

To be or not to be a Word

To be or not to be a Word:
New Reflections on the Definition of Word

Edited by

Iraide Ibarretxe-Antuñano
and José-Luis Mendívil-Giró

**CAMBRIDGE
SCHOLARS**

P U B L I S H I N G

To be or not to be a Word:
New Reflections on the Definition of Word,
Edited by Iraide Ibarretxe-Antuñano and José-Luis Mendívil-Giró

This book first published 2014

Cambridge Scholars Publishing

12 Back Chapman Street, Newcastle upon Tyne, NE6 2XX, UK

British Library Cataloguing in Publication Data
A catalogue record for this book is available from the British Library

Copyright © 2014 by Iraide Ibarretxe-Antuñano, José-Luis Mendívil-Giró and contributors

All rights for this book reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the copyright owner.

ISBN (10): 1-4438-6207-X, ISBN (13): 978-1-4438-6207-3

TABLE OF CONTENTS

Introduction	1
Words, Words, Words...	
Iraide Ibarretxe-Antuñano and José-Luis Mendívil-Giró	
Chapter One.....	6
The Word in Phonology	
Gorka Elordieta	
Chapter Two	66
Word-Defining Properties from a Lexical Approach to Morphology	
Elena Felú-Arquiola	
Chapter Three	93
On a Grammatically Relevant Definition of Word and why it belongs to Syntax	
Antonio Fábregas	
Chapter Four.....	131
From Agglutination to Polysynthesis: Towards a Biological Characterization of the Spoken Word	
Juan-Carlos Moreno-Cabrera	
Chapter Five	164
Words as Constructions: Some Reflections in the Light of Constructionist Approaches	
Francisco González-García	
Chapter Six.....	189
Word in Cognitive Grammar	
Ricardo Maldonado and Boris Fridman-Mintz	
Contributors.....	244
Index.....	247

INTRODUCTION

WORDS, WORDS, WORDS...

IRAIDE IBARRETXE-ANTUÑANO
AND JOSÉ-LUIS MENDÍVIL-GIRÓ

“Words, words, words”... This is how Hamlet replies to Polonius’ question: “What do you read, my lord?” in Shakespeare’s famous, and much quoted, play *Hamlet* (Act II, sc. ii). Although apparently simple, this phrase raises a much deeper and complex issue since... What is really a “word”?

This is precisely the “question” addressed in this book: the nature and definition of what a “word” is in linguistics.

As happens with Hamlet’s answer, it is not easy to define what a “word” is. Indeed, the term subsumes a wide range of phenomena explored from an even wider array of perspectives (see Cruse *et al.* (2002), Dixon and Aikhenvald (2002), DiSciullo and Williams (1987), among others).

And, yet, “words” are the most accessible linguistic units from the speaker’s introspection viewpoint; however, they are, at the same time, an incredibly elusive reality for the linguist. “Words” have been the main linguistic units in the Western grammatical tradition based on Greco-Latin grammar. Linguistic structuralism, in an attempt to avoid using this problematic concept, put forward the notion of morpheme as the central unit for scientific analysis. Unfortunately, structuralist scholars did not meet their purpose. Nowadays, the term “word” has not disappeared from the research agenda in Linguistics. Rather, it is still one of the key concepts in research dealing with the human language where issues such as the definition, theoretical status, limits, characteristics, and psycholinguistic reality of the notion of word are still controversial and, at the same time, open for debate.

All these issues will be discussed at length in the following pages. This book is the result of a scientific meeting organized by the research group

Sylex (Syntax and Lexis) at the University of Zaragoza, Spain.¹ It offers an up-to-date overview of the latest discussions on the nature of “word” in modern linguistics. Indeed, the main contribution of this book lies in that it gathers together under a single collective volume different views of what a “word” is from a wide range of diverse methodological and theoretical linguistic frameworks such as phonological theory (Elordieta), linguistic typology (Moreno-Cabrera), lexical generative morphology (Feliú-Arquiola), generative syntax (Fábregas), cognitive grammar (Maldonado and Fridman-Mintz), and construction grammar (González-García). Despite their different backgrounds, all these papers are geared towards the same goal: to offer a detailed account of what a “word” is in their respective fields.

Elordieta’s chapter provides an overview of the most relevant aspects of the concept of word in generative phonology (most commonly referred to as the phonological or prosodic word): the demarcation of the word in the speech chain, the nature of the relations between morphology and phonology (i.e. morphophonology, Lexical Phonology), conditions on phonological word formation, and the relationship between morphosyntactic words and phonological words. According to Elordieta, the lack of isomorphism or correspondence between the morphosyntactic and phonological sides of the grammatical word reveals itself in the prosodic aspects of clitics, affixes and compound words.

The next two chapters provide a formal approach to words from two contrasting perspectives of the notion of word which represent a long and fruitful debate on the internal architecture of the Human Faculty of Language within the Generative tradition (in the sense that the study of what a word is equals studying how grammars are organized). Thus, Feliú-Arquiola’s contribution takes a lexical approach to morphology, while Fábregas presents a syntactic (“constructivist”) approach to the notion of word.

Feliú-Arquiola’s chapter starts addressing a central question: “Is it legitimate to adopt an approach in which morphological processes are not considered the result of syntactic operations?” After claiming that this is indeed the case, she argues that languages seem to show lexical integrity effects, although neither in the same degree nor in relation to the same kind of phenomena. Therefore, she proposes that from a lexical approach

¹ This book falls within the scope of the Spanish Government funded research projects TAC (HUM2007-64200) and MovEs (FFI2010-14903). We would like to thank all contributors for their expertise and patience as well as Rosario Caballero, Paula Cifuentes-Pérez, Francisco González-García, and Javier Valenzuela for their help with the manuscript.

to morphology words can be considered as items that tend to show lexical integrity properties and that tend to behave as closed semantic domains, in contrast to phrases and sentences. Since words and phrases seem to show different morphologic, syntactic and semantic behaviors, it should be possible to consider that they are produced by different types of operations. As a consequence, morphological processes—processes that give rise to complex words—can be considered different from syntactic operations, since their outputs tend to behave in a different way.

Fábregas' chapter departs from two questions: Is there any grammatically relevant definition of word? If such a definition exists and we can talk about words as distinct units in the grammatical knowledge of speakers, how are they defined? In other words, is the definition different enough from what we know about syntax to allow us saying that morphology is a distinct component? The author proposes an affirmative answer to the first question, which seems to place him within a lexicalist perspective; however, he gives a negative answer to the second question, which leads him to propose a purely syntactic definition of word. According to Fábregas, this strategy allows him to account for the so-called Lexical Integrity effects without renouncing to the more theoretically ambitious assumption that there is only one generative component in language. More specifically, the author makes a syntactic definition of word using phase-theoretical arguments and considering the deactivation of the syntactic derivation of chunks of structure in relation to interface conditions. Should this be the case, his model would predict that all languages have words, to the extent that in all languages syntax is assumed to exist and syntax is a system that deactivates active features in order to allow structures to be processed by the interfaces.

