The intonational phonology of European Portuguese*

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2.1 Introduction

This chapter provides an analysis of the prosodic and intonational structure of European Portuguese. The framework adopted is the auto-segmental metrical theory of intonational phonology, according to which intonation has a phonological organization, and intonational features relate with independent features of the phonological organization of speech established on the basis of prosodic structure (Beckman & Pierrehumbert 1986; Hayes & Lahiri 1991a; Grice 1995; Jun 1996; Ladd 1996; Gussenhoven 2004, among many others). The linguistic variety analyzed is Standard European Portuguese (henceforth EP) as spoken in Lisbon, and other varieties of Portuguese are only briefly mentioned. The analysis has been developed on the basis of corpora especially collected for this purpose, which mainly consist of read speech materials uttered under laboratory conditions.

The structure of this chapter is as follows. Section 2.2 provides an overview of previous work on EP prosody. Section 2.3 is devoted to our analysis of prosodic phrasing and intonation, focusing on prosodic structure and its interaction with intonation, as well as on the account of the intonational features of the main sentence types and the prosodic reflexes of focus. Section 2.4 describes briefly some critical

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differences in phrasing and intonation patterns across varieties of Portuguese. Finally, section 2.5 summarizes the principal findings and highlights a few challenges for future research.

2.2 Previous work on EP prosody

In earlier work on EP prosody, there is much disagreement on the definition of prosodic constituents, on the definition of intonation, on the linguistic status of intonational phenomena, and the ways these phenomena are examined (see Frota 2000: sections 1.5–1.6 for an overview). Viana (1987) is the first work on the intonation of EP that combines the goal of providing a phonological description with the goal of presenting phonetic evidence for the intonational categories proposed. After this pioneering work, during the 1990s authors have concentrated mostly on the description of declarative intonation (Frota 1993, 2000; Falé 1995; Vigário 1997, 1998; Mata 1999; Frota & Vigário 2000). Specific work addressing crucial issues to intonational phonology analyzes, such as the typology of pitch accents and edge tones assumed to account for a given contour, and the details of association and alignment of tonal events with the segmental string, as well as the details of scaling, has only emerged in the last decade (Frota 1997b, 2000, 2002a,b, 2003; Grønnum & Viana 1999; Frota et al. 2007). Similarly, the extension of the analysis to other sentence types, namely question intonation, and to different varieties of Portuguese is fairly recent (Frota 2002b; Frota & Vigário 2000, 2007; Tenani 2002; Vigário & Frota 2003; Fernandes 2007).

Work on the prosodic structure of EP where segmental, durational, and intonational evidence for phrasing are discussed has appeared in the 1990s (Frota 1993, 1996; Ellison & Viana 1996; Vigário 1997, 1998). A thorough description of prosodic phrasing above the word level, including the effects of focus, is found in Frota (2000, 2002c). An account of the prosodic word and the phrasing between the word and the phonological phrase is provided in Vigário (2003). More recently, the interaction between syntactic and prosodic factors and the patterns of intonational phrasing has also been inspected (Elordieta, Frota, & Vigário 2005; Frota & Vigário 2007).

In the following sections of this chapter, the key findings of previous work are described where relevant, as well as the main points of agreement and/or dispute across studies.

2.3 Prosodic Phrasing and Intonation in EP

EP has a prosodic system that deviates in some important aspects from the “typical” prosody of Romance languages (such as Italian or Spanish), both with respect to prosodic structure and intonation. Section 2.3.2 examines the prosodic structure of EP, the (non-)effect of focus on prosodic phrasing, and the relation between phrasing
domains and the assignment and distribution of pitch accents. Section 2.3.3 proposes an account of the intonation of the main sentence types, including neutral renditions and the expression of focus. Before introducing the prosodic structure of EP, the data and data collection procedure are described in section 2.3.1.

2.3.1 Data and methodological procedures
The analysis presented here has been developed on the basis of several corpora of spoken EP especially collected for this purpose, including data from seven different speakers. Over 3500 utterances have been inspected, both auditorily and acoustically (by means of wideband spectrograms, spectral analysis, and F0 contours—see Frota 2000, 2002a, 2003; Frota & Vigário 2007, for a full description of the analysis procedures). The corpora consist of read speech materials collected under laboratory conditions and designed to specifically address issues of segmental realization (as in the case of sandhi phenomena constrained by prosodic domains), of duration contrasts (as in the case of boundary-induced lengthening), and of intonational phenomena (as in the case of alignment of tonal events relative to heads and edges of prosodic phrases). Both neutral renditions and renditions in which a particular constituent is focalized and thus a broad focus reading is lost in favor of a narrow/contrastive focus reading, were obtained: the former have been elicited as out-of-the-blue utterances or all-new utterances triggered by context; the latter have been uttered in response to an eliciting context that triggered the focus. The focus eliciting contexts have been previously assessed by an independent group of subjects, and the focus utterances obtained have been judged as conveying the intended meaning by a different group of listeners (for a full description of the general data collection procedure, see Frota 2000). Utterances pertaining to the various sentences types, such as yes-no questions, imperatives, or the vocative chant have also been obtained by means of eliciting contexts and judged by independent listeners to be naturally sounding.

2.3.2 Prosodic Structure
In the analysis adopted here, an integrated view of prosodic structure is assumed in the sense that the same hierarchical structure defines the domains of external sandhi, of final lengthening, and the domains relevant for intonation. Evidence strongly suggests that such is the case in EP (Frota 2000), similarly to reports for other languages (Bengali–Hayes & Lahiri 1991a; Korean–Jun 1996, 1998; Egyptian Arabic–Hellmuth 2007). Thus, intonational phenomena are just one of the possible ways in which the prosodic hierarchy manifests itself. EP has three prosodic constituents at and above the word level: the prosodic word, the phonological phrase, and the intonational phrase. Evidence in support of these three prosodic constituents is described in the following sections.
The prosodic word

The prosodic word (henceforth PW) consists of a stem plus suffixes. Clitics (that is, stressless items) are incorporated into the host PW when enclitics, and proclitics as well as prefixes are adjoined to the following PW. Prosodic words in EP may contain from one up to more than three syllables (even if clitics are excluded), and monosyllabic words with open syllables are also present in the lexicon (Frota, Vigário, & Martins 2006). Evidence for the PW comprises edge-related phenomena (signaling both the left and the right edges of PW), word-bound phenomena (phenomena that select the PW as their domain, such as clipping and deletion under identity), and prominence-related phenomena. These phenomena are illustrated in (1) to (5) below. The full set of tests available as diagnostics for the PW is described in Vigário (2003).

(1) Phonotactic constraints at the left-edge
   
   *erguer *[iɾ.'ger] vs. perder [piɾ.'der] “to raise”/“to loose”

(2) Non-raising of PW-initial stressless vowels
   
   erguer [eɾ.'ger] vs. roedor [ɾu.i.'dor] “raise”/“rodent”
   opinião [o.pi.ni.'ẽw] vs. miolinho [mi.u.'li.nu] “opinion”/“soft part of bread-DIM”

(3) Deletion of PW-final non-high palatal vowels (regardless of context)
   
   passe ['pas] vs. passemos [pne.‘sɛmu] / pasear [‘pɛsar]
   “to pass/pass-SUBJ-2PP, take a walk”

(4) Clipping as PW-deletion
   
   telemóvel > móvel (tele)pW móvel [%tele ‘mɔvɛl] “mobile”
   telefonía > “fonia” (telefonia) pW > “fonia” [tiliﬁ’niˀ] “radio”

A PW has only one stress, and thus every element bearing a morphologically/lexically assigned stress forms a PW on its own. PW stress is perceptually salient in EP, not only because the stressed syllable is signaled by longer duration, but also because there are many segmental processes that refer to the presence/absence of stress. One of these processes is phonological vowel reduction, namely centralization and raising of unstressed vowels, as shown in (5).

