The Structure of Words at the Interfaces

edited by
HEATHER NEWELL, MÁIRE NOONAN, GYLNE PIGGOTT, AND LISA TRAVIS

Oxford Studies in Theoretical Linguistics
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GLYNE PIGGOTT, AND LISA DEMENA TRAVIS

OXFORD UNIVERSITY PRESS
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General preface

The theoretical focus of this series is on the interfaces between subcomponents of the human grammatical system and the closely related area of the interfaces between the different subdisciplines of linguistics. The notion of ‘interface’ has become central in grammatical theory (for instance, in Chomsky’s Minimalist Program) and in linguistic practice: work on the interfaces between syntax and semantics, syntax and morphology, phonology and phonetics, etc. has led to a deeper understanding of particular linguistic phenomena and of the architecture of the linguistic component of the mind/brain.

The series covers interfaces between core components of grammar, including syntax/morphology, syntax/semantics, syntax/phonology, syntax/pragmatics, morphology/phonology, phonology/phonetics, phonetics/speech processing, semantics/pragmatics, and intonation/discourse structure, as well as issues in the way that the systems of grammar involving these interface areas are acquired and deployed in use (including language acquisition, language dysfunction, and language processing). It demonstrates, we hope, that proper understandings of particular linguistic phenomena, languages, language groups, or inter-language variations all require reference to interfaces.

The series is open to work by linguists of all theoretical persuasions and schools of thought. A main requirement is that authors should write so as to be understood by colleagues in related subfields of linguistics and by scholars in cognate disciplines.

One of the most pressing, and unanswered, questions about the interrelationships between phonology, morphology, and syntax is the status of the notion ‘word’. Much current syntactic theory assumes that words are built through application of syntactic (as opposed to specially morphological) rules, but the extended consequences of this view are not commonly focused upon. In this volume, the editors have brought together a series of chapters, across a wide range of language types, that examine what motivates the different theoretical stances on this question, what these perspectives share, and how and why they are different. The volume as a whole leads to the conclusion that the syntax feeds into the relevant morphophonological notion of word in a fashion that is both asymmetric and complex, but not unconstrained.

David Adger
Hagit Borer
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<tr>
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<td>COMP</td>
<td>complementizer</td>
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<td>CONJ/Conj</td>
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<td>enclitic conjunction marker</td>
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List of abbreviations

DAT/dat  dative case
DEC  declarative
DEL.IMPER  delayed imperative
DET  determiner
dim  diminutive
dir/DIR  direct
dist  distant
DIST.PAST  distant past
DM  Distributed Morphology
DP  determiner phrase
dub  dubitative
E  Event
ec  empty category
EMPH/emph  emphatic
EP  Event Phrase
EPP  Extended Projection Principle
ERG/erg  ergative case
ESS  essive
fin  final suffix
FIN  finite
FUT/fut  future
FV  final vowel
GEN/gen  genitive case
HAB  habitual
HMT  homomorphemicity thesis
II  intransitive inanimate
IMPER  imperative
INAN/inan  inanimate
INCEPT  inceptive
INCH  inchoative
INDIC/IND/ind  indicative
ind  indirect
INFL/Infl  inflection
initial  initial preverb element
INTR/INTRANS  intransitive
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<td>linker</td>
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Introduction

HEATHER NEWELL, MÁIRE NOONAN, GLYNE PIGGOTT, AND LISA DEMENA TRAVIS

1.1 What is a word?

The concept of ‘word’ is arguably one of the most intuitive constructs in language as far as speakers are concerned; every child and adult is aware that there is a unit that correlates to word. And yet, from a theoretical point of view, there is no consensus on the definition of a word.\(^1\) Morphological theorizing has vacillated between proposals where words are created in the same computational space as are phrases (Chomsky and Halle 1968) to theories where morphology and syntax are, at least partially, separate linguistic systems (Lieber 1980; Kiparsky 1982, 1985; Mohanan 1986; Booij and Rubach 1987; Di Sciullo and Williams 1987; Borer 1997; Anderson 1992; Stump 2001; Di Sciullo 2005), and then back to the original idea (e.g. Halle and Marantz 1993; Marantz 1997; Starke 2009). The lexicalist hypothesis has, however, by no means been abandoned. Important for the discussion here is that in a lexicalist framework, where words are formed in a separate module and inserted as atoms into the syntax, a word is, by definition, the output of morphology. Current work couched within Stratal Optimality Theory, to take the most prevalent example, still holds that morphophonology at the word level is computed prior to the computation of phrase-level phonology (Kiparsky 2010; Bermúdez-Otero 2012). Were this notion of a specific word-building module unchallenged, the question ‘What is a word?’ would be long solved. The lexicalist framework, however, has many challenges. These challenges first came to light around the time that people such as Baker (1988b) argued that words could be formed in the syntax through incorporation. In the nineties, the foundation of lexicalism was further shaken through the rise of

\(^1\) This observation has been made many times in the literature but was made again by Heidi Harley at the McGill Workshop on the Structure of Words at the Interfaces, setting in motion an engaging discussion that persisted through the two-and-a-half days of the workshop.

Distributed Morphology (DM), which fully rejects the idea that morphology is part of a separate system prior to syntax (Halle and Marantz 1993; Marantz 1997). Furthermore, DM, in combination with the proposition that the derivation is computed in phases (Chomsky 2001), recasts the Level1 (stem)/Level2 (word) distinction prominent in the lexicalist literature as emerging from syntactic rather than morphophonological cycles (Marvin 2002; Arad 2003; Marantz 2007; Newell 2008).

The view that syntactic computation occurs all the way down to the smallest meaningful elements, i.e. morphemes, has become increasingly widespread and is not tied to a narrow adherence to DM.\(^2\) A consequence of this view is that there is no longer a coherent morphological definition of word. In Williams’ words, ‘phrases are built (directly) out of morphemes, with no intervening notion of word’ (Williams 2007: 359). What follows in essence, outside of a narrow lexicalist position, is that there exists no clear consensus of what a word represents, neither from a phonological, morphological, syntactic, nor semantic viewpoint.

