Intonational Phrasing in two varieties of European Portuguese

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1. Introduction

The placement of intonational boundaries has been known to be determined by various factors of different grammatical nature, from syntax to information structure, and from phonology to more speech-oriented choices. On the side of syntax, the boundaries of syntactic constituents, the relation between them – namely the head-complement relation – the domain of a maximal projection, or the branchingness status of a syntactic phrase have long been described as affecting intonational phrasing (Selkirk 1984, 1986, 2000, 2005; Nespor and Vogel 1986; Truckenbrodt 1999, among many others). Effects of information structure, and of focus in particular, have also been reported (Kanerva 1990; Vogel and Kenesei 1990; Steedman 1991; Truckenbrodt 1995; Selkirk 2005, inter alia). On the phonology side, prosodic weight or heaviness factors have been shown to play a crucial role. Prosodic heaviness may be expressed as length or size of prosodic phrases, as prosodic phrase complexity, or via the prominence level of the prosodic phrase (e.g. Ghini 1993; Frota and Vigário 1996, 2002; Guasti and Nespor 1999; Selkirk 2000, 2005; Jun 1996, 2003). Further, intonational phrasing is also known to be affected by factors such as speech rate and speech style (e.g. Nespor and Vogel 1986; Jun 1996, 2003). This complex situation is well expressed in Selkirk's (2005) opening statement: "The Intonational Phrase organization of a sentence is a hybrid beast".

In addition to being conditioned by all these different factors, the placement of intonational boundaries also shows language-particular preferences. For example, broad focus declarative sentences containing a subject, a verb and an object in that order (i.e. SVO), uttered at a normal rate in reading style, have been reported to be intonationally phrased as (S)(VO) or (SV)(O) in Catalan, depending on the size of the resulting prosodic units, whereas in Spanish (S)(VO) is prevalent and in Standard European Portuguese (SVO) is the basic pattern. None of the latter languages exhibits the (SV)(O) phrasing pattern (Elordieta, Frota, Prieto, and Vigário 2003; Elordieta, Frota, and Vigário 2005).

Despite all the evidence accumulated in the literature, studies that examine in a systematic fashion the import of the different factors behind the placement of intonational boundaries, by approaching intonational phrasing from an empirical perspective, are quite recent. Two examples of such studies are Jun's research project on prosodic phrasing in Korean (Jun 2002, 2003), and the Romance Languages intonational phrasing project (Elordieta et al. 2003; Elordieta, Frota, and Vigário 2005; D'Imperio, Elordieta, Frota, Prieto, and Vigário 2005). The present paper emerges from the latter project.

It is our goal in this paper to investigate the influence of syntactic and prosodic factors on intonational phrasing in two varieties of European Portuguese. The syntactic factor examined is syntactic complexity or branchingness, although other aspects of syntactic constituency will also come into play. Two prosodic factors are inspected: constituent length expressed in number of syllables, and prosodic complexity or branchingness. An effort has been made to disentangle syntactic complexity from prosodic complexity. The two varieties of European Portuguese studied are the Standard variety spoken in Lisbon (SEP) and the Northern urban variety spoken in Braga (NEP). Northern varieties have been generally characterised as more conservative than Central-Southern varieties, where SEP is included, showing traits closer to Spanish. This has long been described in dialectological work for segmental phonetic and phonology differences (Cintra 1971). For example, Northern varieties, similarly to Spanish, may show the presence of /tʃ/ and the absence of

phonological distinction between /v/ and /b/. More recently, a similar contrast between Northern EP and SEP has been proposed to hold also for features of the intonational system, namely the properties of pitch accent distribution and the choices of intonational phrasing (Vigário and Frota 2003). Again, Northern varieties display traits closer to Spanish, as shown by the presence of pitch accents in almost every lexically stressed syllable within a declarative sentence.

This paper is organised as follows. Section 2 summarises the main findings of recent work on the intonational phonology of European Portuguese, which are relevant to the present paper. Section 3 lays out the empirical basis of our approach to the study of intonational phrasing. In section 4, the intonational phrasing patterns of SEP and NEP are described. The effects of syntactic and prosodic factors are compared. Further, a typology of the boundary cues used in each variety, as well as their relative frequency, is given. In section 5, an account of intonational phrasing variation is proposed, within a constraint-based framework. It will be argued that the variation found is explained by the relative weight of two kinds of constraints: syntax-phonology interface constraints and prosodic constraints. Finally, the variation in the type/frequency of the boundary cues will be interpreted in the light of other properties of the intonational system of SEP and NEP.

2. On the intonation of European Portuguese

All known descriptions of declarative intonation in European Portuguese (Viana 1987; Vigário 1998; Grønnum and Viana 1999; Frota 2000, 2002a, 2002b, inter alia) characterise the edges of the declarative contour as consisting of an initial rise (on the left edge) and a final fall (on the right edge). In work on EP intonation couched within the autosegmental-metrical theory (cf. Pierrehumbert 1980; Beckman and Pierrehumbert 1986; Ladd 1996, among the landmarks in the development of this theoretical model), the initial peak has been shown to pertain either to an accentual tone (usually L*H or H*), or to a phrase initial tone (Frota 2003). The final fall has been described as containing an accentual Low target (L*), preceded by a peak and followed by a Low boundary tone (e.g. Frota 2002a; Vigário and Frota 2003).

The tonal events just described have also been shown to generally signal the edges of intonational phrases. Utterances with dislocated topic phrases (such as the subject noun phrase moved to utterance final position, or the object noun phrase placed in utterance initial position) and utterances containing parenthetical expressions provide the crucial data. Like in many other languages (see Nespor and Vogel 1986, among many others), topics and parenthetical expressions form separate intonational phrases in European Portuguese, as extensively shown in Frota (2000). Evidence for their prosodic phrasing as independent intonational phrases comes from both segmental facts, namely the blocking of sandhi rules across the prosodic boundary they induce, and intonational facts. The left-edge of intonational phrases, whether these phrases are initial, medial or final in the utterance, displays the same tonal rise that we described above. The right-edge of intonational phrases, if utterance final or located close to the end of the utterance, also shows the same final fall already described. If the intonational phrase is utterance initial, its right-edge is usually signalled by a rise instead of a fall. The most common pattern consists of an accentual rise followed by a High boundary tone (usually L*H H%), although an accentual fall followed by a high boundary tone is also possible (i.e. HL* H%). Other properties of intonational phrase breaks, irrespective of their location in the utterance, are final lengthening, expressed by the longer acoustic duration of the last stressed syllable and

post-tonic syllable(s) before the boundary, and the possible occurrence of an acoustic pause.

In European Portuguese, the possibility of an intonational break setting the subject noun phrase apart from the rest of the utterance (in subject-verb-object sentences) has been described, at least, since Viana (1987). In Frota (2000), this break was argued to be an intonational phrase break on the basis of segmental, intonation, and duration facts. This intonational break shows all the properties that characterise the prosodic breaks induced by parenthetical expressions, topic phrases, and the other phrases that precede/follow parenthetical expressions and topics within the same utterance.

