

# The Prosodic Word in European Portuguese



# Interface Explorations 6

*Editors*

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*by*

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*To all the impossible things  
that make us dream and do  
and be amazed  
when they ~~do not~~ come true*

*A Luma*



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# Abbreviations and symbols

#: morphological word boundary  
.(dot): syllable division  
+: morpheme boundary  
1/2/3Pl: 1<sup>st</sup>/2<sup>nd</sup>/3<sup>rd</sup> person plural  
1/2/3Sg: 1<sup>st</sup>/2<sup>nd</sup>/3<sup>rd</sup>/person singular  
A: adjective  
ACC: accusative pronominal clitic  
ADV: adverb  
ART: definite article  
AUG: augmentative suffix  
CG: clitic group  
CL: clitic  
COND: conditional  
DAT: dative pronominal clitic  
DIM: diminutive suffix  
EP: European Portuguese  
FEM: feminine  
FUT: future  
I: intonational phrase  
IMP: indicative past imperfect  
IMPS: impersonal pronominal clitic  
INF: infinitive  
Lex: lexical syntactic head  
MASC: masculine  
N: noun  
NP: nominal phrase  
PAST: indicative past perfect  
PB: Brazilian Portuguese  
PL: plural  
PN: person/number suffix  
PP: prepositional phrase  
PRES: indicative present  
REF: reflexive pronominal clitic  
SD: syllable degemination  
SG: singular

SLH: Strict Layer Hypothesis

SUBJ IMP: subjunctive imperfect

SUBJ: subjunctive present

T\*: pitch accent

TMA: tense/mood/aspect suffix

TV: theme vowel

U: utterance

V: verb

V1: first vowel

V2: second vowel

VP: verbal phrase

VR: vowel reduction

W1: first word

W2: second word

<sup>x</sup>: used in acceptability judgments, denotes a very marked almost impossible realization

Σ: foot

φ: phonological phrase

σ: syllable

ω: prosodic word



# **Chapter 1**

## **Theoretical background**

### **1. Introduction**

This book investigates the prosodic word in European Portuguese (EP). The account of the phonology of various types of words developed here is couched within the Prosodic Phonology framework (e.g. Selkirk 1984; Nespor and Vogel 1986; Hayes 1989). It crucially presupposes, in addition, that the grammar is composed of two distinct levels – the lexical and the postlexical level – as also assumed, in particular, in the Lexical Phonology framework (Kiparsky 1982, 1985; Mohanan 1986; Booij and Rubach 1987; Booij 1994, among others).

In this chapter we present the basic claims of prosodic theory (section 2), as well as the general assumptions concerning the organization of grammar assumed in this book (section 3). We review, furthermore, some of the most relevant proposals found in the literature on the issues investigated in this work (sections 4 to 7). We conclude the chapter with an overview of the book.

### **2. Prosodic Phonology: basic claims**

Among the fundamental pioneering work on prosodic phonology are Selkirk (1980, 1984, 1986), Nespor and Vogel (1982, 1983, 1986), and Hayes (1989). In the next paragraphs we survey some of the basic tenets of the theory, following in particular the view presented in Nespor and Vogel's work.

The issues more specifically related to the prosodic word domain – the constituent studied in this book – are the subject matter of sections 4 to 7. It is only then that we review systematically a small part of the impressive amount of research in prosodic phonology that has followed the early works cited in the preceding paragraph.

Whenever possible, we enrich the selected exemplification with data extracted from investigations already conducted on the prosodic phonology of EP.

## 2 Theoretical background

§1. Prosodic phonology is primarily a *theory of prosodic structure* – a structure built with reference to morphosyntactic structures, but distinct from them – which is taken to define the domain of pure phonological phenomena.<sup>1</sup>

The view that phonological processes refer to phonological constituents, rather than to constituents morphosyntactically defined, emerges from the observation that pure phonological rules systematically fail to see certain information that is present in morphosyntactic representations: for example, they do not refer to category labels, such as N, V or A, and they are not sensitive to empty syntactic elements. In addition, pure phonological rules apply within domains that do not always coincide with the domains defined by syntax or morphology (see also paragraph 7 below).

§2. *Prosodic hierarchy is assumed to be universal*, and to include the constituents listed in (1).<sup>2</sup> Thus, in all languages of the world it is expected that each of these phonological constituents – and only these – play some role in the phonology of the language.<sup>3</sup>

- (1) Utterance (U)
- Intonational Phrase (I)
- Phonological Phrase ( $\phi$ )
- Prosodic Word ( $\omega$ )
- Foot ( $\Sigma$ )
- Syllable ( $\sigma$ )

In addition to this set of prosodic constituents, Hayes (1989) proposes the existence of another domain, located between the prosodic (or phonological) word and the phonological phrase – the clitic group (CG). This proposal has been adopted in Nespor and Vogel (1986) and in much subsequent work. However, more recent investigation has brought up a number of arguments against the clitic group as a prosodic domain, which we review in section 4.<sup>4</sup>

Although prosodic hierarchy is claimed to be universal, it is often observed that some prosodic domains seem to be absent in some languages. Nevertheless, as pointed out in Nespor and Vogel (1986: 11–12), the lack of rules referring to a particular prosodic domain in a given language does not necessarily mean that that prosodic domain does not play a role in the phonology of the language.

A good example of such a case is provided by the phonological phrase in European Portuguese (EP): while no sandhi phenomena have been found

so far to apply with reference to this prosodic domain, thus suggesting the absence of the  $\phi$ -domain in this language, there are other (more subtle) phonological phenomena that show the relevance of this constituent in EP phonology. These phenomena include, (i) stress clash resolution processes – which reflect  $\phi$ -level prominence relations, and hence the phonological phrase domain (cf. Frota 2000: chap.3); (ii) pitch accent distribution – since pitch accents in EP are primarily assigned to the head of a  $\phi$ -phrase (cf. Frota 2000: 4.2.2; Vigário 1998a); (iii) register shift – for register shift only occurs across  $\phi$ s, but not within  $\phi$ s (cf. Vigário 1997a, 1997b, 1998a: 6.2.3.4); and (iv) phonological weight requirements on certain syntactic constructions – since, for example, the I-phrase that includes the clause from which a topicalized phrase is extracted requires a heavy head, that is, a  $\phi$  that either bears focus or is branching (cf. Frota and Vigário 1996, 2002; Vigário and Frota 1998).<sup>5</sup>

§3. The constituents in (1) are arranged in a hierarchy argued to satisfy the *Strict Layer Hypothesis* (Selkirk 1984), formulated in Nespor and Vogel (1986: 7) in the following terms:<sup>6</sup>

(2) Strict Layer Hypothesis (SLH)

- i. A given nonterminal unit of the prosodic hierarchy,  $X^p$ , is composed of one or more units of the immediately lower category  $X^{p-1}$ .
- ii. A unit of a given level of the hierarchy is exhaustively contained in the superordinate unit of which it is a part.
- iii. The hierarchical structures of prosodic phonology are n-ary branching.
- iv. The relative prominence relation defined for sister nodes is such that one node is assigned the value strong (s) and all other nodes are assigned the value weak (w).

In recent years, a number of studies have shown the need of relaxing some aspects of the Strict Layer Hypothesis. In fact, in order to account for certain phonological phenomena it has been pointed out that it is necessary to allow, for example, for adjunction and compound structures and such prosodic configurations induce SLH violations (e.g. Ladd 1992; Selkirk 1996; Booij 1996a; Peperkamp 1997a – see also section 5).<sup>7</sup>

#### 4 Theoretical background

§4. There is *no single definition for each prosodic domain*, first of all because the information included in the algorithms of construction of prosodic domains varies to a certain extent across languages. In order to illustrate the type of information required in the syntax-phonology mapping, we present below the definitions of the higher level prosodic domains: the U-domain, as proposed by Nespor and Vogel (1986), and the  $\phi$  and I-domains, as proposed for EP in Frota (2000) (the prosodic word will be dealt with in section 6).

The utterance, the highest constituent of the prosodic hierarchy, is defined in Nespor and Vogel (1986: 222) as a prosodic constituent formed by one or more intonational phrases which includes all the constituents dominated by the highest syntactic node (see 3).

##### (3) Phonological Utterance

- a. U domain: the domain of U consists of all the Is corresponding to  $X^n$  in the syntactic tree.
- b. U construction: Join into an n-ary branching U all Is included in a string delimited by the definition of the domain of U.