The claim that no grammatical module can define the notion of ‘word’ is at odds with the generally held view that phonology is the one domain where the status of word is fairly straightforward. Phonology can generally identify a word, since wordhood plays an important role in domains that relate to stress assignment, harmony, and other ‘word’-based phonological processes.\(^3\) For example, there is considerable cross-linguistic evidence that phonological processes target the exponent of a unit that is smaller than a phrase and is not coextensive with a morpheme. Many languages impose restrictions on sequences of segments that may occur within such an entity. Furthermore, a wide range of phenomena such as vowel harmony, alternating stress, and tone melodies occur within domains that are demonstrably smaller than phrases. There are also many processes or constraints that crucially refer to the edge of phonological words, as distinct from phrases or morphemes. For example, Beckman (1997) points out that segmental contrasts tend to be greater in \textit{word}-initial syllables. There are also languages like members of the Bantu family that limit \textit{word}-final segments to vowels, while other languages place restrictions on \textit{word}-final vowels, sometimes banning them completely as Yapese does. Phonologists can thus give us some information about word domain. Phonology per se, however, lacks a theory of how the ‘word’ comes to be, and phonologists generally look to morphologists or syntacticians to derive this construct. The latter two groups, however, don’t know, and are often content with the fact that phonologists, at least, can tell them that something is a word, when it is.

While there is no consensus regarding wordhood, there is nevertheless a variety of theories about it. Not too controversial is the notion that if something is a complex

\(^2\) Late insertion is probably the one component of DM that is widely shared among syntactic approaches to word formation.

\(^3\) Notions like phonological cliticization, however, blur the edges of the word domain.
head in syntax, then it will become a ‘word’ once PF has dealt with it, provided it satisfies a variety of language-specific PF conditions for wordhood. But this is not a bi-conditional: not everyone agrees that if something is a word then it is a complex (or simple) head in syntax. In fact, it appears that a growing number of researchers working within the broader DM field permit, or transparently assume, that words, whichever way they may be derived, contain phrasal material. This is particularly the case for works on polysynthetic languages (e.g. Wojdak 2008; Compton and Pittman 2010; Barrie and Mathieu 2012), but not restricted to those (e.g. Kayne 1994, 2007b; Koopman 2005; Leu 2008b; Starke 2009, 2011; Noonan 2010).

There appear to be three broad camps with regard to syntactic word formation. The first approach, the most traditional one, implicitly or explicitly postulates a morphosyntactic constraint that a word cannot dominate an XP (e.g. Baker 1996b; Bobaljik 2012; Harley 2013, 2015; Piggott and Travis 2013). In other words, simple or complex X₀ structures map onto words at PF. This permits head movement to feed word formation and also leaves room for words to be derived via post-syntactic operations, such as Lowering and Local Dislocation within the DM framework. The other extreme is to deny the existence of any morphosyntactic concept of ‘word’. This view is explicitly detailed in e.g. Julien (2007) and Haspelmath (2011), who argue that words are not formed in the grammar at all. For neither Julien nor Haspelmath is there a morphosyntactic entity that corresponds to ‘word’. Words do not even correspond to syntactic constituents. Rather, for Julien, words are characterized as morpheme sequences that share distributional properties. Another view, supported by Compton and Pittman (2010), is that the structures that map onto words are parameterized. In some languages, CPs and DPs are linearized as words, while in other languages words correspond to X₀’s.

The contributors in this volume all share the view that word formation, to the extent that it is morphosyntactic, is part of syntactic computation rather than being relegated to a separate module of morphology. They do not, however, agree with respect to whether or not words have a morphosyntactic definition, or if they do, which definition is the correct one. In section 1.2 we present a more detailed characterization of these aforementioned approaches to wordhood within the current theories represented in this volume.

1.2 Approaches to word formation within a syntactic framework

A syntactic approach to word formation with the theoretical backdrop of DM postulates that words can be formed in the syntactic computational component or post-syntactically at PF.⁴ In the latter component we can further divide the processes

⁴ Note that we, and others, use the term PF not to refer to the actual interface but to the grammatical module that contains all the processes that occur between spell-out and the sensory-motor interface.
into word formation that occurs before Vocabulary Insertion (VI) (Lowering, basically the mirror image of syntactic head raising), and post-VI processes such as Local Dislocation (LD) and Phonological Merger. Some linguists approach word formation in a more radical way, whereby morpheme order can only be determined syntactically. That is, they adopt the late insertion approach from DM but not the post-syntactic operations of Lowering and/or LD (Caha 2009; Starke 2009).

Syntactic word formation allows for two movement processes: head movement or phrasal movement. It also allows for the operation of adjunction (which may be late as in Lebeaux 1988, 1990; Stepanov 2000, 2001). This operation can be applied either to heads (Ochi 1999; Newell 2008, this volume; Piggott and Travis this volume), or to phrases (e.g. Compton this volume). As stated above, traditionally, syntactic movement that feeds word formation is restricted to head movement (Baker 1985). Terminal nodes, simple or complex heads, are therefore understood to be the morphosyntactic category that most closely corresponds to the concept of ‘word’, and when the derivation enters the PF component, X0s are therefore mapped onto the morphophonological construct ‘word’. This is presumably what is implied in Selkirk’s (2011) Match Theory, which proposes that a syntactic word is translated as a phonological word at PF, although no definition of ‘syntactic word’ is provided. This approach has been challenged in recent years, in that a growing number of approaches permit words to spell out structures that may contain phrasal constituents. The idea that sequences of roots and affixes may not necessarily correspond to complex heads nor in fact entail syntactic constituency goes back at least as far as Kayne (1994). He proposes that movement creates a structure as in (1) and that the linearly adjacent heads, X and Y, may form a word.

(1) Roll-up tree

\[
\begin{array}{c}
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\end{array}
\begin{array}{c}
\text{ZP}_i \\
\text{ZP}_i \\
\text{ZP}_i \\
\text{ZP}_i \\
\text{ZP}_i \\
\text{ZP}_i \\
\end{array}
\begin{array}{c}
\text{X} \\
\text{X} \\
\text{X} \\
\text{X} \\
\text{X} \\
\text{X} \\
\end{array}
\begin{array}{c}
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\end{array}
\begin{array}{c}
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\text{YP}_j \\
\end{array}
\begin{array}{c}
\text{Y} \\
\text{Y} \\
\text{Y} \\
\text{Y} \\
\text{Y} \\
\text{Y} \\
\end{array}
\begin{array}{c}
\text{ZP}_i \\
\text{ZP}_i \\
\text{ZP}_i \\
\text{ZP}_i \\
\text{ZP}_i \\
\text{ZP}_i \\
\end{array}
\begin{array}{c}
\text{XP} \\
\text{XP} \\
\text{XP} \\
\text{XP} \\
\text{XP} \\
\text{XP} \\
\end{array}
\end{array}
\]

He speculates that this type of structure results in agglutination in head-final languages.