3. Methods and materials

Our data is drawn from the Romance Languages Database (RLD), a comparable database of SVO sentences in Catalan, European Portuguese (both SEP and NEP), Italian and Spanish. The RLD was designed with exhaustive combinations of two constituent length conditions and seven syntactic branching conditions. Constituent length is measured in number of syllables with short constituents containing 3 syllables and long constituents containing 5 syllables (including function words). Subjects, verbs and objects may be either short or long. Syntactic complexity is measured by the absence/presence of branching in subjects and objects (i.e. Noun + Adjective, or N + Prepositional Phrase). The combinations of constituent length with syntactic branchingness result in *short non-branching* phrases (3 syllables), *short branching* phrases (5 syllables), short double branching phrases (9/10 syllables), *long non-branching* phrases (5 syllables), *long branching* (10 syllables) and *long double branching phrases* (15 syllables). Syntactic branchingness can be single or double (N + Adjective + Prepositional Phrase). In a subset of these materials, syntactic branchingness is substituted with prosodic branchingness. The later condition is obtained with structures consisting of two prosodic words which are syntactically non-branching, namely proper names and certain compounds. The different combinations of the various factors produce a total of 124 sentences (for further details, see D'Imperio et al. 2005). The examples in (1)–(2) illustrate how the several factors were manipulated:

(1) Syntactic Branching / Length
        a.   Non-branching Subject and Object --- SVO: Short-Short-Short
              A loura   mirava morenos.
              the blond-girl looked dark-haired-boys
              'The blond girl looked at dark-haired boys..
        b.   Non-branching Subject and Object --- SVO: Long-Short-Long
              A boliviana   falava do   namorado.
              the Bolivian-girl talked about-the boyfriend
              'The Bolivian girl talked about the boyfriend.'
        c.   Branching Subject and branching Object --- SVO: Short-Short-Short
              A nora   da mãe   mirava velhinhas lindas.
              the daughter-in-law of mother looked old-ladies beautiful
              'The daughter-in-law of (my) mother looked at beautiful old ladies.'

(2) Prosodic Branching / Length
        a.   Branching Subject and branching Object --- SVO: Short-Short-Short

O Neno Veiga gostava da Paula Moura.
the Neno Veiga liked of-the Paula Moura
'Neno Veiga liked Paula Moura.'
b.   Branching Subject and branching Object ---   SVO: Long-Short-Long
O ibéro-italiano falava do   macro-endividamento.
the Iberian-Italian talked about-the   macro- in debt
'The Iberian-Italian talked about the great debts (of his country).'

Two speakers of the same region read the sentences three times in random order, with distractor sentences in between target sentences. The sentences were read as all new information, that is, the readers were instructed to utter declarative sentences as if they were answers to questions like 'What happened?'. They were further instructed to read the sentences at their usual speaking rate.

Speakers were educated females in their 20s or 30s. The recordings took place in quiet rooms, using analogical recorders. They were later digitized for acoustic analysis into PCs, using SpeechStation2 (Sensimetrics). Prosodic analysis was done by at least two judges. After auditory assessment of each target utterance, a spectogram, waveform and pitch contour was produced. Following auditory and visual exploration of F0 contours, the pitch contours were phonologically transcribed according to the autosegmental-metrical model of intonation analysis and assuming as a baseline the proposals for EP in intonational phonology work on this language (see section 2 above and references therein). In our approach, intonational phrase boundaries were primarily determined according to a perception-based transcription. Cases where the two judges did not agree were acoustically inspected for intonational phrasing cues and a decision was taken on the basis of the presence/absence of clear phrasing cues. It is important to note that the intonational breaks at stake here are *major* intonational breaks, which correspond to the Intonational Phrase level, that is the kind of breaks that usually set off parenthetical expressions from their adjacent phrases within a sentence. This is clearly so for SEP, the variety which is best studied, as demonstrated in Frota (2000). All known facts indicate that the same holds for NEP. (In particular, distractor sentences including parentheticals do show similar intonational breaks).

The results discussed in section 4.1 are based on the full set of speech materials described above. Those described in section 4.2 are based on 250 utterances. For these utterances, a number of *F*0 and durational measurements were taken at the putative boundary location (see Frota, D'Imperio et al. 2005 for further details). The goal here is to establish for each variety which boundary cues are used, and determine their phonetic realisation.

4. Intonational phrasing in SEP and NEP: the data

4.1. Patterns of phrasing

This section reviews the results reported in D'Imperio et al. (2005) and discusses the role played by syntactic and prosodic factors in the phrasing tendencies shown by each variety.

Table 1 summarises the main results obtained for syntactic non-branching and branching conditions combined with the different constituent length conditions.

TABLE 1 ABOUT HERE

Both in SEP and NEP, only two phrasing patterns were attested: (SVO) and (S)(VO), indicating that no major intonational break is inserted in the first case, whereas an intonational break is inserted between subject and verb in the second case. However, nearly everything else is different in the patterns of phrasing shown by the two varieties.

In SEP, the prevailing pattern is clearly (SVO) in all the non-branching conditions and regardless of constituent length of either S or O. In the branching subject conditions, (SVO) still prevails. Only in the long branching S case does the (S)(VO) phrasing pattern rise above insignificant levels to 40%. NEP offers a very different picture. In this variety both (SVO) and (S)(VO) are found but the latter tends to occur more frequently in all conditions, with the exception of three non-branching subject conditions (and in two of them the two phrasing patterns tie). Still, even in these conditions the contrast between NEP and SEP is striking: 50% or 31% of (S)(VO) in NEP against 0% or 4% in SEP.

FIGURE 1 ABOUT HERE

Figure 1 illustrates the (S)(VO) pattern with a non-branching S and O in NEP. The contrast between the two varieties is depicted in Figure 2, by renditions of a sentence with a short non-branching S showing (SVO) in SEP and (S)(VO) in NEP.

FIGURE 2 ABOUT HERE

As noted above, in SEP the (S)(VO) pattern only starts to become relevant in the long branching subject condition (which is 10 syllables long). Long non-branching Ss and short branching Ss, both 5 syllables long, are similarly phrased as (SVO). The (S)(VO) pattern becomes the predominant one in the double branching S conditions, but with an important difference between the short and the long cases (respectively, 67% and 94%). Representative examples of the short branching S – with (SVO) phrasing – and the long double branching condition – with (S)(VO) phrasing – are given in Figure 3.

FIGURE 3 ABOUT HERE

The length effect that constrains the phrasing of the subject in SEP does not apply to the object. In fact, whether objects are short or long, and regardless of their syntactic branching status, intonational phrasing is not affected. Figure 4 illustrates (SVO) phrasing with a long double branching object.

FIGURE 4 ABOUT HERE

Although the (S)(VO) pattern is frequent in NEP, there are important differences to be noted among conditions. Unlike in SEP, syntactic branchingness is a relevant factor, as shown by the increase in (S)(VO) phrasing with short branching Ss relative to long non-branching Ss, both of which are 5 syllables long (respectively, 69% versus 46%, the average of the 3 conditions with long non-branching S). Also contrary to SEP, object length may be relevant to intonational phrasing, with long branching Os favouring (S)(VO) more than short branching Os.

Due to the effect of syntactic branchingness found in NEP, the question arises whether this effect is due to syntactic complexity or to prosodic complexity, as in our data syntactic branching entails prosodic branching. The results obtained for the prosodic branching conditions with non-branching syntax are shown in Table 2. These results provide a clear answer to the branchingness question. The presence of (S)(VO) phrasing in the prosodic branching conditions is similar to that found for the syntactic branching cases. The effect of branchingness in NEP is thus prosodic, and not syntactic, that is, it is prosodic complexity in number of prosodic words and not syntactic complexity in terms of phrasing structure that boosts the (S)(VO) pattern.[1]

TABLE 2 ABOUT HERE

The results in Table 2 also help to clarify the effect of constituent length in NEP. While length may play a role, both for O and S, its effect is not consistent across conditions. By contrast, the effect of prosodic branching looks more robust.

The two varieties of European Portuguese only show equivalent phrasing tendencies in the double branching subject condition. This is not surprising as this condition is simultaneously the longest – length being the key factor for SEP – and the prosodically most complex one – prosodic branching being the key factor for NEP.

4.1.1. Prosodic length and prosodic branchingness

The SEP results make clear that prosodic length is the relevant factor constraining intonational phrasing in this variety. Branchingness, whether syntactic or prosodic, is clearly not a main factor. Thus prosodic heaviness is computed on the basis of constituent length, here expressed in number of syllables.[2] It was seen that (S)(VO) starts being a frequent phrasing pattern only in the long branching S condition, that is when S is 10 syllables long. Subjects with smaller sizes, respectively 3 syllables and 5 syllables long in the short non-branching and long non-branching/short branching conditions do not trigger (S)(VO) phrasing. Therefore, in SEP the threshold for prosodic heaviness at the intonational phrase level lies somewhere between 6 and 9 syllables. A similar length effect in number of syllables has been found for Korean. Jun (2003) shows that two content words in the relevant syntactic configuration are joined in one accentual phrase if the sequence is up to 5 syllables long. Sequences with 6 and more syllables tend to be divided into two accentual phrases.