Examples of phonological utterances, based on Nespor and Vogel (1986: 8.1), are provided in (4).

- (4)
- a. *My cousin collects snakes. Gertrude prefers butterflies.*  
[[My cousin collects snakes]<sub>I</sub>]<sub>U</sub> [[Gertrude prefers butterflies]<sub>I</sub>]<sub>U</sub>
  - b. *Our next door neighbor, Mr. Jones, bought an ocelot last week.*  
[[Our next door neighbor]<sub>I</sub> [Mr. Jones]<sub>I</sub> [bought an ocelot last week]<sub>I</sub>]<sub>U</sub>

The intonational phrase in EP is defined in Frota (2000: 365) as in (5), which is adapted from Nespor and Vogel's (1986) proposal on the I-domain formation.

##### (5) Intonational Phrase (I) Formation (EP)

- a. I-domain: the domain of I-formation may consist of
  - i. all the  $\phi$ s in a string that is not structurally attached to the sentence tree,
  - or ii. any remaining sequence of adjacent  $\phi$ s in a root sentence.
- b. I-construction: the constituents included in an I must bear a head/complement relation.

Frota includes in a separate condition, stated in (6), a weight requirement to which EP intonational phrases are subject.

- (6) Weight conditions on Is (EP): long phrases tend to be divided; balanced phrases, or the longest phrase in the rightmost position, are preferred.

Illustrative examples of different types of intonational phrases are provided in (7) (from Frota 2000).

- (7) a. [As alunas]<sub>I</sub> [até onde sabemos]<sub>I</sub> [obtiveram boas avaliações]<sub>I</sub>  
 'The students, as far as we know, have got good marks.'  
 b. [O nível actual da inflação]<sub>I</sub> [é um indicador económico positivo]<sub>I</sub>  
 'The present level of inflation is a good economic index.'

The phonological phrase, in turn, is defined as in (8) (Frota 2000: 365, adapted from Nespor and Vogel 1986 and Hayes 1989).<sup>8</sup>

- (8) Phonological Phrase ( $\phi$ ) Formation (EP)

- a.  $\phi$ -domain: The domain of  $\phi$ -formation is defined by the configuration [ ... Lex XP ... ]<sub>Lex<sup>max</sup></sub>;  
 b.  $\phi$ -construction: Elements around Lex are organized into  $\phi$ s so that  
 i. all elements on the non-recursive side of Lex which are still within Lex<sup>max</sup> are contained in the same  $\phi$  with Lex;  
 ii. a  $\phi$  may optionally contain (i) and a following phrase in the domain of (a).

$\phi$ -formation is also claimed to be subject to a (minimality) condition, which is stated in (9).<sup>9</sup>

- (9) Branchingness (or weight) condition on  $\phi$ s (EP): a  $\phi$  should contain more material than one prosodic word.

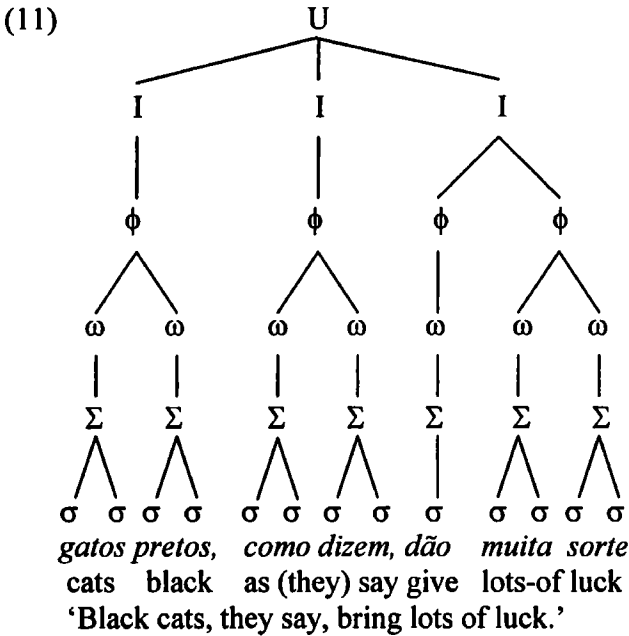
$\phi$ -phrasing is illustrated in (10) (adapted from Frota 2000).<sup>10</sup>

- (10) a. [O bailarino] <sub>$\phi$</sub>  [anda sempre] <sub>$\phi$</sub>  [de limusine preta] <sub>$\phi$</sub>   
 'The dancer always drives a black limousine.'

6 Theoretical background

- b. [As americanas]<sub>φ</sub> [ofereceram]<sub>φ</sub> [a enciclopédia]<sub>φ</sub> [ao jornalista]<sub>φ</sub>  
 'The Americans gave the encyclopedia to the journalist.'

The complete tree in (11) further exemplifies how the elements in the segmental string of an EP sentence are grouped into prosodic domains.<sup>11</sup>



§5. Although the prosodic domains are taken to be *universal*, the information that is included in each domain construction may vary, since it is partially defined on a *language particular basis*.

Thus, for example, Vogel and Kenesi (1987, 1990) argue that focus information is included in the algorithm of the intonational phrase construction in Hungarian, and thus focus affects prosodic structure. In languages like EP, by contrast, focus information seems not to affect prosodic phrasing. This is empirically shown in Frota (2000), who claims that focus is not part of the syntactic information that plays a role in the mapping algorithms of this language.<sup>12</sup>

§6. As mentioned above, it is assumed that *different types of phonological phenomena* refer to prosodic hierarchy. These include not only segmental processes, but also durational, prominence, rhythmic and intonational

phenomena. Examples of each type of phenomenon that have been argued to occur within or at either edge of a prosodic domain are provided below.<sup>13</sup>

*Segmental processes* that have been shown to refer to prosodic constituents include *t*-flapping in North American English, which is bound by the utterance domain (e.g. Nespor and Vogel 1986); central vowel merger which is bound by the intonational phrase in EP (Frota 2000); *Raddoppiamento Sintattico* which is a prosodic word juncture rule that applies within the phonological phrase domain in Italian (Nespor and Vogel 1986); cluster reduction in Sanskrit which applies at the right edge of the phonological word (Selkirk 1980); *t*-aspiration in English which applies at the left-edge of a foot (e.g. Nespor and Vogel 1986; Selkirk 1996); and *l*-velarization in EP which applies at the right-edge of the syllable domain (e.g. Mateus and d'Andrade 2000).

Prosodic constituents such as the intonational phrase and the utterance constitute domains for *durational phenomena*, since these constituents are often reported to induce preboundary lengthening and their limits identify the locus for pause insertion (e.g. Nespor and Vogel 1986, and Cambier-Langeveld 1997, 2000 for Dutch, and Frota 2000 for EP).

Within prosodic phonology, all non-terminal prosodic constituents are assumed to have a single strong element – the head of the constituent – while all the sister nodes of the head are weak (Nespor and Vogel 1986). The prosodic constituents hence form domains for *prominence assignment*. In EP, like in other right-branching languages (cf. Nespor and Vogel 1986), the head of the  $\phi$ -domain is the rightmost daughter of  $\phi$ . The head of higher-level prosodic constituents is also rightmost (Frota 1997, 2000; Vigário 1998a).

The constituents of the prosodic hierarchy also define the domains of *secondary prominence assignment* and *rhythmic phenomena*. For example, according to Roca (1986), the left edge of the  $\phi$ -phrase defines the locus of occurrence of an optional initial stress in Spanish; Stress Retraction in Italian is claimed in Nespor and Vogel (1986, 1989) to apply between words that belong to the same  $\phi$ ; and, like in many other languages,  $\phi$ -level prominence seems to play a role in the definition of clashing sequences in EP (cf. Frota 1995, 2000: chap.3).

Finally, *intonational phenomena* refer to prosodic structure as well. For example, tune association in Bengali is shown in Hayes and Lahiri (1991) to be accomplished with reference to the prosodic hierarchy; and the same approach has been proposed for EP in Frota (1994a, 2000), Falé (1995) and Vigário (1998a).