(5) Vowel reduction of unstressed vowels
   
   dé ['de] vs. de [di] “to give-SUBJ-3PSING/of”

Since a PW has only one stress, it may only bear one pitch accent (in EP, unlike in Brazilian Portuguese or Greek, only the lexically stressed syllable within the PW may be pitch accented (Frota & Vigário 2000; Tenani 2002; Arvaniti & Baltazani 2005). However, a PW does not need to be pitch accented in EP, and in fact most PWs in
prenuclear or postnuclear position are not accented (see 2.3.2.5). The first PW of the intonational phrase is the domain of realization of the (optional) phrasal tone H, which is associated to the left-edge of the intonational phrase (see 2.3.2.3, and Frota 2003).

The clustering of numerous phenomena signaling the PW in EP, as already described, is an important property of the language that makes it closer to Germanic than to other Romance languages (Vigário 2003; Vigário, Freitas, & Frota 2006).

2.3.2.2 Phonological phrase Like in many other languages, phonological phrase formation in EP applies within the maximal projection of a lexical head (Lex\textsuperscript{max}). A phonological phrase (PhP) in EP includes the lexical head, the elements on the head’s nonrecursive side within Lex\textsuperscript{max}, and a following nonbranching phrase also within the Lex\textsuperscript{max} domain. The inclusion of the latter reflects the presence of a weight condition on PhPs: if possible, a PhP should contain more material than a PW (Frota 2000). By default, prominence within the PhP is rightmost, that is, the final PW is the PhP-head. Evidence for this level of phrasing in EP comes from three sources, as illustrated in (6) to (8). The PhP bounds the operation of stress strengthening (a stress clash resolution process by lengthening of the first clashing syllable), as shown in (6) where “FÊ” is lengthened in (6b), but not in (6a).

(6) Stress strengthening
(stressed syllables in capitals; lengthening of the 1st stressed syllable signaled by underlining (see Frota 2000: Chapter 3 for the quantitative data analysis))

a. [ o caFÊ ]\text{PhP} LUta pelo prémio do produto mais qualificado
the coffee fights for the award of the product best qualified
[ o caFÊ ]\text{PhP} luTOU pelo prémio do produto mais qualificado
“Coffee is/was in the contest of the best product”

b. [ o caFÊ Luso ]\text{PhP} contém cevada de boa qualidade
the coffee lusitanian contains barley of good quality
[ o caFÊ lusiTAno ]\text{PhP} contém grãos de várias qualidades
“Lusitanian coffee contains barley of good quality/grains of various qualities”

It plays a crucial role in the definition of rhythmic constraints on the output of vowel sandhi (namely, vowel deletion is not allowed if the words involved are the heads of PhPs), as shown in (7) where blocking of vowel deletion in “dançaRIno” obtains in (7a), but not in “bailaRIno” in (7b).1

1 In EP vowel sandhi rules are domain span phenomena that apply within the intonational phrase and are constrained by rhythmic factors.
(7) Rhythmic constraints on vowel sandhi
(vowels affected underlined; stressed syllables in capitals; head of PhP in bold)

a. [ o dançaRino ]_{PhP} [ Ama ]_{PhP} [ a bailarina russa ]_{PhP} *dançarinama
   the dancer loves the ballerina Russian (<dançarino+ama)
   “The dancer loves the Russian ballerina”

b. [ o bailaRIno ]_{PhP} [ ANda SEMpre ]_{PhP} [ de limusine preta ]_{PhP}
   the dancer drives always by limousine black
   (bailarinanda) (<bailarino+anda)
   “The dancer always drives a black limousine”

Finally, the PhP accounts for the attested patterns of pitch accent distribution in
prenuclear position: under default prominence, if a PW is pitch-accented within a
PhP, this PW is the head of the phrase, and no PW may be accented if the head is not
accented as well (Frota 2000, 2003), as in (8) where “LÂmina” may not be pitch-
accented if “LONGa” does not bear a pitch accent.

(8) Patterns of pitch accent distribution (PhP head in bold)

[ a LÂmina LONGa ]_{PhP} é mais eficaz
   the blade long is more efficient
   No Yes "A long blade is more efficient"
   Yes Yes
   *Yes No

Unlike in many languages, however, the PhP in EP is not the domain of any sandhi
rule, does not exhibit temporal boundary marking (namely, there is no PhP-final
lengthening distinguishing the PW-level from the PhP-level. (See Frota 2000: Chapter 4)),
and does not have to be tonally marked. PhP-edges are not signaled by edge-tones in EP,
and PhPs need not be pitch accented (Vigário 1998; Frota 2000, 2002a, b (see also 2.3.2.5)).
The PhP-level has, therefore, subtle manifestations in the prosody of EP when compared to languages such as English, Italian, Greek, or
Bengali (Hayes & Lahiri 1991a; Ghini 1993; Arvaniti 1994; Grice 1995; Nespor &
Vogel 2007).

2.3.2.3 Intonational phrase  The intonational phrase (IP) groups all adjacent PhPs
within a root sentence; PhPs in a string not structurally attached to the sentence tree
form an independent IP on their own (e.g. parenthetical phrases, explicative phrases/
clauses, tags, vocatives, topics). IPs are constrained by weight conditions: long
phrases tend to be divided, balanced phrases or the longest phrase in the rightmost
position are preferred. Importantly, short IPs are not demoted to PhPs but they may
form a Compound IP-domain with an adjacent IP (Frota 2000). The length conditions
that trigger the division of long phrases into several IPs operate from left to
right, thus resulting in the (S)(VO) phrasing of SVO utterances when the subject is
more than eight syllables long (Elordieta, Frota, & Vigário 2005). The same kind of constraint seems to promote compound IPs: as in all the data reported in Frota (2000), the short IPs involved in compound phrasing crucially contain fewer than eight syllables. Evidence for compound IP phrasing is discussed later in this section. Prominence within the IP is rightmost, by default. That is the head of the final PhP gets IP-level prominence.

There is abundant evidence for this level of phrasing in EP. The IP bounds the application of many sandhi rules, such as Syllable Degemination, Vowel Merger, Vowel Deletion, Semivocalization, and Fricative Voicing. (See Frota 2000: Chapter 2, Vigário 2003: Chapter 3, and also (9) and (10) in this chapter). It is the domain for pre-boundary lengthening, it defines the locus for pauses, and it has a precise intonational definition: the intonational phrase is the domain of the minimal tune in EP, as only the IP-head must be pitch-accented (see also 2.3.2.5) and only the right-edge of the IP requires tonal boundary marking in the language. Further, the left-edge of the IP is optionally signaled by %H or by a phrasal H tone associated to this edge and realized within the domain of the first PW. (For a detailed analysis of IP-initial peaks, see Frota 2003; an example of left-edge tonal marking is given in section 2.3.3.1, Fig. 2.4). Another property of the IP left-edge is the strong tendency of proclitic words to appear realized in their non-reduced forms when IP-initial, as shown in (10) (Frota 2000: 251-253; Vigário 2003: Chapter 7).