A further aspect of prosodic heaviness in SEP is its restriction to the subject. Objects do not count for prosodic heaviness, as O sequences may contain up to 15 syllables (as in the long double branching O condition) without affecting the phrasing pattern. In other words, prosodic heaviness behaves as an edge effect on the leftmost phrase of the utterance.

In NEP, by contrast, prosodic branchingness is the major factor constraining intonational phrasing. In this variety prosodic heaviness is thus computed on the basis of prosodic complexity. In our data, prosodic complexity amounts to the number of prosodic words. Complex sequences, that is, sequences with more than one prosodic word, are heavy and therefore promote the division of the utterance into two separate intonational phrases. A similar prosodic weight effect has been independently reported for a different kind of data in EP, namely Heavy NP Shift: shifted objects tend to be prosodically heavy and heaviness is expressed by prosodic branchingness, that is, the presence of more than a single prosodic word (Frota and Vigário 2002).

In both varieties of EP, surpassing the threshold for prosodic heaviness means increasing the tendency for (S)(VO) phrasing. Further, the more the limit is exceeded, the more the (S)(VO) phrasing prevails. This is shown in Figure 5.

FIGURE 5 ABOUT HERE

Figure 5 provides a summary of the main contrasts in intonational phrasing tendencies between the two varieties of EP. A fact emerges that is not due to the length or branchingness factors discussed above. The (S)(VO) phrasing shown by NEP in the short non-branching condition (NbS and NbL) is not, of course, a consequence of heaviness. For the time being, the factor(s) behind this phrasing pattern remain obscure. We will come back to this issue in section 5.

4.2. Boundary cues: type and frequency

It was just shown that SEP and NEP intonationally phrase their utterances in different ways. The question we will now address is whether the two varieties also mark their intonational breaks in different ways. In particular, we want to establish if there are phonological differences in the type of boundary cues used, and/or in the relative frequency of their use. Further, an inspection of the phonetic instantiation of the most frequent boundary markers will show whether differences, to the extent they are found, are mainly phonetic in nature.

Table 3 lists the boundary cues used in each variety, and their relative frequency. The boundary cues found were a continuation rise (a large F0 rise just before the break), sustained pitch (a continuous high pitch before the boundary), a High or Low boundary tone (irrespective of the shape of the pitch movement before the boundary), preboundary lengthening (a lengthening which is clearly perceived as such), an acoustic pause, pitch reset (the beginning of the second phrase at a higher level than the pitch level before the boundary would predict), and a drop in pitch to the base level.

TABLE 3 ABOUT HERE

It is clear that intonational breaks in both varieties of EP are usually marked by a High boundary tone which tends to be preceded by a rise on the last stressed syllable. This is a trait common to other Romance languages, as Catalan, Spanish, or Italian (Frota et al. 2005). Figures 1, 2 (panel B) and 3 (panel B) above, all provide illustrations of this type of boundary marking.

Besides the main boundary markers, the two varieties generally use the same cues, with the exception of sustained pitch between the (last) stressed syllable and the boundary syllable, which is specific to NEP. The presence of this high preboundary plateau correlates with an alignment pattern of the intonational phrase nuclear pitch accent, which is also NEP particular: the accentual high target is attained *within* the stressed syllable (at the end of the vowel) and the contour remains high in the posttonic. In SEP the accentual high is always realised in the posttonic. Figure 2 (panel B) shows a case with sustained pitch and the alignment pattern just described. This can be contrasted with the continuation rise in Figure 1, which displays the alignment pattern similar found in SEP. The contrast is represented in (3).

(3)   A nora   maravilhava velhinhas lindas (Figure 2, panel B)

|
LH*H%
'The daughter-in-law marveled beautiful old women.'
A loura   memorizava uma melodia   (Figure 1)
|
L*H H%
'The blond girl learned a song by heart.'

There are other similarities and differences in the frequency of boundary cues. The two varieties use a low boundary tone (in nearly all cases with a drop to the utterance base level) in about the same proportion. The same holds for pitch reset (defined here as a similar pitch beginning of the second intonational phrase relative to the first). The use of pitch reset is illustrated in Figure 6, which also exemplifies a case of multiple boundary marking with a continuation rise and also a pause.

FIGURE 6 ABOUT HERE

An important difference concerns the use of (perceived) preboundary lengthening in NEP in more than two-thirds of the data. The lengthening of the last stressed syllable and preboundary syllable is not only more frequent in NEP, but also larger. We compared the duration differences, relative to utterance duration, between renditions of the same sentence uttered with and without an intonational break. When a break is present, the preboundary stretch is on average 3.27% longer and 122 ms longer (in absolute duration) in NEP, whereas in SEP it is 1.44% and 50 ms longer in average. Also in NEP the last unstressed vowel (e.g. *namoradO*, *mulherengO*) is usually not deleted before a boundary, unlike in SEP, and a schwa is frequently inserted if the boundary syllable is a closed syllable (e.g. *mulheR* [mu.ʎɛ́.rɨ]). Figure 7 illustrates the relevance of preboundary lengthening, together with the realisation of the post-tonic, as a cue to intonational phrasing breaks in NEP. It should be further noted that besides preboundary lengthening, NEP is also characterised by a higher frequency of pauses than SEP.

FIGURE 7 ABOUT HERE

In short, the major intonational break marker in the two varieties is the same – a High boundary tone. This similarity co-exists with a few differences in boundary cue type and frequency, namely the use of sustained pitch (and LH* H%) in NEP, and the higher frequency of perceived boundary lengthening and pauses also in NEP.

An inspection of the phonetic instantiation of the most frequent boundary marker – the H boundary tone – shows that it is realised similarly in both varieties. We have calculated the ratios of the H boundary tone relative to the utterance first peak and to the utterance initial *F*0 value. The results obtained are given in Table 4. Again, the results are similar for both varieties.

TABLE 4 ABOUT HERE

Interestingly, recent work has shown that languages may differ not only in the phonology but also in the phonetics of intonational boundaries. For example, German and British English differ in the way they exploit the phonetic space of H% (Chen 2003), and Catalan and Spanish are characterised by higher high boundary tones than

European Portuguese (Frota et al. 2005). Our SEP and NEP data, however, suggest that this is not the case for the two varieties under study.

Summing up, SEP and NEP intonationally phrase their utterances in different ways, but tend to mark their intonational breaks in similar ways. The main differences found were the use of sustained pitch (and thus of the LH* H% tonal sequence), which is NEP particular, and the higher frequency of perceived preboundary lengthening and acoustic pauses that also characterises NEP.

5. An account of intonational phrasing

5.1. Syntax and phonology

In the previous sections, it was shown that various factors may contribute in different ways to the patterns of intonational phrasing found in a language or language variety. Furthermore, the variation in intonational phrasing seems to be gradient in nature, that is, given a certain combination of factors it is not always the case that a speaker phrases his/her utterances in exactly the same way. Our data thus suggest that phrasing preferences aren't absolute. These two facts suggest that a suitable framework would allow for different weights for the factors that constrain phrasing, as well as for variation in the phrasing outputs. We will thus propose an account of the SEP and NEP data within a constraint-based framework (e.g. Prince and Smolensky 1993; Truckenbrodt 1995, 1999; Selkirk 2000, 2005; Hayes 2000). This account builds on the proposals in Elordieta, Frota, and Vigário (2005), extending them so that an understanding of the NEP phrasing patterns and the way they differ from the SEP phrasing patterns can be provided.

Elordieta, Frota, and Vigário develop their analysis to account for intonational phrasing in Spanish and European Portuguese (the Lisbon variety). We here review their analysis and then consider how NEP fits into this wider picture. The data discussed in Elordieta et al. (2005) for Spanish and (S)EP is summarised in Figure 8, which also includes the NEP data. It seems clear that NEP shows intonational phrasing patterns *intermediate* between Spanish (Sp) and SEP.

