

## TONAL STRUCTURE OF POST-FOCAL L IN ENGLISH AND CATALAN

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The aim of this paper is to investigate the tonal structure of narrow focus signalled by accentual means in English and in Catalan. In particular, it analyses the status of the  $F_0$  valley in the H(igh)-L(ow) movement observed after the focal constituent. In both languages, the H is interpreted as an H\* pitch accent given its alignment within the accented syllable of the focal word. However, the nature of L is unclear since it can be analysed as the trailing tone of a bitonal accent (H\*+L) or a phrase accent (H\*L-). The status of L is investigated in words with different stress distributions (oxytones, paroxytones, and proparoxytones) in subject and verb focal positions. An examination of the timing of L with respect to the accented syllable demonstrates that in Catalan the L corresponds to a phrase accent since it is anchored at the end of the word irrespective of the number of post-accented syllables. In English, on the other hand, the L is better interpreted as the trailing tone of H\*+L, due to its fixed distance with respect to the accented syllable. These results confirm the assignment of focus at phrase final position in Romance languages as opposed to Germanic languages.

### 1. Introduction

Studies on the strategies used to signal the focal structure of sentences have usually classified English and Catalan as languages that convey focus by different means (Vallduví and Zacharski 1994; Vallduví 1995; Kiss 1995). Whereas English signals focus by means of an accentual shift, that is, by locating the nuclear accent on the focal constituent and deleting post-focal accents (Ladd 1980, 1996), Catalan tends to use a syntactic restructuring (the focal constituent moves into an intonationally prominent position, namely, the last position in the sentence). These two strategies are illustrated in (1) and (2) for English and Catalan respectively. (1a) and (2a) show a sentence with a broad focus reading (focus on the whole sentence). For the two languages, the nuclear accent falls on the stressed syllable of the last lexical item (underlined). (1b) and (2b), on the other hand, illustrate the same sentence but produced with narrow focus (focus on a particular part of the sentence). In both examples, the focal element is the subject. In English, the syntactic structure remains the same, but now the nuclear accent is located over the focal element (in small capitals). No more pitch accents are realised after the focal material. In Catalan, the phonological structure is unchanged (the nuclear accent remains on the last position) but there is a syntactic shift, that is, the focused element moves into the last sentence slot. Thus, whereas in English the assignment of focus may cause an accentual shift, in Catalan it is positionally determined.

- (1) a. Millie lives in Ireland  
 b. MILLIE lives in Ireland
- (2) a. *La mare menja arengades*  
 The mother eats herrings  
 b. *D'arengades, en menja LA MARE*  
 Herrings, eats them THE MOTHER

Vallduví and Zacharski (1994) and Vallduví (1995) claim that the cross-linguistic variation observed in Catalan and in English is the reflex of a *Plasticity Parameter* of intonation relative to focus. In [+plastic] languages, such as English, the relation between focus and prominence is achieved by accentual means. In [-plastic] languages, such as Catalan, the relation between prominence and focus is achieved through syntax. This cross-linguistic classification has received different names in the literature, namely, [+syntactic] as distinct from [-syntactic] languages (Frota 1993) or discourse-configurational as distinct from non-discourse-configurational languages (Kiss 1995).

However, recent work on the ways of expressing focus in Catalan (Estebas Vilaplana 2000, 2001), as well as in other Romance languages (Spanish: García Lecumberri 1995; French: Zubizarreta 1998; or European Portuguese: Frota 1998), seems to be at odds with the aforementioned classification, since it has been shown that accentual strategies similar to the English ones can be used in these languages to signal the focal structure of sentences. Estebas Vilaplana (2000) showed that it is possible for Catalan speakers to produce (as well as to perceive) focus signalled by an accentual re-structuring. Thus, a sentence such as the one illustrated in (3) was found to be accepted by Catalan speakers.

- (3) *LA MARE menja arengades*  
 THE MOTHER eats herrings

Figures 1 and 2 below show the speech waveforms and the  $F_0$  contours of the utterances *MILLIE lives in Ireland* and *LA MARE menja arengades*, produced by an English and a Catalan native speaker respectively. The beginning of each syllable is marked with a vertical line at the bottom screen. The  $F_0$  contours displayed in figures 1 and 2 show that the phonetic properties of narrow focus signalled by intonational means happen to be very similar in the two languages: a high  $F_0$  movement is observed over the accented syllable of the focal word followed by an immediate fall. After the fall, the  $F_0$  contour remains low and level till the end of the utterance. The possibility of using accentual devices in Catalan to express focus is at odds with the claim that in this language the focal element is positionally-determined and must occupy the last slot of the phrase. Given the controversy which has arisen over these data, the aim of this study is to investigate whether the similar phonetic properties observed in the two languages in utterances such as the ones illustrated in figures 1 and 2 actually correspond to the same tonal structure.