The book continues with Moreno-Cabrera's chapter, which somehow serves as a link between formal and functionalist-cognitivist approaches. Moreno-Cabrera's chapter proposes a critical overview of a robust (but not very spread) tradition, i.e. a purely naturalistic approach to the nature of linguistic units in general and words in particular. In his contribution, Moreno-Cabrera focuses on the spoken word from the perspective of speech and its impact on the morphological typology of languages. He argues that classical morphological typology is almost exclusively based on the written word and, therefore, is of little use for establishing a word typology relevant to spoken languages. He concludes that some of the word types envisaged in classical morphological typology do not define language types and may, instead, be interpreted as manifestations of universal properties of human speech. He then shows that the spoken word can be conceived of as a linguistic realization of "chunks" in short-term

memory tasks. Later he relates this approach with Dahl's (2004) notion of "packets" and with De Reuse's (2009) proposal concerning the polysynthetic word. He concludes that the quantitative limits of words as speech chunks coincide with the "magical number seven, plus or minus two" originally proposed by Miller (1956).

The two chapters that close this book come from a cognitive linguistic tradition. González-García focuses on word and construction grammar (see Hoffmann and Trousdale 2013 for a review), whereas Madonado and Fridman-Mintz draw on Langacker's (1987, 1991, 2008) Cognitive Grammar to define what a word is. Cognitive Linguistics is not a homogeneous framework, but an umbrella term subsuming different approaches that share basic theoretical and epistemological tenets. Therefore, words in construction grammar approaches are considered "constructions", i.e. form-meaning pairs (or "conventional associations of a given form and its corresponding semantics and/or discursual function") and words in Cognitive Grammar are regarded as minimal symbolic units (composed of a semantic pole and a phonological pole). Regardless of internal differences, both sub-models coincide in considering morphology and syntax not as separate and/or (in)dependable units of analysis but as members of a grammar-lexicon (semantics/pragmatics) continuum.

Apart from their specific views on what a "word" is, each paper provides a succinct description of their corresponding frameworks and focuses on certain word-related crucial phenomena. González-García provides an overview of the main constructionist approaches that exist nowadays with a special focus on the characteristics they have in common. Later he describes how Golberg's Construction Grammar accounts for compounding, coercion and the *saber* 'know' + secondary predicate constructions in Spanish. In turn, and after briefly introducing some of the basic mechanisms in Langacker's model (especially, base/profile, compositional path, and scope), Maldonado and Fridman-Mintz propose a cognitive account of what a syllable is from a cognitive phonetics perspective. They use this notion of syllable to define what a word is and to discuss several related issues such as cohesion, separability, independence, and informativity.

All in all, this collection of papers offers different perspectives that will contribute to provide some answers to the myriad of questions that a simple phrase such as "to be or not to be a Word" arises.

References

- Cruse, D. A., F. Hundsnurscher, M. Job and P. R. Lutzeier (eds.) 2002, *Lexikologie/Lexicology: Ein Internationales Handbuch zur Natur and Struktur von Wörtern und Wortschätzen/An international handbook on the nature and structure of words and vocabularies*, Berlin: Mouton de Gruyter
- Dahl, Ö. 2004, *The Growth and Maintenance of Linguistic Complexity*, Amsterdam: John Benjamins
- De Reuse, W. J. 2009, "Polysynthesis as a typological feature. An attempt at a characterization from Eskimo and Athabaskan perspectives", M.-A. Mahieu and N. Tersi (eds.) *Variations on Polysynthesis. The Eskaleut Languages*, Amsterdam: John Benjamins, 19-34
- Dixon, R. M. W. and A. Y. Aikhenvald (eds.) 2002, *Word: A Cross-Linguistic Typology*, Cambridge: Cambridge University Press
- DiSciullo A. M. and E. Williams 1987, *On the Definition of Word*, Cambridge (Mass.): MIT Press
- Hoffmann, H. and G. Trousdale (eds.) 2013, *The Oxford Handbook of Construction Grammar*, Oxford: Oxford University Press
- Langacker, R. 1987, *Foundations of Cognitive Grammar, Vol. 1. Theoretical Prerequisites*, Stanford: Stanford University Press
- . 1991, *Foundations of Cognitive Grammar, Vol. 2: Descriptive Application*, Stanford: Stanford University Press
- . 2008, *Cognitive Grammar*, Oxford: Oxford University Press
- Miller, G. A. 1956, "The magical number seven, plus or minus two: Some limits on our capacity for processing information", *Psychological Review* 63, 81-97

CHAPTER ONE

THE WORD IN PHONOLOGY*

GORKA ELORDIETA

1. Introduction

Included in a volume that contains chapters addressing aspects of the word from different linguistic disciplines, this chapter provides a short overview of the evidence provided by the sound component of grammar (phonetics and phonology) for a domain or grammatical entity referred to as a “Word”, that is, the Phonological Word. The chapter is conceived as a quick mini-guide of the most relevant issues pertaining to the word in phonology, without stopping at any depth in any of them. It is mainly intended for a reader with basic knowledge of phonology who would like to have access to an overview of some of the main issues on the word in phonology, especially in the context of a volume containing papers from different modules of grammar and which may attract the attention of a generalist reader or a reader not specialized in phonology. The chapter may prove particularly useful for anyone interested in Spanish linguistics,

* First and foremost, I would like to thank the editors of this volume, Iraide Ibarretxe-Antuñano and José-Luis Mendivil-Giró, for their interest in having me as a contributor to this volume, and above all, for their infinite patience while awaiting my submission (which was delayed due to several circumstances). Parts of the contents of this article were presented as an invited talk at the Workshop “On the nature of the word”, at the University of Zaragoza on October 7-8, 2010, organized by *Sy/lex*, the research group on syntax and the lexicon of that university and to which the editors of this volume belong. I am grateful to the members of that group for their invitation and to the participants in that event for their comments and feedback. This work forms part of the research activities of the Group of Theoretical Linguistics (HiTT, in its Basque acronym) funded by the Basque Government (reference code IT769-13), of the Research and Formation Unit on Theoretical and Diachronic Linguistics (UFI11/14) of the University of the Basque Country (UPV/EHU), and the funding from these institutions is gratefully acknowledged.