FIGURE 8 ABOUT HERE

Elordieta, Frota, and Vigário (2005) account for the prime difference in intonational phrasing between Sp and SEP – the dominance of (S)(VO) in Sp versus the dominance of (SVO) in SEP – by means of a syntax-phonology interface constraint of alignment. The syntax literature (reviewed in Elordieta, Frota, and Vigário 2005) provides arguments for a difference in the location of preverbal subjects between the two languages: EP subjects are *internal* to the Inflection Phrase or the Extended Projection of VP (ExtVP), whereas Spanish subjects are in a A'-bar position *external* to ExtVP. The alignment constraint proposed in Elordieta et al. (2005) enforces the alignment of the left edge of ExtVP with the left edge of the Intonational Phrase - *Align (ExtVP, L; IP, L).*[3] For Spanish this constraint creates an intonational break between S and O, as in the dominant (S)(VO) pattern; for SEP, no break is created, as in the dominant (SVO) pattern. The status of NEP with regard to this constraint will be discussed later.

Neither in Sp and SEP is the Verb Phrase (VP) split up into separate intonational constituents. In Elordieta, Frota, and Vigário (2005) this is accounted for by assuming a syntax-phonology interface constraint of the *Wrap-XP* type, that would

wrap together the verb and the following object. NEP is precisely like Sp and SEP in not allowing an intonational break between V and O. Thus Wrap-XP must have an active role in NEP, as well.

Besides the two constraints of the syntax-prosody interface which create prosodic constituency from syntactic constituency, the account of intonational phrasing patterns in Sp and SEP requires a prosodic constraint that plays a role in the avoidance of too heavy phrases. In SEP (S)(VO) becomes frequent and increases in frequency as the number of syllables in the subject increases, as we have seen above. In Spanish, as described in Elordieta, Frota, and Vigário (2005) and depicted in Figure 8, (S)(VO) increases with branchingness. Thus, heaviness is computed differently in the two languages: on the basis of length in SEP; on the basis of prosodic complexity in Sp (for Sp, see also D'Imperio et al. 2005). Elordieta, Frota, and Vigário (2005) propose to account for these effects by means of a prosodic markedness constraint on the maximum size of intonational constituents – *MaximumIP*. Languages may choose different parameters for computing weight: in SEP, the relevant parameter is the number of syllables and thus a constituent should not contain more than n syllables; in Sp it is prosodic complexity, defined as the number of prosodic words. Our NEP data shows that this variety of Portuguese is akin to Sp in this regard: prosodic heaviness plays a role in intonational phrasing, and is computed on the basis of branchingness, that is the presence of more than one prosodic word.[4] In NEP MaximumIP also plays a role, and this variety, unlike SEP but similarly to Sp, instantiates the branchingness parameter.

The SEP data shows that intonational breaks are only forced by weight effects, and do not appear otherwise. In other words, a break not motivated by MaximumIP would be unexpected, and unnatural. In Elordieta, Frota, and Vigário's (2005) prososal, this fact is explained by the active role of an economy constraint of the *Struct* type (see Prince and Smolensky 1993: 25), that penalises the creation of prosodic structure, namely the insertion of intonational breaks – *IntBreak* (No Intonational Break). This constraint ensures that in SEP intonational breaks are only allowed to avoid violations of MaximumIP. In Sp, this constraint plays virtually no role. In NEP, (S)(VO) phrasing is common even with subjects and objects of a small size. It thus looks like *IntBreak plays no role in this variety. We will come back to the relevance of *IntBreak in NEP later.

In Elordieta, Frota, and Vigário (2005), the same group of constraints, ranked in the same order, account for the attested phrasing tendencies in Sp and SEP: *Align (ExtVP, L; IP, L), Wrap-XP, MaximumIP >> *IntBreak*. Crucially, the phrasing differences found arise from the different syntax of subjects and the different setting of the weight constraint. As shown in Figure 8 above, intonational phrasing tendencies in NEP are intermediate between those attested for SEP and Sp. This is particularly clear in the short constituent conditions where utterances show as much (SVO) as (S)(VO) phrasing. Overall, NEP intonational phrasing looks like a *soft* version of Sp. This similarity is not unexpected, as the setting of the weight constraint is basically the same. However, the active role of MaximumIP does not account for (S)(VO) phrasing in the non-branching conditions. In Sp, (S)(VO) in these conditions is explained by Align (ExtVP, L; InP, L). However, if NEP had a similar phonological grammar, we would expect a large majority of the (S)(VO) pattern, and not the attested tie between (S)(VO) and (SVO).

Using the same set of constraints, we propose to account for intonational phrasing in NEP in the following way. Wrap-XP ensures that the verb and the following object belong to the same intonational phrase, as in SEP or Sp. MaximumIP

explains why (S)(VO) increases in the branching conditions and is the prevailing phrasing pattern. The alignment constraint, together with *IntBreak, are responsible for the patterns obtained in the non-branching cases. To get this result, we may assume that the syntax of subjects in NEP is similar to Spanish. This assumption is motivated by syntactic evidence apparently pointing in that direction, though it is fair to say that the issue is far from settled.[5] Further, unlike in Sp or SEP where Align (ExtVP, L; InP, L) is undominated, we propose that the alignment constraint in NEP is ranked below Wrap-XP and MaximumIP. A consequence of this demotion is that the prosodic weight constraint becomes more important than the syntax-phonology interface alignment constraint. In addition to the demotion of *Align*, we also propose that it is freely ranked with *IntBreak. A result of this free ranking is that violating Align or violating *IntBreak amounts to the same penalty. Therefore, in the non-branching conditions – where both Wrap-XP and MaximumIP are obeyed either by (SVO) or (S)(VO) – the (SVO) pattern incurs in the violation of Align, whereas the (S)(VO) pattern violates *IntBreak. In other words, choosing one pattern is as good as choosing the other. The phonological grammar *Wrap-XP, MaximumIP >> Align (ExtVP, L; IP, L), *IntBreak* thus predicts the tie result obtained in the data. Our account of intonational phrasing tendencies in SEP, NEP, and Sp is summarized in (4) and (5).

(4)   a. SEP, Sp: *Wrap-XP, MaximumIP, Align (ExtVP, L; IP, L) >> *IntBreak*
        b. NEP: *Wrap-XP, MaximumIP >> Align (ExtVP, L; IP, L), *IntBreak*

(5)

	SEP	**Sp**	**NEP**
MaximumIP	(S)(VO)	(S)(VO)	(S)(VO)
	Length	Branching	Branching
			↓↓
Align (ExtVP, L; IP, L)	(SVO)	(S)(VO)	(S)(VO)
	↓↓		
*IntBreak	*(S)(VO)	-------	*(S)(VO)
	If not long		If not branching

In our analysis NEP differs from SEP in two important ways: the syntax of subjects and the phonological grammar as far as the constraint ranking is concerned. It also differs from Spanish in the phonological grammar. An interesting consequence of this difference is that in NEP intonational phrasing is not as reliable a cue to the syntax of subjects as in SEP, or Spanish.

5.2. Phonology and phonetics

In section 4, a number of phonological differences between the two varieties of European Portuguese under study were described, namely, different tendencies in intonational phrasing that may be accounted for by different phonological grammars as proposed in 5.1 above, and differences in the ways intonational breaks are marked. Although the latter differences are small, they raise the question of whether there might be some reason behind the availability and/or the more frequent use of some boundary marking options. In this section, the variation in the type/frequency of the boundary cues will be interpreted in the light of other properties of the intonational system of SEP and NEP.