The examples in (9) and (10) illustrate the patterns of intonational phrasing in EP already described. Evidence for phrasing comes from Fricative Voicing (a domain span phenomenon where word-final fricative followed by a word-initial vowel is realized as [z] within the IP versus [ʃ] at the juncture), presence/absence of pre-boundary lengthening (indicated by underlining of the stressed and post-stressed syllables) as well as of a boundary tone at the right-edge, and non-reduced/strong form realization of IP-initial clitics. As shown in (9b/c) or (9d/e), compound phrasing of IPs may obtain if a short IP is involved, in which case Fricative Voicing applies throughout any of the IPs and all the IP right-edges are marked by lengthening as well as by the presence of a boundary tone (see Fig. 2.1). The inner IP right-edge is different from the outer IP edge simply due to the degree of final lengthening (signaled by double underline for the stronger boundary in compound IPs) and the magnitude of pitch range in the boundary rise (illustrated in Fig. 2.1). In other words, the difference in realization between the inner and outer edges of compound IPs is a gradient one, expressed by the phonetic strength of the same types of cues, and not by a difference in the type of cues that signal the two phrases. This fact, together with the fact the compound IP phrasing is promoted under the

2 Weight conditions on compound IPs, however, require further investigation, as the data in Frota (2000), unlike in Elordieta et al. (2005), did not distinguish between number of syllables, number of prosodic words, and number of phonological phrases.
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same length conditions that trigger intonational phrasing in general (as mentioned), supports the compound IP analysis against a proposal of two different prosodic units (namely, an intermediate phrase and an IP).³

³ Note that the categorical blocking of Fricative Voicing only at the outer IP edge, and not at the inner edge, is an expected consequence of the domain span character of the phenomenon. Fricative Voicing
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Sónia Frota

   "The students have got good marks"

   "The students, as far as we know, have got good marks"


   "The foreign students in the Azores as far (we) know accepted to-come"


In (10), the independent IP-phrasing of a topic phrase, whether dislocated (10b) or in situ (10c), is shown by Fricative Voicing and percentage of realization of the clitic word aos "to-the" in its strong form [aw] or reduced form [ɔ] (data from Frota 2000; see also section 2.3.3.1, Fig. 2.5, for the intonation contour of example (10c)).

   "The Angolan women offered spices to the journalists" (80%)

   "To the journalists, the Angolan women offered spices" (88%)

   "The Angolan women offered spices, to the journalists" (92%)

It should be noted that if the properties of the PW and the PhP set EP apart from Romance languages, the same cannot be said about the IP as far as the segmental facts are concerned: in EP, like in other Romance languages but unlike in Germanic languages, the IP is the domain for resyllabification (Peperkamp 1997; Vigário 2003; Nespor & Vogel 2007).

2.3.2.4 Focus and prosodic phrasing In EP, the prosodic phrasing patterns described in the previous sections do not change under narrow or contrastive focus (Frota 2000, 2002c). Utterances obtained as answers to wh-questions, or elicited by means always applies within an IP domain, and being the inner IP within a larger IP domain (the compound phrase), Fricative Voicing should apply at the inner edge and only be blocked at the outer edge, which defines the maximal relevant domain for the rule.
of contexts that trigger contrastive focus interpretation (see 2.3.1) show the exact same phrasing as neutral (broad focus) utterances.

At the phonological phrase level, the stress strengthening facts described in section 2.3.2.2 (and illustrated by the examples in (6)) also hold under focus, showing that the distinction between within and across PhPs is maintained: for example, in (11) “fé” but not “lã” lengthens with respect to its focalized counterpart in a non-clashing sequence.

(11) Stress strengthening under focus

(stressed syllables in capitals; focus in bold; lengthening of the 1st stressed syllable signaled by underlining (see Frota 2000: Chapter 3 for the quantitative data analysis))

a. [ o caFFÉ LuSo ]\_{\text{PhP}}
   [ o caFFÉ lusITAno ]\_{\text{PhP}}
   the coffee Lusitanian “Lusitanian coffee”

b. [ O gaLÃ ]\_{\text{PhP}} ANda de porsche
   the hero drives by Porsche
   [ O gaLÃ ]\_{\text{PhP}} anDAva de porsche
   “The hero used to drive a Porsche”

In addition, the pitch contour of the fall associated with the focused word (to be fully described in section 2.3.3) remains constantly aligned with respect to the stressed syllable regardless of the number of either pretonic or post-tonic syllables and the number of syllables from a previous or a following PhP boundary (Frota 2002a). These facts also argue in favor of the absence of a new tonal boundary before or after focus.

At the intonational phrase level, focus was found not to affect the application of any of the sandhi rules that span the IP domain. This is illustrated in (12) by Fricative Voicing, that is not blocked either before or after focus (but is blocked in the case of topics, as shown in (10); in (12) boldface signals focus). Further, the percentage of realization of the clitic aos “to-the” in its weak form also shows the absence of an IP-boundary before focus in (12b), contrasting with the IP-boundary before the topic in (10c).

(12) a. [ a[z] angolana[z] ofereceram especiaria[z] aos jornalista[ʃ] ]\_{\text{IP}}
   the Angolan offered spices to-the journalists
   “(It were the) The Angolan women (that) offered spices to the journalists”

b. [ a[z] angolana[z] ofereceram especiaria[z] [ɔʃ] jornalista[ʃ] ]\_{\text{IP}}
   “The Angolan women offered spices to the journalists” (88%)

The identity in intonational phrasing between focus and neutral utterances against utterances with a topic is further supported by tonal facts: (i) the pitch falls to the bottom of the speaker’s range either before or after a topic, but not before or after a
focus; (ii) there is always a pitch rise (or reset) after a topic, but never after a focus (examples are provided in Figs. 2.5 and 2.7 in section 2.3.3).

2.3.2.5 Phrasing domains and pitch accents One of the distinguishing prosodic features of EP, in particular among Romance languages, is the sparseness of pitch accents within the IP. This is a result of two conjoined facts: length of prosodic phrases and pitch accent distribution.

As already mentioned, intonational phrases in EP are mapped from root sentences, and thus it is rather common that subjects, verbs, and objects (even sentential ones) are joined together in the same IP. While very long subjects tend to form an IP on their own, the same does not happen to very long objects, which tend to phrase with the verb (Elordieta, Frota, & Vigário 2005). Therefore, an IP may consist of more than 9 PWs, and in a corpus of utterances with the average length of 5.2 PWs, 54.4% of the IPs produced have 4 or more PWs (the numbers are based on the data in Elordieta et al. 2005 and Frota & Vigário 2007).

Only an IP-head, as noted already, must be pitch-accented in EP. Prosodic words need not be so. Heads of PhPs also do not require a pitch accent. Indeed, only 17% of IP-internal stressed syllables were pitch accented in a corpus of utterances with three to eight prosodic words (Vigário & Frota 2003). In Hellmuth’s (2007) terms, the relevant domain for pitch accent distribution in (Standard) EP is the intonational phrase. This, together with IP-length, accounts for the sparse distribution of pitch accents in the language. Other varieties of Portuguese may show a richer pitch accent distribution, similar to other Romance languages, either because intonational phrases are smaller and/or the relevant domain for pitch accent distribution is smaller (the PhP or even the PW). I will go back to this point in section 2.4.

2.3.3 Intonational analysis

For the intonational analysis of European Portuguese, we recognize two types of tonal events: pitch accents, which associate to stressed syllables, and edge tones, which show a peripheral association to intonational phrase edges. In EP, there is no evidence for phrase accents, nor for another prosodic phrase, besides the intonational phrase, whose edges are tonally marked. The tonal events of the language behave as morphemes that encode semantic/pragmatic information, whether in isolation or in combination in a given tune. In the next sections, the intonation of the main sentence types is described, as well as the interaction between prominence, intonation, and focus.

