parameter-based) treatment of grammatical representations (Liceras et al. 2008; Slabakova 2009; Hicks & Domínguez 2020;

1. As Roberta D'Alessandro (p.c.) reminds us, there is a link between the thinking underlying *Feature Reassembly* and other work in formal linguistics. For instance, Giorgi and Pianesi's (1997) notion of *feature scattering*, which holds that functional heads can merge and split depending on the language. Also, Rizzi (1994) and much work inspired by his work (e.g., Haegeman 1997; Prévost 1997) has argued that the functional architecture can be 'truncated', which is also related to recent work which argues that structures can be removed during the derivation (Müller 2017; Pesetsky 2019). Space prevents us from discussing this link any further.

Frasson 2022). That is, as features became the prime explanans for language variation more generally, they also came to play a pivotal role in work on L2 grammars. As a result, many of the proposals and hypotheses associated specifically with *Feature Reassembly* were never extended or integrated into a more general theory of features and their realizations. In one of the later papers, Lardiere (2008) mentioned other types of separationist models and pointed towards *Distributed Morphology* (DM) as a natural theoretical home for *Feature Reassembly*:

> It is clear that locating the source of morphological variability in a distinct morphological (or phonological) component of the grammar requires a separationist model of grammar [...]. One such possible framework is that of Distributed Morphology, in which the assembly of lexical items is 'distributed' throughout the grammar.

Although DM has been mentioned explicitly for its compatibility with *Feature Reassembly*, there are also appeals to *endoskeletal*, i.e., lexicalist, notions of feature matrices and lexical items that do not align with recent theorizing efforts in exoskeletal models (Hwang 2012; Hwang & Lardiere 2013; Lardiere 2017; Lee 2015; Lee & Lardiere 2016, 2019) (see e.g., Slabakova 2021 for a discussion of these issues).[2] Despite this allusion, little work has been done to formalize the concepts found in *Feature Reassembly* with models that argue for a 'distributed' lexicon like DM.

In work on L2 grammars, *Feature Reassembly* has been utilized to account for a range of patterns. However, it is important to note that *Feature Reassembly* in and of itself does not make predictions regarding structure-building primitives. Features and their syntactic properties are not relevant when it comes to these predictions. Rather, the constraints in question are second-order constraints, which is to say that they are added on top of whatever features and mechanisms are assumed beyond the core operations responsible for creating hierarchical structure. In this respect, *Feature Reassembly* is not alone on the market when it comes to a system of second-order constraints that are built on top of structure-

2. Lee's (2015: 95–6) treatment of *Feature Reassembly* and feature matrices gives the impression that some elements of this approach rely on a lexicalist architecture:

> The Feature-Reassembly Approach claims that one of the most difficult aspects of L2 acquisition lies in figuring out the features associated with functional categories and remapping the feature matrices for L1 lexical items to those of the L2 [...] The Feature-Reassembly Approach ascribes the source of difficulty not only to the addition of new features into the feature matrices in the target language but also to remapping features into language-specific configurations and conditioning environments that may differ from the native language.

building primitives (see, i.e., Sánchez's 2019 discussion of *bilingual alignments*). It should therefore be a goal to make as much as possible fall out from first-order constraints, that is, from properties related to the grammatical architecture as such. A major goal of the present contribution is to make progress towards this goal, which requires the integration of core elements of *Feature Reassembly* into a model that advocates for a 'distributed' lexicon. In the next sub-section, we present the general architecture that we will use, namely what we label exoskeletal approaches to grammar, of which DM is one possible implementation.

2.2 Exoskeletal approaches to grammar

Since Chomsky (1965), formal grammar has by and large adopted a lexicon-driven approach to structure building. If we take verbs as an example, a verb then encodes the number of arguments it takes in the lexicon. This encoding is projected in the syntax so that a transitive verb has two argument positions in the syntax whereas an intransitive verb has one (albeit a position that may not be the same for all intransitive verbs, cf. Chomsky 1981). This approach has been very successful in uncovering numerous generalizations (see, among many, Levin & Rappaport Hovav 2005). To many, this lexicon-driven approach also encompasses what Lapointe (1980) calls the *Lexical Integrity Hypothesis*, here in the words of Di Sciullo and Williams (1987: 49): 'Words are atomic at the level of phrasal syntax and phrasal semantics. The words have FEATURES, or properties, but these features have no structure and the relations of these features to the internal composition of the word cannot be relevant in syntax'. That is, words have whatever properties that the lexicon assigns to them, and the syntax simply operates on these properties.

The alternative to a lexicon-driven approach to structure building is a syntax-driven approach. Essentially this is what Chomsky (1955, 1957) developed, where syntactic structures were generated based on phrase structure rules and then morphemes were inserted at the end of the derivation. A modern version of this view has gained considerable attention and traction in the past 20 years or so. We would like to call this view 'exoskeletal approaches' to grammar, which is a family of approaches ranging from *Distributed Morphology* (Alexiadou, Anagnostopoulou & Schäfer 2015; Alexiadou & Lohndal 2018, 2021; Embick & Noyer 2007; Embick 2015; López 2020; to appear) to Borer's specific version (Borer 1994, 2005a, b, 2013, 2014, 2017) to *Nanosyntax* (Blix 2021; Caha 2009; Fisher et al. 2022; Natvig et al. 2023).[3] A commonality of these exoskeletal

3. Note that Borer's model is often referred to as exoskeletal, but as she herself makes clear, the technical implementation does not follow from the conceptual framework (Borer 2005b: 10):

approaches is the emphasis on the way in which syntactic structure determines both the grammatical properties and 'the ultimate fine-grained meanings of lexical items themselves' (Borer 2003: 33).

Instead of a lexicon-driven versus a syntax-driven approach, one can also use the label *endo-* versus *exo*skeletal (Borer 2003). As Borer (2003) emphasizes, the two views entail substantially different perspectives on the nature of grammatical competence. On the lexicon-driven view, the focus is on humans' ability to acquire lexical items and their properties. On the syntax-driven approach, on the other hand, the rule-governed, computational perspective is highlighted. In actuality, many approaches are located somewhere on a continuum between these two outlier positions. For instance, Folli and Harley (2005) and Ramchand (2008) pursue an approach where some aspects are handled by the structural component and others are handled by properties of lexical items.