From this brief illustration, it is clear that the prosodic hierarchy is more than a structure of domains for sandhi or juncture processes. We should notice, nevertheless, that it is still a matter of controversy whether the structure relevant for the different kinds of phonological phenomena is one and the same. For example, while Selkirk (1984: 30) proposes that the domains for segmental processes and for prominence relations coincide, and Hayes and Lahiri (1991) argue in favor of the existence of a single structure to account for segmental and tonal phenomena in Bengali, Gussenhoven and Rietvelt (1992) hold that durational and intonational phenomena in English refer to distinct prosodic hierarchies. In other cases, as in Pierrehumbert and Beckman (1988), the structure assumed to account for intonational phenomena is very similar to the prosodic hierarchy of Selkirk (1984) and Nespor and Vogel (1986), but it is not clear whether the two structures are in fact the same.

For EP, Frota (2000) has extensively shown that various phonological phenomena refer to the same prosodic structure: namely, sandhi phenomena, clash resolution, preboundary lengthening, pause insertion, and intonational phenomena.

§7. A basic claim of prosodic phonology is that the domains of pure phonological phenomena are *not necessarily isomorphic* to morphological or syntactic domains. A classical example of mismatch between the two structures is provided in (12) (from an original pair presented in Chomsky and Halle 1968, cited in Nespor and Vogel 1983, 1986, Hayes 1989, Dresher 1996, among many others).

(12) *Syntactic bracketing*

This is [<sub>NP</sub> the cat [<sub>S'</sub> that caught [<sub>NP</sub> the rat [<sub>S'</sub> that stole [<sub>NP</sub> the cheese]]]]]

*Prosodic bracketing (at the level of the intonational phrase)*

[This is the cat]<sub>I</sub> [that caught the rat]<sub>I</sub> [that stole the cheese]<sub>I</sub>

Mismatches between morphosyntactic structure and prosodic structure may result from the mapping algorithms that relate the two structures, as in the example above. An example of a mismatch at the level of the  $\phi$ -phrase in EP is further shown in (13): if a phonological phrase is defined as in (8), and is subject to the condition formulated in (9) above, it includes the head of a syntactic constituent and it may comprise a following syntactic phrase



within that constituent as well; thus, in a sentence as the one in (13), there is no syntactic constituent that coincides with the second  $\phi$ -phrase.

(13) *O João deu rosas à Maria.*

‘John gave roses to Mary.’

- |   |                      |
|---|----------------------|
| a. [[O João] <sub>NP</sub> [deu [rosas] <sub>NP</sub> [à Maria] <sub>PP</sub> ] <sub>VP</sub> ] | syntactic bracketing |
| b. [[O João] <sub>φ</sub> [deu rosas] <sub>φ</sub> [à Maria] <sub>φ</sub> ]                     | prosodic bracketing  |

Other possible sources of mismatches between morphosyntactic structures and phonological structures arise from the more flexible nature of the latter. For example, while the syntactic structure of the sentence in (14) is the one represented in (14a), the phonological structure assigned to it may vary depending on factors such as speech rate, or the length of the prosodic constituents (see 14b–d, from Nespor and Vogel 1983).

(14) *The frog ate a fly for lunch.*

- |  |                        |
|--|------------------------|
| a. [ [the frog] <sub>NP</sub> [ate [a fly] <sub>NP</sub> [for lunch] <sub>PP</sub> ] <sub>VP</sub> ] | syntactic bracketing   |
| b. [the frog] <sub>i</sub> [ate a fly] <sub>i</sub> [for lunch] <sub>i</sub>                         | } prosodic bracketings |
| c. [the frog] <sub>i</sub> [ate a fly for lunch] <sub>i</sub>  |                        |
| d. [the frog ate a fly for lunch] <sub>i</sub>   |                        |

An interesting consequence of the non-isomorphism between syntactic structures and prosodic structures is that a sentence may be non-ambiguous from a syntactic point of view, but ambiguous from a prosodic point of view, as the sentence in (15) (based on Nespor and Vogel 1986: 261–262).

(15) *Marco ha guardato la ragazza col canocchiale.*

‘Marco looked at the girl with the binoculars.’

Syntactic structure

[[Marco]<sub>NP</sub> [ha guardato [la ragazza]<sub>NP</sub> [col canocchiale]<sub>PP</sub>]<sub>VP</sub>]

‘Marco is holding the binoculars.’

[[Marco]<sub>NP</sub> [ha guardato [[la ragazza [col canocchiale]<sub>PP</sub>]<sub>NP</sub>]<sub>VP</sub>]

‘The girl is holding the binoculars.’

Prosodic structure (for both interpretations)

[[Marco]<sub>φ</sub> [ha guardato]<sub>φ</sub> [la ragazza]<sub>φ</sub> [col canocchiale]<sub>φ</sub>]<sub>i</sub>

§8. Ever since the early proposals on prosodic phonology, a clear distinction is made between *pure phonological processes* and *lexical processes* (e.g. Nespor and Vogel 1986: 2.1.1; Hayes 1990): the former apply auto-

matically, postlexically, and refer only to phonological information, including the prosodic domains; the latter apply within the lexicon and may refer to non-phonological information.

In addition, at a first moment it was thought that prosodic domains were built postlexically. Later research, however, in particular by Booij (1988), Inkelas (1990), and Booij and Lieber (1993), led to a refinement of the original idea, so that the constituents up to the word level are now usually assumed to be already present within the lexical component. These issues, which bear on the organization of grammar, are developed in the following section.

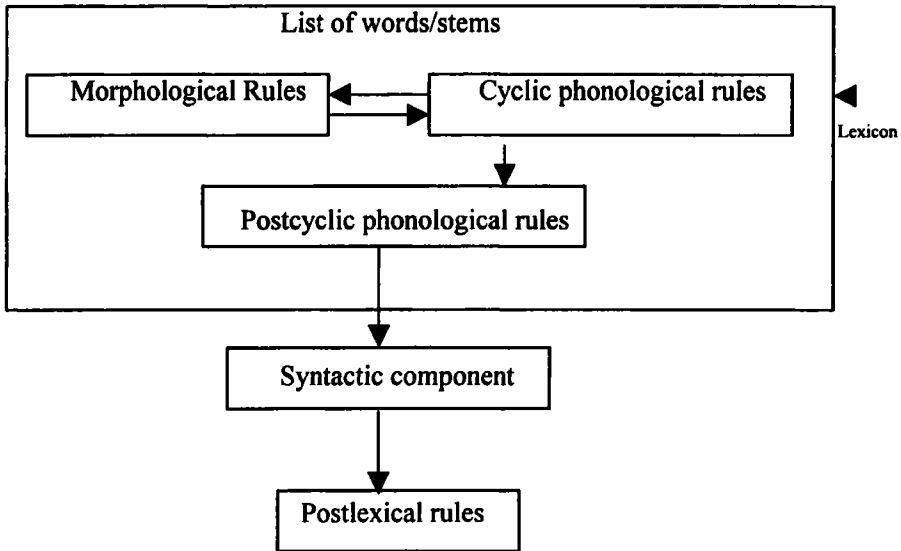
### **3. The organization of grammar**

#### *3.1. The lexical/postlexical distinction and the properties of phonological processes*

As mentioned in paragraph 8, standard proposals in prosodic phonology adopt the lexical phonology conception that the grammar (and phonology) is composed of two basic components: the lexical level and the postlexical level (e.g. Nespor and Vogel 1986: chap.1).<sup>14</sup> Regardless of further subdivisions within the lexical level<sup>15</sup>, this organization allows us to establish two major classes of phonological processes, according to the point in the grammar where they operate, each of them with well identified properties, as we will see below.

Within the classical lexical phonology framework, both morphology and (some) phonology are assumed to operate in the lexical level, and to be interrelated so that the result of a morphological operation may provide the input for the application of a phonological rule, and conversely. Furthermore, morphological operations may be sensitive to phonological information, and phonology may refer to the morphological structure of words, in addition to idiosyncratic information of specific items or classes of items. This type of interaction between morphology and phonology is claimed in Booij and Rubach (1987) to occur before the word-level, where rules are considered to be cyclic (that is, to reapply after each word-formation operation). At the word-level, on the contrary, phonological rules no longer interact with morphology, and apply both inside and across morpheme boundaries. This conception is represented by the model in (16) (taken from Booij and Rubach 1987: 3).

(16)



In this section we do not intend to provide a full description of the basic claims of lexical phonology (see, for example, Kiparsky 1982, 1985; Mohanan 1982, 1986; Booij and Rubach 1984, 1987; and, for reviews of the theory, Kaisse and Shaw 1985, and, more recently, Booij 1994, 1996b). Rather, we will concentrate only on those aspects that are of crucial importance for the purposes of this book: namely, the properties of the phonological processes that apply in the lexical component, on the one hand, and in the postlexical component, on the other hand.