It is important to recall that IP-edges are not only the only ones to be tonally marked, but they are also the only ones signaled by final lengthening. In the particular circumstances where compound IP-phrasing obtains (see section 2.3.2.3), the properties that define IP-edges are present in both the inner and outer edges of the IPs, but manifest themselves with different strength. Thus the difference between an inner IP and an outer IP is a gradient one, whereas the distinction between an IP and a PhP involves a contrast in type, that is a different prosodic category. On categorical and gradient differences in phrasing, see Frota (2012a).
2.3.3.1 Declaratives  All known descriptions of declarative intonation in EP (Viana 1987; Vigário 1998; Grønnum & Viana 1999; Frota 2000, 2002a, 2002b, inter alia) characterize the declarative contour as consisting of an initial rise and a final fall. In work on EP intonation couched within the autosegmental-metrical theory, the initial peak has been shown to pertain either to an accentual tone associated to the first stressed syllable (usually H* or L*+H), to an initial boundary tone (%H), or to a phrase initial H tone with a secondary association to the first PW (Frota 2003). Notably, all three categories of initial peaks seem to function as delimitative marks of the left-edge. The final fall has been described as containing an accentual Low target immediately preceded by a peak (H+L*), and followed by a Low boundary tone (e.g. Frota 2002a; Vigário & Frota 2003). The accentual fall occurs in the last stressed syllable of the IP, that is the IP-head. As described in section 2.3.2.5, the stretch of the contour between the initial peak and the nuclear fall is usually accentless, thus showing a plateau-like shape. The sparseness of tonal events IP-internally, the initial accentual peak and the nuclear fall that characterize neutral declaratives are illustrated in Figs. 2.2 and 2.3. Fig. 2.4 provides an example of the phrase initial H tone, which is always realized within the domain of the first prosodic word and usually on the second or third syllables irrespective of stress.5

![Figure 2.2 Fo contour of the utterance “o POEta canTOU uma maNHÃ angelical” (the poet sang a morning angelic, “The poet sang an angelic morning”), produced as a neutral declarative. Here and elsewhere in the example sentences capital letters indicate word stressed syllables.](image)

5 The phrase initial H, %H, and H* are distinguished by their alignment patterns and distributional properties: the first shows variable alignment within the domain of the initial PW and may not co-occur
Figure 2.3 Fo contour of the utterance “a LOUra graVAva uma meloDla maraviLHOsa do lagaREIro” (the blond girl recorded a song wonderful from the olive-pressman, “The blond girl recorded a wonderful song from the olive-pressman”), produced as a neutral declarative.

Figure 2.4 Fo contour of the utterance “o namoRAdo megalÔmano da brasILEIra miRAva moREnas” (the boyfriend megalomaniac of-the Brazilian-girl looked-at dark-haired-women, “The Brazilian girl’s megalomaniac boyfriend looked at the dark-haired women”), produced as a neutral declarative and showing phrasing into two intonational phrases due to the presence of the long subject.

with H* or any other accent in the first PW; %H is typically aligned with the first or second syllable in the IP (regardless of the stress pattern and PW status); finally, H* typically aligns with the stressed syllable or the following syllable in the case of late alignment. A detailed analysis of these properties is provided in Frota (2003).
In declarative utterances comprising several intonational phrases, such as those that include parenthetical expressions, a topic phrase, or a long subject, the right-edge of each IP is marked by a boundary tone: usually, utterance-initial IPs and even medial IPs (like in parentheticals) are signaled by a High boundary (H%), whereas utterance-final IPs are naturally signaled by a Low boundary (L%), as well as some non-final IPs like the one that precedes a topic phrase. Examples of typical continuation rise contours found in non-final IPs are given in Figs. 2.1 and 2.2.4 (see also Frota et al. 2007). Fig. 2.5 illustrates the typical contour of utterances with a final topic.

The neutral declarative intonation just described, with its H+L* L% nuclear contour, contrasts with the contour of declarative utterances in which a particular constituent is focalized, and thus the neutral/broad focus reading is lost in favor of a narrow/contrastive focus reading. The focus contour is characterized by a peak on the stressed syllable of the focalized word, immediately followed by a fall. The contrast between the neutral contour and the focus contour is depicted in Fig. 2.6. Crucially, the two contours differ in the location of the peak and the fall relative to the nuclear syllable (H+L* versus H*+L). The realization of the peak within the nuclear syllable in the focus contour, as well as the tight timing relationship between the peak and the Low are independent of the late or early position of the focus in the utterance. Furthermore, this pattern is consistent, regardless of the number of pre or post-tonic

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Arguments for the presence of L% at the right-edge of IPs, and against the absence of a tonal target (0%), are found in Vigário 1998; Frota 2000, 2002a.)
syllables in the nuclear word, and of the distance from and to a phrase boundary (as quantitatively shown in Frota 2002a). This is illustrated by the contours in Fig. 2.7 and 2.8.

We saw in section 2.3.2.4 that the presence of a focus does not change the prosodic phrasing patterns regularly obtained in neutral utterances. However, it does have an
effect on phrasal prominence and intonation: (i) the focus is the IP-head irrespective of the (early or late) position in which it occurs in the IP (i.e. there is no edge-alignment of focus with a prosodic phrase in EP); (ii) focus prominence is always signaled by lengthening, and late focus lengthening was found to be significantly longer from default prominence lengthening (Frota 2000: Chapter 5); (iii) focus is tonally expressed by means of a particular pitch accent, H*+L. 7 The EP data argue for a prominence-based account of the prosodic reflexes of focus, being the tonal effects predictable consequences of focus prominence (Frota 2000, 2002c; a proposal along these lines is also developed in Selkirk 2005).

Besides inducing the presence of a special pitch accent, focus prominence also triggers (postnuclear) pitch accent subordination in EP. This is shown in Figs. 2.7 and 2.8. In the contour in Fig. 2.8 in particular, where the early nucleus is not too far away from the last stressed syllable of the IP, the presence of a postnuclear accent on this syllable is clear. 8 The postnuclear accent is always (a reduced) H+L*.

2.3.3.2 Questions In this section, the intonation of wh-questions, neutral yes-no questions, and focused yes-no questions is described. While wh-questions are

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7 A pilot perception study reported in Frota (2000: Chapter 6) shows that subjects reliably distinguish focus prominence from neutral prominence. The categorical nature of the neutral/focus contrast was investigated in Frota (2002b), providing experimental evidence for the perceptual contrast between H+L* and H*+L.

8 The postnuclear fall occurs on the last stressed syllable irrespective of its position relative to the boundary. In other words, the fall cannot be accounted for by L%.
syntactically and lexically marked in EP, yes-no questions show the same surface syntactic properties as declaratives, and have no lexical marker.

Descriptions of question intonation in EP, whether from a phonetic (Viana 1987; Falé 2005) or phonological point of view (Cruz-Ferreira 1980, 1998; Viana 1987; Frota 2002b; Vigário & Frota 2003), point to similarities between wh-questions and declaratives. In either case, the prenuclear contour shows a high plateau and the nuclear contour consists of a sharp final fall in the last stressed syllable of the IP (H+L* L%). An example of the wh-question contour is provided in Fig. 2.9. A variant of the wh-question contour, which adds additional politeness to the question, shows a final rise after the accentual fall, instead of the low ending, similarly to the intonation of yes-no questions (Cruz-Ferreira 1980, 1998; Frota 2002b; Arvaniti & Baltazani 2005 report similar facts for Greek).