In adjudicating between endo- and exoskeletal approaches, argument structure has often been an important battleground. The core question is whether verbs really have argument structure properties that lexically constrain the syntax. Many scholars answer 'no' to this question, including, among others, Alexiadou (2014), Borer (1994, 2005a, 2005b, 2013), Lohndal (2012, 2014, 2019), Pietroski (2005, 2018), Schein (1993), Wood (2015), Åfarli (2007). As aptly summarized by Marantz (2013a: 153), current developments in linguistic theory

> [...] have shifted discussion away from verb classes and verb-centered argument structure to the detailed analysis of the way that structure is used to convey meaning in language, with verbs being integrated into the structure/meaning relations by contributing semantic content, mainly associated with their roots, to subparts of a structured meaning representation.

Put differently, at its core the exoskeletal approach is concerned with '[...] why *words* can mean so many things, but structures cannot' (Borer 2005a: 3).

There is a substantive literature defending the exoskeletal perspective. Core arguments have centered around the following three areas: (i) linguistic creativity, the property that verbs, old and new, can be interpreted differently in different syntactic environments, (ii) argument structure flexibility, that is, that many verbs can appear in a range of different argument structure environments, and (iii) sco-

> In what follows, I will continue to bring forth arguments that support a rich syntactic functional component, and a correspondingly impoverished lexical component. In turn, I will also propose a very specific syntactic functional structure for event structure [...]. However, the validity of postulating an impoverished lexicon, in the sense employed here, is quite independent of the validity of any specific functional structure I will propose.

pal arguments, or rather 'Schein arguments' (Schein 1993), demonstrating that the interpretation of an eventive verb has to be separated from the interpretation of the verb's different 'arguments'. These and other arguments have been thoroughly reviewed elsewhere (see, among others, Borer 2005a, b, Pietroski 2005; Lohndal 2012, 2014, 2019; Williams 2014) so we will not engage in a comprehensive presentation here. Rather, we will present the second area briefly, as this provides a useful illustration of the logic.

Many verbs display substantial argument structure flexibility. Rappaport Hovav and Levin (1998: 97–98) illustrate this with the examples in (1)–(3).

(1) a. Terry swept.
b. Terry swept the floor.
c. Terry swept the crumbs into the corner.
d. Terry swept the leaves off the sidewalk.
e. Terry swept the floor clean.
f. Terry swept the leaves into a pile.

(2) a. Kim whistled.
b. Kim whistled at the dog.
c. Kim whistled a tune.
d. Kim whistled a warning.
e. Kim whistled me a warning.
f. Kim whistled her appreciation.
g. Kim whistled to the dog to come.
h. The bullet whistled through the air.
i. The air whistled with bullets.

(3) a. Pat ran.
b. Pat ran to the beach.
c. Pat ran herself ragged.
d. Pat ran her shoes to shreds.
e. Pat ran clear of the falling rocks.
f. The coach ran the athletes around the track.

Rappaport Hovav and Levin (1998: 98) comment on these examples by pointing out the following: 'If such variation is the rule rather than the exception – and recent studies show that the phenomenon is indeed widespread – then the lexicon must contain a vast number of verbs with multiple lexical entries'. As they go on to point out, this would be an undesirable result, as it would entail that there are for instance six different verbs *run* listed in the lexicon. They also illustrate various restrictions at play; for instance, *sweep* can take a direct object as in (b), other direct objects such as *the crumbs* are conditional on there also being a PP (Rappaport Hovav and Levin 1998: 98).

(4) *Terry swept the crumbs.

However, despite restrictions such as (4), the fundamental problem still remains, namely, that stipulating multiple occurrences of almost identical verbs misses a fundamental generalization. Once again, in the words of Marantz (2013a: 152–153):

> [...] despite ambitious attempts to describe how verbs might systematically appear in a variety of syntactic structures depending on their semantic category, the flexibility of verbs to appear within the various set of frames relating form and meaning has defied these efforts to regulate apparent alternations in argument structure through the classification of verbs.

Wood (2015: 31) adopts an even stronger stance: '[...] for almost every verb class in Levin (1993), one can find verbs which differ from the other members of the class in non-trivial respects'.

Our purpose here is not to discuss the empirical details of these claims, but rather to illustrate one type of argument upon which exoskeletal approaches rest, namely that argument structure is not governed by fine-grained features of verbs. Borer (2005a: 9) frames it in the following way, where 'XS' stands for an exoskeletal model and listemes can be thought of as roots.

> Within an XS-model, then, the particular final meaning associated with any phrase is a combination of, on the one hand, its syntactic structure and the interpretation returned for that structure by the formal semantic component, and, on the other hand, by whatever value is assigned by the conceptual system and world knowledge to the particular listemes embedded within that structure. These listemes, I suggest, function as modifiers of that structure.'

To exemplify, this means that there is only one verb *sweep*, one verb *whistle*, and one verb *run* in the lexicon. However, these verbs can be merged in particular syntactic structures, for instance an intransitive, transitive or a ditransitive structure. In case of mismatches, such as the restriction shown in (4), these are due to an interplay between the various factors Borer mentions, and not simply because a verb has a feature requiring it to appear in a particular syntactic configuration (see Lohndal 2014 for extensive discussion).

Exoskeletal approaches to grammar differ in many details, but we claim that they also have important commonalities, here listed in (5).

(5) a. Syntax is distinct from morphology
    b. Syntax operates on features and their properties
    c. There is a morphological component where exponence and morpho-phonological operations are captured
    d. The smallest units in the grammar are uncategorized roots

In this paper, we will mostly be concerned with (5a–c) and set aside roots, simply because their presence or absence won't have any significance for what we have to say.

A crucial component of the exoskeletal architecture is that it allows us to separate the atomic units (roots and features) from associated exponents. The precise mapping of syntax to morphology is subject to controversy across the various implementations (see more immediately below). However, they are all committed to the existence of a distinction between the underlying features in a system, their subsequent values, and the actual exponents that are associated and matched with them. We can illustrate this as in (6).