Of the works mentioned above we extracted the major properties commonly attributed to the lexical rules, which are summarized in (17).

#### (17) *Lexical Rules*

- only lexical rules may refer to morphological information – thus, for example, (i) phonological rules that distinguish derived environments from underived environments (those that are subject to the Strict Cycle Condition – cf. Kiparsky 1982), necessarily apply within the lexical component; (ii) phonological rules that apply only with specific morphemes or word classes, necessarily apply in the lexical component
- only lexical rules may have exceptions – thus, if a rule does not apply in all cases where its structural description is met, the rule necessarily applies in the lexical component

## 12 Theoretical background

- only lexical rules may precede other lexical rules – thus, if a rule  $R_\alpha$  has some property of a lexical rule, a rule  $R_\beta$  that applies prior to  $R_\alpha$  necessarily belongs to the lexicon<sup>16</sup>
- lexical rules are necessarily categorical, that is they do not have gradient outputs

An additional property often ascribed to lexical rules is structure preservation (e.g. Kiparsky 1985: 92; Kaisse 1990). That is, lexical rules may build structure and specify underspecified segments, but they cannot modify existing structure or the underlying feature composition of segments. Thus, for example, according to this principle the application of a lexical process should not create segments that do not belong to the underlying inventory of the language. However, this property seems to characterize only cyclic rules, as suggested in Booij and Rubach (1987). In fact, these authors show that word-level (i.e. postcyclic, but lexical) processes do create segments that do not exist in the underlying inventory of languages. Canadian French provides an illustrative example. In this language, high vowels alternate between [+tense] in open syllables and [-tense] in closed syllables. Lax vowels do not exist in the underlying system. Nevertheless, the rule that creates lax vowels in closed syllables must operate within the lexical level, since it is not blocked by resyllabification. The latter process applies postlexically across words, causing the lexical closed syllables to become open. According to Booij and Rubach, resyllabification does not affect the application of the laxing rule, because it has already applied within the lexical level (see Löfstedt 1992 and Booij 1994: 4.2, among others, for further exemplification of word-level processes that are not structure preserving). Thus, as a general statement, it is not the case that all lexical rules are structure preserving.<sup>17</sup>

It is frequently assumed, further, that rules that apply across words operate necessarily in the postlexical component (e.g. Kiparsky 1982). This idea is challenged, for instance, by Hayes (1990), who observes that certain processes that apply between words may have the properties of lexical processes, and thus should belong to the lexical component. In order to account for the existence of such processes in languages like Ewe, French, Kimatumbi, Mende and Hausa, Hayes proposes that these rules are precompiled in the lexical level.

An example of a precompiled rule, taken from Hayes (1990), is tone raising in Ewe. In this language, a High tone in a verb becomes a Rising tone if it follows a High or a Rising tone, and it is followed by a *noun*

starting with a Mid or a Low tone (cf. Clements 1978). This rule is formalized by Hayes as in (18).

- (18)  $H \rightarrow R / [{}_V [-\text{Lopitch}] \_ ]_{[\text{Frame1}]}$   
 Frame 1: /  $\_ [{}_N [-\text{Hipitch}] \dots]$

This means that the form to be inserted in the context defined by the Frame 1 will have undergone H-tone raising rule in the lexical component.

Precompilation may also consist of lexical listing when the variations in the form of morphemes do not follow from phonological rules. For example, in order to account for the English alternations in the determiner *a/an*, Hayes proposes that the lexical entry of the indefinite article includes the two forms, together with the contexts where they are inserted, as shown in (19).<sup>18</sup>

- (19)  $\left( \begin{array}{c} \dots \\ \textit{Phonological instantiation:} \\ / \text{ə} \text{n} / \text{ (in the context) } / \_ V \\ / \text{ə} / \text{ (elsewhere)} \end{array} \right)$

Both in Kaisse (1990) and in Hayes (1990) we find a number of diagnostics for lexical-like processes that apply between words. The major properties associated with the application of this type of processes, that is of precompiled phrasal rules in Hayes' terms, as opposed to pure phonological rules applying across words, are listed in (20).<sup>19</sup>

- (20) *Precompiled Rules* (lexical rules applying across words)<sup>20</sup>
- only precompiled rules can precede rules of lexical phonology
  - only precompiled rules can precede morphological rules
  - precompiled rules cannot follow postlexical rules
  - only precompiled rules can treat parallel X' categories asymmetrically, that is, they may refer to properties of individual items or classes of items
  - only precompiled rules may show sensitivity to syntactic information, including elements with no phonetic content (empty categories, traces, pro)
  - precompiled rules are necessarily ingradient

## 14 *Theoretical background*

As for the properties of postlexical processes, they are listed in (21), taken from various sources, such as Kaisse and Shaw (1985), Nespor and Vogel (1986), Hayes (1990), Kaisse (1990), and Nespor (1990).

### (21) *Postlexical Rules*

- postlexical rules do not refer directly to morphosyntactic or lexical information, and thus their application is general and free of idiosyncratic exceptions (in other words, postlexical rules apply automatically, and refer only to phonological information, including the prosodic domain within which they operate)
- postlexical rules always follow lexical (including precompiled) rules
- the output of a postlexical rule may be gradient
- postlexical rules are often optional
- postlexical rules may be sensitive to speech rate<sup>21</sup>

Notice that, as we have seen above, the fact that postlexical rules apply to strings that may be larger than the word is not a distinctive property of postlexical rules, since there are also lexical rules applying across words. Similarly, the absence of structure preservation is not specific of postlexical rules, and thus it is not included among the properties that may identify these rules.<sup>22</sup>

Mohanan (1982) provides, in addition, evidence for the psychological reality of the lexical/postlexical levels (cf. Kaisse and Shaw 1985): speakers judge the output of lexical rules as different from the input, while this is not always the case of postlexical processes; the forms that result from slips of the tongue, which are assumed to occur at a more superficial level, are not subject to lexical rules, but they are subject to postlexical processes; the forms created in word games, involving for instance modifications in the sequence of segments, undergo postlexical rules, but not lexical rules; lexical rules are not blocked by pauses, while postlexical processes usually are.

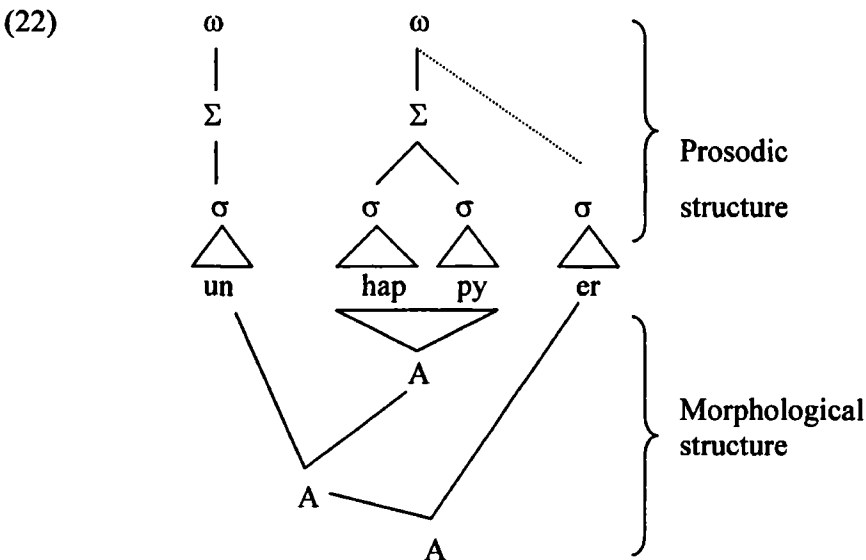
### 3.2. *The locus of construction of prosodic domains*

As mentioned above, the construction of prosodic domains was firstly seen to be accomplished postlexically (see paragraph 8). One problem of this approach, already anticipated in Nespor and Vogel (1986), results from the

fact that the construction of a prosodic domain such as the prosodic word may refer to morphological information, and this type of information is assumed no longer to be present at the input of the postlexical component. A solution to this type of problem is to allow for the construction of the lower prosodic domains in the lexical component. This has been proposed in Booij (1988), Booij and Lieber (1993), Inkelas (1990), Nespor (1990), and Vogel (1991), among others. Some of the arguments in favor of such a view are presented below.