as the paper contains many references to this language, in the form of examples illustrating specific issues under discussion and specially in the form of analyses of my own on the prosody of clitics, affixes, and compound words in Spanish (to my knowledge, there is no other analysis of the prosodic structure of affixes, compound words, and clitics in Spanish).² There are many aspects related to the phonological word that will not be dealt with in this paper, because the breadth of the topic of “the word in phonology” exceeds the limits of space for the papers in this volume. A careful, detailed coverage of the topic certainly deserves a book rather than an article of 60-some pages. This constraint on paper size also prevents me from illustrating every issue with examples. But with the snapshots presented in the paper I hope to offer at least an initial service to readers interested in getting to know about phonological studies of the word, so that they can proceed later to the specialized literature on each topic.³

The remainder of the chapter is organized as follows: section 2 presents some aspects of the phonetic and phonological cues for the demarcation of words. Section 3 offers a brief overview of the main framework devised for studying word-internal phonology, namely Lexical Phonology. Section 4 focuses on the conditions on the formation of prosodic words (such as minimum-size requirements), and the correspondences between phonological words and syntactic terminal nodes, as part of the object of study of Prosodic Phonology. In this section, particular attention is paid to the prosodic structures of function words adjacent to lexical words, affixed words, and compound words. Finally, section 5 addresses the relevance for the domain of the word of recent proposals on the syntax-phonology interface that advocate for a direct mapping from morphosyntax to phonology, in the sense that morphological and syntactic phases (or rather the Spell-Out domains of phases) are mapped onto PF as domains where phonological phenomena of various sorts may apply.

2. Phonetic and phonological demarcation of words

In most common everyday speech situations, phonological words are not separated or preceded by pauses. That is, speakers of different languages do not indicate word boundaries by pauses, which would be the most obvious means of identifying words. Thus, the question arises

² This slight bias arises from the fact that this chapter is a written development of an oral presentation at the University of Zaragoza, Spain, for an audience of researchers in General and Spanish linguistics.

³ Hall (1999a) is also an excellent review article on the phonological word.

whether there are any phonetic or phonological cues that serve to demarcate the edges of words in the speech chain. Several studies have reported the existence of different types of cues for word boundaries present in the world's languages.

At least in higher levels of the prosodic hierarchy (utterance, intonational phrase, intermediate phrase, phonological phrase), the left edges or beginnings of words have been found to be pronounced with a higher degree of articulatory strength, in the form of greater duration of initial consonants and/or initial syllables, VOT or aspiration in initial consonants, glottalization of word-initial vowels, or bigger resistance to assimilation and lenition processes. In contrast, word-medial consonants and vowels are more prone to weakening effects, such as lenition, reduction, and deletion. Diachronically, strengthening processes may result in favoring obstruents in word-initial positions. Inversely, weakening processes affecting word-medial segments may lead to the occurrence of sonorants word-medially (cf. Martinet 1955, Hock 1991, 1992, Vennemann 1993). On the other hand, the ends or right edges of words can also be strengthened. At higher levels of the prosodic hierarchy, word-final syllables can be signaled by lengthening, accompanied by other suprasegmental cues such as the presence of boundary tones. These phenomena are clearer the higher the prosodic constituent the word starts or ends. The following references of phonetic analysis can be consulted: Quené (1992), Fougeron and Keating (1997), Byrd and Saltzman (1998), Fougeron (1999), Byrd (2000), Cho and Keating (2001), Cho (2002, 2004, 2006), Keating *et al.* (2003), Cho, McQueen and Cox (2007), *inter alia*. For a more phonological discussion of word-initial versus word-internal positions, see Beckman (1998), Kirchner (1998, 2001), Smith (2005) and Barnes (2005), among others.

Stress at the left and right edges of words is very common among the world's languages. Of the 306 languages surveyed by Hyman (1977), 114 (37.3%) had initial stress, and 97 (31.7%) had final stress. Initial and final stress systems are thus found in 211 languages, 69% of the languages consulted. These languages were both quantity-sensitive and quantity-insensitive. Gordon (2002) offers a survey of 262 quantity-insensitive languages, divided into languages with fixed single stress, languages with dual stress (primary and secondary), and languages with binary and ternary stress. Of the 262 languages, 85 languages have initial stress and 75 have final stress (61.08% of the languages).⁴ Finally, Goedemans and van der

⁴ These figures are not found in any single table in Gordon's (2002) article. Rather, they are the result of my own calculations on the location of primary stress, taking

Hulst (2011) claim that of the 282 languages with fixed stress they analyzed, 92 have initial stress and 51 have final stress. Thus, 143 of the 282 languages have initial or final stress (50.70%). But the percentages of stress systems marking word edges as stress locations increase substantially once penultimate stress is considered. This pattern is very common among fixed stress systems. Penultimate stress is only one syllable away from the word's right edge, and Gordon (2001) hypothesizes that penultimate stress may derive from final stress due to phonetic reasons against having final stress in phrase-final position. In phrase-final position, a word with final stress would have to realize both the tonal configuration for stress and the one for a boundary tone. If the tonal specifications for stress and the boundary tone were of the opposite type, such as a rising tone or a high tone for stress and a falling tone or a low tone for the boundary tone (as in declaratives), the crowding that originates could motivate retraction of stress to the penultimate syllable. This retraction in phrase-final position could then be reanalyzed as penultimate stress at the word level. Another aspect not favoring the last syllable of a word in phrase-final position as a bearer of stress is that at higher level prosodic constituents the last syllable or vowel is weakened, as manifested in many languages by vowel devoicing, reduction, neutralization or deletion (cf. Hock 1999, Barnes 2005). A fact in support of these phonetic explanations is the asymmetry between the right and left edges. The equivalent of penultimate stress on the left edge of the word is peninitial stress (i.e. stress on the postinitial syllable), and the number of languages with this pattern is much lower than the number of languages with penultimate stress. If we add languages with penultimate stress to the number of languages with initial and final stress, the percentage of languages with "edge" stress is a clear majority. In Hyman's (1977) corpus, there are 77 languages with penultimate stress, which added to initial and final stress amount to 94.11% of the total languages considered. Gordon (2002) reports 76 languages with stress on the penultimate syllable, which together with initial and final stress languages gives a total percentage of 90.07% of the languages surveyed. Finally, in Goedemans and van der Hulst's (2011) classification, there are 110 languages with penultimate stress, and thus 253 of the languages studied would have initial, final or penultimate stress, i.e. 89.71% of the total. According to these surveys, then, between 89% and 94% of the languages would have stress at a word's edge or on the penultimate syllable, only one syllable from the word's edge. These figures would

Gordon's figures for single and dual stress patterns and binary and ternary stress patterns across the article.

reflect quantitatively what Trubetzkoy (1939) called the demarcative function of stress.