(6) [$\alpha\,\beta\,\gamma$] ↔ /X/
synsem features exponent
(Embick 2015: 9)

This is a *realizational* approach to morphology (see Stump 2001 for an overview of different types of theories), where morphosyntactic properties license inflectional exponents. However, the specific details differ among exoskeletal approaches. DM assumes that the specific exponents are listed in the lexicon, and that the morphosyntactic properties are hierarchically represented as morphemes (sets of morphosyntactic features). These are then linked as in (6). Borer, on the other hand, follows the *Word-and-Paradigm* tradition from Anderson (1992), Beard (1981, 1995), Matthews (1972), and Zwicky (1985). On this approach, an inflected word is associated with a specific set of morphosyntactic features which license a rule determining the specific inflectional form. For instance, *works* is created by a rule appending -s to any verb stem associated with the features such as 3. PERSON SINGULAR, PRESENT TENSE, and INDICATIVE MOOD. *Nanosyntax* offers a yet different perspective where feature structures are mapped directly onto morphophonological exponents, where one exponent can 'span' multiple syntactic heads, i.e., be simultaneously associated with the syn-sem content of multiple features. That is, *works* is the spell-out of a syntactic sequence including multiple syntactic heads, at least N and Num. Again, our goal is not to adjudicate between these concrete implementations in this article. Rather, the basic point is once again to divorce syntax and morphology, which of course makes this family of approaches a suitable host for the core principles of *Feature Reassembly*.

The exoskeletal model is now well-established in theoretical linguistics and is frequently used to analyze a range of phenomena from many and diverse languages. In recent years, various versions of this kind of architecture have become crucial in analyzing a range of bi- and multilingual data. This can be seen through the following non-exhaustive list of references: Aboh (2009, 2015, 2019, 2020), Alexiadou (2017), Alexiadou & Lohndal (2018, 2021, in press), Alexiadou et al.

(2015), Grimstad et al. (2018), Lardiere (1998a, b, 2005, 2007, 2008, 2009, 2017), Lohndal et al. (2019), Lohndal & Putnam (2021, 2023), López (2020, to appear), Natvig et al. (2023), Prévost & White (2000a, b), Putnam (2020), Putnam, Perez-Cortes & Sánchez (2019), Riksem (2017, 2018), Riksem et al. (2019), Sugimoto (2022), Sugimoto & Baptista (2022), and Vanden Wyngaerd (2021). In these analyses, disassociated feature structures and morphonological exponents play a crucial role in investigations of the development of the syntax-morphology interface in bi- and multilinguals across the lifespan.

3. Feature reassembly 'dissolved': An exoskeletal approach to bilingual grammars

Feature Reassembly affects two elements of structure: (i) functional projections, or functional heads/features, and their sequences, and (ii) the inventory of exponents. Reviewing previous research on *Feature Reassembly*, the approach consists of mechanisms that can handle the following scenarios:

(7) a. Expanding structures
When the L2 requires additional functional projections that the L1 does not have (e.g., aspect)
b. Expanding feature inventory
When the L2 requires additional features that the L1 does not have (e.g., genericity)
c. Feature splitting
When a feature in the L1 must appear in different position in the L2 (e.g., verb placement)
d. Expanding exponency inventory
When new exponents need to be acquired (e.g., grammatical gender)
e. Acquiring new mappings
When the mapping between syn-sem features and their exponents changes (e.g., a number feature is realized by way of a different exponent)

Analyses using *Feature Reassembly* treat these mechanisms as primitives of the theory. From our point of view, these are 'second order mechanisms', in that they must be listed separately from the mechanisms governing structure building and the syntax-morphology mapping.

Exoskeletal models can straightforwardly accommodate these cases. These models are built on a separationist approach to morphology; that is, that syn-sem features are separated from their associated morphophonological exponents. Syn-sem features are the building blocks of syntactic structures, which means that a

grammar consists of features and their associated syntactic projections. Individual mappings between features and exponents also have to be listed as part of the lexicon, although exoskeletal models differ in their precise conception of the lexicon. For instance, *Distributed Morphology* argues that the lexicon is decomposed into three different lists, whereas *Nanosyntax* allows the lexicon to consist of treelets, that is, small pieces of syntactic structure and their exponents. It is obvious that a child acquiring their L1 and an adult L2 learner must both acquire the syn-sem features of a given grammar, their associated syntactic projections, and the mapping between these features and their exponents. This, then, captures the scenarios listed in (7) without the need for any additional statements or mechanisms that are not already part and parcel of the exoskeletal architecture. Again, this strengthens the case for a null theory approach to mono- and bilingual grammars.

At this point it is important to emphasize that exoskeletal models are designed to handle structural aspects related to features and their exponents. They are not designed to account for a range of additional relevant facts relating to bilinguals' language usage, i.e., determining which combinatorial factors are predicted to be 'easier' or 'more difficult' in connection with the particular dyad of languages that speaker is acquiring, and whether or not the L1 influences the L2 will often relate to a range of non-grammatical variables such as exposure and proficiency. Such constraints are second-order ones to the extent that they have no bearing on the structure-building operations and principles of grammar structures. Our claim is that *Feature Reassembly* as a mechanism is not needed as it can be captured by independently required mechanisms in exoskeletal models.

4. Case studies

In this section, we will illustrate how the architecture outlined in Section 2 can be used to account for bilingual data. Our focus will be on previous studies where *Feature Reassembly* has been used as the analytic tool. These should be seen as case studies offering a proof of concept, as there are many additional phenomena that could have been discussed, as seen by the extensive list of references at the end of Section 2. As mentioned in the Introduction, an important goal is to develop a null theory approach, which is to say that the approach should be equally amenable to monolingual and bilingual data. The case studies chosen here, alongside previous research listed at the end of Section 2, demonstrate the utility of exoskeletal approaches when it comes to different types of bilingual phenomena.

4.1 The L2 acquisition of number marking in Korean and Indonesian

To get things started, we take a closer look at the research of Lee (2015) and Lee and Lardiere (2016, 2019) who investigate the acquisition of grammatical number by adult learners of Korean and Indonesian. This research builds upon previous research that utilizes a feature-based approach to modeling L2 grammars (Hwang 2012; Hwang & Lardiere 2013). These two works investigate the acquisition of plural number marking by two dyads of speakers: (i) L1-Korean speakers who are L2-acquirers of Indonesian, and in contrast (ii) L1-Indonesian speakers who are L2-acquirers of Korean. Based on previous research that investigated the L2 acquisition of plural marking in Korean by L1-English speakers, Hwang and Lardiere (2013) discovered that certain feature-exponent correspondences that did not exist in English were only gradually acquired by more informants with advanced proficiency in Korean. To explain these effects, Hwang and Lardiere (2013) appealed to the notion of feature geometry as the culprit for these difficulties, based on the assumption that "feature depth" in a hierarchy resulted in Vocabulary Items that are more difficult to acquire (see e.g., Harley & Ritter 2002 for a more detailed treatment of the notion of feature-geometry/hierarchy). The studies by Lee (2015) and Lee and Lardiere (2016, 2019) introduce the possibility of testing for bidirectional effects in both dyads, since Korean and Indonesian are both languages that mark plurals with classifiers.