\(^5\) Note that it has been proposed that LD, contra the initial proposal of Embick and Noyer (2001), occurs prior to VI (Adger 2006).
It may be that this is what underlies pure agglutination, that is, cases in which Y and X never fuse, even partially, contrary to what can happen in inflectional languages. Since this derivation of YX as a non-constituent depends on both Y and X having the property of forcing their complements to move to their specifier position, and since that kind of property is dominant in the so-called head-final languages, the expectation is that agglutinative YX (where Y originates below X) will primarily be found in strongly head-final languages. (Kayne 1994: 53)

More recently, a similar conception of how ‘affixes’ can come to combine with roots or stems is found in Julien (2007), who permits words corresponding to any of the following configurations.

(2) Syntactic structures feeding into wordhood where the word is X+Y (Julien 2007: 214)

a. YP
   \[ Y \]
   X Y

b. XP
   \[ X \]
   YP Y

\[ Y \]
c. YP
   \[ ... X \]
   Y'
   Y

d. XP
   \[ X \]
   ZP
   \[ Y ... \]
   Z'
   Z

Essentially, this kind of approach denies that there is any morphosyntactic correlate to wordhood. If such is the case, then wordhood is established entirely through post-syntactic mechanisms.

1.3 A typology of word formation approaches

During the workshop on the Structure of Words at McGill University in May 2012, participants invented a set of terms to characterize the various approaches to word formation that turn out to be useful for the discussion at hand. The view that PF maps X⁰-constituents to ‘words’ was labelled ‘head banging’, and can be defined as follows:

(3) Head banging

A phonological word must be dominated by X⁰ and cannot contain any Xⁿ where n>0 (words are complex head adjunction structures). These complex structures can be derived by head movement, external merge of simple or complex X⁰'s, by Lowering, or perhaps by Local Dislocation.
In contrast to head banging, approaches which allow XP constituents to be mapped to a ‘word’ at PF were labelled ‘squishing’, defined as follows:

(4) **Squishing**

Pronouncing an XP and whatever this XP dominates (including any YP inside that XP) as a phonological word.

An additional category of squishing was termed ‘supersquishing’. This process interprets all of the heads within an XP domain as members of a phonological word, ignoring any phrases dominated by said XP.

Finally, the process that permits heads or phrases to be prosodically incorporated in the post-syntactic component was broadly referred to as ‘glomming’.

(5) **Glomming**

Particular affixes or phrases (sometimes representing non-constituents in syntax) may be interpreted as part of a prosodic word without being members of a complex X0.

A classic example of glomming would be the phonological incorporation of the possessive ’s clitic in English, such as in the example ‘the Queen of England’s bed’:

(6) [the Queen of [England]’s] bed

These different avenues that lead to word formation, together with the above labels, are disentangled in Myler’s chapter in this volume. The discussion during the workshop, as Myler reminds us, made it clear that glomming is a process that both the head-banging as well as the squishing approach need to appeal to in certain instances. It is clear that the possessive ’s in (6) cannot be in a syntactic head adjunction structure with the word it attaches to phonologically. There therefore needs to be some post-syntactic mechanism (akin to the process of Phonological Merger, proposed in Newell and Piggott 2014) that concatenates ’s with England in example (6).

Good examples of the non-syntactic composition of words (glomming) come from the variable prosodic organization of object ‘enclitics’ in three related Italian languages—Standard Italian, Neapolitan, and Lucanian (Peperkamp 1997). As in many cases, the location of stress in these languages helps us to decide what constitutes a word. In all three languages, the main stress is assigned within a three-syllable window at the right edge of words lacking enclitics. We see the pattern in Standard Italian (pórtə ‘bring!’), teléfona ‘call!’), Neapolitan (cónta ‘tell!’), péttna ‘comb!’) and Lucanian (vínnə ‘sell!’), jénnara ‘son-in-law’). Differences emerge when verbs combine with object enclitics. These enclitics are completely ignored in

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6 See Harley (2015) for similar examples.
Standard Italian, with the verb constituting the stress domain (e.g. *teléfona-mi* ‘call me’, *teléfona-me-lo* ‘call me it’). The verbs also bear stress in Neapolitan, but an additional stress is assigned to clitics, provided at least two follow the verb (e.g. *péttina-la* ‘comb them!’, *péttina-tí-(l)lo* ‘comb-you-them!’). Finally, the combination of verb and object clitics constitutes a single domain of stress assignment in Lucanian (*vənní-(l)lo* ‘sell it!’, *vinna-mí-(l)lo* ‘sell me it!’), and the single stress may fall on the verb or a clitic, depending only on proximity to the right edge. With regard to word structure, the differences cannot be directly linked to syntax because clitics would presumably be generated in the same configurations in these languages. Hence, the observed surface differences would emerge post-syntactically (Peperkamp 1997).

In the context of his discussion of glomming, Myler (this volume) discusses examples from three Serbo-Croatian dialects (Zec 1993), which are comparable examples to the Italian enclitics. The relevant data concerns the placement of high tone (of which there can be only one per word) in sequences of prepositions and nouns. In one dialect, the H tone surfaces on the head noun; in other words, the preposition is entirely ignored by the phonology. In another dialect, the H tone obligatorily surfaces on the preposition, indicating that the P is fully incorporated into the ‘word’, and in a third dialect, H tone placement may fall on either the P or the noun. Myler refers to Selkirk’s (1995) treatment of the data, which describes the behaviour of the preposition in terms of Free Clitic, Internal Clitic, and Affixal Clitic, respectively.

\[\begin{align*}
(7) \quad & \text{a. Cl } (\omega \text{XYZ}) \rightarrow (\omega \text{Cl}) (\omega \text{XYZ}) \quad \text{Free clitic} \\
& \text{b. Cl } (\omega \text{XYZ}) \rightarrow (\omega \text{Cl XYZ}) \quad \text{Internal clitic} \\
& \text{c. Cl } (\omega \text{XYZ}) \rightarrow (\omega \text{Cl } (\omega \text{XYZ})) \quad \text{Affixal clitic}
\end{align*}\]

Given that everyone needs to postulate glomming, and that the result of glomming can be indistinguishable from the result of syntactic head adjunction, Myler, a self-declared ‘squisher’, concludes that the more restrictive ‘head-banging’ approach is not warranted, and that independent criteria are needed that establish what counts as a word in a given language. Needless to say, not everyone agrees.