In order to do that, we will concentrate our investigation on the analysis of the falling intonation (HL) observed after the focal element. The  $F_0$  contours will be examined within the tenets of the Autosegmental-Metrical (AM) approach of intonational analysis (Pierrehumbert 1980; Ladd 1992; Beckman and Hirschberg 1994; among many others). This framework represents the  $F_0$  contour as a string of H and L *pitch accents* and *edge*

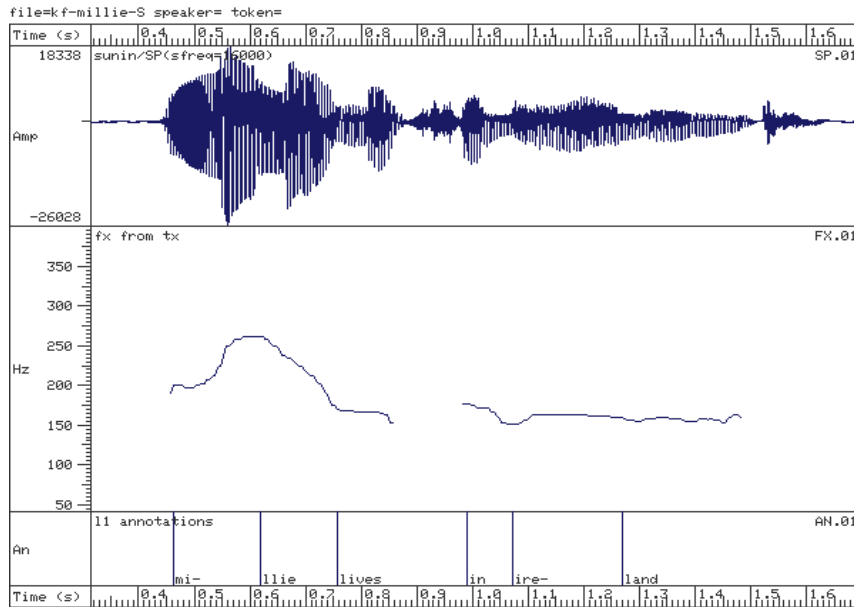


Figure 1: Speech waveform and  $F_0$  contour for the sentence MILLIE lives in Ireland

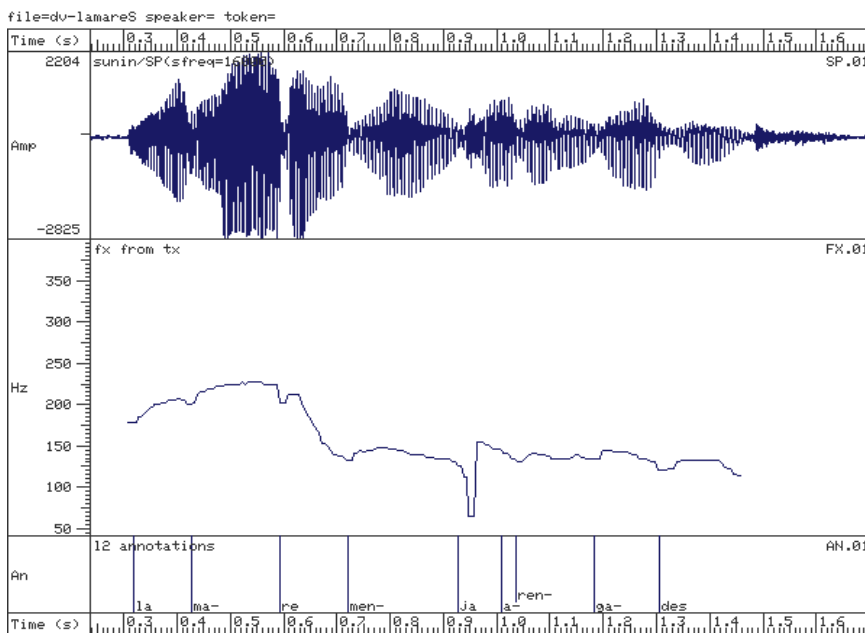


Figure 2: Speech waveform and  $F_0$  contour for the sentence LA MARE menja arengades

*tones*. Pitch accents are associated to accented syllables and are indicated with an asterisk ( $H^*$  and  $L^*$ ). They can be monotonal ( $H^*$  and  $L^*$ ) or bitonal ( $L^*+H$ ,  $H^*+L$ ,  $L+H^*$ ,  $H+L^*$ ). In bitonal accents, the starred tone is associated to the accented syllable and the leading

or trailing tone indicates the presence of a significant  $F_0$  movement before or after the accented syllable. Edge tones are divided into *phrase accents* and *boundary tones*. Boundary tones mark the end of an *intonation phrase* and are indicated as  $H\%$  and  $L\%$ . Phrase accents signal the end of an *intermediate phrase* and are indicated as  $H-$  and  $L-$ . The intonation phrase is the highest domain of prosodic structure and is composed of one or more intermediate phrases. An intermediate phrase is a lower domain of prosodic structure which has at least one pitch accent followed by a phrase accent.