The distinctive feature of yes-no questions with respect to declaratives is the obligatory final rise. The shape of the remnant contour, however, is similar to both the declarative and wh-question tunes (Figs. 2.10–2.12): the prenuclear contour typically consists of a high plateau, and the nuclear syllable shows a sharp fall (H+L*). The rise that follows the accentual fall clearly has a boundary nature, as both the beginning and end of the rise are aligned with respectively the left and right edges of the boundary syllable (Figs. 2.10–2.12). In addition, it is not the case that the Low edge-tone spreads to the left, thus controlling the pitch between the pitch accent and the boundary as expected from a Low phrase accent (e.g. Beckman & Pierrehumbert 1986; Beckman, Hirschberg, & Shattuck-Hufnagel 2005). What is found in EP is simple interpolation between the accentual H+L* and the bitonal boundary tone, LH% (as shown in Figs. 2.11 and 2.12, and like in Bengali–Hayes & Lahiri 1991a). If there

\[\text{FIGURE 2.9} \quad \text{F}0 \text{ contour of the utterance “QUEM pinTOU uma maNHÃ ÂMbar?” (who painted a morning amber, “Who painted an amber morning?”).}\]
is enough distance between the accentual low and the low boundary, the scaling of
the boundary tone is higher than that of the accentual tone (as illustrated in Fig.
2.12).

The contour of yes-no questions with an early focus provides further arguments for
the bitonal analysis of the boundary rise in questions.

As with declaratives, the contour of yes-no questions in which a particular
constituent is focalized contrasts with its neutral counterpart. The most salient
differences are the following: in focused questions, the nuclear syllable shows low-
rising pitch instead of the nuclear fall of neutral questions; in focused questions there
is either a boundary rise or a boundary fall, whereas the boundary rise is an obligatory feature of neutral questions.

The pitch of the nuclear accented syllable in the focus contour is low during a good portion of the syllable and then rises into the postnuclear syllable, irrespective of the position of the nuclear word in the PhP or in the IP, and regardless of the number of post-tonic syllables available, as shown in Figs. 2.13–2.15 (Fig. 2.13 can be compared to
FIGURE 2.14 Fo contour of the focused yes-no question “o galá ANda de PORsche?” (the hero goes by Porsche, “Does the hero drive a Porsche?”), with the focus on “o gala” (as uttered in the context I have seen that movie but I don’t remember who drives a Porsche).

FIGURE 2.15 Fo contour of the focused yes-no question “o POEta canTOU uma maNhÁ angeliCAL?” (the poet sang a morning angelic, “Did the poet sing an angelic morning?”), with the focus on “manhá” (as uttered in the context I’ve read that poem but I don’t remember what part of the day the poet describes as angelic).

its neutral counterpart in Fig. 2.11, and Fig. 2.15 with its neutral counterpart in Fig. 2.10). This tonal shape is thus described as a L*+H accent. If the focus in the yes-no question is final in the IP, a boundary fall follows (Fig. 2.13); if it is not final, then a boundary rise signals the right-edge of the IP (Figs. 2.14 and 2.15). The boundary rise shows the exact same properties described already for the bitonal...
LH% tone that characterizes neutral questions (namely, a gradual fall appears between the accent and boundary showing that the pitch is not controlled by the Low tone, and the steep boundary rise is located on the final syllable).

Similarly, the boundary fall in the late nucleus case is also located on the right-edge. Such a fall could result from either the transition of the high accentual target into a low boundary, or from the presence of a bitonal HL%. However, both alignment facts in the presence of additional post-stressed syllables and the height of the peak argue in favor of the bitonal boundary (Frota 2002b). The latter is illustrated in Fig. 2.13, where the final (accentual) peak is not only much higher than the first peak but also higher than the accentual peak in the early focus cases, a phonetic effect straightforwardly accounted for by upstep due to the presence of two successive high targets (L*+H HL%; for other cases of upstep in EP see Vigário 1998). The distribution “early focus plus boundary rise” versus “late focus plus boundary fall” may be understood under a pragmatic account of the focus marker (that is, the nuclear pitch accent), the interrogative marker (that is, the bitonal boundary tone), and the interaction between the two. A combination of the interrogative marker with the neutral accent indicates a broad yes-no question. The presence of the focus marker L*+H in a question indicates a focused question, that is a question where a specific constituent (the one bearing L*+H) is being questioned about. Thus the focus marker simultaneously carries the meaning interrogation, making the boundary rise redundant, in particular in the presence of a late nucleus. If the question focus is not final, then L*+H is farther away from the phrase edge and some ambiguity may arise as to the global status of the IP as a question. In this case, LH% clarifies the interrogative status of the IP (Frota 2002b).

Question intonation clearly shows that EP is not a truncation language. When a sequence of tones is linked to a single syllable (as in utterances that end in the nuclear syllable), the segmental string is extended to cope with tonal realization. There are two possible ways of extending the segmental string: by means of lengthening of the nuclear vowel (as in “cal” [ˈka:l] in Fig. 2.10), or by adding a new syllable via vowel epenthesis (a strategy available if a sonorant coda is present, as in “mar” that may be produced as [ˈmar], as in Fig. 2.16).

9 The alignment pattern for HL% differs slightly from that of LH%; in the boundary fall, the high target aligns with the prefinal syllable, whereas the low target aligns with the boundary syllable in the boundary rise.

10 Falé (2005) and Falé & Faria (2006) addressed the issue of perception of the declarative/interrogative distinction using the Categorical Perception paradigm. The identification results show that the distinction is categorical, whereas a consistent peak of discrimination in the cross-over between categories was not found. It is, however, important to note that stimuli manipulation did not take into account alignment of tonal targets, in particular the boundary rise was designed as continuous pitch rising from the last stressed vowel into the utterance edge.
Imperatives

In EP, imperative sentences, whether expressing commands or requests, are usually characterized by being verb-initial and by the use of the imperative mood and of the 2nd person in most of the cases. The intonation of imperative sentences is yet largely unstudied. The two phonological accounts available in the literature (Viana 1987; Cruz-Ferreira 1998) are sketchy, as this sentence type is just briefly mentioned and thus both phonological issues such as association and alignment of tonal events or the precise nature of the tonal categories, and pragmatic issues such as differences between commands and requests or other more subtle differences (e.g. insistence, politeness), are not addressed. Moreover, the descriptions disagree in that Viana approximates the intonation of commands to that of wh-questions, whereas Cruz-Ferreira mentions a nuclear low-falling tone that already begins at the bottom of the speaker’s range. In Falé (2005) and Falé & Faria (2007) the intonation of imperatives is studied from a pure phonetic viewpoint. The following two major findings are reported: the toplines of imperatives show higher Fo in the vicinity of the last stressed vowel than in declaratives; the contours of commands and requests have the same topline shape, but Fo is higher in commands. As the authors resort to stylized representations of the Fo contours as toplines on the basis of a selection of specific datapoints (no actual contours are given), the phonetic description is hard to interpret phonologically. To our knowledge, this section provides the first detailed phonological account of imperative intonation in EP. Both commands and requests are addressed, as well as more subtle pragmatic distinctions within requests.