Although both Korean and Indonesian use classifiers to mark plurality, there are several important differences that distinguish these languages from one another. First things first, the data in (8) illustrate the interaction of the classifiers *buah* (Indonesian) and *mali* (Korean) with the numerals *tiga* 'three' and *sey* 'three' respectively.[4]

(8) a. John membeli tiga (buah) buku kemarin. Indonesian
John buy three CL book yesterday
'John bought three books yesterday.'

b. John-un kangaci sey mali-lul sa-ss-ta. Korean
Joh-TOP dog three CL-ACC buy-PAST-DECL
'John bought three dogs.'

Both languages also do not allow the co-occurrence of classifiers with non-numeric quantifiers, such as 'many', as shown in the examples in (9).

(9) a. John membeli dua (buah) / banyak (*buah) buku. Indonesian
John buy two CL many CL book
'John bought two / many books.'

4. The data in this section are taken directly from Lee and Lardiere (2016: 114–5).

b. Chimdae-ui-ey chayk twu kwon / manhun *kwon-i iss-ta. Korean
bed-above-LOC book two CL many CL-NOM exist
'There are two / many books on the bed.'

In spite of both being classifier languages, both Indonesian and Korean productively make use of plural marking. Indonesian uses full reduplication to mark plurality, i.e., *anak-anak* 'children' (10a), whereas Korean marks plural with the suffix *-tul*, i.e., *chinkwu-tul* 'child-PL' (10b). Another factor worth mentioning is that, unlike English, plural-marked nouns in both languages must be specific nouns.

(10) a. Anak(-anak) senang belajar Inggris. Indonesian
Child(-PL) like study English
'(The/some specific) children like to study English.'
b. Yuna-nun ecey tayhakkyo chinkwu-(tul)-ul manna-ss-ta. Korean
Yuna-TOP yesterday college friend(-PL)-ACC meet-PAST-DECL
'Yung met (her/some specific) college friends yesterday.'

When we encounter examples of plural marking interacting with quantifiers, we find a key difference between Indonesian and Korean. Whereas Indonesian does not allow quantifiers, neither numeric nor non-numeric, to co-occur with plural marking, Korean allows this combination of plural marking with non-numeric quantifiers, but crucially not with numeric quantifiers, e.g., *manhun chayk-tul* 'many books' is acceptable, while **ney chayk-tul* 'four books' is not (11b).

(11) a. Saya membeli dua buku(*-buku) / banyak buku(*-buku). Indonesian
I buy two book(*-PL) many book(-PL)
'I bought two books / many books.'
b. Tosekwan-ey-nun manhun chayk-tul / *ney chayk-tul-i iss-ta.
library-in-TOP many book-PL four book-PL-NOM exist-DECL
'Many books / four books are in the library.' Korean

Finally, let's consider the interaction of numeral quantifiers in combination with classifiers with plural marking. Indonesian does not allow this combination, as evinced by (12); however, Korean does allow this to occur under two conditions: First, the classifiers and plural marking must occur within the same DP. Second, the pluralized noun must be human (13).

(12) *Tiga ekor anjing-anging sedang bermain di kebun. Indonesian
three CL dog-PL still play in garden
'Three dogs are playing in the garden.'

(13) a. Haksayng(-tul) payk myeng-i i-ss-ta. Korean
student-PL 100 CL-NOM exist-PAST-DECL
'There are 100 students.'

b. *Chayksang(-tul) payk kay-ga i-ss-ta.
table-PL 100 CL-NOM exist-PAST-DECL
'There are 100 tables.'

One of the key motivating factors for investigating the acquisition of the marking of grammatical number in these two dyads of Indonesian-Korean bilinguals is that the results may reveal interesting findings with respect to the following research question: Is it more difficult (based on accuracy rates associated with level of proficiency) to add new syntactic and semantic restrictions to the L2 grammar, or to relax those that exist in the L1, which are not present in the L2? In their analysis, Lee and Lardiere (2016, 2019) adopt the following set of features in (14) (based on Gebhardt (2009)).[5]

(14) Features categorizing the Korean and Indonesian number and quantifier system
a. [n] = noun
b. [human] = human
c. [group] = plural
d. [individualization]
e. [q] = quantification
e'. [q-rel] = 'relative' = non-numeric quantifier
e''. [q-abs] = 'absolute' = numeric quantifier
f. [specific] = 'i.know'

Although both languages share a few features, i.e., [n], [group], and [specific], Korean requires additional features and distinctions among them when modeling plural marking. This is illustrated in Table 2 below.

Table 1. Korean vs. Indonesian plural marking (from Lee & Lardiere 2016: 115)

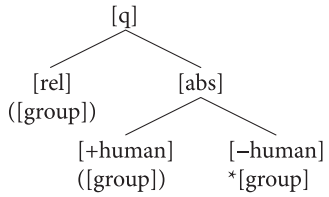
Korean PL: *-tul*	**Indonesian PL: *reduplication***
[n]	[n]
[group]	[group]
[specific]	[specific]
[q-rel]	
[q-abs, human]	

Before discussing the design and results of their experimental study, Lee and Lardiere (2016, 2019) make the case for the feature co-occurrence of [± human]

5. For a different set of functional/syntactic heads to account for grammatical number, see Wiltschko (2021).

and [q-abs] (based on an initial proposal by Hwang & Lardiere 2013). This dependency is represented in the hierarchical tree structure in (15) (adopted from Lee & Lardiere 2016: 116):

(15)



Lee and Lardiere (2016, 2019) issue a prediction that L2 learners will experience less difficulty acquiring structures in situations where the L1 and L2 "feature bundles" are the same, i.e., in situations where Korean and Indonesian are 'similar'. In this particular dyad, this would be in effect if learners were asked to produce or evaluate plural marked forms co-occurring with numeric quantifiers. On the other hand, when these "feature bundles" differ, difficulties in L2 acquisition are anticipated. For L2 Indonesian learners, the task is to acquire the restriction banning plural marking from co-occurring with non-numeric quantifiers, while L2 Korean learners must learn that plural marking with numeric quantifiers is possible, however, only with [+ human]-entities. Since this distinction does not exist in L1 Indonesian – and since these distinctions are "deeply embedded" in the hierarchical tree structure in (15), Lee and Lardiere (2016: 116) predict the acquisition of these distinctions will "be delayed until advanced stages of L2 development".