According to the AM framework, the  $F_0$  peak observed on the accented syllable of the focal word in English and in Catalan should be interpreted as an  $H^*$  pitch accent, since the peak clearly occurs within the limits of the accented syllable in the two languages. However, the interpretation of the following  $F_0$  valley is not so clear. The  $L$  can be the trailing tone of a bitonal accent (as in  $H^*+L$ ) or it can be a phrase accent signalling the end of an intermediate phrase ( $L-$ ).

Given the claim that in Catalan the focal word always occupies a phrase-final position, it is expected that in this language the  $L$  marks the presence of a phrase boundary ( $L-$ ) after the focal element. In English, on the other hand, the presence of a phrase boundary after  $H^*$  is not necessary, so its status might correspond to the trailing tone of  $H^*+L$  rather than  $L-$ .

## 2. Experimental design

In order to determine the status of  $L$  after the focal element in the two languages, focal words with different stress distributions were used, namely, oxytones (words with stress on the ultimate syllable), paroxytones (words with stress on the penultimate syllable), and proparoxytones (words with stress on the antepenultimate syllable). The expectations are as follows: if  $L$  is part of the bitonal accent, it is expected to be placed at a fixed distance with respect to the accented syllable, since trailing tones are observed to have a fixed location after the starred tone (Pierrehumbert and Beckman 1988; Grice 1995; Arvaniti et al. 2000). If, on the other hand,  $L$  demarcates a boundary, its location is independent of the accented syllable, yet it should be aligned with the end of the focussed word, irrespective of the number of post-stressed syllables. This is schematised in figure 3 below. The shaded boxes show the limits of the accented syllable and the white boxes stand for unaccented syllables.

For both English and Catalan, the data consisted of Subject-Verb-Object sentences produced with narrow focus either on the subject or on the verb. Narrow focus on the object was not included due to its potential confusion with broad focus. For each focal domain (subject and verb), 12 words with a different stress pattern (oxytones, paroxytones and proparoxytones) were gathered. Overall, 72 sentences were recorded for each language (the list of sentences is displayed in the Appendix).

English sentences were produced by a 30-year-old female speaker of a Southern (London) variety of British English (identified as KF). Catalan sentences were produced by a 32-year-old female speaker of the Central variety of Catalan (identified as DV). Neither of them spoke the other language at the time of the recording. Sentences were gathered by means of a reading activity. The speakers were given a list of sentences which

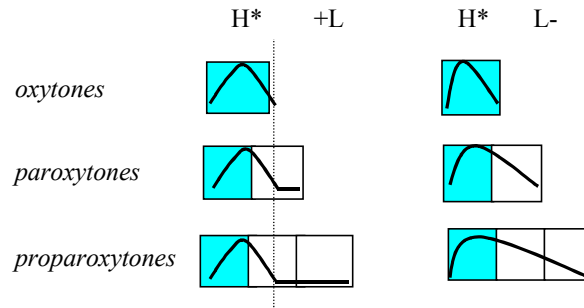


Figure 3: Expected location of L in H\*+L and H\* L- in words with different stress distributions

were replies to questions posed by the researcher. The questions were expected to trigger a narrow focus response. Questions were asked live. The data were recorded in the anechoic room of the Department of Phonetics and Linguistics of University College London. For each sentence, speech and laryngeal (Lx) signals were obtained. Speech was recorded to a B and K sound level meter of the type 2231, which was fitted with a 4165 microphone. The laryngeal signal was obtained by means of a laryngograph processor. Both speech and Lx signals were recorded on a Sony 1000 ES DAT recorder.

### 3. Analysis of the data

An acoustic analysis of the data was done by means of the Speech Filing System (SFS) program. Speech and laryngeal signals were transferred from the Sony 1000 ES DAT recorder into a Sun Sparc-10 computer in which SFS ran. Acquisition of the signals was done at a 16 kHz sampling rate, following the routines of the program.  $F_0$  traces were obtained from the laryngeal signal by means of the VTX and FX programs.