In the attempt to obtain a certain order from the typology of the rather disparate approaches to word formation argued for herein and elsewhere, we have constructed a sort of ‘checklist’ of assumptions that form the theoretical backdrop of those who work on the structure of words. The list is neither exhaustive nor is it possible in all cases to fully characterize each individual approach with it. We nevertheless feel that in the absence of clear principles it is useful to have such a set of heuristics. It is of note that the checklist below is verified against the notion of a phonological word. We agree, for example, with Julien (2007) and Haspelmath (2011) that there are no tests specific to the morphosyntax that can determine wordhood.\(^7\)

\(^7\) Clearly in saying ‘word’ in QUESTIONS 1–5 we are excluding cases of glomming. This is necessary because most people would be answering ‘no’ in order to include England’s as in (6).
The ‘word checklist’

1. Is the word represented by a syntactic constituent?
2. Is the word exhaustively dominated by an X⁰? (head banging)
3. If yes,
   (a) is syntactic head movement used in the creation of the word?
   (b) is the order of morphemes predicted by the syntax alone according to
       the principles of antisymmetry?
   (c) are Lowering and/or Local Dislocation used in the creation of the word?
4. Does the word contain any Xⁿ, where n is not zero? (squishing)
5. If yes,
   Are some XPs within the syntactic domain of the word not phonetically part
   of the word? (supersquishing)
6. Does the word contain elements that were not attached by head movement,
   adjunction, Lowering, Local Dislocation, or squishing? (glomming)
7. If yes,
   (a) is the post-syntactic attachment dependent on the phonology of the
       affix?
   (b) is it dependent on the phonology of the stem?
8. Does every syntactic phase constitute a word or can a word properly contain
   syntactic phases?

These questions are somewhat interrelated. For example, if the answer to Question 2
is No, then the answer to Question 4 is most certainly Yes, since phonologically,
words constitute a domain. Empirically, it appears that everyone needs a positive
answer to Question 6.

It is clear from the above discussion that there are more open questions regarding
the status of wordhood than there are answers to questions that have been solved.
The chapters in this volume add to the discussion, sometimes overtly and sometimes
implicitly, of what kinds of morphosyntactic domains constitute words, and what
kinds of operations distinguish words from phrases. Each analysis herein brings new
data or analyses into play that will impact our answers to the above questions, and
will help us to zero in on what the correct questions are that anyone working on
wordhood should be asking.

1.4 The chapters

In this section we introduce the individual chapters. Before we do, a note on the
organization of this volume is required. As the operations involved in word forma-
tion and the notion of wordhood speak to all grammatical modules—(morpho)-
phonology, (morpho)syntax, and semantics—the chapters are sequentially organized
accordingly. The first (Chapter 2) is Newell’s chapter, which concerns itself with an
overarching question, that of whether cyclic derivations result in opaque domains (phonologically, morphologically, and syntactically). Chapters 3–6 by Piggott and Travis, Lochbihler, Myler, and Zuraw are works whose main evidence is found primarily in the domain of morphophonology and its relation to wordhood. Chapters 7–11 by Bobaljik and Harley, Salanova, Leu, Noonan, and Mathieu, Fry, and Barrie all deal with data that highlight morphosyntactic operations at the word level. Lastly, Chapters 12 and 13, by Slavin and Compton, bring forward arguments from the domain of syntax-semantics pertinent to the discussion of the size of word-internal constituents.

In this introduction, however, we have decided to highlight another way in which the chapters in this volume could have been organized, taking the taxonomy in section 1.3 as a guide. We will therefore link the chapters below based on their answers to particular questions in (8). We do this in the hope that it will encourage the reader to use this volume in two ways: as a means of comparing the current research both with regard to the particular theoretical stances taken by the authors, and also with regard to the primary linguistic domain from which each work takes the data that supports its argumentation. Both modes of organization indicate ways in which this volume can be read, and we encourage the reader to use both.

Starting with Question 1 (‘Is the word represented by a syntactic constituent?’), we look to Salanova’s chapter ‘The paradoxes of Mèbengokre’s analytic causative’, which offers an interesting perspective, since it explores a mismatch between morphophonological bracketing and syntactic constituent structure. Salanova examines the morpheme o in Mèbengokre, a Jê language spoken in Northern Brazil. There are both phonological and semantic arguments that this morpheme is a prefix on the following verb. For example, it triggers phonological changes to the verbal stem such as syncope (o + akuno ‘lost\text{\text{\_}intrans}’ \rightarrow oakno ‘lost\text{\text{\_}intrans}’). Further, as it introduces an argument, it exhibits behaviour similar to causative morphemes, which are verbal affixes in other languages. Salanova shows, however, through an exploration of a range of constructions in which o appears and the variety of semantic contributions that it makes, that o in fact is syntactically related to the DP that precedes it. In other words, o is a postposition selecting the DP that precedes the verb rather than a causative prefix on the verb. It nevertheless undergoes phonological cliticization to the following verb, causing the observed phonological changes. This chapter, then, by examining a case where morphological attachment appears to give misinformation about syntactic architecture, serves as a cautionary tale of jumping too quickly to the conclusion that morphophonological information directly represents syntactic constituency. Salanova’s approach thus crucially relies on post-syntactic glomming, as the creation of the morphophonological word uses phonological cliticization, perhaps a case of Phonological Merger as described in Piggott and Travis (this volume).