Word phonotactics may also be another cue for word edges. For instance, in English monomorphemic words obstruent clusters are permitted at word-end codas, but not word-internally. In Dutch, word-final syllables are longer than word-internal syllables. In several languages, certain consonants, consonant clusters and vowels are banned from word-initial or word-final positions, or alternatively, only certain consonants may be allowed in word-initial position or word-final codas. Dixon and Aikhenvald (2002: 14-15) mention several cases (cf. the references therein for details). In Bare, aspirated consonants can only occur word-initially, and nasalized vowels can only occur word-finally; in Zoque, there are onsets with three and four consonants, but only in word-initial position; in Estonian, one can find syllables beginning with a vowel only in word-initial position; in Basque, stops and affricates can be codas only word-finally (cf. Hualde 2003: 34). The presence of such segments or sequences of segments at the left or right edge of a word in these languages is an indicator of word boundaries.

Phonotactic restrictions may also hold of certain vowel or consonant sequences occurring across word edges. In Fijian, vowel sequences may be pronounced as diphthongs word-medially, but when they straddle two words they have to be pronounced in different syllables (cf. Dixon and Aikhenvald 2002: 15); in many languages certain sequences of consonants are only permitted across word boundaries, not internal to the word (e.g. in Basque, sequences of stop or affricate+consonant are only permitted across words, not within a word, with the exception of stop+liquid onset clusters; cf. Hualde 2003: 35). The presence of such vowel or consonant sequences serves as an indicator of word boundaries.

In some cases, phonotactic restrictions may be negatively focalized, in the sense that specific consonants may be banned from appearing at the left or right edge of a word. In Yingkarta, laterals are not permitted word-initially, and words cannot begin with rhotics in several languages, such as Tariana (cf. Dixon and Aikhenvald 2002: 15) and Basque (cf. Hualde 2003: 37, although the restriction is relaxed in present day). In German, a word cannot end in a short lax vowel (Hall 1999b). For phonotactic constraints as diagnoses of the word in Dutch, see Booij (1999). In general, the occurrences of such consonants or vowels indicate that there are no word-boundaries aligned with those consonants, i.e. that no word is starting or ending there.⁵

⁵ See Flack (2009) for an analytical treatment of phonotactic restrictions at word edges in Optimality Theoretic terms.

Also, historical processes of word-initial strengthening and word-medial lenition or weakening may end up shaping the phonotactics of a language so that obstruents are favored in word-initial position and sonorants are favored word-medially.

One of the main observations in Prosodic Phonology is that certain phonological phenomena may be bound to the limits of the phonological word. For instance, Nespor and Vogel (1986, ch. 4) give examples of assimilation processes of different kind in several languages applying within words but not between words or even between a word and a clitic (cf. also Peperkamp 1997, Hall and Kleinhenz 1999, Dixon and Aikhenvald 2002: 17-18, Itô and Mester 2009, and Vigário 2010 for additional phenomena and recent discussion). Closely related would be non-stress or non-tonal suprasegmental processes, such as nasalization or vowel harmony, which spread over consonants or vowels within a phonological word, but not across words, as in Turkish, Hungarian, Finnish, Sundanese, Terena, etc.

Altogether, prosodic domain-initial and domain-final strengthening, edge-located stress, prosodic word-bounded phonological rules and word-edge phonotactics serve a delimitative function (Trubetzkoy 1939), which aids word recognition and lexical acquisition or bootstrapping (cf. Christophe and Dupoux 1996). Indeed, in recent decades there has been increasing attention directed towards word segmentation in children and adults, and the results indicate that listeners make use of a number of phonotactic, allophonic, coarticulation and prosodic cues in word segmentation. Some references could be Mehler *et al.* (1981), Otake *et al.* (1983), Hirsh-Pasek *et al.* (1987), Cutler and Norris (1988), Friederici and Wessels (1993), Saffran, Aslin and Newport (1996), Saffran, Newport and Aslin (1996), McQueen (1998), Jusczyk, Houston and Newsome (1999), Jusczyk, Hohne and Bauman (1999), Smith and Hawkins (2000), Johnson and Jusczyk (2001), Bagou, Fougeron and Frauenfelder (2002), or Fernandes, Ventura and Kolinsky (2007). For a recent overview with many more references, see chapter 1 of De la Cruz (2012).

3. Phonology internal to the Word: Morphophonology and Lexical Phonology

The surface form of a word may reveal the occurrence of phonological phenomena of various sorts affecting the features of the segments contained in the underlying form, such as assimilation, dissimilation, epenthesis, and deletion. These phenomena may occur in non-derived environments, with respect to an underlying form, or in derived

environments, when two or more morphemes combine to form a complex word. As for the latter, it has been a longstanding observation that morphemes in the same phonological context (the same “structural description”, in *SPE*-terminology) may display different behaviors with respect to a given phonological phenomenon.

In Peninsular Spanish, for instance, there is a process of interdentalization of /t/ and /k/, by which these voiceless stops are spirantized to /θ/ (/s/ in Latin American Spanish and some southern varieties of Peninsular Spanish) when they occur in root-final position and are followed by a suffix beginning with /i/. But the process does not apply with all /i/-initial suffixes. With the superlative and the diminutive suffixes, for example, no interdentalization applies. The examples in (1a) (center column) illustrate cases of application of the process for the root-final consonants in the left-hand column, and those in (1b) (right-hand column) illustrate cases of non-application of the process:

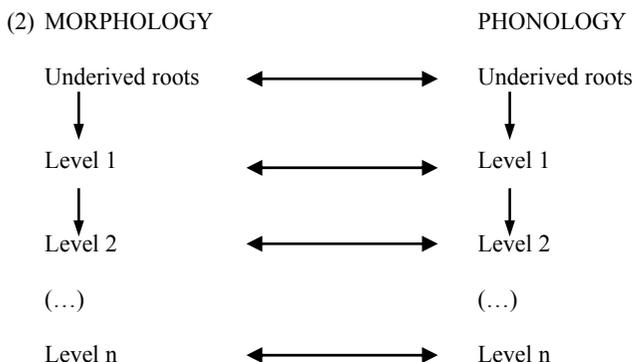
(1) misti/k/-o 'mystic'	a. misti/θ/-ismo mystic-ism	b. misti/k/-ísimo mystic-SUPERL
clási/k/-a 'classic'	clasi/θ/-ismo classic-ism	clasi/k/-ísimo classic-SUPERL
opa/k/-o 'opaque'	opa/θ/-idad opac-ity	opa/k/-ísimo opaque-SUPERL
decen/t/-e 'decent'	decen/θ/-ia decent-cy	decen/t/-ísimo, decen/t/-illo decent-superl., decent-DIM
poten/t/-e 'powerful'	poten/θ/-ia powerful-ness	poten/t/-ísimo, poten/t/-illo powerful-superl., powerful-DIM