In a series of experiments including a sentence completion task, a grammaticality judgment task, and a multiple-choice task, members of each dyad (L1 Indonesian-L2 Korean and L1 Korean-L2 Indonesian) of three different proficiency levels (Low-Intermediate, High-Intermediate, & Advanced) were compared with native speaker control groups from each language. Summarizing their key findings, L1 Indonesian-L2 Korean learners struggled to acquire the 'deeply-embedded' co-occurrence contingency – even among those with advanced proficiency.

These findings can easily be integrated into an exoskeletal model without recourse to "lexical items".[6] In our view, the conceptualization of "feature matrices" are exclusively present in syntactic structure, similar to what Lee and Lardiere (2016, 2019) proposed in (15) above. From the point of view of an exoskeletal model, the challenge faced by L1 Indonesian-L2 Korean learners is thus a three-step process: First, these individuals must acquire syn-sem features that are not relevant for their L1. Second, they must acquire the proper bundling of these fea-

6. See also footnote 1.

tures without one another. This involves combining [q-abs] and [+human] and not, for instance, [q-abs] and [−human]. Third, they must also acquire the proper exponency associated with these Vocabulary Items. The cases involving "feature overlap" only require the acquisition of the association with different exponency with feature bundles already shared between the L1 and L2. The appeal to the notion of "embeddedness" is thus questionable, and as we see in the review of L2 acquisition of Chinese imperfective marker in the subsequent section, the primary factor at play seems to be the absence of the feature irrespective of its hierarchical position.[7] In order to account for the delay in acquisition, rather than embedding of features one can appeal to the structure of the feature bundles themselves ('complexity'; see also Lohndal & Putnam 2021): Feature bundles that are more complex, take longer to acquire, whereas a feature bundle consisting of one feature is predicted to be simpler. This is also because the mapping from feature bundle to exponents tends to be more complex when more features are part of the bundle.

4.2 L2 acquisition of Chinese imperfective markers

We now turn to a scenario in L2 acquisition in which those acquiring a second language must enrich their feature inventory and develop a system of more complex mappings of features-to-exponent combinations. Here we summarize recent research carried out by Guo (2022) on the L2 acquisition of Chinese imperfective markers by L1-speakers of English. To illustrate the L2 acquirer's tasks more precisely, let's turn first to the English feature inventory for imperfective aspect as laid out by Guo (2022). Following initial proposals by Comrie (1976) and Smith (1997), English has three primary types of imperfective: (i) habitual, (ii) progressive, and (iii) resultant-stative ones. In (16) below, we illustrate both the progressive and resultant-stative reading of *be+ing* constructions in English (adapted from Guo 2022: Table 1):

(16) Imperfective marking in English: *be+ing* constructions
  a. He is eating a swordfish. [+progressive]
  b. The socks are lying on the floor. [+resultant-stative]

7. There are a number of theory-internal issues that we do not discuss here that are important for future theory-building efforts. Here we mention two of them: First, at the moment we are treating the association of features and concatenative and non-concatenative morphology (in the case of reduplication) as identical. Second, the question of whether or not features that are not 'active' in the L1 (but are still there in a cartographic sense) or must be acquired anew is also left for future research considerations (cf. Cinque 2006, and Ramchand & Svenonius 2014).

Due to their dynamic nature, activities and accomplishments are a natural fit with imperfectives associated with [*be* + *ing*] in English, which is shown in (16a) above with the predicate *eat*. In resultative states proceeding a telic event, verbs such as *wear*, *sit* or *lie*, lead to a resultative-stative reading.

As alluded to above, both the extant feature inventory and the feature-to-exponent mappings are more complex in Chinese imperfectives. Whereas Guo (2022) only lists two features for imperfective aspect in English (e.g., [+progressive] and [+resultative-stative]), the inventory has been increased to five in the Chinese inventory, i.e., the two aforementioned features plus [+atelic], [+durative], and [+T(ense)]. Not only is there an increase in the feature inventory, but also an increase in exponency; whereas English productively makes use of [be + ing] to expressive imperfective aspect, Chinese has three, *zai*, a variant of *-zhe* that indicates a progressive reading, and another variant of *-zhe* that stands for a resultative-stative reading. We adopt Guo's (2022) terminology and refer to these homophonous variants of *-zhe* respectively as *-zhe*$_P$ and *-zhe*$_R$. The various combinatorial possibilities and their semantic interpretations are laid out in Table 2 below.

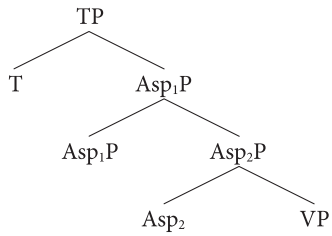
Although Chinese also has feature distinctions for [+progressive] and [+resultant-stative] similar to English, the task of requiring the Chinese imperfective system from the perspective of starting from an L1 English grammar requires a number of tasks: First, the learner must either (i) acquire or (ii) adjust/recruit (i.e. 'reassemble') other features, e.g., [+durative], [+T], and [+atelic], to map to one of the three exponents. Second, the learner must discover which functional projection, i.e., syntactic head, they are supposed to associate these features with in order to successfully match up with the correct exponent. In short, L1 English speakers aspiring to acquire the Chinese imperfective system must minimally undergo these two tasks.

With respect to this second point, namely, successfully associating features with appropriate functional projections in the syntax, Guo (2022), following an initial proposal by Huang et al. (2009), advocates for an underlying syntactic ordering of functional heads which has two adjacent ones dedicated exclusively to aspectual projections – AspP$_1$ and AspP$_2$. Without diving deep into the details in support of these assumptions, what is relevant for our immediate purposes here is that the exponent *zai* is associated with the higher AspP$_1$-head, while both variants of *-zhe* – *-zhe*$_P$ and *-zhe*$_R$ – occupy AspP$_2$. Based on the assumption that underlyingly English only requires one AspP-projection, L2 acquirers of Chinese will have to notice – and eventually postulate – that two functional projections are required here.