The  $F_0$  contours of both English and Catalan sentences produced with narrow focus on the subject and on the verb showed an  $F_0$  peak located within the limits of the accented syllable of the focussed word. After that, a fall in  $F_0$  was observed, followed by a low and level  $F_0$  till the end of the utterance (as illustrated in figures 1 and 2 above for two sentences with narrow focus on the subject). A small percentage of the Catalan utterances (18%) showed a post-focal accent after the nuclear accent. This post-focal accent was consistently aligned with the stressed syllable of the last lexical word of the whole intonation phrase. The post-focal accent showed a severely compressed pitch range compared to that of the focal accent, but presented a similar  $F_0$  movement, that is, a peak located within the limits of the accented syllable. Post-focal accents will be analysed in more detail in section 5.1.

In order to determine whether the L is a trailing tone or a phrase accent, the following measurements were performed for all words in the two languages: (a) distance between the onset of the accented syllable and the end of the word (on-end); (b) distance between the onset of the accented syllable and the location of the  $F_0$  valley (on-valley). The valley was considered to be the lowest  $F_0$  point after the focal element.

#### 4. Results

The results are presented in table 1 and in figures 4 and 5 for the Catalan and the English data respectively. Table 1 displays the mean values and standard deviations for the on-valley distance and the on-end distance in oxytones, paroxytones and proparoxytones, both in Catalan and in English.

		CATALAN		ENGLISH	
		<i>on-valley</i>	<i>on-end</i>	<i>on-valley</i>	<i>on-end</i>
<i>Oxytones</i>	Mean	<b>0.22</b>	<b>0.22</b>	<b>0.31</b>	<b>0.24</b>
	SD	0.04	0.04	0.05	0.04
<i>Paroxytones</i>	Mean	<b>0.32</b>	<b>0.33</b>	<b>0.30</b>	<b>0.29</b>
	SD	0.05	0.05	0.04	0.05
<i>Proparoxytones</i>	Mean	<b>0.46</b>	<b>0.45</b>	<b>0.33</b>	<b>0.45</b>
	SD	0.06	0.07	0.03	0.05

Table 1: Mean values and standard deviations (SD) for the on-valley and on-end distances in oxytones, paroxytones and proparoxytones in Catalan and in English

As expected, the results presented in table 1 show that the mean values for the on-end distance vary as the number of post-accented syllables vary, that is, the higher the number of post-accented syllables the longer the on-end distance. This behaviour is observed both in English and in Catalan. However, the mean values for the on-valley distance show a different behaviour in the two languages. In Catalan, the on-valley distance is very similar to the on-end distance, indicating that the L is anchored at (or very near to) the end of the word. In English, on the other hand, the on-valley distance ranges from 0.30 and 0.33 for all kinds of words, indicating that the L is located at a fixed distance with respect to the accented syllable no matter the number of post-accented syllables.

The results displayed in figures 4 and 5 corroborate the observations presented in table 1. Figures 4 and 5 plot the correlations between the on-end and the on-valley distances for nuclear oxytones, paroxytones and proparoxytones, both in subject and in verb positions for Catalan and English. If L is part of the bitonal accent, a very low correlation between the two distances is expected, as L will be anchored at a fixed location with respect to the starred tone (or onset of the accented syllable). If, on the other hand, L marks the presence of some kind of boundary, L will be anchored at the end of the word irrespective of the number of post-stressed syllables and hence a high correlation between the two measurements is expected. Each graph plots the distance between the onset of the accented syllable and the  $F_0$  valley (on-valley) against the distance between the onset of the accented syllable and the end of the word (on-end) in seconds. The coefficients of correlation between the two variables ( $R^2$ ) and the regression lines are displayed in each graph.

The results on the Catalan data show high correlations ( $R^2$  ranges from 0.84 to 0.96) between the on-end distance and the on-valley distance, indicating that the valley is consistently anchored at the end of the focussed word, irrespective of the number of post-stressed syllables. This suggests that the L signals a prosodic boundary, rather than the trailing tone of a bitonal accent. Thus, according to these results, the HL  $F_0$  movement

observed in the focal constituent has to be described as an H\* pitch accent followed by an L- phrase accent.