Such differences in the application of phonological rules have been interpreted by Lexical Phonology as evidence that morphemes are organized in different levels or strata in the lexicon, and that phonological rules/processes are set to operate in different levels or strata. Namely, if a morpheme undergoes or causes a phonological process in a certain phonological context, and if another morpheme with the same phonological context does not undergo or cause the same process, lexical phonologists would assume that the two morphemes belong to different levels or strata (cf. Kiparsky 1982, 1985, Mohanan 1982, 1986, Halle and Mohanan 1985, Hargus and Kaisse 1993, Hanson and Inkelas 2009, among others). Phonological rules are specified to apply at level/stratum 1, 2, 3...*n*, the same way that morphemes are attached at levels or strata 1, 2, 3...*n*, and

thus phonological rules operating at level 1, for instance, will only apply to morphemes attached at that level; phonological rules operating at level 2 will only apply to morphemes attached at level 2, and so on. There are two competing views on the interaction between morphology and phonology: the interactionist position claims that phonology and morphology go in tandem in each level, cyclically (cf. Mascaró 1976, Pesetsky 1979, Kiparsky 1982, 1985, Booij and Lieber 1993, among others), and the non-interactionist view claims that phonology only operates after all morphology has taken place (cf. Chomsky and Halle 1968, Halle and Mohanan 1985, Halle and Vergnaud 1987, Halle, Harris and Vergnaud 1991, among others). In an interactionist model, morphological bracketing indicating the morphological composition of an earlier level may not be available to the next level (i.e. bracket erasure), and in the non-interactionist model all morphological bracketing needs to be available when the phonology applies, since phonological rules are specified to apply at different levels.

According to the interactionist view of Lexical Phonology, the derivation would proceed as follows: first, there would be the underived roots, on which certain structure-building operations apply (such as syllable structure or stress assignment); then, the resulting form is sent to Level 1 morphology and phonology, so that morphemes belonging to that level are added and the phonological operations specified at that level apply on the new structures created; then, the resulting form goes to Level 2 morphology and phonology, where morphemes of that level are added and the phonological rules specified for that level apply; and so on. The basic schema can be illustrated as in (2):⁶

⁶ It is still a matter of debate in Generative Linguistics whether word-formation takes place fully in the lexicon or fully in syntax, or whether morphology is split between derivational/compounding morphology and inflectional morphology, in the sense that the former takes place in the lexicon and the latter takes place in syntax or after syntax. For references, see Halle (1973), Aronoff (1976), DiSciullo and Williams (1987), Baker (1988), Hale and Keyser (1993), Halle and Marantz (1993), Noyer (1997), Embick and Noyer (2007), among others, and chapters 2 and 3 in this volume.



According to this view, most lexical phonological rules are cyclic (cf. the Strict Cycle Condition of Mascaró 1976), although there have been proposals that lexical rules can be noncyclic as well, especially those applying in the last morphological level of the word (i.e. the so called word-level, cf. Booij and Rubach 1987, Borowsky 1993).

In Lexical Phonology, the application and underapplication/non-application of interdentalization in Spanish would be explained by assigning this phonological rule to the level or stratum in morphology where affixes such as *-ismo*, *-idad* and *-ia* are attached to the roots. If these morphemes were attached at, say, Level/Stratum 1, interdentalization would apply to these suffixes because it is specified to apply at this level, and only at this level. The underapplication or non-application of the process to the superlative and diminutive suffixes would be accounted for if these suffixes belonged to Level/Stratum 2 in morphology. The phonological rule of interdentalization would not apply to any morpheme in this level (cf. García-Bellido 1987 as well).⁷

⁷ The caveat of so-called “bracketing paradoxes” is in order here. In English, the word *unhappier* has the morphological bracketing [[un-happy]-er], as it can be paraphrased as ‘more unhappy’, rather than ‘not happier’, but the comparative suffix *-er* attaches to bisyllabic stems only, so it should attach to *happy* and not to *unhappy*. Another example is *ungrammaticality*, where *un-* must be assumed to attach first to *grammatical*, as the meaning is ‘the property of not being grammatical’, but the lexical morphology and phonology of English suggest that *-ity* is a Level 1 affix and *un-* is a Level 2 affix. There have been alternative approaches to bracketing paradoxes, including Williams (1981), Selkirk (1982), Pesetsky (1985), Spencer (1988), Sproat (1988) and Beard (1991), among others. Limits of space prevent me from discussing these here, and the reader is referred to the sources.

Lexical Phonology received contemporary resistance as well, as there were attempts to reinterpret affix classes in representational terms, by positing affixation to either roots or words (instead of Class I and Class II affixes, cf. Selkirk 1984) or by advocating the presence of prosodic constituents below the word level (cf. Inkelas 1990; see next section for a review of Prosodic Phonology at the word level). On the other hand, the existence of levels/strata and cyclicity imply the notion of derivation from an underlying representation to a surface representation going through cycles, hence the possibility of having intermediate levels of representation. The advent of Optimality Theory in the 90s brought the rejection of derivations and cycles. However, recent versions of OT acknowledge the impossibility of abandoning cycles and strata from phonology altogether, and some serial or derivational relationship between strata is assumed. For instance, in Bermúdez-Otero's (2011, 2012, 2013) Stratal OT framework three strata are distinguished: stem-level, word-level and phrase-level, giving rise to at least three cycles.

Finally, there have been recent proposals to rethink levels and strata based on the Phase Theory of syntactic derivations (Chomsky 2001). Marantz (2007), Embick and Marantz (2008) and Embick (2010) claim that the category-assigning heads *n*, *v* and *a* are phases that are spelled out, and hence any new addition of a categorial head constitutes a phase. Thus, there can be inner and outer phases, resembling the cycles or levels of Lexical Phonology, where allomorphy operates (see also Pak 2008: ch. 6). Marvin (2002) and DiSciullo (2004, 2005) call these “morphological phases”, and in this line of thinking, Samuels (2009, 2011, 2012) named this model “Phonological Derivation by Phase”. This is certainly an interesting and promising line of research that deserves to be explored further, as it relates cyclicity and morphophonology to the general functioning of grammar, in terms of phases and cyclic spell-out. The reader is referred to the mentioned sources and to chapter 3 (this volume) for discussion.