The chapters that belong most clearly to the Yes camp to Question 2, that is, those labelled ‘head bangers’, are those by Bobaljik and Harley and Piggott and Travis.
Bobaljik and Harley, in their chapter ‘Suppletion is local: evidence from Hiaki’, present a unified analysis of locality restrictions on cross-linguistic suppletive patterns in comparative/superlative constructions and on verbal suppletion in Hiaki. It is shown that root suppletion may be triggered in only the following two environments: an X₀ or XP element merged to the root may condition suppletion. Additionally, head movement/lowering may expand this conditioning domain to include members of any complex X₀ that contains the root. It is argued that the ability of XP sisters of the root to trigger suppletion, contrary to initial appearances, is not a counterexample to the generalization in Bobaljik (2012) that suppletion must be conditioned within an XP. It is demonstrated that all arguments (XPs) that trigger verbal root suppletion in Hiaki are internal arguments. In addition to transitive internal arguments, it is shown that only the arguments of the unaccusative verbs may condition suppletion. Unaccusative verbs are distinguished from intransitive agentive verbs by their ability to enter into constructions with the agency-sensitive applicative head -ria. Agentive intransitive verbs do not supplete. These facts offer further support for the proposition put forth in Harley (2011), Marantz (1997), and Kratzer (1996) that internal arguments are arguments of root morphemes rather than of higher functional heads. Bobaljik and Harley do not take a stand on whether cross-phrasal interactions are achieved through head movement or lowering, but it must be the case that one has occurred. An XP projection between two heads will block allomorphy/suppletion. Therefore the two heads need to be ‘banged together’ in order to condition vocabulary insertion. This head banging could therefore not be Local Dislocation as originally conceived, as LD is proposed to occur post-Vocabulary Insertion.

Piggott and Travis’s (PandT) chapter, ‘Wordhood and word-internal domains’, investigates a view of wordhood where words are analysed as complex heads that contain no phrasal material. Several cases are examined where phonological and semantic information point to the existence of word-internal domains, but these domains are argued not to be indicative of phrases but rather phases that are spelled out separately. The claim is that syntax is a better predictor of cyclic phonological patterns than is either Lexical Phonology or Stratal OT. The first section of the chapter presents a syntactic account for an apparent counterexample to the ban on word-internal phrases by positing head adjunction via External Merge. The second section of the chapter presents a phonological account of mismatches between the structure produced by the phasal spell-out in the syntax and the phonological output. The claim is that these structures are created through Phonological Merger, where phonological movement from a higher to a lower phase is triggered by a phonological requirement.

The chapter entitled ‘Adjunction of complex heads inside words: A reply to Piggott and Travis (2013)’, by Mathieu, Fry, and Barrie (MFandB), provides a different viewpoint on very similar data. This chapter represents an approach to word formation in terms of squishing. MFandB argue that Ojibwe morphology allows
the presence of phrasal material within words, a view diametrically opposed to that of PandT. They assume that the Extension Condition cannot be violated (Chomsky 1995a) and therefore head movement is not a valid operation in the syntactic component. They therefore propose that a structure where phrasal material is permitted word-internally has a conceptual advantage over head-only proposals like that of PandT. Further, they show that, in certain Noun Incorporation constructions, head movement would have to violate the Proper Head Movement Generalization of Baker (2003), an unwanted result. Various empirical issues for the PandT account are raised, such as Verb–Noun ordering, the appearance of derivational morphemes outside of inflectional morphemes, and the ability to insert emphatic elements at particular junctures of complex verbs. Complex word structure in this account involves phrasal merge. Word-internal structure, which may include phrasal complements to heads as well as adjoined phrasal elements, therefore looks very similar to syntactic structure. Like PandT, MFandB explain word-internal phonological domains via spell-out of phases, and they also propose, following Oxford (2014), that certain elements are cliticized to the structure projected at the interpretation of a phase, explaining why some elements appear more loosely attached, allowing material such as emphatics to intervene.

Staying with squishers, we turn next to Compton’s chapter, ‘Adjuncts as a diagnostic of polysynthetic word formation in Inuit’. This chapter addresses the issue of linearization within words. It investigates the implications of the order and interpretation of adverbs within verbal complexes in Inuit for the following hypotheses: Kayne’s Linear Correspondence Axiom (Kayne 1994), Cinque’s universal adverb hierarchy (Cinque 1999), and Baker’s view of word formation as head movement (Baker 1988b, 1996b). Compton’s conclusion is that the possible variations of adverb order with respect to the verbal head and to one another cannot be accounted for by a cartographic approach to the generation of adverbs combined with head movement. He proposes that adverbs in Inuit are right-adjoined to a head-final verbal structure, and that, following Ernst (2002), their order is determined not by structure but by semantic considerations. The resulting complex word is created not by head movement nor by XP movement, but rather by the spelling out of the syntactic phrase as one complex morphological structure, i.e. word (see e.g. Wojdak 2008; Compton and Pittman 2010). For Compton, words are created by phasal spell-out of phrasal material including adjuncts. In this sense, Compton can clearly be situated in the squishers’ camp, and even be considered a ‘supersquisher’, since the word in Inuit is formed only at the end of an extended projection in terms of Grimshaw (2000). His work also relates to QUESTION 6 in the list in (8). While the word is derived by spelling out a syntactic phase, that of DP or CP, there is no clear sign of additional word-internal domains, i.e. smaller spell-out domains such as nP or vP.

Compton’s spell-out of CP and DP can be connected to Lochbihler’s chapter, ‘Syntactic domain types and PF effects’. Here, Lochbihler recognizes different
spell-out domains within words. Adopting phase theory, she argues for a distinction between final and non-final phases. Final phases are those headed by C and D in the verbal and nominal domains, respectively. Non-final phases are headed by such functional elements as category-defining $v$, $n$, $a$, etc., and other heads such as $v^*$ that signals theta-completeness. The two types of phases are considered to differ with respect to internal boundary strength. The spell-out of final phases instantiates stronger and less permeable boundaries than the spell-out of non-final phases. The chapter begins by citing syntactic evidence and arguments in the syntactic literature that justify the distinction between phases headed by the top-level functional categories C and D and those headed by lower categories. Final phases are recognized as containing barriers to head movement and scrambling, while non-final phases freely allow such syntactic processes. Lochbihler then proceeds to show that the contrast holds at the phonological level and helps to resolve a paradox in the Eastern Algonquian language, Ojibwe. As described by Kaye and Piggott (1973), this language has a palatalization process that is both bled and counter-bled by an apocope process deleting final lax vowels, depending on the construction. When the vowel targeted for deletion is part of the verb stem, deletion counter-bleeds palatalization, but when the targeted vowel is a nominalizing (i.e. participle) suffix, its deletion bleeds palatalization. Lochbihler’s solution to the paradox requires the apocope process to be active only in final phases, while palatalization applies in all phases. Apocope thus applies too late to affect elements that are spelled out in non-final phases such as $v^*P$, where verb stems emerge. Lochbihler then proposes that the participle ending (i.e. /i/) emerges in the CP phase, where it is deleted and unavailable to combine with a verb which is spelled out in an earlier, non-final phase. This chapter shows that phasal distinctions required for independent syntactic reasons play important roles in explaining phonological patterns.