The main attested difference was the use of sustained pitch (as a result of the LH* H% tonal sequence), which is particular to NEP. In addition, NEP was found to

resort more frequently to (perceived) boundary lengthening and acoustic pauses. We find it striking that the pitch-based cue – sustained pitch – involves a relation between tonal targets and not simply the presence of a given tonal event. The other differences concern boundary cues realised in the temporal dimension. These facts suggest that NEP differs from SEP in choosing cues that do not require the presence of pitch events, but rather the relation between pitch events or the use of duration. In previous work, we have shown that these two varieties of EP strongly differ with respect to their pitch accent distribution properties (Vigário and Frota 2003). In SEP, stressed syllables are usually accentless internal to the intonational phrase. This sparseness of tonal events contrasts with the density of pitch accents found in NEP (where 74% of stressed syllables in intonational phrase internal position are accented, as reported in Vigário and Frota 2003). An illustrative example of this contrast is provided by the contour in Figure 4 above and that in Figure 9 below, which show the same sentence respectively uttered by a SEP and a NEP speaker.

FIGURE 9 ABOUT HERE

We would like to suggest that this contrasting property of the intonational system of the two varieties lies behind the differences found in the choice of boundary markers. Due to the sparseness of tonal events, the presence of a tonal gesture in SEP nearly always means an upcoming boundary. In NEP, by contrast, an intonational phrase may have several internal pitch accents, and thus the presence of a tonal gesture is not, per se, a signal of a phrasing boundary. The pitch accent distribution properties in this variety favour boundary marking by other means, whether pitch-related or duration-based. In other words, the differences found in boundary marking, though small, might help facilitate the task for the listener by making intonational breaks easier to identify.

6. Conclusion

The main goal of this work was to investigate the influence of syntactic and prosodic factors on intonational phrasing in two varieties of European Portuguese. We discussed empirical results from the Standard variety spoken in Lisbon (SEP) and the Northern urban variety spoken in Braga (NEP) that show different tendencies in intonational phrasing. In SEP, (SVO) prevails; in NEP (S)(VO) is much more frequent. Prosodic length in number of syllables is the crucial factor favouring the (S)(VO) phrasing pattern in SEP. In NEP, it is prosodic branchingness understood as the presence of more than one prosodic word that boosts the (S)(VO) pattern. Syntactic complexity plays no role in either variety. Nevertheless, two other aspects of syntactic constituency were shown to be relevant to account for intonational phrasing in European Portuguese: the syntactic position of preverbal subjects and the boundaries of the Verb Phrase. The import of these factors is captured by the active role of two syntax-phonology interface constraints, respectively an alignment constraint and a wrap-XP constraint. These two constraints, together with a prosodic size constraint and an economy constraint, were proposed to account for the variation in intonational phrasing between SEP and NEP. A crucial aspect of this account is the relative weighting of constraints governing the syntax-phonology mapping and phonological size constraints: the former are undominated in SEP, whereas prosodic size is more important than alignment in NEP.

The two varieties critically differ in their patterns of intonational phrasing, and not in the types or frequency of the boundary cues used. An inspection of the types of boundary markers, as well as of the phonetic instantiation of the most frequent cues, revealed only small differences. Intonational breaks in both SEP and NEP are usually marked by a High boundary tone, a trait common to other Romance languages. Nevertheless, the small differences found in the boundary cues converge in providing NEP with more options of boundary marking. It was suggested that the additional options would help to signal intonational breaks in NEP, as this variety is characterised by a higher density of pitch accents in intonational phrase internal position, and thus a pitch gesture, per se, may not work as a boundary marker as in SEP.

Finally, it is important to mention an unforeseen outcome of the present study. In our discussion of intonational phrasing tendencies, we compared both SEP and NEP with Spanish. The results of this comparison placed NEP closer to Spanish than to SEP. Although only the speech of two speakers from each variety was inspected, and further research comparing the two varieties is required, the present results are convergent both with segmental phonetic and phonology facts long described in traditional dialectological work, and with other intonational differences more recently described. This certainly highlights the interest of cross-dialectal studies and the need for within-language as well as cross-language research on the dimensions of prosodic variation.

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Table 1. Percentages of phrasing patterns in the syntactic non-branching and branching conditions combined with the constituent length conditions (744 utterances per variety: 124 sentences x 2 speakers x 3 repetitions). Data source: D'Imperio et al. (2005).

Condition		SEP		NEP	
Branching	Length	(S)(VO)	(SVO)	(S)(VO)	(SVO)
Non-branching S and O	Short S	0	100	50	50
	Long S	4	96	56	44
Non-branching S/short branching O	Short S	0	100	56	44
	Long S	4	96	31	69
Non-branching S/long branching O	Short S	4	96	69	31
	Long S	8	92	50	50
Branching S	Short S	4	96	69	31
	Long S	40	60	63	37
Double branching S	Short S	67	33	83	17
	Long S	94	6	71	29

Table 2. Percentages of phrasing patterns in the prosodic branching conditions in NEP (288 utterances: 48 sentences x 2 speakers x 3 repetitions). Data source: D'Imperio et al. (2005).

Condition		NEP	
		(S)(VO)	(SVO)
Short non-branching S	Short branching O	58	42
	Long branching O	75	25
Long non-branching S	Short branching O	54	46
	Long branching O	54	46
Short branching S	All O conditions	80	20
Long branching S	All O conditions	98	2

Table 3. Frequency of boundary cues (% relative to 205 utterances with perceived boundary): continuation rise (Contrise), sustained pitch (SusPitch), boundary tone (BT), preboundary lengthening (PBLeng), acoustic pause (Pause), pitch reset (Preset), and drop to base level (DropBL). Data source: Frota et al. (2005).

	Contrise	SusPitch	BT		PBLeng	Pause	PReset	DropBL
			H	L				
SEP	**95**	0	**95**	4	15	5	25	4
NEP	**89**	8	**97**	3	72	17	21	1

Table 4. Ratios of the H boundary tone relative to the first peak (HBT/H1) and relative to the utterance initial F0 value (HBT/UtIni). Data source: Frota et al. (2005).

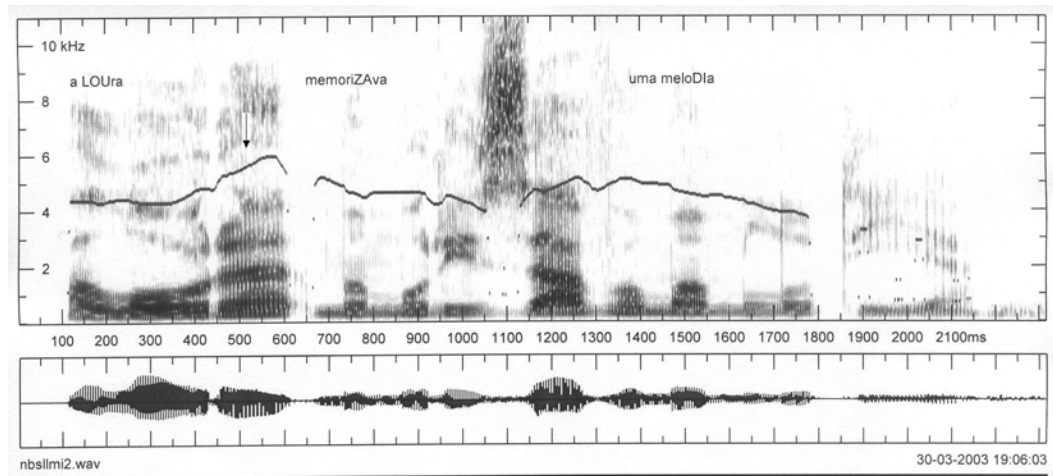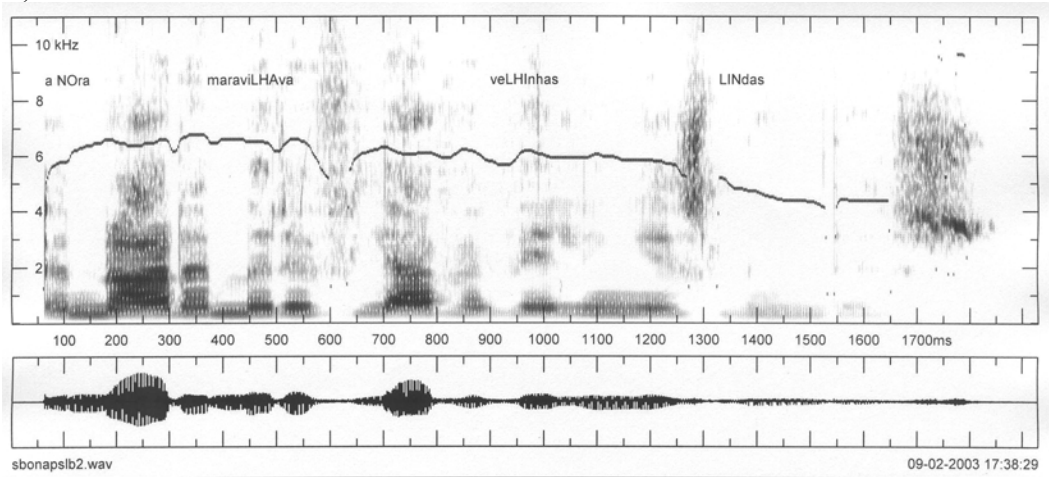|	HBT/H1	HBT/UtIni
SEP	0,88	1,05
NEP	0,86	1,12