Let us now turn our attention to aspects of phonological words having to do with their formation. First, I will briefly review conditions on phonological or prosodic word formation, such as minimum-size constraints. Then I will deal with the mapping from morphosyntax to phonology, concretely with the delimitation of prosodic words. Both aspects of phonological/prosodic word formation are areas of study of the subpart of phonology known as Prosodic Phonology.

4. Prosodic Word formation

Prosodic Phonology is the part of phonology having to do with suprasegmental phenomena and phonological constituency above the segment, from the Mora to the Utterance. Prosodic Phonology is also the subarea of phonology that deals with the formation or derivation of prosodic constituents from morphosyntactic constituency following certain principles or conditions, such as alignment with the edges of morphosyntactic constituents (roots, prefixes, words, phrases, clauses, sentences). These prosodic constituents are the Phonological or Prosodic Word, the Phonological Phrase, the Intonational Phrase, and the Utterance (Nespor and Vogel 1986; Selkirk 1986; Itô and Mester 2009; Vigário 2010, among others). I will address the issue of the alignment of morphosyntactic and prosodic constituents in subsection 4.2, focusing on the Prosodic Word. But first let us briefly review some well-formedness conditions imposed on prosodic words.

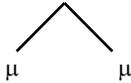
4.1. Conditions on Prosodic Words

First of all, there is an apparently universal condition on word stress, namely that a prosodic word can only have a maximum of one primary stress. Notice that this condition is not equivalent to stating that a prosodic word can only have one syllable that is stressed, since there are many languages in which words can have one or more syllables bearing secondary stress, apart from the syllable with primary stress. The observation is that the maximum number of primary stresses a word can have is one. Notice that this constraint should not also be taken as a minimum requirement on the number of stressed syllables in a prosodic word, i.e. as a condition stating that prosodic words must have at least one (primarily) stressed syllable, as there are languages where words are lexically unaccented (e.g. (Tokyo) Japanese and (Northern Bizkaian) Basque).

Another widespread (although not universal) condition that prosodic words need to fulfill is minimum size. In many languages, a prosodic word needs to be minimally bisyllabic or bimoraic, that is, it needs to contain at least two syllables or two moras (cf. McCarthy and Prince 1986, 1990, 1993, Nespor and Vogel 1986, among others). Whether the restriction is imposed on syllables or moras is language-dependent (cf. Kenstowicz 1994: 640-646, Hayes 1995: 87-88, Downing 2006). Such restrictions are usually imposed on content or lexical words (nouns, adjectives, verbs, adverbs) but not on function words (e.g. prepositions, determiners,

pronouns). The minimum size condition could be represented schematically as in (3):

- (3) Minimal word
 a. Bisyllabic $(\sigma.\sigma)_w$
 b. Bimoraic $(\sigma)_w = (C)VV, (C)VC$



In Spanish, for instance, lexical words must be minimally of the form (C)VX, where X can be C or V in a diphthong: *pan* ‘bread’, *sol* ‘sun’, *luz* ‘light’, *ser* ‘be’, *ley* ‘law’, *pie* ‘foot’, etc. CV lexical words are normally disallowed, with the exception of certain borrowings like *té* ‘tea’, and certain conjugated forms of verbs with the shape CVC in the infinitive, e.g. *ser* : *sé* ‘be, imperative’, *ir* : *va* ‘go, 3rd sg. pres.’, *dar* : *dé* ‘give, 1st/3rd sg. pres. subj.’.⁸ On the other hand, function words can be monosyllabic with the shape (C)V: *a* ‘to’, *de* ‘of’, *mi* ‘my’, *la* ‘the, fem.’, *que* ‘that’, etc.

McCarthy and Prince (1986) argued that the minimum size constraints for words arise from the fact that words contain feet, and normally feet do obey minimal size constraints, in the sense that they have to be minimally bimoraic or bisyllabic. Thus, word minimality, stated as a constraint calling for a minimally binary structure, stems from foot minimality conditions, demanding such minimally binary structure. For different languages, see Fitzpatrick-Cole (1990), Cabré (1993), Kenstowicz (1994), Leben and Ahoua (1997), Hall (1999b), Downing (1999) and Parker (1999), among many others. In fact, Hayes (1995) claims that word minimality constraints should really be understood as language-specific constraints on degenerate feet, composed of only one mora or one syllable. Namely, if a language shows minimal size restrictions on words it is because it does not allow degenerate feet; and conversely, if a language permits monosyllabic CV words (i.e. monomoraic and monosyllabic), it must be because the language does not ban degenerate feet. However, more recent work (cf. Garrett 1999, Gordon 1999, Downing 2006) shows that word minimality does not arise from foot size restrictions: there are languages which permit degenerate feet but impose minimum size

⁸ The verb *haber* ‘have’ has CV forms in the present indicative (*he* ‘1st sg.’, *ha* ‘3rd sg.’). However, this verb is not used nowadays as a lexical verb but as an auxiliary verb used to convey perfective aspect. On the other hand, the musical notes *do*, *re*, *mi*, *fa*, *la*, *si* also have the shape CV, but these can hardly be considered lexical words, in the sense that they do not denote objects, concepts or events.

restrictions on phonological words (e.g. Cahuilla); languages demanding minimally disyllabic words have moraic feet rather than syllabic feet (e.g. Carib, Hixkaryana); monosyllables with the shape CVC are accepted as minimal words in some languages where only CVV syllables count as heavy (e.g. Malayalam, Lardil); unbounded stress languages, which offer no evidence for foot structure, may also show word minimality conditions. The reader is referred to Garrett (1999) and Downing (2006: ch. 3) for alternative accounts of word minimality. Finally, it is important to remember that many languages allow words to be composed of a single CV syllable, that is, that word minimality is by no means a universal or dominant constraint on the world's languages.