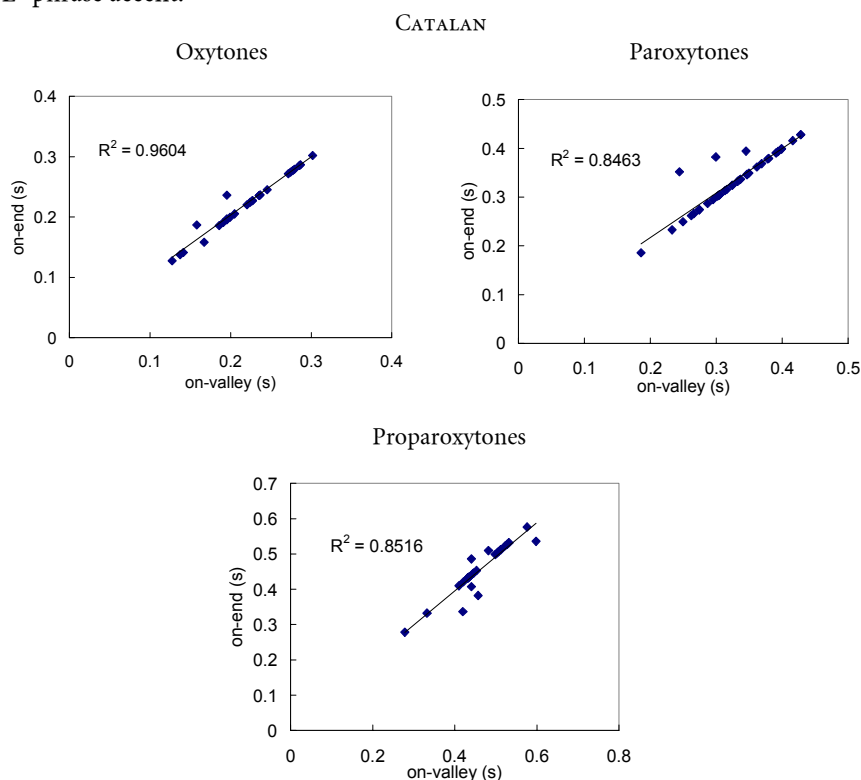


Figure 4: Distance between the onset of the accented syllable and the  $F_0$  valley (on-valley) against distance between the onset of the accented syllable and the end of the word (on-end) in seconds, for nuclear accents in different kinds of words (oxytones, paroxytones and proparoxytones) in Catalan

The English results, on the other hand, show a very low correlation between the two variables for all kinds of words ( $R^2$  varies from 0.02 to 0.25), suggesting that the L is not anchored at the end of the word but seems to be the trailing tone of a bitonal accent ( $H^*+L$ ). In order to confirm this possibility, we performed an analysis of variance on the on-valley measurements for the three groups of words (oxytones, paroxytones and proparoxytones) in English. The expectations were that if L is the trailing tone of the bitonal accent, no significant differences should be observed on the on-valley distance for the three types of words, since trailing tones have been shown to be located at a fixed distance after the starred tone (Pierrehumbert and Beckman 1988; Grice 1995; Arvaniti et al. 2000). Setting the significance level at 1 per cent ( $p < 0.01$ ), the results of the ANOVA showed no significant differences in the location of L in the three word types ( $p = 0.03$ ,  $F = 6.08$ ). As presented in table 1, the on-valley mean values for the three word types were very similar: oxytones (mean=0.31), paroxytones (mean=0.30) and proparoxytones (mean=0.33). These results indicate that the L has a fixed location in time with respect to the starred tone (or onset of the accented syllable) and confirm the interpretation of the

nuclear accent in English narrow focus sentences as H\*+L. This behaviour is different from the Catalan data where the L was clearly located at the offset of the word marking the right boundary of an intermediate phrase.

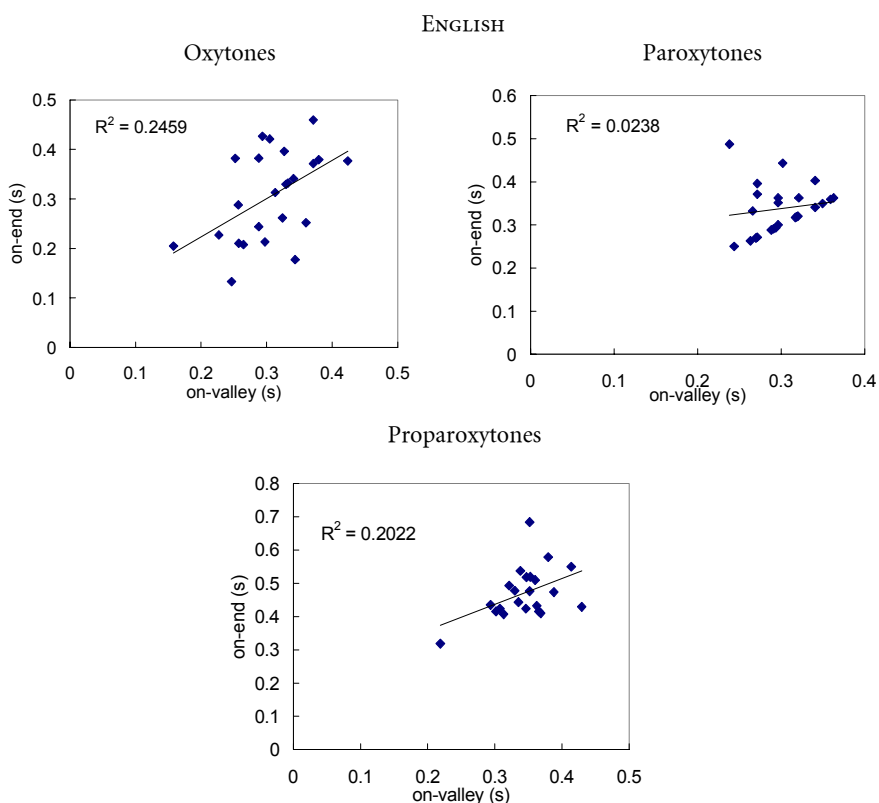


Figure 5: Distance between the onset of the accented syllable and the F<sub>0</sub> valley (on-valley) against distance between the onset of the accented syllable and the end of the word (on-end) in seconds, for nuclear accents in different kinds of words (oxytones, paroxytones and proparoxytones) in English