There is evidence that morphological structure and prosodic structure must coexist (cf. Booij and Lieber 1993): for example, in Polish the choice between two particular allomorphs depends on whether the last consonant of the base word is syllabified by the syllabification algorithms of the language or it remains extrasyllabic; and reduplication in Tagalog requires affixation to a prosodic constituent in addition to a morphological constituent.

Another case where affixes have both morphological and prosodic subcategorizations is provided by the English comparative suffix *-er*: It subcategorizes for adjectival bases which, in addition, must be monosyllabic or disyllabic if the second syllable is light. The existence of forms such as *unhappier* suggest a paradox, since from a morphological point of view, the suffix is added to a trisyllabic base (*unhappy*).



However, from a prosodic point of view the suffix attaches to a disyllabic prosodic word (*happy*), as the prefix *un-* constitutes an independent prosodic word (cf. Pesetsky 1985). These cases, therefore, do not constitute actual exceptions to the prosodic requirement if this requirement is imposed on the prosodic word rather than on the morphological base *-er* attaches to (cf. Booij and Rubach 1984). This implies the coexistence of morphological and prosodic planes. Under this approach a word such as *unhappier* has the structure in (22) (cf. Booij and Lieber 1993: 35).

Other elements that may have prosodic selection requirements are clitics (Inkelas 1990; Booij and Lieber 1993; Booij 1996a; Van der Leeuw 1997). For example, according to Booij and Lieber (1993) the Dutch clitic *ie* ('he') subcategorizes for a prosodic word preceding it. Notice, however, that this information is present in the lexical entry of the clitic, and therefore it does not imply that the prosodic structure is built in the lexical component. In fact, *ie* attaches to the prosodic word it selects only postlexically (cf. Berendsen 1986: chap.3; Booij 1996a).

Clitics provide, nevertheless, additional support for the presence of prosodic structure in the lexical level. This can also be illustrated by Dutch clitics, and their behavior with respect to final devoicing and resyllabification. According to Booij (1995, 1996a), among others, the prosodic word is the domain for resyllabification in Dutch. The fact that clitics such as *ie* are included in that domain shows that they are incorporated into the preceding prosodic word (cf. 23a). Syllable-final devoicing, a process whereby a voiced obstruent becomes voiceless in syllable final position (cf. 23b), is classified in Booij and Rubach (1987) as a word-level lexical rule, applying within a domain that includes lexical suffixes (cf. 23c). As illustrated in (23d), the postlexical integration of the enclitic into a prosodic word ending in an underlying voiced consonant, does not bleed final devoicing, although resyllabification causes the consonant to become syllable initial (see also Berendsen 1986, and Baumann 1996, who adds perceptual and acoustic evidence showing that the relevant resyllabified consonants surface unvoiced).

- |      |                   |            |                                       |
|------|-------------------|------------|---------------------------------------|
| (23) | a. <i>komt-ie</i> | 'comes he' | (kɔm) <sub>σ</sub> (ti) <sub>σ</sub>  |
|      | b. <i>held</i>    | 'hero'     | (hɛlt) <sub>σ</sub>                   |
|      | c. <i>heldin</i>  | 'heroine'  | (hɛl) <sub>σ</sub> (din) <sub>σ</sub> |
|      | d. <i>vond-ie</i> | 'found he' | (vɔn) <sub>σ</sub> (ti) <sub>σ</sub>  |



The fact that lexical phonological processes refer to a prosodic domain, in this case the syllable, also confirms the existence of prosodic structure in the lexical component.

To sum up, the idea that prosodic domains up to the word level are built in the lexical component is supported at least by three major classes of arguments: (i) the observation that certain morphological operations refer to prosodic constituents; (ii) the fact that the construction of certain prosodic domains must refer to morphological information; (iii) the observation that some phonological processes refer to prosodic domains whose form may have to be defined prior to the concatenation of words and subsequent modifications (such as resyllabification and the integration of clitics).<sup>23</sup>

#### 4. The status of the Clitic Group within the prosodic hierarchy

The prosodic hierarchy is seen to include the Clitic Group since the proposal of Hayes (1989), adopted in Nespor and Vogel (1986) and much subsequent work (e.g. Vogel 1990, 1991; Hannahs 1995a; Nespor 1999a; Schwindt 2000, among others). This constituent groups together a prosodic word plus adjacent clitics, and is located above the prosodic word and below the phonological phrase. Like other prosodic domains, the clitic group has been reported to constitute the domain for many phonological rules. For example, according to Nespor and Vogel (1986) the clitic group is a domain for stress assignment in Latin. Thus, when enclitics are attached to a word, the primary stress is shifted from its original position in the word to the syllable that precedes the clitic, as illustrated in (24) (from Nespor and Vogel 1986: 146).

- |      |               |                   |
|------|---------------|-------------------|
| (24) | <i>virum</i>  | <i>virúmque</i>   |
|      | 'the man-acc' | 'and the man-acc' |
|      | <i>vidēs</i>  | <i>vidēsne</i>    |
|      | 'you see'     | 'do you see?'     |

Other examples of phonological rules that have been argued to refer to the clitic group include *v*-Deletion and *s*, *z*-Palatalization in English (Hayes 1989), Demotic Greek Stress Readjustment, Italian Intervocalic *s*-Voicing, Greek Nasal Deletion, Nasal Assimilation and Stop Voicing, and Turkish Vowel Harmony (Nespor and Vogel 1986). The clitic group has also been

proposed to be the domain for stress assignment within compounds in Hungarian (Vogel 1990).

There are, however, a number of important arguments against the existence of such a prosodic domain. We review some of these arguments in the next paragraphs.

According to Inkelas (1990), there seems to be no language where postlexical processes distinguish between the clitic group and the prosodic word; in most of the cases presented as evidence for the clitic group, the data can be reinterpreted as following from the distinction between lexical prosodic words and lexical rules versus postlexical prosodic words (that may include clitics) and postlexical rules. Thus, if the behavior of clitics can be explained by independently required tools, the clitic group should be eliminated on economy grounds (see also Booij 1988, 1996a; Selkirk 1996: note 3).

Under the proposals of Inkelas (1990), Inkelas and Zec (1991), Selkirk (1996), Kleinhenz (1996), Peperkamp (1997a), Hall (1999a), among others, clitics may attach not only to prosodic words, but also to prosodic phrases (see section 6.3). Thus, if it is assumed that prosodic hierarchy is universally defined, and the placement of the clitic group is fixed within that hierarchy, the distinction between word and phrasal clitics cannot be accounted for (cf. Peperkamp 1997a).

The definition of the clitic group presented in Nespor and Vogel (1986: 154) implies furthermore that clitics form independent prosodic words. Nevertheless, the most salient property of clitic words is their prosodic deficiency and the lack of properties characteristic of independent prosodic words. By abandoning the clitic group and the need for clitics to be independent prosodic words, it is possible to establish a one-to-one correspondence between the prosodic word and primary word stress: (i) each prosodic word must bear one main stress, and (ii) each stress bearing unit is contained within a prosodic word. Such statement could not be made under Nespor and Vogel's (1986) assumption that a prosodic word is defined as a constituent that bears at most one main stress.

Finally, proclitics and enclitics (like prefixes and suffixes) often show asymmetries in terms of their coherence to the host (base) they attach to (e.g. Booij 1996a for Dutch, Peperkamp 1997a for Italian, Kleinhenz 1996 and Hall 1999a for German): enclitics (like suffixes) usually show a stronger degree of connection with their hosts (bases) when compared to proclitics (prefixes), which usually present a phonological behavior more independent of the host (base). Furthermore, enclitics and proclitics may also attach to different prosodic constituents (as in the case of German,

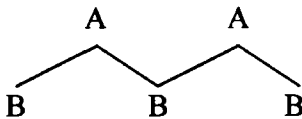
according to Kleinhenz 1996 and Hall 1999a). Under the clitic group approach, no such asymmetry should arise (cf. Kleinhenz 1996; Peperkamp 1997a).

In summary, there are strong reasons to assume that the clitic group is not a prosodic constituent. In section 6.3 we discuss the types of structural relations clitics may bear with their host, and we present some of the prosodic constituents that have been claimed to form possible hosts for clitics.