4.2. Correspondence of morphosyntactic terminal nodes and prosodic words

4.2.1. The level of the Prosodic Word in Prosodic Phonology

Lexical items (nouns, adjectives, verbs, adverbs) are terminal nodes in syntax. Under the assumption of Generative Grammar that there is a mapping between syntactic structure and prosodic structure, the null theory should be to presume that the most transparent mapping between the two structures would be one in which each non-empty syntactic terminal node corresponded to a phonological or prosodic word. Hence:

$$(4) \quad X^0 \Rightarrow \omega$$

This straightforward relationship is illustrated in the example from Spanish in (5), where each of the syntactic heads or terminal nodes constitutes a prosodic word:

(5)	C^0	D^0	N^0	V^0	P^0	N^0	
	<i>que</i>	<i>la</i>	<i>mujer</i>	<i>volvió</i>	<i>a</i>	<i>Bilbao</i>	⇒
	that	the	woman	returned	to	Bilbao	

$$(que)_\omega (la)_\omega (mujer)_\omega (volvió)_\omega (a)_\omega (Bilbao)_\omega$$

However, things are not so simple in the correspondence between syntactic heads and prosodic words. There are mismatches which blur such a direct mapping, and I will present some of them in what follows.

Crosslinguistically, it is very common for function words (determiners, pronouns, complementizers, prepositions, conjunctions) not to carry stress.

These syntactic heads do not constitute independent prosodic words, and lean on adjacent lexical heads to form prosodic words. Such function words are called “clitics”, and the prosodic leaning or attachment is called “cliticization”. In the case of (5) above, then, the mapping into prosodic words would be as in (6), where the complementizer *que*, the determiner *la*, and the preposition *a* cliticize onto the lexical words to their right:⁹

(6)	C^0	D^0	N^0	V^0	P^0	N^0	
	<i>que</i>	<i>la</i>	<i>mujer</i>	<i>volvió</i>	<i>a</i>	<i>Bilbao</i>	⇒
	that	the	woman	returned	to	Bilbao	

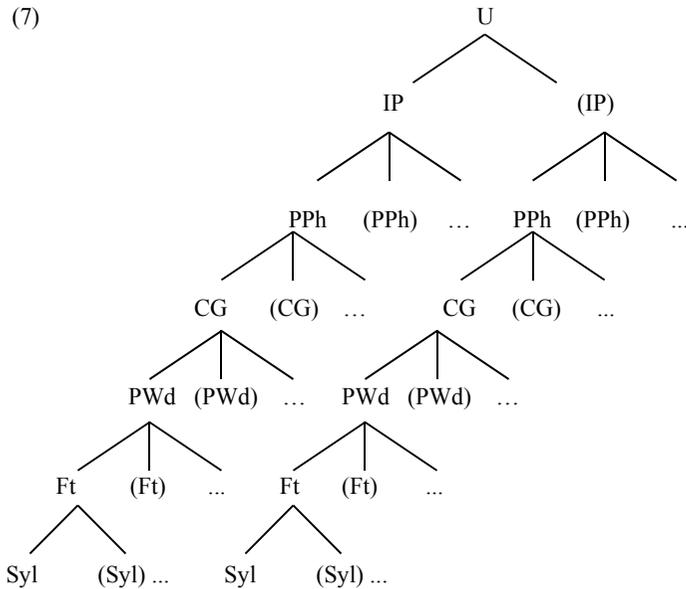
(que la mujer)_ω (volvió)_ω (a Bilbao)_ω

In the eighties there arose two models of the interface between syntactic structure and prosodic structure: the Relation-Based Approach (RBA) (Nespor and Vogel 1982, 1986, Hayes 1984/1989) and the End-Based Approach (EBA) (Selkirk 1980, 1986, 1996, Chen 1987, Selkirk and Tateishi 1988, 1991, Selkirk and Shen 1990, *inter alia*). I reproduce here parts of the review of these theories in Elordieta (2008).

The structure in (7) would be a schematic prosodic tree, according to the RBA. Notice that at each level there may be more than one constituent, symbolized by the parentheses. (The following abbreviations are used: U = Utterance; IP = Intonational Phrase; PPh = Phonological Phrase; CG = Clitic Group; PWD = Prosodic Word; Ft = Foot; Syl = Syllable).

⁹ A question worth considering is whether the cliticization of *que* and *la* onto the head noun *mujer* takes place in one swoop for both function words or iteratively, i.e. *la* attaches to *mujer*, creating a prosodic word, and *que* attaches to this prosodic word. For a discussion on European Portuguese, cf. Vigário (2003, chapters 5-6).

(7)



In this model, functional elements such as determiners, auxiliaries, possessive pronouns, and conjunctions are included in phonological words, clitic groups or phonological phrases with adjacent heads. That is, these elements may be either independent phonological words, which combine with other words to form phonological phrases, they may be clitics which attach to phonological words to create clitic groups, or they may be affixes which combine with a stem to form a phonological word. This is the typology of phonological patterns of so-called *function words*. For the sake of discussion, let us present the algorithms for the creation of phonological words and clitic groups that Nespor and Vogel propose:

(8) ω domain (ω = phonological word)

A. The domain of ω is Q (Q = terminal element of a syntactic tree)

or

B.I. The domain of ω consists of

a. a stem;

b. any element identified by specific phonological and/or morphological criteria

c. any element marked with the diacritic [+W].

II. Any unattached elements within Q form part of the adjacent ω

closest to the stem; if no such ω exists, they form a ω on their own.

Phonological words may thus be equal to or smaller than the terminal element in a syntactic tree (i.e. Q), as expressed by A and B in (8), respectively. Possibility A refers to phonological words which are composed of the stem and all affixes, or by the two members of a compound together (e.g. Greek, Latin; cf. Nespors and Vogel 1986: 110-116, Nespors and Ralli 1996). Possibility B_{1a} is exemplified by those cases in which only a stem plus affixes counts as a phonological word, that is, with each member of a compound word forming its own phonological word (e.g. Sanskrit, Turkish, Italian; cf. Nespors and Vogel 1986: 117-122, Nespors and Ralli 1996).¹⁰ Both possibilities can coexist in the same language, although one option is always the least favored one (Nespors and Ralli 1996, Peperkamp 1997).

Part B_{1b} of possibility B refers to the distinctions that some languages show between prefixes and suffixes in terms of phonological word formation. In Hungarian and Italian prefixes are specified to form independent phonological words, as opposed to suffixes, which combine with the stem to form one phonological word (cf. Nespors and Vogel 1986: 122-134). Thus, there are affixes which form phonological words on their own by virtue of satisfying minimal prosodic size requirements such as bisyllabicity (e.g. Yidin; cf. Nespors and Vogel 1986: 134-136). Part B_{1c} refers to affixes which are idiosyncratically specified to form independent words, as in Dutch (cf. Nespors and Vogel 1986: 136-140), hence the diacritic [+W].

Part II of possibility B responds to the necessity of obeying the Strict Layer Hypothesis (cf. Selkirk 1981, 1984, 1986, Nespors and Vogel 1986), which says that every level of prosodic constituency must exhaustively parse the entire segmental string. That is, every segment must be part of a phonological word, a phonological phrase, an intonational phrase, and an utterance. By this condition, elements that do not qualify as stems, such as conjunctions, complementizers and clitics, also form a ω , either by attaching to a ω within Q or by themselves.