## 5. Discussion

The results obtained in this study showed that the F<sub>0</sub> contours of narrow focus signalled by intonational means do not correspond to the same tonal structure in Catalan and in English. Whereas in Catalan the HL sequence corresponds to an H\* pitch accent followed by a phrase accent (L-), in English HL is better interpreted as a bitonal accent (H\*+L), since the L is located at a fixed distance with respect to the accented syllable. These results have some implications for intonational theory.

### 5.1. Catalan H\*L-

The presence of a prosodic boundary after the focussed element in Catalan is in line with

the idea that in Romance languages focus has to be assigned at a prominent sentence position, namely, sentence/phrase final position (Zubizarreta 1998; Sosa 1999). However, the data showed that the location of the focussed element in a prominent position does not always have to be mediated by a syntactic shift, as claimed by Vallduví and Zacharski (1994) and Vallduví (1995), but intonation alone can create a prominent position by introducing a prosodic boundary after the focussed item. The effects of focus on the phrasing structure of an utterance have been observed in languages such as Bengali (Hayes and Lahiri 1991), Chichewa (Kanerva 1990), Korean (Jun 1996; Oh 1999) and Greek (Baltazani and Jun 1999).

The postulation of an intermediate phrase boundary after the focal domain in Catalan creates some problems for intonational theory, since the status of post-focal material is unclear. If an intonation phrase is made up of one or more intermediate phrases (Beckman and Pierrehumbert 1986), it seems logical to think that after an intermediate phrase boundary a new intermediate phrase starts. Thus, for example in our data, the stretch of words after the intermediate phrase marked L- should constitute another intermediate phrase, most probably identified as L- followed by the L% boundary tone. This proposal, however, is problematic for phonological structure, since the second intermediate phrase has no pitch accent and in principle the theory does not allow empty intermediate phrases. The presence of this second intermediate phrase, however, can be justified by the presence of post-focal accents.

Most of the Catalan narrow focus utterances produced with accentual strategies obtained in the production test showed deaccenting of the post-focal material. Deaccenting has been described as the lack of a pitch accent in words that are expected to be accented, mainly due to the focalisation of early elements in the sentence. Even though in most cases the Catalan post-focal material presented deaccentuation, a small number of productions (13 sentences) showed a pitch accent after the nuclear tone. This post-focal accent was consistently aligned with the stressed syllable of the last lexical word of the whole intonation phrase. The post-focal accent showed a severely compressed pitch range compared to that of the focal accent, but presented the same tonal specification (an F<sub>0</sub> peak described as H\*).

A perceptual test was designed to see whether the post-focal accent was perceived as a secondary accent and hence subordinate to the nuclear one, or whether the post-focal accent was perceived as primary and hence having double focus. The perceptual test was performed by two Central Catalan speakers aged 29 and 31. They were asked to listen to 25 stimuli consisting of 13 target sentences (narrow focus sentences containing a post-focal accent) and 12 distractors (narrow focus sentences with no post-focal accent). Both types of sentences were produced by speaker DV in the production test. The 12 distractors were selected at random from the number of sentences with no post-focal accent. The distractors were included to see whether the speakers perceived any differences between utterances with a post-focal accent and utterances without a post-focal accent. The stimuli were separated from the whole recording by means of the SFS program, which allowed us to break the signal into different speech chunks. The stimuli were transferred to a Sony 1000 ES DAT recorder and finally recorded onto a UHER CR 160 tape. For each stimulus, the listeners were asked to underline (in a written list of sentences) what they considered the most informative word or words of the utterance, a minimum of one and a maximum of two words to be underlined per sentence. The results of the perception test were

categorical since for all utterances (both targets and distractors) the speakers only underlined as the most informative word the nuclear item of the focal constituent. The last lexical word of the utterance was never underlined despite the presence of a post-focal accent in some of the utterances. These results suggest that post-focal accents should be interpreted as secondary and subordinate to the primary ones, rather than as a case of double focus.