Table 2. Chinese imperfective markers and their features (adapted from Guo 2022: 92, Table 2)

Marker	Feature	Examples
zai	[+progressive]	Ta zai chuan waitao. s/he ASP wear/put on coat 'S/he is putting on a coat.'
	[+durative]	*Ta zai daoda shanding. s/he ASP reach mountaintop 'S/he is reaching the mountaintop.'
	[+T]	Ta zai chang ge. s/he ASP sing song 'S/he is singing.'
-zhe$_P$	[+progressive]	#Ta chang zhe ge. s/he sing ASP song 'She is singing.'
	[+atelic]	*Ta gai zhe yi dong fangzi. s/he build ASP one CL house 'S/he is building a house.' (Lin 2002) *Ta daoda zhe shanding. s/he reach ASP mountaintop 'S/he is reaching the mountaintop.'
-zhe$_R$	[+resultant-stative]	#Ta chuan zhe waitao. s/he wear/put on ASP coat 'S/he is wearing a coat.'

(17)



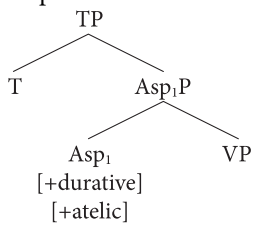
Guo's (2022) study on the L2 acquisition of Chinese imperfective exponency, e.g., *zai, -zhe$_P$*, and *-zhe$_R$*, by L1 English-speaking learners included L2 learners at 3 different proficiency levels. Guo (2022) designed and implemented three different experimental tasks to gain insight to what properties these acquirers found particularly difficult, and in contrast, those in which they showed acquisitional gains: (i) judgment task, (ii) sentence-picture matching task, and (iii) sentence completeness judgment task. Here we provide a summary of the main findings of Guo's (2022) study as they pertain to her 'advanced learners' group.

(18) a. **Finding 1:** Advanced learners are successful in reassembling additional semantic features when the L1 and L2 functional category where the *to-be-added* features belong to the same functional category:
   – The [+durative] feature of *zai*, and
   – The [+atelic] feature of *-zhe*$_P$
   b. **Finding 2:** Advanced learners however encounter difficulties in differentiating between the interpretations of the progressive *zai* and the resultant-stative *-zhe*$_R$
   c. **Finding 3:** Advanced learners are not sensitive to the 'incompleteness reading' of *-zhe*$_P$

Guo (2022: 89) interprets these findings as evidence of a long-standing prediction of the *Feature Reassembly* architecture (Lardiere 2009), namely, that "the discarding of L1-transferred features is arduous for learners". Once again, although this task may indeed be "arduous for learners", this determination is a second-order concern that does not have direct bearing on structure-building principles. We generally concur with Guo's assessment and interpretation of these empirical findings, and in the remainder of this subsection we sketch out an exoskeletal (re)analysis of her findings.

We conceptualize the acquisition of the Chinese imperfective markers in two steps. We hypothesize that Step 1 consists of the following structure:

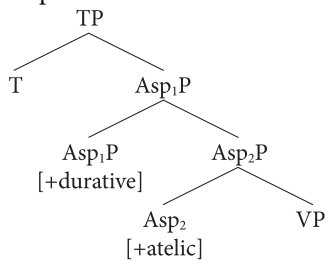
(19) Step 1



As illustrated in Step 1, the L1 English-L2 Chinese-acquirer has not yet postulated an additional AspP$_2$-projection, which is the appropriate head that the progressive *zai*-exponent is associated with. The first task for the L2 acquirer is to generate this additional AspP$_2$-projection, which we show in Step 2 below. In addition to the creation of this additional functional projection, two additional steps must take place. The second step involves the successful acquirer 'splitting' the [+progressive] feature so that it can be associated with AspP$_1$ (when realizing *zai*) and AspP$_2$ (when realizing *-zhe*$_P$). This is akin to what Lardiere (2008) refers to as the

de-linking of features.[8] Third, the grammar of successful advanced L2 acquirers of this system is responsible for creating the additional novel mapping relations between features and exponents once both AspP-heads are stable and established.

(20) Step 2



The exoskeletal approach sketched out in this section can model the same acquisition steps that would be required by *Feature Reassembly*. Recruiting and (re)assembling constellations of features that are different than those found in the L1, assigning those features to the appropriate functional/syntactic head, and, in this particular case, postulating the creating of an additional aspectual head to ensure the correct feature-to-exponent mappings, do not require additional constraints or operations in exoskeletal approaches.

4.3 Definiteness in Norwegian heritage language

In this last case study, we will consider data from Norwegian heritage language, specifically data from older speakers of Norwegian in the US, often referred to as American Norwegian. The data come from the Corpus of American Nordic Speech (CANS; Johannessen 2015), which consists of recordings and transcriptions of third to fifth generation speakers of Norwegian in the US. We will consider two types of data: First we will look at compositional definiteness, and then we will look at language mixing between Norwegian and English. Both types of data illustrate the need for an exoskeletal model, which has also been argued for some of the data before (Alexiadou et al. 2015; Alexiadou & Lohndal 2018, Riksem et al. 2019, López 2020). That is, the data lend support to our claim that *Feature Reassembly* as a separate mechanism is not needed; rather, the data can be fruitfully captured within exoskeletal approaches to grammar.

Compositional definiteness is the phenomenon that definiteness is marked on multiple elements in one phrase. An example from Norwegian is provided in (21).

8. More specifically, in *Distributed Morphology* this situation could be captured via the post-syntactic operation *Fission*, which is an operation that converts one terminal node in a tree structure into two (resulting in two exponents) (Halle 1997).

(21) den gaml-e hest-en
DEF.SG old-DEF horse-DEF.M.SG
'the old horse'

This example illustrates that there is a prenominal determiner and a postnominal suffix which both mark definiteness, in addition to an inflectional marker on the adjective. Whenever an adjective is present, this double realization of definiteness is required.[9] Recently this phenomenon has been studied in Anderssen, Lundquist and Westergaard (2018) and van Baal (2020, 2022). A general finding is that speakers produce many examples without compositional definiteness in environments where it is required in the homeland variety. Arguably this is not surprising given that English is the contact language. The most typical instance of a modified definite phrase is one in which the prenominal determiner is missing. This is illustrated in (22).