The data analyzed show two main patterns, respectively illustrated in Figs. 2.17 and 2.18, and Figs. 2.19 and 2.20: (i) a Low nuclear accent on the last stressed syllable of the utterance, preceded by a peak on the first stressed syllable (H* L* L%); (ii) the use of...
the focus accents, already described for yes-no questions and declarative sentences, as the early nucleus on the verb (either L∗+H or H∗+L), or of H∗+L as the late nucleus on the verbal object (in either case the boundary tone is low). Crucially, the two patterns are not pragmatically equivalent: the first pattern expresses a request, whereas the second pattern expresses a command.
The most striking features of the first pattern (the request contour) are the following: the nuclear accent is L*, unlike in all the other sentence types previously described; the pitch within the nuclear vowel is all low (or just slightly falling during the first part of the vowel) and the vowel is lengthened; the pitch fall from the initial peak to L* starts on the 1st post-stressed syllable (or on the 2nd when the peak is

![Figure 2.19 Fo contour of the utterance “DÁ-me as LÂminas” (give-me the slides, “Give me the slides”), produced as a command (the average rating for this utterance in the perception task was 4.3).](image1)

![Figure 2.20 Fo contour of the utterance “DÁ-me as LÂminas” (give-me the slides, “Give me the slides”), produced as a command (the average rating for this utterance in the perception task was 4.1).](image2)
aligned later). Figs. 2.17 and 2.18 provide examples of these features. By contrast, in the second pattern (the command contour) the key feature is the presence of a focus accent. Like in other focused utterances, in commands the focus may also be early or late. Focus distribution seems to interact with the choice between the two focus accents available in the language: if focus is early, both the accent previously found on focused questions (L*+H) or the accent that signals focus in declaratives (H*+L) may be used (Fig. 2.19 and Fig. 2.21); if focus is late, only the latter is a possibility (see Fig. 2.20). This interaction is not surprising under the pragmatic account of the focus and interrogative markers put forward in section 2.3.2.2: in the EP intonational system, a late focus expressed by L*+H, followed by falling pitch, would also express interrogation; by contrast, an early focus conveyed by L*+H and not followed by the right-edge rise that marks interrogation but by a Low boundary instead, such as in the case of the command contour, may unambiguously express a command.

The pragmatic difference between the two types of contours described is clearly supported by perception data. A section of the imperative utterances, representing the two contour types (as well as more subtle pragmatic differences among requests that will be mentioned later), were included as items in a perception task (in a total of

11 Globally, and not considering the pitch accent association and alignment issues, as well as pitch accent status in the tune, this analysis is not too far from Viana's (1987) analysis of request/persuasion where the main tonal events are also an initial peak and a following low tone.

12 The question of whether in commands with an early focus (that is focus on the verb) a postnuclear accent may be present requires further research. If such a pitch accent is present, it is an L* as in the nucleus of requests, and thus pitch movement is not the best cue for it. However, preliminary data suggest that duration of the final stressed syllable may correlate with perceived postnuclear accent, as is the case in Fig. 2.21 but not in Fig. 2.19.
23 items). 15 subjects were asked to evaluate the items on a five-point scale. The scale includes three options for requests (stated as gentle request (1), request (2), and insistent request (3)) and two options for commands (stated as command (4) and strong command (5)). Thus the request dimension is defined around point two of the scale, whereas the command dimension is defined on the upper extreme of the scale. Items are randomized and the subjects listened to each of the 23 utterances twice. The results confirmed the pragmatic difference between the two types of tunes (see Fig. 2.22), by placing H* L* L% within the request dimension and the tunes with the focus accents within the command dimension (the difference in rating is significant: p = 0.0003).

The perception results also show more variation within the request dimension.13 The three options given to subjects are not the only factor behind this larger variation, as it is not the case that subjects systematically assigned the label “gentle request” to some of the utterances, or the label “insistent request” to other utterances. In fact, variation across subjects (and within subjects) is paramount in the request dimension. While this may mean that the labels provided are not the best to capture the more subtle pragmatic differences at hand, it may also mean that such differences are indeed harder to distinguish due to their more gradual-like (and perhaps also

13 In Falé & Faria’s (2007) study, and although the kind of perception task used is very different from the one I have applied, it is also reported that requests are more difficult to rate than orders (i.e. only 23% of the request items were considered good cases of requests contra 50% for the orders).
subjective-like) nature. An example of such a case is given in Fig. 2.23, where the H* L* L% contour is uttered with a much higher peak and longer vowel durations, adding a “begging” flavor to the request. These properties seem to be interpreted by some subjects as conveying a “gentle request”, by others as expressing an “insistent request”, and even as both one or the other by the same subject.

To conclude this section, the intonation of one-word imperatives is analyzed. The main features of both the request and command contours are maintained in one-word utterances: the former begin high, and the stressed syllable shows the nuclear L*, as well vowel lengthening; the latter begin low and the focus accent H*+L is associated to the stressed syllable (Fig. 2.24). The high beginning in the request contour strongly suggests that this tune requires a HL melody, that is realized as H* L* when more than one stressed syllable is available, and as an initial edge tone % H and L* if just one stressed syllable is present.

In EP, imperative intonation in both requests and commands is crucially conveyed by pitch accent choice and not by final boundary marking, unlike in languages such as Catalan, Greek, Korean, or Chickasau, which highly differ in their prosodic and intonation systems but share the use of boundary marking (LHL% or HL%) in the intonation of requests and/or commands (respectively, Prieto 2004; Prieto et al. 2007; Arvaniti & Baltazini 2005; Jun 2005; Gordon 2005).14

Interestingly, in a very few cases a reduced rise-fall (!HL%) follows the nuclear L*, adding an insistent note to the request. So, it may well be that in EP boundary marking is subsidiary to request intonation and used to signal more subtle pragmatic differences within the request dimension.
2.3.3.4 Vocative chant  The intonation of calling has not attracted the attention of researchers on EP prosody. This section thus provides the first phonetic and phonological description of calling contours in this language. Calling contours have been shown to have strong similarities across European languages, but also systematic differences in tune-text association that apparently reflect language-specific structural properties, and specific languages may use different variants of the calling contour linked to particular pragmatic meanings (Gussenhoven 1993; Ladd 1996; Prieto 2002).

In EP, there are two variants of the calling contour: the sustained pitch variant (the typical vocative chant), characterized by high pitch on the nuclear syllable and a downward step into the first post-tonic syllable after which the pitch level is sustained until the end of the contour; the low pitch variant (low vocative chant), also characterized by high pitch on the nuclear syllable, immediately followed by a gradual fall until the end of contour. The two variants are pragmatically distinct: the low vocative chant expresses an insisting impatient call that would be pragmatically inadequate if used as an instance of a greeting or first call. Examples of the two calling contours are given in Figs. 2.25–2.29.

The patterns of tonal alignment in the typical variant of the vocative chant are as follows. The peak is always attained in the nuclear vowel, irrespective of number of pre-stressed syllables (from 0 to 3, in our data) and the sustained pitch usually aligns with the beginning of the first post-tonic syllable. The rise to the nuclear peak may start from the beginning of the utterance (as in Fig. 2.27) or be aligned to the left edge of the nuclear syllable (as in Fig. 2.28), thus suggesting the optional presence of a low
prefix to the nuclear peak. In the greeting call, the nuclear syllable and most particularly the boundary syllable are lengthened. Importantly, the requirement for extended duration of the boundary syllable blocks post-tonic phonetic vowel reduction or even vowel deletion (as in the case of [u] and [i]) that generally characterize

\[15\] This additional low target has apparently no consequences for the pragmatic meaning of the contour. For these cases I adopt the \((L+)H^*\) label to make clear that the prefix is optional and that the accent with the prefix is a phonetic variant of \(H^*\):
the language (Vigário 2003: Chapter 7). Consequently, in calling sequences final unstressed vowels are necessarily fully realized, as shown in “Maximilian[ʊ]” (Figs. 2.27 and 2.28) and “Álvar[ʊ]” (Fig. 2.29). The same lengthening requirement leads to the split up of the nuclear syllable when no post-tonic syllable is available, as in “João” [ˈʒɔjɐ] (Fig. 2.25). In the case of VV sequences that yield diphthongs, another splitting option is available by the realization of the high V as a full vowel instead of a glide, as in [ˈʒɐu]. Given the properties just described, the greeting call is analyzed as (L+)*H% !H%, with spreading of !H% in the post-tonic stretch.
The extended duration of the boundary syllable is taken to go hand in hand with the special nature of !H% in this contour: this is the only edge tone that clearly shows a spreading behavior in EP. Although the issue requires further inspection, the spreading nature of this tone may be argued to be phonological, due to the consequences it has for phonetic vowel reduction and deletion, and diphthongization.  