Slavin’s chapter, ‘Verb stem formation and event composition in Oji-Cree’, investigates the morphological composition of the verb stem in Oji-Cree, a variety of Ojibwe, focusing on the observation that certain verb roots, classified as weak, must be preceded by a preverbal modifier. Slavin argues that these weak roots are semantically deficient, lacking elements of meaning such as manner, direction, result, etc. She associates the presence of the obligatory modifier before a weak verb root with the requirement that a verb stem must qualify as an Event and therefore constitutes an Event Phrase (EP) at the derivational stage where it is semantically interpreted. The obligatory preverbal modifier, occupying the left edge of the verb stem, supplies the missing semantic component, without which a verb that contains a deficient root would be ill-formed. Slavin appeals to the restricted range of meanings associated with modifiers preceding weak roots as evidence that they are really stem-internal. She argues, for example, that sentence-level and speaker-oriented interpretations of such modifiers are impossible. In contrast, such interpretations are possible when the same preverbal modifiers precede verb roots classified as strong, constituting full
events by themselves. Preverbal modifiers in Oji-Cree therefore occupy two positions: stem-internal and stem-external. The semantic differences that are associated with this contrast have phonological correlates. For example, Slavin argues that phonological processes such as hiatus resolution and assignment of iambic stress, described by Piggott and Newell (2005), apply across the modifier–root boundary only if the modifier is stem-internal. She concludes that PF and LF evidence, therefore, combine to show that the verb stem formation in Oji-Cree is an independent spell-out domain within a word. Slavin may be seen to be squishing to create words as she creates words by simply spelling out syntactic structure without creating complex heads via head movement or other post-spell-out operations.

The chapter by Myler, ‘Exceptions to the Mirror Principle and morphophonological “action at a distance”: The role of “word” internal phrasal movement and spell-out’, investigates morphophonological processes inside words that apply in non-adjacent, opaque contexts. He examines three case studies, spirantization in Nyakusa, reduplication in Ndebele, and the ruki rule in Sanskrit. Myler shows that in those instances where these processes appear to occur at a distance, across an intervening morpheme, the morpheme order in the word typically violates Baker’s Mirror Principle. To solve this conundrum, he adopts an approach to word formation that permits phrasal movement to determine morpheme order. Derivations that obey the Mirror Principle occur as phrasal roll-up movements, in each case pied-piping the constituent to whose specifier the root/stem (vP) has moved. Mirror Principle violations result from movement that strands lower projections: vP moves up the tree in successive cyclic fashion without pied-piping the intervening phrases. Adopting the hypothesis that Vocabulary Insertion (VI) occurs from the most deeply embedded structure outward (Bobaljik 2000), Myler shows that the morphophonological processes under focus can be derived in a local manner if one assumes the phonology applies after each instance of VI. In this way, the phenomena under investigation are entirely reconcilable with a syntactic approach to morphology. This chapter concludes with a comprehensive discussion of whether or not there is a coherent concept of wordhood in terms of morphosyntactic properties, and if not, what the various possibilities are which determine what counts as a word in a given language. Myler permits squishing (i.e. yes to question 3 in (8)), since he analyses apparent Mirror-Principle-violating morpheme orders as the result of phrasal non-roll-up movement, similar to Koopman’s (2005) approach to certain Korean morpheme orders.

Two further chapters in the volume that can be counted in the camp of the squishers are those by Leu and Noonan; both adopt a highly decompositional approach to functional words that supposes them to be derived through movement of XPs.

Leu’s chapter, ‘ein is ein and that is that: A note on anti-homophony and metamorphology’, addresses issues of homophony and cross-language correspondences of functional morphemes. Leu proposes the Homomorphemicity Thesis (HMT), which bars phonemically identical morphemes within overlapping syntactic domains (in
particular, regarding functional items). The intuition behind this idea is that the HMT helps children uncover the morphosyntactic and/or semantic properties of the pieces (i.e. morphemes) in their language. The comparative approach takes seriously overlaps between distribution patterns of functional items (Morph Distribution Patterns, MDPs) across several languages. As particular case studies, Leu recounts arguments from German on *d*, and presents new observations on *ein*, in particular observations regarding its distribution, and how it compares with that of French *on*. It leads him to decompose words such as German *nein* 'no' into *n-ein*, or *mein* 'my' into *m-ein*, where *ein* is the same morpheme as *ein* of the indefinite article, which turns out to be also the same element as the adpositional particle *ein*. A close look at the counterparts of German *ein* in French and English supports the analysis. Leu’s radically decompositional approach to function words entails that seemingly small words and their inflections are often the result of phrasal movement, and may even span non-constituents. In this sense Leu’s approach can be counted in the category of squishing as well as glomming (i.e. NO to QUESTION 4 and YES to QUESTION 6).