(22) a. norsk-e ordbok-a (westby_WI_05gm)
Norwegian-DEF dictionary-DEF.F.SG
'The Norwegian dictionary' (Anderssen et al. 2018: 755)
b. stor-e båt-en (flom_MN_01gm)
large-DEF boat-DEF.M.SG
'the large boat' (van Baal 2022: 9)

A subgroup of speakers omits the suffixed determiner:

(23) a. den best-e gang (chicago_IL_01g)
DEF.SG best-DEF time
'the best time' (van Baal 2022: 10)
b. den grønn-e bil (sunburg_MN_11gk)
DEF.SG green-DEF car
'the green car' (van Baal 2022: 10)

Van Baal (2022: 9) points out that this omission correlates with proficiency in the heritage language or with homeland-like gender marking (Anderssen, Lundquist & Westergaard 2018). That is, the better the proficiency, the less determiners are missing.

Van Baal (2022) probes the diachronic development of compositional definiteness based on the available data. She considers data collected by Einar Haugen in 1942, which have been added to CANS, data from Arnstein Hjelde's fieldwork between 1987–1992 (Hjelde 1992), the data used in Anderssen, Lundquist & Westergaard (2018) (ALW below in Table 3), and her own data from van Baal

9. There are some exceptional adjectives that allow the omission of the prenominal determiner. We set these aside here; see van Baal (2022) for a comprehensive discussion.

(2020). The following table provides an overview of the historical development and is reproduced from van Baal (2022: 16).

Table 3. Types of modified definite phrases used at different time points

	1942	1987–1992	ALW 2018	van Baal 2020
Compositional definiteness	31 (70%)	7 (70%)	93 (39%)	143 (21%)
Adjective incorporation	–	1 (10%)	–	47 (7%)
Without determiner	5 (11%)	0	113 (48%)	339 (49%)
Without suffixed article	7 (16%)	0	31 (13%)	35 (5%)
Bare phrase	1 (2%)	2 (20%)	0	123 (18%)
Total phrases	**44**	**10**	**237**	**687**

As this table demonstrates, the percentage of phrases with compositional definiteness has gone down considerably in present-day speakers compared to the Haugen and Hjelde data. Three other cases demonstrate divergence compared to the homeland variety: omission of the determiner, omission of the suffixed article, and bare phrases. For these cases, there is variation among the speakers. Determiner omission is much more frequent now, whereas there is less omission of the suffixed article in van Baal's data compared to the earlier generations. From a sociolinguistic perspective, this is not surprising since these heritage speakers are highly dominant in English, which does not have comparable constructions.

The question is how to analyze these data. Given the significant omission of the determiner, van Baal (2020: 160) argues that '[…] it is the determiner – i.e., the spell-out of D – that is optional in [American Norwegian] modified definite phrases'. An important argument in favor of this analysis is that the syntax and nominal concord are in place, strongly suggesting that the abstract syntax is there, although the morphology is missing. In our exoskeletal model, this means that the abstract syntactic features are in place, but that the spell-out of these features is optional. We can envisage the following pronunciation rules for the three definite determiners.

(24) a. [DEF, MASC/FEM, SG] ↔ {den, Ø}
b. [DEF, NEUT, SG] ↔ {det, Ø}
c. [DEF, PL] ↔ {de, Ø}

The only difference compared to the homeland variety is the addition of the zero exponent, that is, omission. *Feature Reassembly* could easily handle these data as well, but again, our point is that we do not need an independent mechanism of

Feature Reassembly, as the data simply follow from the principles and ingredients of an exoskeletal approach.

Let us now turn to a slightly different area of American Norwegian, namely language mixing. Speakers of this heritage language mix English and Norwegian quite substantially, and the various mixing patterns in American Norwegian have been studied carefully in much previous research (Alexiadou & Lohndal 2018; Grimstad, Lohndal & Åfarli 2014; Grimstad, Riksem, Lohndal & Åfarli 2018; Lohndal & Putnam 2021; Riksem 2017; Riksem, Grimstad, Lohndal & Åfarli 2019). Here we want to focus on a diachronic study by Riksem (2017, 2018) where she compares language mixing in Haugen (1953) to speakers in CANS. A crucial finding is that in contrast to Haugen's speakers, speakers in CANS often omit functional suffixes, both in plural and definite phrases. They also use the English determiner *the* together with a Norwegian noun, a pattern which is unattested in Haugen's data. Here we will limit our attention to definiteness.

Haugen (1953) documented that English nouns often acquire Norwegian definiteness marking. Some representative examples taken from Riksem (2017, 2018) are provided in (25).

(25) a. harvest-en
harvest-DEF.M.SG
'the harvest' (Haugen 1953: 579)

b. field-a
field-DEF.F.SG
'the field' (Haugen 1953: 575)

c. train-et
train-DEF.N.SG
'the train' (Haugen 1953: 602)

In the words of Haugen (1953: 451): 'Whether words were singular or plural […] they had to add the N[orwegian] definite article under appropriate circumstances'. He specifically says that 'E[nglish] *the* would not be acceptable' (Haugen 1953: 451).

The data in CANS look quite different, as Riksem (2017, 2018) demonstrates. The following data are all taken from her study. In (26), the absence of the definite suffix on the noun is illustrated, in (27) the use of the English determiner without the definite suffix on the noun, and lastly, (28) shows the use of the English determiner in compositional definiteness.

(26) a. denne cheese (blair_WI_04gk)
this.M/F cheese
'this cheese'

b. denne country (decorah_IA_01gm)
this.M/F country
'this country'

c. den school (gary_MN_01gm)
that.M/F school
'that school'

d. den birdhouse (coon_valley_WI_12gm)
that.M/F birdhouse
'that birdhouse'

e. den stor-e building (chicago_IL_01gk)
DEF.M/F.SG big-DEF building
'the big building'

f. det gaml-e stuff (chicago_IL_01gk)
DEF.N.SG old-DEF stuff
'the old stuff'

g. det norsk-e settlement (albert_lea_MN_01gk)
DEF.N.SG Norwegian-DEF settlement
'the Norwegian settlement'

h. nephew min (portland_ND_02gk)
nephew my
'my newphew'

i. cistern min (westby_WI_01gm)
cistern my
'my cistern'

(27) a. the by (chicago_IL_01gk)
the city
'the city'

b. the ungdom (harmony_MN_01gk)
the youth
'the youth'

c. the gaml-e kirke (chicago_IL_01gk)
the old-DEF church
'the old church'

d. the peng-er (albert_lea_MN_01gk)
the money-INDEF.PL
'the money'

(28) a. the andre dag-en (harmony_MN_02gk)
the second day-DEF.M.SG
'the second day'

b. the gård-en (gary_MN_01gm)
the farm-DEF.M.SG
'the farm'

c. the rest-en (vancouver_WA_03uk)
the rest-DEF.M.SG
'the rest'

Clearly these data look different when compared with the stage that Haugen has documented. Note that the syntactic structure is as expected: The order of the constituents is as predicted based on the grammar of Norwegian, including post-nominal possessives as in (26h, i), and concord is visible on adjectives even in the presence of an English determiner, illustrated in (27c) and (28a).