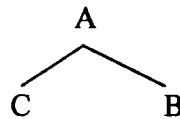
## 5. The Strict Layer Hypothesis

It has been observed that some essential properties distinguish prosodic structures from syntactic and metrical ones. The grouping of prosodic constituents is such that it forms n-ary structures, composed of a fixed number of constituents organized in a hierarchical fashion, with a limited depth. Consequently, the prosodic tree is flatter than syntactic and metrical trees. These properties are expressed by the Strict Layer Hypothesis (SLH), presented in (2) above (cf. Selkirk 1984; Nespor and Vogel 1986), which is assumed to constitute a set of well-formedness conditions on prosodic structure that define (im)possible geometric configurations of prosodic trees. The following structures, taken from Ladd (1996), illustrate some of the configurations that the SLH rules out (see Nespor and Vogel 1986: 8 for further exemplification on possible and impossible trees).

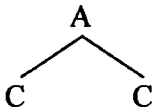
(25) a. No multiple domination



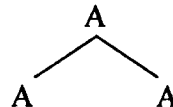
b. No heterogeneous sisters



c. No skipping of levels



d. No recursion



However, various phonological facts in the languages of the world have been reported to require analyses that violate certain aspects of the SLH. Some examples are briefly mentioned below.

Under Inkelas' (1990) theory, the satisfaction of the prosodic subcategorization frames of clitics always implies the violation of the SLH, since cli-

tics are Chomsky-adjoined to the prosodic domain they subcategorize for. The analysis of prefixes and proclitics in Dutch and in several dialects of Italian, developed in Booij (1996a) and Peperkamp (1997a), respectively, also implies the violation of the SLH in that these elements may form syllables which are adjoined at the level of the prosodic word or the phonological phrase. Finally, Leben and Ahoua (1997) suggest that a number of structures in Baule – a language spoken in Côte d'Ivoire – form prosodic words that may have internal prosodic words. Thus, recursion is implicitly admitted at the level of the prosodic word (see also section 6.4).

Recursion at the level of the intonational phrase level has also been argued for, namely by Ladd (1992, 1996) and Frota (2000).

Ladd (1992) questions the Strict Layer Hypothesis on the basis of arguments of various sorts: (i) the more closely phonological phenomena are studied, the greater tendency there is to introduce new prosodic domains – which suggests a prosodic structure with no fixed depth; (ii) the fixed depth of prosodic structure is not always supported by phonetic cues of boundary strength; (iii) certain prosodic groupings of intonational phrases that disambiguate sentences may violate the SLH – for example, a sentence like the one in (26) may be realized so that [*his faithful black labrador*] is interpreted as one of the elements Dubois lives with (in which case it constitutes an intonational phrase of the same type as adjacent intonational phrases), or it may be realized so that it is interpreted as the same entity as Jean-Charles (in which case there is a stronger prosodic connection between this intonational phrase and the preceding one).

- (26) *Dubois lives in a restored 15<sup>th</sup> century farmhouse with Jean-Charles, his faithful black Labrador, and a motley assortment of cats.*

In order to account for such facts, Ladd puts forth the Compound Domain Hypothesis, according to which prosodic domains – at least at the intonational phrase level – are allowed to be grouped together under a prosodic constituent of the same level.

Frota (2000) has also shown that a number of phonological phenomena require (limited) recursion at the intonational phrase level in EP.<sup>24</sup> In particular, Frota shows that several phonological phenomena point to the existence of an intonational phrase domain ( $I^{\max}$ ) that dominates two constituents of the same type (which we will refer to as  $I^{\min}$ ). These phenomena include (i) sandhi processes – for example, fricative voicing is bound by the  $I^{\max}$ -domain, whereas consonant deletion involved in the process of syllable degemination is bound by the  $I^{\min}$ -domain; (ii)

preboundary lengthening – despite the existence of significant preboundary lengthening at the right edge of both the  $I^{\min}$ -domain and the  $I^{\max}$ -domain, the amount of preboundary lengthening in the former is significantly shorter than the one found in the latter; (iii) pause distribution – acoustic pauses seem to signal  $I^{\max}$  boundaries, rather than  $I^{\min}$  boundaries; (iv) F0 range – although both  $I^{\max}$  and  $I^{\min}$  are tonally marked with the nuclear tone and a boundary tone (which are identifying features of the I-domain in EP), the tonal events associated with an  $I^{\max}$  are realized with a wider pitch range, than those associated with an  $I^{\min}$ .<sup>25</sup>

A number of proposals have therefore been put forward in order to weaken or relax the requirements embodied by the SLH (e.g. Ladd 1992; Selkirk 1996). Along the lines of Inkelas (1990) and Itô and Mester (1992), Selkirk (1996) proposes that the SLH should be decomposed into a set of constraints on prosodic domination, formulated and exemplified in (27) (where  $C^n$  stands for some prosodic category).

(27) a. *Layeredness*

No  $C^i$  dominates a  $C^j$ ,  $j > i$  (e.g. no  $\sigma$  dominates a  $\Sigma$ )

b. *Headedness*

Any  $C^i$  must dominate a  $C^{i-1}$ , except if  $C^i = \sigma$  (e.g. a PW must dominate a  $\Sigma$ )

c. *Exhaustivity*

No  $C^i$  immediately dominates a constituent  $C^j$ ,  $j < i-1$  (e.g. no PW immediately dominates a  $\sigma$ )

d. *Nonrecursivity*

No  $C^i$  dominates  $C^j$ ,  $j = i$  (e.g. No  $\Sigma$  dominates  $\Sigma$ )

Among these, the first two are argued to hold universally and to be unviolable, whereas Exhaustivity and Nonrecursivity are considered to be violable constraints (as the exemplification in the preceding paragraphs has already shown).<sup>26</sup>

Although weakened, the modifications introduced in the SLH are such that it still captures the original idea that prosodic structures are flatter than syntactic structures, and are composed of a fixed prosodic constituency.<sup>27</sup>

## 6. The prosodization of words

### 6.1. Diagnostics for the prosodic word

*Primary word stress* is one of the most intuitive diagnostics for the prosodic word domain. In fact, it is generally accepted that the prosodic word must bear one and only one primary stress. Adopting the view that clitics cannot form independent prosodic words, the generalization in (28) can be formulated (see also Van der Leeuw 1997, among others).<sup>28</sup>

(28) A prosodic word must bear one and only one primary (word) stress

Like other domains, the prosodic word is a domain for the *application of phonological rules*. For example, Nespor and Vogel (1986) present several processes of various languages that are bound by the prosodic word domain: namely, Nasal Assimilation and Stop Voicing in Greek, Main Stress Rule in Latin, Final Voicing in Sanskrit, and Vowel Harmony in Turkish.

In addition to word stress and (other) phonological rules, the prosodic word has also been reported to be a domain for *phonotactic generalizations*. To cite just a few examples, in Dutch, the right edge of the prosodic word allows for syllables longer than those found word internally (Booij 1995), in Italian, prosodic words cannot begin with [ʎ] (Peperkamp 1997a), in German, short full lax non-low vowels cannot occur at the right edge of the prosodic word (Hall 1999a), in English, there are more consonantal clusters word internally than at either edge of the prosodic word domain (Raffelsiefen 1999a).<sup>29</sup>

In pitch accent languages such as Serbo-Croatian, pitch accents are assigned to every prosodic word but not to clitics (e.g. Godjevac 2000). In such languages, therefore, this type of tonal information may be used as diagnostics to the prosodic word as well.<sup>30</sup>

*Deletion under identity* may also cue the prosodic word. In fact, Booij (1985, 1988), Wiese (1993, 1996), Kleinhenz (1994) propose that in Dutch and German the deletion of an element within complex words in partially similar coordinate structures depends not only on morphosyntactic information, but also on the prosodic status of the element to be omitted in the string: besides partial phonological identity with respect to the other element of the coordinate structure, it must also form an independent prosodic word.<sup>31</sup> Representative examples from Dutch that show the relevance for coordination reduction of the phonological word rather than the morpho-

syntactic word are presented in (29) (taken from Booij 1985).<sup>32</sup> In (29a), both *schei* and *kunde* constitute prosodic words, but the former element does not exist as an independent word. In (29b) the suffix *-achtig* may be deleted because it forms a prosodic word, contrasting with *-ig*, in (29b'), which does not form an independent prosodic word and therefore may not undergo coordination reduction.<sup>33</sup>