The low vocative chant also shows a peak in the nuclear vowel, and similarly to the greeting call, the rise to the peak may start from the beginning of the utterance or just before the nuclear syllable. However, unlike in the greeting call, the peak is followed by falling pitch: the fall may start already in the nuclear vowel and reaches its endpoint on the final syllable (Figs. 2.26, 2.27, and 2.29). Also unlike in the greeting call, there is no split up of the nuclear syllable if no post-tonic syllable is available: in this case, both the peak and the fall are realized in the nuclear syllable (Fig. 2.25). In the low vocative chant, the boundary syllable does not exhibit the extended duration that characterizes it in the H* !H% contour: a comparison of the absolute duration of the boundary syllable in both contours in multisyllabic utterances by the same speaker shows that in H* !H% this syllable is 218 ms longer on average; in monosyllabic utterances the syllable is 97 ms longer on average. Overall, across multisyllabic utterances and speakers, the final syllable takes on average 48% of the duration of the whole word in the H* !H% contour contra 35% in the low vocative chant. Given the properties just described, this variant of the vocative chant is analyzed as (L+)H* L%. The two variants are thus distinguished by type of boundary...

![Figure 2.29](image-url)  
**Figure 2.29** Fo contour of the utterances “Álvaro” (“Alvaro”), produced as a greeting/first call, and “MÔnica” (“Monica”), produced as an insisting impatient call.

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16 Hayes & Lahiri (1991b) have argued for phonological lengthening as a feature of the calling contour, as it neutralizes the distinction between long and short vowels in the languages analyzed.
marking: the greeting call shows !H% with its special spreading and lengthening features, whereas the low vocative chant uses L%, the same boundary tone found in many other tunes (as in declaratives, wh-questions, or imperatives).

The melody of the low vocative chant can be contrasted with the focus accent H*+L described in section 2.3.3.1. Both melodies show the same two high and low tonal targets, with the peak aligned with the nuclear syllable (see, respectively, Fig. 2.26 and Fig. 2.6). However, in the focus accent the pitch in the syllable that immediately follows the stress falls more abruptly regardless of the number of post-tonic syllables (section 2.3.3.1 and Frota 2002a); in the calling contour, by contrast, the pitch fall is less steep the more the nuclear syllable is farther away from the boundary (see, for example, the gradual fall in the contour of \[m\text{o}ni.k\] in Fig. 2.29). This is exactly as expected in a contour where the accentual peak and the fall are independent tonal events associated with different sites in the prosodic structure of the utterance, as in the low vocative chant.

2.3.3.5 Intonational analysis: summary In Table 2.1, the properties of commonly occurring EP tunes are summarized. For ease of reference and cross-checking, the numbers of Figures with relevant exemplification are added, as well as the indication of the nuclear words in the examples (with the stressed syllable in capitals). The schematic representation of the realization of nuclear contours assumes a stressed syllable (signaled by the box) and a following syllable.

2.4 Prosodic phrasing and intonation across varieties

This section describes briefly some critical differences on phrasing and intonation patterns across varieties of Portuguese. The standard variety, which is the focus of this chapter, is compared to the Northern variety (as spoken in the urban area of Braga) with respect to declarative and question intonation, as well as pitch accent choices and prosodic phrasing patterns in declaratives (Vigário & Frota 2003; Frota & Vigário 2007; Frota et al. 2007). The standard European variety is also compared with the Brazilian variety (as spoken in S. Paulo) with regard to declarative intonation (Frota & Vigário 2000; Tenani 2002; Fernandes 2007).

It was shown in section 2.3 that H+L* is the nuclear accent in the neutral declarative, wh-question and neutral yes-no question tunes in the standard variety. In Northern EP (hereafter NEP), this role has been shown to be played by L* instead (Vigário & Frota 2003): L* L% is the most common nuclear contour of both declaratives and wh-questions, and L* HL% the most common nuclear contour of

17 In measurements over a sample of ten nuclear words with antepenultimate stress, it was found that while more than 55% of the fall occurs within the first post-tonic syllable in H*+L, only 30% of the fall occurs in the first post-tonic in H* L%. In the latter case the fall is spread between the stressed syllable and the boundary syllable (respectively, 25%, 30%, and 45% for the antepenult, penult, and final syllables).
TABLE 2.1 EP tunes: labels, realization of the nuclear contour, usage

<table>
<thead>
<tr>
<th>Labels</th>
<th>Realization</th>
<th>Context/ Meaning</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>(H) H+L* L%</td>
<td>Neutral declarative</td>
<td>Fig. 2.2: angeliCAL</td>
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<td>Fig. 2.3: lagaREIro</td>
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<td>Fig. 2.4: moREnas</td>
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<td>Fig. 2.6: caSAram</td>
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<td>Fig. 2.5: jornaLIStas</td>
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<tr>
<td>(H) H*+L L%</td>
<td>Focused declarative</td>
<td>Fig. 2.6: caSAram</td>
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<tr>
<td>(H) H*+L !H+L* L%</td>
<td>Early focus</td>
<td>Fig. 2.7: angolAnas (final PW: jornaLIStas)</td>
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<td>Fig. 2.8: maNHÃ (final PW: angeliCAL)</td>
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<tr>
<td>L*+H H%</td>
<td>Continuation Parenthetical</td>
<td>Fig. 2.4: brasiLEIra</td>
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<td>Fig. 2.1: saBEmos</td>
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<tr>
<td>(H) H+L* L%</td>
<td>Wh-question</td>
<td>Fig. 2.9: ÂMbar</td>
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<td>(H) H+L* LH%</td>
<td>Neutral yes-no question</td>
<td>Fig. 2.10: angeliCAL</td>
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<td>Fig. 2.16: MAR</td>
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<td>Fig. 2.11: LÂminas</td>
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<td>Fig. 2.12: LEram-no-la</td>
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<tr>
<td>(H) L*+H HL%</td>
<td>Focused yes-no question</td>
<td>Fig. 2.13: LÂminas</td>
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<tr>
<td>(H) L*+H LH%</td>
<td>Early focus (dashed line)</td>
<td>Fig. 2.14: gaLÁ (final PW: PORsche)</td>
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<td>Fig. 2.15: maNHÃ (final PW: angeliCAL)</td>
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<td>H* L* L%</td>
<td>Request (multiword)</td>
<td>Fig. 2.17: angeliCAL</td>
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<td>Fig. 2.18: MÁrio</td>
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<td>Fig. 2.23: ÂMbar</td>
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<td>%H L* L%</td>
<td>Request (one word)</td>
<td>Fig. 2.24: aJUda-me</td>
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<td>(H) H**+L L%</td>
<td>Command (late focus)</td>
<td>Fig. 2.20: LÂminas</td>
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<td>H**+L (L*) L%</td>
<td>Early focus</td>
<td>Fig. 2.21: reCEeba (final PW: jornaLIStas)</td>
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<tr>
<td>L**+H (L*) L%</td>
<td>Early focus</td>
<td>Fig. 2.19: DÁ-me (final PW: LÂminas)</td>
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<tr>
<td>(L+)H* !H%</td>
<td>Vocative chant (greeting)</td>
<td>Fig. 2.25: JOÃO</td>
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<td>Fig. 2.26: maRIAna</td>
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<td>Fig. 2.27: maximilIAano</td>
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<td>Fig. 2.28: MÁrio</td>
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<td>Fig. 2.29: ÁLvaro</td>
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<td>Fig. 2.25: JOÃO</td>
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<td>Fig. 2.26: maRIAna</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fig. 2.27: maximilIAano</td>
<td></td>
</tr>
<tr>
<td>(L+)H* L%</td>
<td>Low vocative chant (insisting call)</td>
<td>Fig. 2.29: MÔnica</td>
<td></td>
</tr>
</tbody>
</table>
yes-no questions. NEP also differs from the standard variety in its choice of nuclear
accents for utterance-internal IPs: while L*+H or H*+L are the common choices in
the former, in NEP the L* accent is also among the possible nuclear accents (Frota
et al. 2007). However, the most striking prosodic difference between NEP and the
standard variety seems to result from the length of prosodic phrases and the fact of
pitch accent distribution.