The question that Riksem is concerned with is what is changing – the underlying structure or rather the exponents? Riksem (2017, 2018) provides an in-depth discussion of both alternatives. Given that, just like in the unilingual cases involving compositional definiteness, the syntax and the concord system by and large are in place, we argue that we are dealing with cases of missing exponents in (26) and (27). That is, the syntax and the features are in place, but the exponents are not realized. For instance, when a definite suffix is missing in a definite context, we have the rules given in (29), where again we have optionality, since some also produce the expected forms.

(29) a. [DEF, MASC, SG] ↔ {-en, -Ø}
b. [DEF, FEM, SG] ↔ {-a, -Ø}
c. [DEF, NEUT, SG] ↔ {-et, -Ø}

An additional advantage of this analysis is that it also allows for a unified treatment of all the data we have seen in this sub-section: In both cases, we have a feature structure that accounts for concord and the fact that the syntax is largely as predicted, whereas the exact morphophonological realizations are subject to variation and sometimes silence. This highlights that no additional mechanisms are necessary, again arguing that *Feature Reassembly* as such is not required.

5. Conclusion

In conclusion, we have outlined the conceptual advantages for adopting an exoskeletal approach to the syntax-morphology interface. Not only is it capable of successfully modeling inter- and intra-speaker variant data, but this family of approaches also renders *Feature Reassembly* superfluous as it pertains to structure-building primitives. As we hoped to have shown above, this approach is particularly well-suited for modeling morphosyntactic and morphophonologi-

cal properties found in bilingual grammars. In fact, it is exactly these populations and individuals for whom this model is particularly well-suited. To recapitulate, the fundamental attributes of an exoskeletal approach are as follows:

(30) a. The structure-building component of grammar, i.e., syntax, operates on features
b. These features are morphologically realized after Spell-Out,
c. The morphological realization may be based on a single feature – one exponent (DM), or multiple exponents,
d. This architecture is flexible enough to capture changes across the lifespan and across speakers and generations (see e.g., also Lightfoot 2020),
e. This architecture supports a null theory approach, according to which the architecture proposed to account for monolingual speakers, L*n* speakers, heritage speakers, and also possibly creole and pidgin speakers is one and the same (Sugimoto & Baptista 2022).

In this keynote we focused exclusively on explicating the key attributes and operations associated with an exoskeletal approach to grammar, supported with empirical evidence from three case studies from different populations of bilinguals, i.e., late L2 learners and heritage speakers. From our perspective, the architecture and approach adopted here shows tremendous promise for future collaborations between those involved in theory-building efforts and those engaged primarily with experimental research. Although we did not engage much with experimental research in this keynote, we wish to point out here that exoskeletal approaches are well-equipped to interface with this body of research (31).

(31) a. Combined multi-competent, integrated architecture of cognition and language (Kroll & Gollan 2014; Pickering & Garrod 2013; Putnam, Carlson, & Reitter 2018),
b. Need for simultaneously tracked hierarchical structure (Brenna &. Hale 2019; Ding, Melloni, Zhang, Tian, & Poeppel 2016; Getz, Ding, Newport, & Poeppel 2018; Murphy 2021),
c. Usefulness of hierarchical abstract structures in online morphological processing (Gwilliams 2019; Marantz 2013b) and binary feature distinctions in mental representations (Seyboth & Domahs 2023),
d. Compatibility with modular, late-insertion models (Creemers 2020; Fruchter & Marantz 2015; Goodwin Davies 2018; Krauza & Lau 2023; Oseki & Marantz 2020; Stockall, Manouilidou, Gwilliams, Neophyton, & Marantz 2019; Taft 2004; Wu & Juffs 2022),
e. Conflict between competing representations (Goldrick, Putnam, & Schwarz 2016; Hartsuiker & Bernolet 2017; Melinger, Branigan, & Pickering 2014)

Taken together, our call to subsume *Feature Reassembly* within exoskeletal models of grammar has wider ramifications considering their compatibility for experimental research. If these assumptions are on the right track, they illustrate not only the compatibility of exoskeletal models with experimental approaches, but also present additional experimental evidence in line of this derivational approach to syntax. As such, it also demonstrates that exoskeletal models must be considered as a serious and viable contender to competing theories involving 'constructions' and 'chunks', not at least due to the evidence for the primacy of hierarchical syntactic representations, which also extend into 'words' on this view.

The exoskeletal approach opens a range of questions for future research. An obvious task is to apply the exoskeletal analysis to other language combinations and studies where *Feature Reassembly* has been employed. Furthermore, as more recent work on *Feature Reassembly* attributes an important role to feature hierarchies, it would be imperative to consider other cases of feature hierarchies and their role in accounting for data. More generally, our first case studies and the existing literature raise general theoretical questions about feature hierarchies and geometries irrespective of L*n*, where studying bilingual speakers may provide important evidence. Hybrid research combining invasive techniques from cognitive neuroscience and exoskeletal models, e.g., ERPs to confirm the decomposition of grammatical categories into binary features (see, e.g., Seyboth & Domahs 2023 and Opitz et al. 2013) and the application of cross-modal priming to test L2-speakers' processing of hierarchical structure and its feature composition (see, e.g., Song et al. 2020), demonstrates what is possible in these joint efforts moving forward.

In summary, the exoskeletal approach to the syntax-morphology interface developed in the pages above provides a formal and explicit model of the interaction between syn-sem features and their exponents. The modular architecture associated with this framework allows us to subsume the core, structure-building tenets of *Feature Reassembly* into this system, hence motivating our call to 'dissolve' *Feature Reassembly* moving forward, at least as it concerns structure-building primitives.

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