Figure 1. F0 contour of the NEP utterance *A loura memorizava uma melodia* 'The blond girl learned a song by heart', showing an intonational phrase break after the subject *a loura*. Word initial boundaries are signalled by text alignment. Stressed syllables are indicated in capitals. The arrow signals the boundary rise.
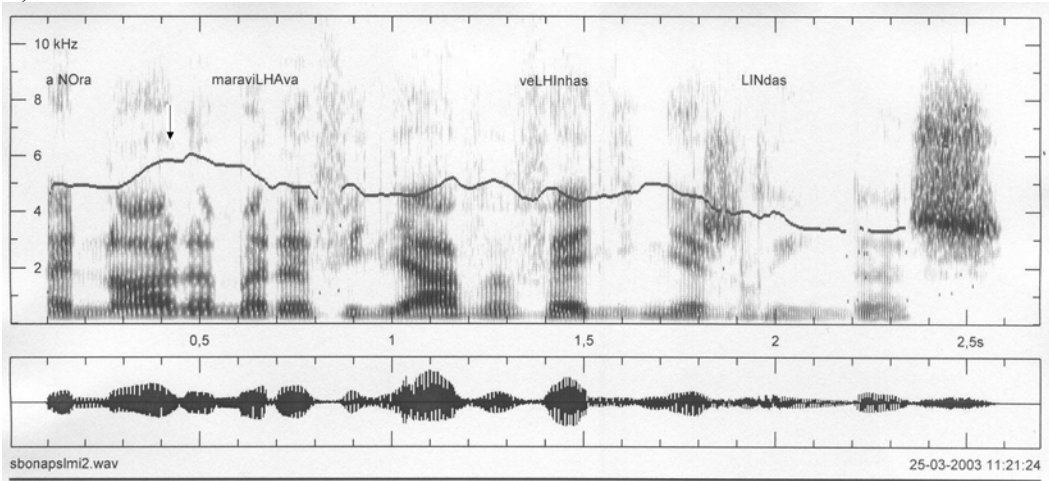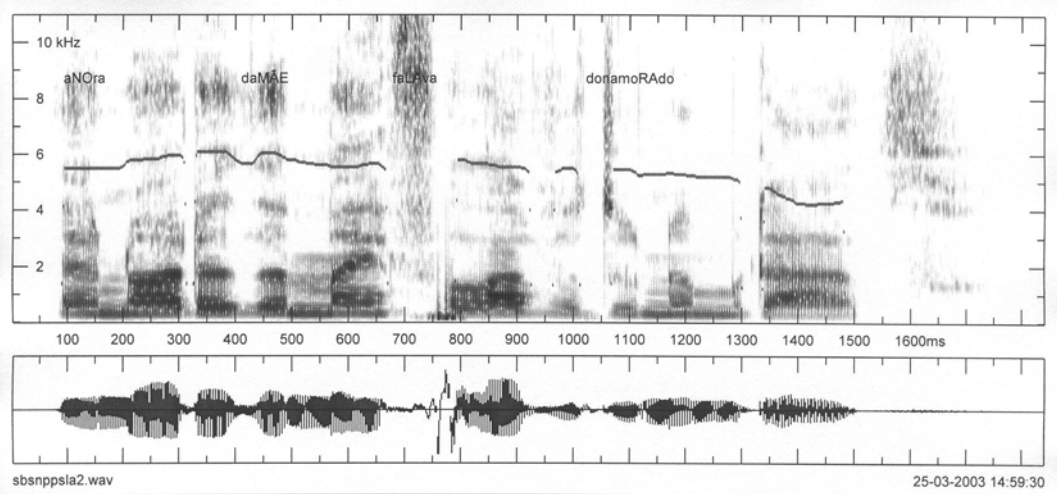
Figure 2. F0 contours of the utterance *A nora maravilhava velhinhas lindas* 'The daughter-in-law marveled beautiful old women': panel A, by a SEP speaker and showing (SVO) phrasing; panel B, by a NEP speaker and showing (S)(VO) phrasing. The arrow signals the intonational break with a rise in the stressed syllable followed by sustained pitch (panel B).

A)