The End-Based Approach (EBA) has been the model that has been followed by most researchers in the area of the syntax-phonology interface. Selkirk's (1986) original proposal is that the edges of phrases and heads are mapped onto prosodic structure as edges of prosodic constituents. This simple algorithm is part of Universal Grammar, and it is a directional parameter, so that in some languages prosodic edges are

¹⁰ Reiss (2003) offers a reanalysis of vowel harmony in Hungarian that renders superfluous the need to assume that each member of a compound constitutes an independent prosodic word, as traditionally argued in the literature. It could be that other cases could be reanalyzed the same way.

inserted at the left edges of XPs or X^0 s, and in other languages they are inserted at the right edges of these constituents. The parameter is represented in (9):

- (9) a. Left alignment: $[X^0 \Rightarrow \omega[$
 b. Right alignment: $X^0] \Rightarrow]\omega$

A crucial axiom in the EBA is the Principle of Invisibility of Functional Categories (Selkirk 1984), which states that functional categories (determiners, unstressed pronouns, complementizers, prepositions, conjunctions) do not project edges of prosodic constituents, unlike lexical categories (nouns, verbs, adjectives, adverbs). The following example from Shanghai Chinese (cf. Selkirk and Shen 1990) illustrates this principle. Prosodic word boundaries are inserted at the left edge of lexical X^0 s, as proven by the fact that pronouns, auxiliaries, prepositions, quantifiers and classifiers do not project prosodic edges and are hence included in one prosodic word with the lexical heads on their left. Syntactic structure is represented in square brackets on the left, above the words, and prosodic structure is represented on the right, in round brackets:

- (10) a. $V [Pro Part.] \Rightarrow (V Pro Part.)$
taN 'noN leq
 hit you part.
 '(s)he has hit you'
- b. $V [N Part.] \Rightarrow (V) (N Part.)$
taN 'mo leq
 hit horse part
 '(s)he has hit the horse'
- (11) a. $V [P [N]_{SN}]_{SP} \Rightarrow (V P) (N)$
'z 'laq 'zawNhe
 live in Shanghai
 'live in Shanghai'
- b. $V [Q Classif. N]_{NP} \Rightarrow (V Q Class.) (N)$
taw ?iq pe 'zo
 pour a cup tea
 'pour a cup of tea'

Recently, Selkirk (2011) has argued that prosodic domains are not created simply by a parametric choice of left or right edges of X^0 s or XPs, but by a default mapping mechanism that matches X^0 s or XPs (including clauses) with prosodic words and phonological phrases, wrapping both left and right edges of these constituents (hence generalizing Truckenbrodt's

1995, 1999 Wrap-XP constraint). This is the Match Theory of the syntax-phonology interface, which would be based on principles like: (a) Match Clause (a clause in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ι , in phonological representation); (b) Match Phrase (a phrase in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it φ , in phonological representation); (c) Match Word (a word in syntactic constituent structure must be matched by a corresponding prosodic constituent, call it ω , in phonological representation). Phonological markedness constraints (such as prosodic weight or binarity considerations, rhythm) interplay with these general algorithms, and can impose deviations from the most transparent match between syntactic and prosodic constituency. Selkirk (2011) shows the advantages of Match Theory over the EBA, hence opening a promising new line of investigation that should be bound to produce interesting results.

However, work within this framework has only focused on the match between syntactic and phonological phrases (Match Phrase), not on the match between syntactic and prosodic words, although research is expected to be carried out on this end as well. For the purposes of this chapter, then, I will proceed with a review of a sample of the most representative research on the prosody of words within the EBA. Selkirk (2011) suggests that many of the assumptions of most recent work within the EBA, such as recursivity of prosodic structure or the prosodic dependency of functions words (to be discussed below), are also to be adopted by Match Theory for the word level.

4.2.2. The prosody of function words (clitics)

The EBA, applied in a simple manner, would not distinguish between affixes and unstressed functional syntactic heads, as both would be integrated in prosodic words together with adjacent lexical heads. Selkirk (1995) provides a representation of the different prosodic relationships between lexical heads and function words. She assumes that recursivity is allowed in prosodic structure (i.e. that a prosodic constituent of type p may dominate another node of type p), and a principle formerly known as Exhaustivity (i.e. that a prosodic constituent p must exhaustively dominate prosodic constituents of the immediately inferior level, $p-1$). According to Selkirk (1995), function words may: (a) integrate almost as affixes with an adjacent lexical head, in a prosodic word; (b) adjoin to the prosodic word that an adjacent lexical word constitutes (violating recursivity); (c) attach directly to the prosodic constituent higher than the Prosodic Word, attach

directly to the Phonological Phrase, the prosodic constituent higher than the Prosodic Word (violating Exhaustivity),¹¹ or (d) constitute independent prosodic words, if focalized or pronounced in isolation. Thus, possibility (a) would represent a parallelism or similarity between function words and affixes. Possibility (b) would correspond to a cliticization of function words to the level of the Prosodic Word. Possibility (c) would amount to a cliticization to the level of the Phonological Phrase. Finally, possibility (d) would constitute a case of non-affixation and non-cliticization of function words. Selkirk (1995) coins the following terms for the function words integrated with lexical words in these four ways: (a) internal clitics, (b) affixal clitics, (c) free clitics, and (d) prosodic words, respectively.

The four types of prosodizations of function words are represented schematically in (12a-d), where the function word precedes the lexical word. The function words in contexts (12a-c) have received the name “proclitics” in the literature. A function word that is focalized or pronounced in isolation will be stressed (will receive a pitch accent), and will hence be projected as a prosodic word (12d). The symbol ω stands for a prosodic word, ϕ stands for a phonological phrase, and σ stands for the syllables that the function words and lexical words are composed of (for the sake of simplicity, I assign one syllable to function words, as they are most commonly monosyllabic, and one or more syllables to lexical words, as they are most commonly polysyllabic). “Fnc” and “Lex” stand for function word and lexical word, respectively. (12’a-d) presents bracketed representations of the different prosodic structures in (12a-d). The schemes in (12) and (12’) are adapted from Selkirk (1995), with the omission of the Foot level.

¹¹ This possibility is rejected by Itô and Mester (2009) in favor of adjunction to the Prosodic Word. Other scholars have proposed prosodic analyses with attachment of function words to the Phonological Phrase (cf. Hall 1999b or Kabak and Schiering 2006, for German).