The presence of post-focal accents in Catalan justifies the claim that post-focal material is part of another intermediate phrase, since within the AM model (Beckman and Pierrehumbert 1986) every intermediate phrase has to have a minimum of one pitch accent. However, this raises the question of what the status of post-focal accents is: are they optional (sometimes they appear, sometimes they do not and there is deaccentuation), or is deaccenting a reduction or elision of an underlying post-focal accent? Post-focal accents have been observed in several Romance languages, such as Italian (Grice 1995; Grice and Savino 1997; D'Imperio 1997), Maltese (Vella 1995), Peninsular Spanish (García Lecumberri 1995) and European Portuguese (Frota 1998). Frota (1998) claims that the post-focal accent is an obligatory event in Portuguese focus contours. Its apparent absence in some of the contours is due to a case of *extreme subordination* to the nuclear accent, rather than deaccenting.

Further research is needed to clarify the status of Catalan post-focal accents. However, from a phonological point of view, the appearance of a post-focal accent accounts for the presence of an intermediate phrase after the focal material and allows us to propose that in Catalan, as in other Romance languages, the focal element is always placed at the end of an intermediate phrase. Based on phonological grounds then, it seems plausible to claim that there is always an underlying post-focal accent after the early focussed material in Catalan and that this post-focal accent tends to be reduced in most cases, although it can sporadically emerge. Thus, the notion of “post-focal deaccenting” in Catalan seems to be explained as a reduction of a pitch accent rather than as the lack of accentuation. With this proposal, the problem of what is post-focal in Central Catalan seems to be solved, since the presence of a post-focal accent confirms the presence of a post-focal intermediate phrase.

### 5.2. English $H^*+L$

The tonal structure proposed for the English data is at odds with the first proposals of the AM model (Pierrehumbert 1980). Within the AM model, the traditional characterisation of the valley (and subsequent low plateau) after the nuclear accent ( $H^*$ ) in narrow focus sentences is an L- phrase accent followed by a boundary tone  $L\%$  (Pierrehumbert 1980; Beckman and Pierrehumbert 1986). In early versions of the model (Pierrehumbert 1980), phrase accents were not associated to a particular level of prosodic phrasing, but were treated as floating tones, which accounted for the intonation between the last pitch accent and the boundary tone. Thus, L- accounted for the  $F_0$  contour between the  $H^*$  observed on the focussed word and the boundary tone ( $L\%$ ). However, in later proposals (Beckman and Pierrehumbert 1986; Pierrehumbert and Beckman 1988), phrase accents became markers of an intermediate level of prosodic phrasing, and subsequently, the L- had to be associated at the right edge of an intermediate phrase. In the case of English narrow focus

sentences, the end of the intermediate phrase coincided with the end of the intonation phrase. This meant that in order to account for the low plateau between the nuclear H\* and the end of the phrase, a tone spreading rule had to be formulated, which claimed a leftward spreading of the L- phrase accent up to the nuclear accent.

However, if we analyse the nuclear accent of narrow focus productions as H\*+L, the discrepancy derived from the two versions of the theory seems to be solved. On the one hand, H\*+L accounts for the immediate valley after the focal peak. On the other, the L- phrase accent is associated to the end of the intermediate phrase domain and there is no need to postulate a spreading of the tone. Furthermore, the model predicts that the interpolation between H\* and L is a progressively falling line. If the HL fall of English narrow focus utterances (figure 1) is described as H\*L-, then there is a mismatch between the predictions of the model and the F<sub>0</sub> contours, since there is no progressively falling interpolation between H\*L- in such cases. However, if we interpret the falling F<sub>0</sub> as H\*+L L-, the model better accounts for the F<sub>0</sub> trace, since between H\*+L and L- the F<sub>0</sub> is low and level, as predicted by interpolation rules.

The H\*+L notation is problematic with the initial taxonomy of the model (Pierrehumbert 1980), where the L had no phonetic target value but only functioned as a downstep trigger of a succeeding H. However, with the treatment of downstep as a property of the lowered tone itself (Ladd 1980, 1996; Beckman and Hirschberg 1994; Grice 1995; Grabe 1998), the H\*+L accent is relieved of its downstepping duty and can be used as a phonetically transparent notation. Furthermore, the analysis of the pitch movements observed in the data as H\*+L entities agrees with those analyses that describe English F<sub>0</sub> contours by means of left-headed accents (Gussenhoven 1984; Grabe 1998). In this approach, only two pitch accents (H\*+L and L\*+H) are taken as basic tones and all other patterns are derived from them by means of a set of phonological adjustment rules.