Noonan’s chapter, ‘Dutch and German R-pronouns and P-stranding: r you sure it’s P-stranding?’, argues that the ‘r’ in Dutch R-pronouns like *daar* ‘there’ is the same morpheme that occurs in corresponding German constructions, although here ‘r’ does not appear to be part of the pronoun but occurs when a seemingly r-less locative pronoun (*da* ‘there’) is placed to the left of a vowel-initial adposition, e.g. *darin* ‘there-in’. The intriguing observation is that when the pronoun separates from the adposition (in P-stranding contexts), ‘r’ moves with the pronoun in Dutch (unsurprisingly, being part of the pronoun even in the absence of a P), but remains with the adposition in German: *daar* … *op* versus *da* … *rauf* ‘there … on’. Noonan analyses ‘r’ as a syntactic head in both languages and concludes that what appears to be P-stranding by a locative pronoun is really stranding of the ‘pronoun’ by an extended projection of P, the size of which differs in Dutch and German. In German it includes the projection headed by ‘r’ while in Dutch ‘r’ is stranded with the remnant constituent containing the pronoun (itself decomposed into ‘d’ and a morphemic vowel). The chapter furthermore recounts arguments for postulating a clausal structure in the extended domain of adpositions whose core is a nominal category. A consequence of Noonan’s analysis is that small function words involve large phrasal domains and their derivation involves phrasal movement. Words such as *da* ‘there’ and *in* are shown to be pronunciations of different parts of the clausal cartography associated with adpositions. Specifically, ‘r’ is analysed as a deictic head, likened to Tense in the verbal extended domain. Having much similarity to Leu’s decompositional approach, Noonan’s work is also in the camp of squishing as well as glomming (i.e. NO to QUESTION 4 and YES to QUESTION 6).

Newell’s chapter, ‘Nested phase interpretation and the PIC’, examines the derivational properties of phases within words. As such, it is concerned with evidence in
favour of a positive answer to QUESTION 7 (‘Does the word properly contain any syntactic phases?’). Her focus is on the morphosyntactic and phonological status of the Phase Impenetrability Condition (PIC) (Chomsky 2000, 2001). She presents cross-linguistic evidence that demonstrates the epiphenomenal nature of PIC effects (following Bošković 2007, contra D’Alessandro and Scheer 2015), with a focus on word-internal syntactic, morphological, and phonological operations. In addition to previous evidence from long-distance agreement (Bošković 2007) and multiple WH-questions (Franks 2010), Newell argues that late adjunction of (particle and diminutive) morphemes inside of words and the subsequent morphophonological repair strategies that arise demonstrate that the syntactic, morphological, and phonological modules have access to the structure of already-interpreted phases. Further evidence from Malagasy causative constructions (Dobler et al. 2011) shows that previously interpreted morphemes are not syntactically frozen, but may continue to undergo head movement in following phases. Finally, Ojibwe hiatus resolution strategies and English infixation derivations are shown to target domains spelled out in previous phases, indicating that purely phonological domains are accessible to post-interpretation modifications and that these modifications are not restricted to the phase edge. She concludes that the non-existence of the PIC negates the need for a phase edge domain, offering a possible explanation for the conflicting views in the literature regarding whether or not phasal heads are interpreted with their complements.

Lastly we turn to Zuraw’s chapter, ‘Quantitative component interaction: Data from Tagalog nasal substitution’, which adds a note of caution to the question of word-internal phases (QUESTION 7). Some of the chapters in this volume (e.g. Lochbihler, Slavin, Piggott and Travis, Myler, Newell) cite phonological evidence as support for particular (morpho)syntactic analyses of certain constructions. For example, Piggott and Travis draw attention to phonological differences that emerge in the realization of alienable and inalienable possessive constructions in a number of languages. The differences can be readily correlated with syntactic differences and the cyclic (i.e. phasal) interpretation of the relevant structures. Zuraw points out that phonological processes are often not categorical, frequently displaying variability or optionality. Her chapter examines data from the manifestation of nasal substitution in Tagalog (English 1986). Nasal substitution involves the replacement of a prefix nasal and a stem-initial obstruent with a nasal that has the same place of articulation as the obstruent. Zuraw points out that nasal substitution is triggered by many different affixation patterns, and shows that across all types the manifestation is variable. Voiceless obstruents show higher rates of substitution than voiced ones and, within the latter category, rates also vary according to place of articulation. Zuraw observes that variation between affixation types is also found. For example, two nominalization patterns show different rates. Within a given affixation pattern, variation also appears to be sensitive to semantic classes. Zuraw observes that,
within one prefix–verb pattern, adverive verbs have lower rates of substitution than other verbs. In another prefix–adjective pattern, the substitution process varies according to the class of the adjective. Given the ways in which the manifestation of nasal substitution varies in Tagalog, Zuraw concludes that it would be a challenge to theories of the (morpho)syntax–phonology interface to explain the variation in morphosyntactic terms.

1.5 Conclusion

Given the preceding discussion, the various approaches to word formation emerging from the research presented by the authors of this volume, and the several recent treatments of words in the literature, it is apparent that there cannot be one sole narrow-syntactic structure that underpins the entity we call the word. That said, it is intriguing that all nodes in a syntactic X\textsuperscript{0} derived through head movement are universally interpreted as part of the same word.\textsuperscript{8} This fact in and of itself renders separating the notion of word from morphosyntactic structure impossible. It is a one-way correlation that emerges where a complete dissociation of phonological chunking and syntactic structure would predict none. Note that while many researchers have noted the relation between syntactic structure and phonological output at the word level, couched in the terms of alignment constraints (e.g. McCarthy and Prince 1993; Selkirk 2011), no theory has managed to offer a cohesive definition of the ‘grammatical word’.

This volume offers a fairly comprehensive testimony to the possible syntactico-phonological relations at this level. The possibilities herein include words that appear to be phrasal, such as complex modifiers, emerging from structures that are in fact complex syntactic heads. These possibilities also include words that, despite initial appearances, are argued not to be derivable from complex syntactic heads, such as morphologically complex determiners and prepositions. According to some viewpoints, words include phrasal structure, while a different perspective represented in this volume argues that phrasal material is universally banned from word-internal domains. It is interesting for the latter viewpoint that polysynthetic languages (Ojibwe, Oji-Cree, and Inuit) parse structures that include morphemes from the verbal root all the way to the head of CP as words, while, strikingly for the former, the internal structure of entities as small as function words is argued to include phrases.