- (29) a. *scheikunde*                      *en natuurkunde* > *schei en natuurkunde*  
          analysis knowledge and nature knowledge  
          'chemistry and physics'  
       b. *stormachtig en regenachtig*                      > *storm en regenachtig*  
          'stormy and rainy'  
       b'. *blauwig en rodig*                                      > \**blauw en rodig*  
          'bluish and reddish'

A wide number of languages have additionally been reported to show *Minimal Word requirements*, that is, the prosodic word is argued to have a minimal size, usually being at least disyllabic or bimoraic. According to the literature surveyed in Kenstowicz (1994), such languages include English, Yidin', Arabic, Japanese, Lardil, Estonian, and Choctow. To this list we can add Bengali (Fitzpatrick-Cole 1991), Catalan (Cabr  1993), Baule (Leben and Ahoua 1997), German (Hall 1999a), many Bantu languages cited in Downing (1999) and Chamicuro (an Amazonian language – cf. Parker 1999), among others. Notice, nevertheless, that a few languages do not seem to show the minimal word syndrome, namely, Irish (cf. Green 1997, cited in Hall 1999b), and Brazilian Portuguese (cf. Bisol 2000). In the latter language (as well as in European Portuguese), a prosodic word may consist of a single syllable, whether closed or open, and headed by low, mid or high vowels. This is illustrated in (30), taken from Bisol (2000).<sup>34</sup>

- (30) *tr s*                      *p *                      *mi*  
       'three'                      'foot'                      'mi'  
       *pai*                      *p *                      *nu*  
       'father'                      'dust'                      'naked'

*Clipping* (or truncation) is another process that may provide evidence for the prosodic word domain. In fact, various languages have been reported to have morphological operations consisting of the shortening of words whose output forms a (minimal) prosodic word (e.g. Mester 1990 for

Japanese; Prieto 1992 for Spanish; Cabré 1993 and Cabré and Kenstowicz 1995 for Catalan; Thornton 1996 for Italian). Examples of truncation in Italian are provided in (31) (from Thornton 1996: 87).

- (31) a. *amplifictore* (ampli+fica+tore) > *ampli* 'amplifier'  
 b. *diapositive* (dia+positiva) > *diapo* 'slide'  
 c. *meteorologico* (meteo+logico) > *meteo* 'concerning weather'

Notice that in some of these cases the clipped form (which retains the semantics of the original base) does not correspond to a morphological constituent (cf. 31b–c). By contrast, in all cases it corresponds to a minimal prosodic word, which Thornton argues to be the disyllabic trochee in Italian.

In Germanic languages, where (re)syllabification is bound by a word-size constituent, the domain of *syllabification* is also usually taken to be a reliable diagnostic for prosodic wordhood (e.g. Booij 1995, 1996a, for Dutch; Wiese 1996, Hall 1999a, for German; Raffelsiefen 1999a, for English). However, in Romance languages, the picture is not so clear due to the existence of syllabification at the word level and of resyllabification across words (see, for example, the discussion in Nespor and Vogel 1986: 3.1.1, and section 7 below).<sup>35</sup>

To conclude, several types of phenomena may cue the prosodic word domain. Nevertheless, it is possible that only a subset of these diagnostics may play a role in the identification of prosodic words in each language. This is, for instance, the case of EP, as we will show in chapter 5.

## 6.2. *The prosodic word domain*

According to Nespor and Vogel (1986: chap.4), the prosodic word (PW) may be either of the same size or smaller than a syntactic terminal node, depending on language-particular definitions of the prosodic word domain. In languages such as Greek and Latin there is a coincidence between the prosodic word domain and the terminal syntactic node: a PW includes a stem, plus all adjacent affixes, as well as both members of compounds. In languages such as Turkish or Sanskrit, by contrast the PW domain is smaller than a syntactic terminal node, since each member of a compound structure functions as a prosodic word domain.



In other languages, additional information may be required in order to define the PW domain. This is the case of Hungarian, where prefixes seem to form their own prosodic word, as well as of Italian, where only certain prefixes, depending on phonological properties (namely, syllable structure), form independent prosodic words, and Dutch, where certain suffixes form their own prosodic word and have to be lexically marked as prosodic words.<sup>36</sup>

In order to account for the different types of languages observed, Nespor and Vogel (1986) propose the definitions of the prosodic word domain in (32).<sup>37</sup>

(32) PW domain (two major types of languages)

*Type I.* The domain of PW is Q (Q=syntactic terminal node)  
(e.g. Latin)

*Type II.* The domain of PW consists of (a) a stem; (b) any element identified by specific phonological and/or morphological criteria (e.g. Italian); (c) any element marked with the diacritic [+W] (e.g. Dutch). Any unattached elements within Q form part of the adjacent PW closest to the stem.

More recently, some aspects of Nespor and Vogel's proposal have been either questioned or refined. For example, unlike Nespor and Vogel, and adopting the view that clitics do not constitute independent prosodic words, Booij (1996a), among others, shows that the combination of a host and a clitic constitutes a case where a prosodic word may correspond to a unit larger than a syntactic terminal node. In fact, since phonological clitics may behave syntactically in the same way as phonologically non-clitic words, it may be assumed that (at least certain) clitics constitute syntactic terminal nodes distinct from the terminal node corresponding to their host (the issues related to the prosodization of clitics are treated in the following section).

Furthermore, it is shown in Nespor and Ralli (1996) that compound words both in Greek and Italian may be computed either as a single prosodic word, or as two prosodic words. According to these authors, the choice between the two possibilities depends on the morphological structure of the compound. This suggests that the distinction between the two classes of languages referred above is (at least) not supported by Greek and Italian data (the prosodization of compounds is discussed in more detail in section 6.4, below).

Finally, Peperkamp (1997a) proposes an alternative analysis of Italian prefixed words, in which prefixes are claimed not to incorporate into the base prosodic word, regardless of syllabic structure considerations (the prosodization of affixes is briefly considered in section 6.5 and the issues related to the (re)syllabification of prefixes are discussed in section 7).

To conclude, although it is clear that there must be a word-sized prosodic domain distinct from any morphosyntactic constituent, the definition of the prosodic word in the languages of the world is still an open matter. The following sections are devoted to a more detailed inspection of some of the questions raised by the prosodization of clitics, compounds and derived words.

### 6.3. *The prosodization of clitics*

Of all topics discussed so far, clitics and related matters are among those that have attracted the greatest attention from researchers (e.g. Zwicky 1977; Klavans 1985; Neijt 1985; Berendsen 1986; Inkelas 1990; Zec and Inkelas 1991; Selkirk 1996; Booij 1996a; Kleinhenz 1996; Peperkamp 1996, 1997a; Van der Leeuw 1997; Nespor 1999a; Hall 1999a; Bisol 2000, among many others). In this section we will concentrate on some of the core questions related to the prosodization of clitics.

Assuming that the clitic group is not a prosodic constituent, phonological clitics must attach to items that correspond to some other prosodic domain. Thus, the first question that we have to address concerns the identification of the possible *prosodic hosts* for clitics.

In the literature where the clitic group is excluded from the prosodic hierarchy, we find several possible prosodic hosts, ranging from the prosodic word, to the phonological phrase, and the intonational phrase. For example, in the work of Zec and Inkelas, the three constituents are argued to constitute possible hosts for clitics in different languages: clitics attach to the prosodic word both in Modern Greek and in Serbo-Croatian (Zec and Inkelas 1991); the emphatic particle in Hausa, as well as determiners in Kivunjo Chaga (a Bantu language), attach to the  $\phi$ -phrase (Inkelas 1990); clitics attach to the I node in languages like Tzotzil (a Mayan language) (Zec and Inkelas 1991). We will mention just two types of evidence for these proposals. In Kivunjo Chaga there are phrasal phonological rules that show the presence of a  $\phi$ -boundary between the phonological host (a noun) and the clitic (a determiner). In the case of Hausa and Tzotzil the argument is based on the distribution of clitics, rather than on direct phonological evidence. It

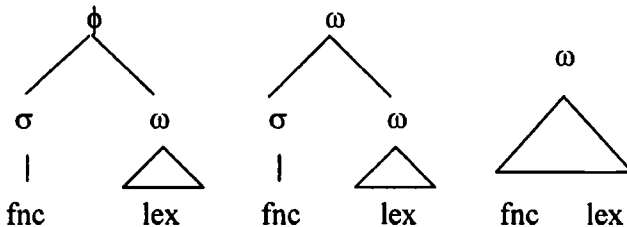
is claimed that the relevant clitics are located with reference to prosodic constituents rather than to syntactic constituents, and a direct correlation is established between the prosodic constituent with respect to which the clitic is located and its prosodic host (see, nevertheless, Van der Leeuw 1997: 2.6 for a critical discussion of some of these proposals).