The most common intonational phrasing pattern in NEP declaratives consisting of
a subject, verb, and object is the phrasing of these utterances into two IPs—(S)
(VO)—and not into one IP, as in the standard variety. (See section 2.3.2.5; see also
Frota & Vigário 2007 for an account of the NEP phrasing pattern based on syntax-
phonology mapping constraints). Therefore, for the same corpus of utterances (with
an average length of 5.2 PWs), while in the standard variety 54.4% of the IPs produced
have four or more PWs (section 2.3.2.5), in NEP 50% of the IPs have less than three
PWs. The shorter phrases of NEP show a rich pitch accent distribution: 74% of IP-
internal stressed syllables were pitch accented in a corpus of utterances with three to
eight prosodic words, against only 17% in the standard variety (Vigário & Frota 2003).
It is thus clear that the relevant domain for pitch accent distribution in NEP is not the
IP, as in standard EP, but a smaller prosodic domain. The available evidence strongly
suggests that this domain is the phonological phrase, i.e. in NEP every PhP-head
must be pitch-accented.

In the Brazilian variety of Portuguese (henceforth BP), declaratives show the H+L*
L% nucleus as in standard EP (Frota & Vigário 2000; Tenani 2002; Fernandes 2007).
However, this is apparently the only common feature between BP and EP declarative
intonation, as BP, like NEP, is characterized by rich pitch accent distribution. In
Frota & Vigário’s (2000) data, 80% of all IP-internal PWs in BP are pitch-accented,
and the authors claim, together with Tenani (2002), that the presence of a pitch
accent signals a phonological phrase in BP.18

This brief description of prosodic and intonational variation within Portuguese
has shown that varieties of this language may differ at least in three dimensions of
variation: tonal inventory and respective pragmatic meanings of tonal morphemes,
prosodic phrasing, and pitch accent distribution.19 It has also made clear that the
sparseness of pitch accents that characterizes standard EP does not only distinguish
this language from other Romance languages, but also singles it out relative to other
varieties of the same language.

18 Further data inspection is required to determine whether the relevant domain for pitch accent
distribution in BP is not even smaller, i.e. the prosodic word, like in Egyptian Arabic (Hellmuth 2007).
19 A comprehensive study of prosodic variation in Portuguese is currently in progress, including
European, Brazilian and African varieties (see the Interactive Atlas of the Prosody of Portuguese). <http://
www.fl.ul.pt/LaboratorioFonetica/InAPoP/>
2.5 Summary and conclusion

In this chapter, I have presented an analysis of the prosodic and intonational structure of standard European Portuguese. The properties of the prosodic word, the phonological phrase, and the intonational phrase in this language are summarized in Table 2.2. The prosodic word is the domain for many segmental and prominence-related phenomena that make the phonology of the PW in EP closer to Germanic than to other Romance languages. Also unlike in many languages, including some of the Romance area, the phonological phrase in EP is not a domain for sandhi, does not show temporal boundary marking, and does not have to be tonally marked; in EP, the PhP only plays an important role in rhythmic and prominence related phenomena. The more subtle manifestations of the PhP in the prosody of EP contrast with the properties shown by the intonational phrase, which is the domain for sandhi phenomena, pre-boundary lengthening, tonal boundary marking, and pitch accent distribution. The latter property also singles out EP relative to other Romance languages. This property, together with a tendency to long prosodic phrases, yields one of the most salient prosodic features of EP: the sparseness of pitch accents within the intonational phrase.

The intonation system of the language was shown to consist of pitch accents and edge tones with a peripheral association to intonational phrase edges. The phrase accent category can be dispensed with in the intonational analysis of EP. A system of phonological contrasts between accentual tones, IP boundary tones, and their combinations accounts for all the contours examined, as well as their pragmatic meanings. The morphemic behavior of the tonal events is clearly exemplified in the way the language expresses focus prosodically. The presence of a narrow/contrastive focus in a sentence does not change the default phrasing patterns, whether at the phonological or intonational phrase levels. However, it does change both the sentence prominence and intonation: in particular, the IP-head under focus prominence bears a special pitch accent that contrasts with the nuclear accent under default or unmarked prominence. Another example of such morphemic status is the use of a particular type of tonal boundary marking to signal interrogation. The way in which the tonal and the segmental strings interact in EP also deserves a comment: the language does not truncate, but it seems also not to compress the tonal string; rather, the segmental string is extended to cope with tonal realization, either by means of vowel lengthening or by vowel epenthesis after a sonorant coda. In the particular case of the vocative chant, not only the vowel split into two vowels may occur, but also phonetic vowel reduction and vowel deletion, common elsewhere, are blocked.

Although the last few decades have seen much progress in the description and understanding of the intonational phonology of European Portuguese, there are still many unresolved issues and challenges for future research. Among the former are the...
### Table 2.2 EP prosodic structure: properties of the PW, PhP and IP

<table>
<thead>
<tr>
<th>Properties</th>
<th>Segmental</th>
<th>Durational</th>
<th>Tonal</th>
<th>Prominence</th>
</tr>
</thead>
<tbody>
<tr>
<td>PW</td>
<td><em>Edge phenomena:</em> phonotactic constraints, many segmental processes. <em>Phenomena targeting the PW:</em> clipping, deletion under identity</td>
<td>[not studied]</td>
<td>First PW of the IP is the domain for the optional phrasal tone H</td>
<td>Word stress: Many segmental processes that refer to presence/absence of word stress (e.g., vowel reduction)</td>
</tr>
<tr>
<td>PhP</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>Rightmost (default) PhP heads constrain the output of vowel sandhi</td>
</tr>
</tbody>
</table>
| IP         | *Domain for many segmental processes*  
             *Domain for resyllabification*  
             *Left edge:* reduced forms of proclitics are highly disfavored | Final lengthening  
             IP-edge:  
             Locus of pauses | Domain for pitch accent distribution: IP heads require a pitch accent  
             Right edge requires boundary tone  
             *Left edge* optionally marked | Rightmost (default) Focus prominence (not positional) |
phonetics and phonology of scaling and pitch register, upstep and downstep phenomena included, as well as the occurrence of post-focal accents in utterances other than declaratives. Among the latter, I would like to highlight those that are in my view the three main avenues for future research: (i) phrasing and intonation across varieties of Portuguese (extending the comparative work that began with Northern EP and BP as in work in progress within the *Interactive Atlas of the Prosody of Portuguese* project (Frota & Cruz 2012–2014)); (ii) phrasing and intonation across speech styles (together with the design of a set of conventions for labeling Portuguese intonation, as in work in progress within the P-ToBI project (Viana & Frota 2007)); and (iii) the acquisition and development of prosodic phrasing and intonation.
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http://seneca.uab.es/atlesentonacio/