B)
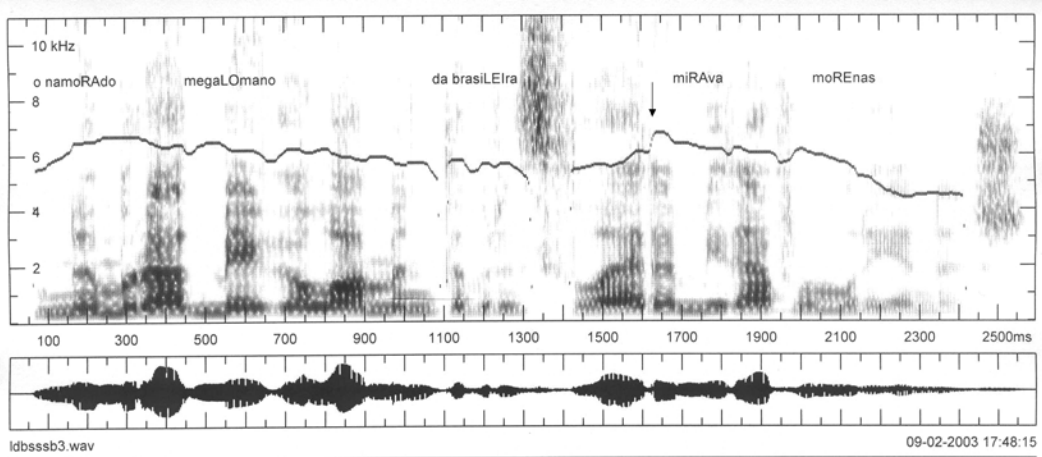
Figure 3. F0 contours of the sentence *A nora da mãe falava do namorado* 'The daughter-in-law of (my) mother talked about the boyfriend' (panel A), showing the (SVO) phrasing pattern, and the sentence *O namorado megalómano da brasileira mirava morenas* 'The Brazilian girl's megalomaniac boyfriend looked at the dark-haired women' (panel B), showing the (S)(VO) phrasing pattern. Both sentences were uttered by a SEP speaker. The arrow signals the boundary rise (panel B).
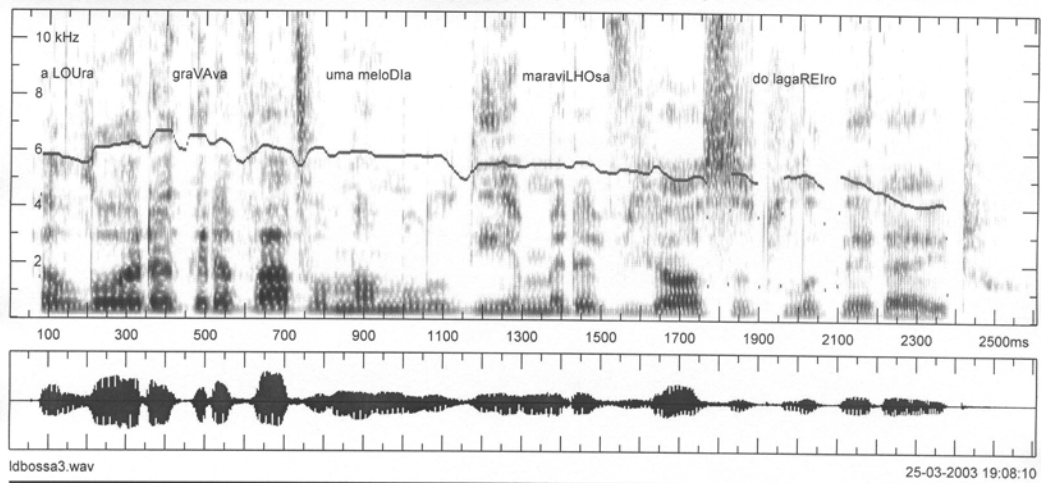
Figure 4. F0 contour of the SEP utterance *A loura gravava uma melodia maravilhosa do lagareiro* 'The blond girl recorded a wonderful song from the olive-pressman', showing (SVO) phrasing.
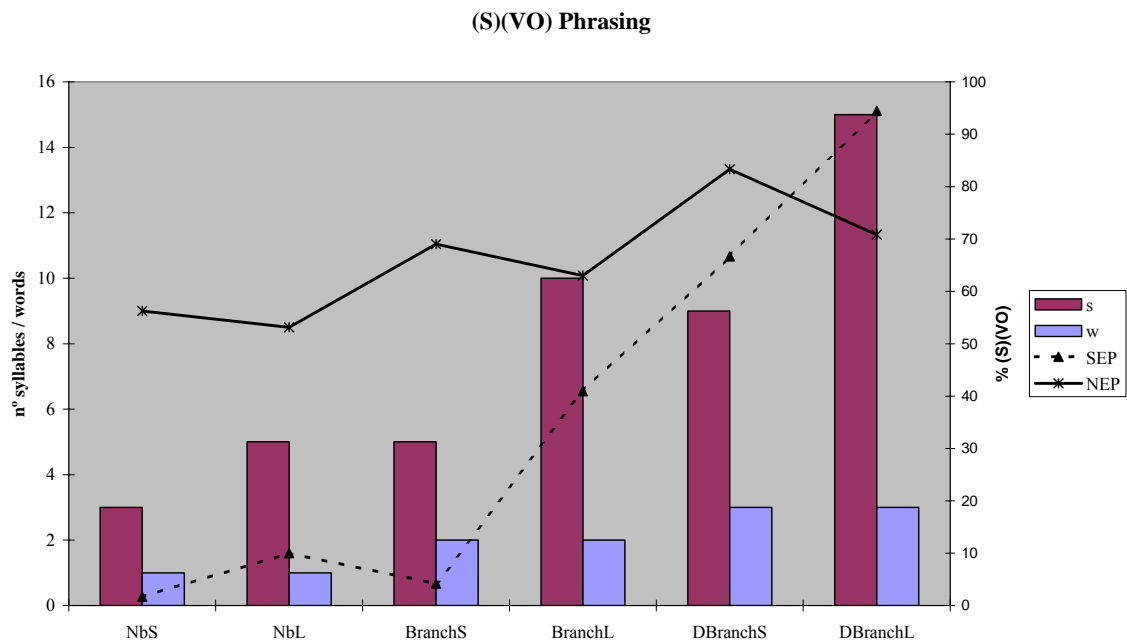
(S)(VO) Phrasing

Figure 5. (S)(VO) phrasing in Standard and Northern EP. Branchingness and constituent length conditions for the subject noun phrase on the x-axis (NbS, non-branching short; NbL, non-branching long; BranchS, branching short; BranchL, branching long; DbranchS, double branching short; and DbranchL, double branching long), number of syllables (s) and words (w) in the left y-axis, percentage of (S)(VO) in the right y-axis. Adapted from Vigário and Frota (2003).
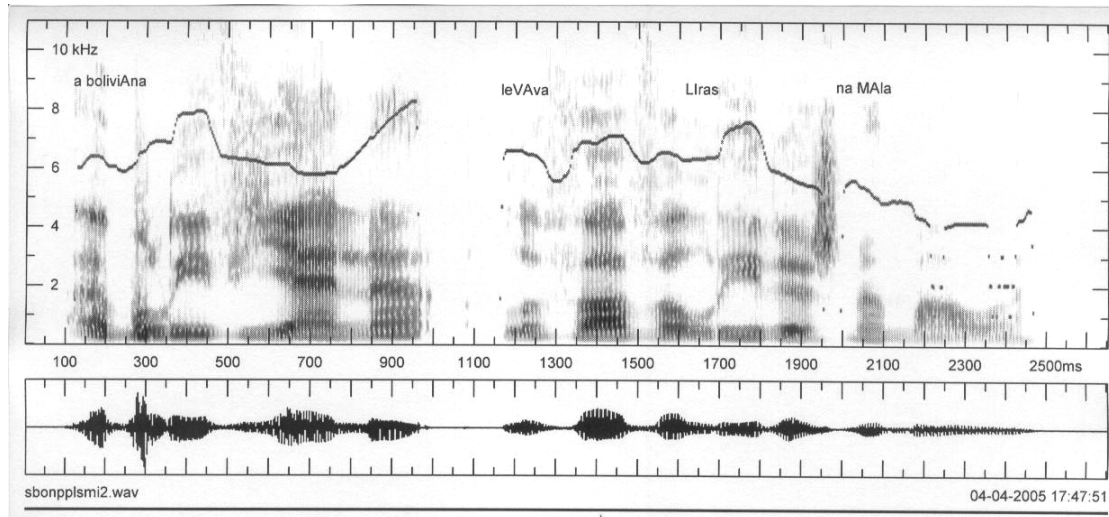
Figure 6. F0 contour of the NEP utterance *A boliviana levava liras na mala* 'The Bolivian girl took liras in her purse'. The first IP begins at 185 Hz; the second IP begins at 190 Hz.
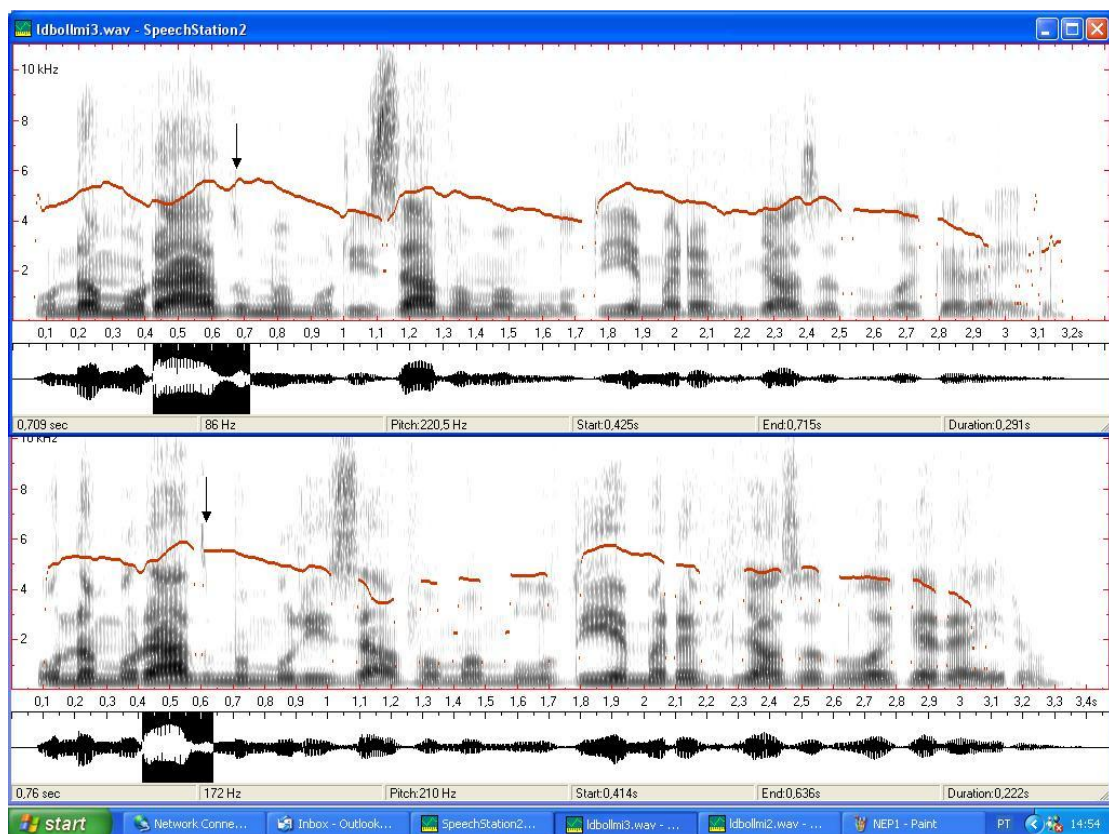