Other examples of phrasal hosts for clitics are found, for example, in the analysis of English clitic function words in phrasal non-final position proposed in Selkirk (1996), in the analysis of Standard Italian pronominal clitics in Peperkamp (1997a), or the analysis of German proclitics in Kleinhenz (1996) and Hall (1999a). It appears, nonetheless, that the hosts of clitics correspond more commonly to prosodic words. This is the case of English reduced object pronouns (Selkirk 1996), of Dutch clitics (Booij 1996a), of pronominal clitics in Neapolitan and Lucanian (Peperkamp 1997a), as well as of most German enclitics (Kleinhenz 1996; Hall 1999a), and of Chamicuro determiners (Parker 1999).

Not only can languages and dialects vary according to the possible hosts for clitics, but they can also vary in the way clitics are integrated in prosodic structure (e.g. Selkirk 1996; Booij 1996a; Peperkamp 1997a; Hall 1999a).

According to Selkirk (1996), who assumes that Exhaustivity and Nonrecursivity are violable constraints (as we have seen in section 5), clitic function words may be prosodized in three different ways, as represented in (33) (where *fnc* and *lex* correspond to the phonological content of function words and lexical words). The different types of configurations where clitics may appear with respect to the prosodic word give rise to their classification as “free clitics”, “affixal clitics”, and “internal clitics”.

(33) a. free clitics      b. affixal clitics      c. internal clitics



An example of the instantiation of each possibility is provided by three NeoŠtokavian dialects of Serbo-Croatian (cf. Zec 1993, reviewed in Selkirk 1996). In each dialect, a default initial high tone accent is assigned to the first mora of the prosodic word. The realization of the initial accent varies,

however, depending on the way the clitic is structured with respect to the host: in the dialect of E. Herzegovina (NŠ-1), the initial accent is realized on the first mora of the clitic, and not on the host lexical word; in the (standard) dialect of Belgrade (NŠ-2), the initial accent is realized on the first mora of the lexical word, but not of the clitic; in the dialect of Šrem, Mačva (NŠ-3) there are two possibilities – the high accent may fall on the first mora of the clitic, or it may fall on the first mora of the lexical word, in which case it spreads to the preceding clitic. Thus, in NŠ-1 the clitic behaves as PW initial, as in the representation in (34a); in NŠ-2 the clitic behaves as PW external, as in the representation in (34b); and finally, in NŠ-3 both the clitic and the lexical word may receive the initial accent, a possibility that would follow from a representation like (34c) (in the examples the acute accents represent the high tone accents).

- (34) a. internal clitic      (ú graad)<sub>ω</sub>            ‘to the city’  
       b. free clitic        u (gráad)<sub>ω</sub>            ‘to the city’  
       c. affixal clitic    (ú (graavu)<sub>ω</sub>)<sub>ω</sub>        ‘into (the) head’  
                                  or (ú (gráavu)<sub>ω</sub>)<sub>ω</sub>

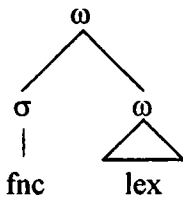
On the basis of word stress assignment, Peperkamp (1997a) argues for a similar kind of distinction between different Italian dialects (or languages). Observing that in certain dialects of Lucanian enclitics induce the main stress to shift to the penultimate syllable, the author proposes that in these dialects enclitics are incorporated into the host prosodic word, as in (35a). In Neapolitan, by contrast, both the host and the first of two pronominal enclitics are assigned main stress, which is accounted for by assuming that the sequence host plus clitic is prosodized in a recursive structure, as represented in (35b).<sup>38</sup> Finally, in Standard Italian enclitics do not interact with main stress assignment and this is taken to indicate that they are prosodized in a position external to the prosodic word, as in (35c) (in the examples acute stress represents main word stress).<sup>39</sup>

- (35) a. Lucanian            (man:atə míllə)<sub>ω</sub>        ‘send it to me’  
       b. Neapolitan       ((cóna)<sub>ω</sub> tíllə)<sub>ω</sub>        ‘tell it to you’  
       c. Standard Italian ((pórta)<sub>ω</sub> melo)<sub>φ</sub>    ‘bring it to me’

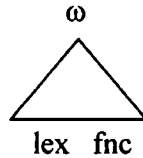
The variation in the prosodization of clitics may also be found within the same language/dialect, depending either on the direction of cliticization

(cf. Booij 1996a) or on the segmental string that results from the combination of lexical and clitic words (cf. Hall 1999a).<sup>40</sup> Specifically, based on different phonological phenomena that apply with reference to the prosodic word domain – namely, resyllabification, prevocalic schwa deletion, /n/-insertion, and homorganic glide-insertion – Booij (1996a) shows that Dutch *proclitics are adjoined* to the following prosodic word, as in the representation in (36a), whereas *enclitics are incorporated* in the preceding prosodic word, as in the representation in (36b).

(36) a. Dutch proclitics



b. Dutch enclitics

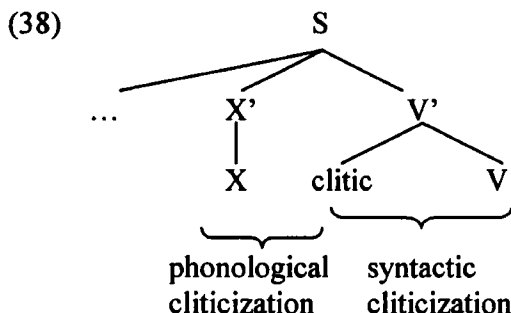


Hall (1999a), in turn, proposes that enclitics in German may either be incorporated into the preceding prosodic word (as in Dutch), or be prosodized in a position external to the prosodic word if the result of the combination of the clitic with the preceding word violates the language phonotactic constraints on the prosodic word. For example, consonant-initial enclitics may not be incorporated into the preceding prosodic word when the enclitic ends in a short full lax vowel, because this would violate the Lax Vowel Constraint that prohibits prosodic words to end with such a vowel. Hall thus proposes the two possible representations in (37) for German enclitics.<sup>41</sup>

(37) German enclitics (host+enclitic)<sub>ω</sub> or ((host)<sub>ω</sub> + enclitic)<sub>φ</sub>

A final major issue related to phonological cliticization concerns the *direction of cliticization*.

Ever since the influential work of Klavans (1985), it has been well established that there is no necessary correlation between the direction of syntactic attachment of clitics, and the direction of phonological cliticization. An example where the direction of the two types of attachment does not coincide is provided by Nganhacara (an Australian language), where clitics attach phonologically to their left, while their syntactic host may appear to their right. This is schematized in (38) (adapted from Klavans 1985: 105).



The question then arises of how the directionality of cliticization is defined, since it is not sufficient to assume, like in Hayes (1989: 208) for English, that a clitic attaches to the constituent with which it shares more category membership (where 'X and Y share category membership in C if C dominates both X and Y').

Along the lines of Klavans (1985), Nespor and Vogel (1986) claim that syntactic configuration is not enough to determine the direction of phonological cliticization, and that it may follow, instead, from an inherent property of individual clitics. The relevance of the inherent property of individual clitics is demonstrated by the Greek possessive clitics, which, like Nganhacara clitics, are phonological enclitics, although syntactically proclitic.

A slightly different approach is proposed in Booij (1996a). For this author, languages may show a preference for a given direction of cliticization, which may follow from the language's rule of Stray Adjunction (Anderson 1992: 203). Individual clitics may, in addition, be specified to cliticize only to the right or to the left. Thus, in the case of Dutch the preferred direction of cliticization is leftwards, although rightward cliticization is also possible, for example, if no host occurs to the left of the clitic. The clitic *-ie*, however, is specified to cliticize phonologically only to the left.<sup>42</sup> In the same line of approach, Kleinhenz (1996) suggests that German displays a similar preference for leftward cliticization, and the possibility of bi-directional cliticization, maintaining, further, that in this language no clitics appear to attach solely to the right.