That said, some directions towards a solution to the problem of the definition of word also materialize from these chapters. The discussions of operations such as glomming or Phonological Merger underscore the ability of the morphological and

\textsuperscript{8} A rare exception is Zubizarreta’s (1985) analysis of Romance causatives, according to which parts of a complex head end up pronounced as different words.
phonological modules to merge elements that do not correspond to a complex head in the syntax. The observation that the phonology can be demonstrated to alter the syntactic output it receives may take some of the burden off those who search for a cohesive morphosyntactic account of word structure. It remains, however, to offer an explanatory account of what the range of possible merger operations in the PF module is. Operations that are purely phonological (infixation) or purely syntactic (head movement) are relatively uncontroversial, but they do not cover cases that fall under other proposed processes such as Lowering and Local Dislocation. Interestingly, the post-syntactic operations proposed in the literature conspire to create $X^0$ structures. None that destroys the $X^0$/word correlation has been proposed. Even in cases of Fission, which breaks one head into two for the purposes of VI, the split VI sites continue to form part of the same word. Why should this be so? Further research into this type of question will, we believe, bring out explanations for these types of observations.

1.6 Some outstanding questions

We end with a discussion of some outstanding questions that can be explored in future work. Reviewing different approaches to word formation has forced us to address issues that do not have easy answers but which provide other arenas to investigate the mechanism of spell-out and the syntax–phonology interface. For example, no chapter in this volume tackles the unresolved issue of the prefix–suffix contrast. There appears to be a cross-linguistic tendency that suffixes are somehow closer to the base, morphophonologically speaking, than prefixes. Prefixes often have clitic-like behaviour, while this appears to be rare for suffixes. For example, it has even been observed that enclitics in Romance appear to have a tighter connection to the stem than proclitics (see e.g. Sportiche 1997 for enclitics in French). This tendency is interesting to view from the perspective of Kayne’s (1994) antisymmetry theory. Under antisymmetry, complex heads created by head movement can only be derived through left-adjunction. If head movement does not occur (9a), then the relation between H and R can only be prefixation derived through subsequent glomming. If, however, the root/stem R syntactically combines with the functional head H (9b), this will always produce suffixation.

\[
\begin{align*}
\text{(9) a. } & [\text{HP } H [\text{RP } R]] & \quad \text{H-PREFIX} \\
\text{b. } & [\text{HP } H [\text{RP } R]] \rightarrow [\text{HP } R + H [\text{RP } R]] & \quad \text{H-SUFFIX}
\end{align*}
\]

9 Bobaljik and Wurmbrand (2001) also note asymmetries between inflectional prefixes and suffixes in Itelmen.
A complex head involving prefixation could, according to Kayne (1994), only be syntactically derived by the prefix, H, being hierarchically lower than the root/stem, R, and incorporating into R.

\[(10) \quad [RP \ R [\text{HP} \ H]] \rightarrow [RP \ H \ R [\text{HP} \ H]]\]

Antisymmetry makes a nice prediction concerning the morphophonological relationships between the affixes in (9) and (10) and their bases. We expect prefixes derived as in (10) to be able to hold a similar morphophonological relation to the stem as suffixes can. However, any kind of prefixation as in (9b) with hierarchically higher heads would be predicted to result from glomming. With glomming, we expect more morphophonological distance. This possibility opens up an analytical approach that merits being investigated more closely.

Another recurring issue involves the notion of domains within words. It has been suggested that syntactic phases can be used to account for word-internal phonological domains (e.g. Marvin 2002; Marantz 2007; Newell 2008). The understanding of syntactic phases, however, has not yet reached a steady state, some remaining questions being whether PF phases are isomorphic with LF phases (e.g. Marušić 2005; D’Alessandro and Scheer 2015), whether phases may be extended under certain circumstances (e.g. Bobaljik and Wurmbrand 2013; Bošković 2015; den Dikken 2007; Svenonius 2004a), or whether phases may vary cross-linguistically (e.g. Compton and Pittman 2010). On the one hand, applying the technology created for syntax within the domain of morphology is only as dependable as the technology to be applied. On the other hand, word-internal phonological domains, if they are to be equated with syntactic phases, may illuminate syntactic issues.

Further, just as there are questions as to whether spell-out domains are the same at PF and LF, there is a question whether, within morphology, all domains are equivalent. For example, Embick (2010) and Bobaljik (2012) discuss locality conditions on the triggers of root suppletion but are not explicit as to how these domains relate to the phonological domains discussed in Marantz (1997) and Marvin (2002).\(^{10}\) While Tense may trigger root suppletion in languages like English (eat/ate), phonological data from Ojibwe suggest that Tense is not in the same phonological domain as the root (see Lochbihler this volume; Newell this volume; Piggott and Travis this volume).\(^{11}\)

The investigation of the status of domains could further benefit from a study of the inner syntactic structure of compounds (see e.g. Harley 2011). Compounds by

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\(^{10}\) The topic of root suppletion raises a further question that bears exploring: what is the status of readjustment rules? (See Haugen and Siddiqi 2013 for an overview of this question.)

\(^{11}\) Kilbourn-Ceron et al. (2016) discuss this apparent mismatch, and using data from Yiddish (Cable 2004; Davis and Prince 1986; Waletzky 1969) suggest a solution that requires a lower agreeing head which triggers root suppletion.
definition contain two roots, but the details of how these roots are combined, and how many different ways they may be combined cross-linguistically as determined by their phonological interactions, is worthy of more study. Phonology may distinguish different domains within compounds. Ojibwe evidences two morphosyntactically distinct types of compounds, one where the two roots emerge in the same phonological domain, and one where they emerge in two separate domains. Once again this is a place where phonology can be seen as providing some insight into morphosyntactic structures and the mechanisms operative at the interface.

We started this introduction by examining which module (and what processes within this module) may define wordhood. The most likely module was phonology, where it is clear that certain phonological processes pick out a span that is larger than a morpheme and smaller than a phrase—and in most cases this span coincides with an item native speakers intuitively recognize to be a word. But, as has become obvious throughout this introduction, there are still many important and exciting issues to be addressed.

Acknowledgements

We would like to thank Richard Compton and Tom Leu for their detailed comments on many of the chapters in this volume as well as invaluable input into discussions during our review meetings. We also would like to thank all of the participants in the ETI1 Words Workshop for their thought-provoking comments and enthusiastic discussions. We are grateful for financial support for the workshop and the volume from FRQSC 2012 SE-144646 and SSHRC 646-2011-1138.

\[\text{Of course, native-speaker intuitions will not always coincide with the phonological results, e.g. England's in the Queen of England's bed.}\]
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