Figure 7. Two renditions of the utterance *O namorado memorizava uma melodia maravilhosa do lagareiro* 'The boyfriend learned by heart a wonderful song from the olive-pressman', by the same NEP speaker. Upper panel: (S)(VO) phrasing; Lower panel: (SVO) phrasing. Duration values of the tonic plus posttonic sequence (marked in the waveform) are given at the lower right corner. The difference in the realisation of the posttonic vowel is shown in the spectrogram and waveform. The arrow marks the right edge of the subject noun phrase *o namorado*.
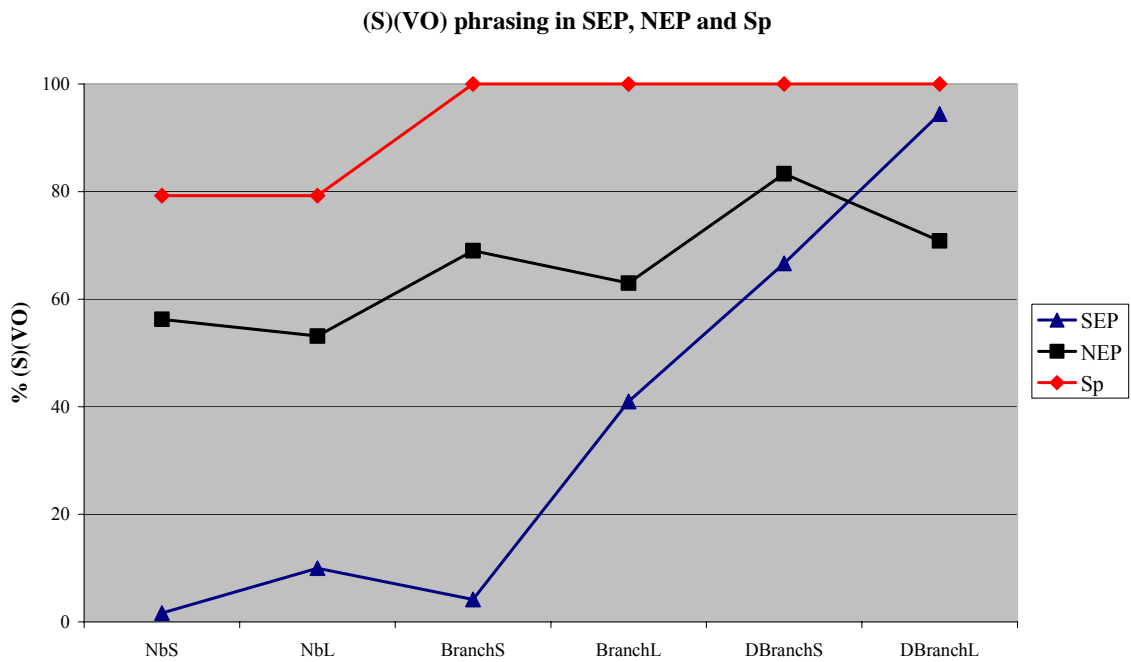
(S)(VO) phrasing in SEP, NEP and Sp

Figure 8. (S)(VO) phrasing in Standard EP, Northern EP and Spanish compared. Branchingness and constituent length conditions on the x-axis. Percentage of (S)(VO) in the right y-axis.
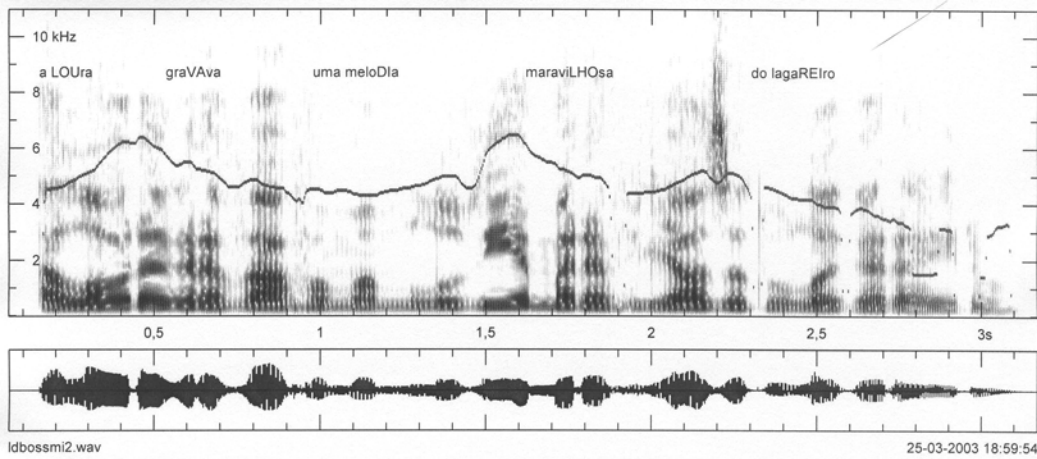

Figure 9. F0 contour of the NEP utterance *A loura gravava uma melodia maravilhosa do lagareiro* 'The blond girl recorded a wonderful song from the olive-pressman'.

[1] The relevant contrast to disentangle syntactic from prosodic complexity is the one we tested, i.e. complex syntax + complex prosody *versus* simple syntax + complex prosody. This comparison established whether the effect of complexity was due to syntax or prosody. In SEP, no effect of complexity was found and thus the issue is irrelevant. EP does not allow us to test the complex syntax + simple prosody case, as syntactic branching structures (at least as we defined them) are always also prosodically branching.

[2] It should be noted, however, that SEP seems to be also sensitive to the number of prosodic phrases (if more than two) within a constituent. This would explain why, for subjects, the long branching condition, the short double branching condition and the long double branching condition show a gradual increase of the (S)(VO) pattern: the difference between the former two resides in the number of prosodic phrases (2 *versus* 3 prosodic phrases, but 9/10 syllables), whereas the difference between the latter two resides in the number of syllables (3 prosodic phrases but 9/10 *versus* 15 syllables). We leave for future work a systematic inspection of the length effect measured in number of prosodic phrases, in combination with the length effect in number of syllables.

[3] Elordieta, Frota & Vigário (2005) use the term *Major Phrase*, instead. In their use of Major Phrase they refer to an intonational constituent that may correspond either to an Intermediate Phrase or to an Intonational Phrase. The reason for this cover term is the apparent presence of variation in the nature of the relevant phrase in Spanish. This variation seems not to exist in European Portuguese (see sections 2 and 3 above; see also Frota 2000, 2002a, for evidence against an intermediate phrase level in European Portuguese).

[4] In fact, the way weight is computed in NEP is clear than in Sp, as the latter shows a difference between heaviness in subjects – which is prosodic in nature – and in objects, where the difference between syntactic and prosodic heaviness is not clear and the issue remains unsettled (D'Imperio et al. 2005).

[5] There are at least two kinds of constructions relevant to the understanding of the syntax of subjects that seem to differ in acceptability between SEP and (at least some) Northern dialects: the possibility/impossibility of left dislocation in embedded interrogatives – impossible in SEP and acceptable in some Northern dialects – and recomplementation structures, which are possible and frequent in Northern EP and marked or marginal in SEP (we thank J. Costa for drawing our attention to these facts).