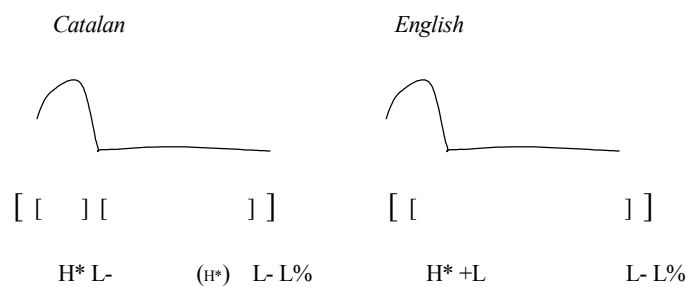


Figure 6: Tonal interpretation of narrow focus sentences in Catalan and in English

Overall, the results have shown that similar F<sub>0</sub> contours in Catalan and in English narrow focus sequences correspond to two different tonal structures. In Catalan, the HL sequence corresponds to an H\* pitch accent followed by a phrase accent (L-), since the L is consistently anchored at the end of the word irrespective of the number of post-accented syllables. In English, on the other hand, HL is better interpreted as a bitonal accent (H\*+L), since the L is located at a fixed distance with respect to the accented syllable. Whereas Catalan introduces an intermediate phrase boundary after the focal

element, with optional deaccenting of post-focal material, English does not signal focus by means of phrasing, and hence deaccentuation is compulsory in this language. A sketched contour of the different ways of signalling focus in the two languages is presented in figure 6 above. The large brackets stand for an intonation phrase and the small ones for an intermediate phrase.

## 6. Conclusion

In this study, the status of the L observed after the focal element in Catalan and in English narrow focus utterances was examined by analysing the anchoring of the  $F_0$  valley in focal words with different stress distributions (oxytones, paroxytones, and proparoxytones). The results showed that in Catalan the L corresponded to a phrase accent (L-), which signalled the end of the focal domain. These results corroborate the fact that in Romance languages focus is assigned at phrase final position (Zubizarreta 1998; Sosa 1999), but reject the idea that the relation between focus and accentuation must be mediated by syntax (Vallduví and Zacharski 1994; Vallduví 1995). The Catalan data show that intonation alone can create a prominent position by introducing a prosodic boundary after the focussed item. In English, on the other hand, the post-focal L should be interpreted as the trailing tone of a bitonal accent ( $H^*+L$ ) since the  $F_0$  valley is located at a fixed distance with respect to the accented syllable. This interpretation provides a better account for the low and level  $F_0$  contour after the focal element till the end of the sentence.

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## Appendix

### ENGLISH

#### *Focus on the subject*

#### Oxytones

THE BALLOON was moving upwards  
 THE NAME was written at the door  
 THE LAW was modified  
 THE MEAL was delicious  
 THE MOON was shining  
 THE MERINGUE was very sweet  
RAY resigned from his job  
JOHN divided the legacy

#### *Focus on the verb*

The girls BELIEVE in fairies  
 The jam REMAINED in the jar  
 Marjorie ADORES movies  
 Brenda REMOVES the garbage  
 The boys ASSUME their innocence  
 The girls ADMIRE the singer  
 The boys NEED a new game  
 The bluebells DIE with the rain

JO relies on my money  
LEE remembered the melody  
MO recovered the money  
SUE directed the course

The gardener MOWS the lawn  
 Norma RUNS every morning  
 Molly MEANS to succeed  
 Susan MOVES the chair

## Paroxytones

My MOTHER loves babies  
 The NANNY's ironing the linen  
 The LAWYER's reading the journal  
 The LADY ordered the meal  
 The LINEN is very dirty  
 The MONEY was in the bag  
MARY learns languages  
MILLIE lives in Ireland  
MOLLY made the dinner  
MINI loves marmalade  
LORNA remembers the story  
LILY wrote a novel

My brother REMEMBERS the rhymes  
 The boy DELIVERED the magazines  
 Ron AMENDED the bill  
 Jonathan ERASES the message  
 John RECORDED the performance  
 Brenda SUBMITTED the paper  
 Josephine NEEDED an explanation  
 Melanie ORDERED an orange juice  
 My neighbour MARRIED the model  
 The general MURDERED the villain  
 Robert HANDED the book  
 Nelly ALTERED the order

## Proparoxytones

THE MELODY was amazing  
 THE MARMALADE is on the fridge  
 THE GARDENER lived in London  
 THE LULLABY brings good memories  
 THE MESSAGES arrived late  
 THE MAINTENANCE is very expensive  
MELANIE will win the award  
EMILY damaged the window  
MARJORIE married an Indian marine  
MARILYN nurses the baby  
MARGERY measured the distance  
DEBORAH rejected the job

Mary ACKNOWLEDGES receipt  
 John REORGANISED the meeting  
 Susie EXTRAPOLATES the result  
 Tom EXAGGERATES the truth  
 The boys EVACUATE the room  
 The boss ENUMERATES the articles  
 The rain DAMAGES the harvest  
 The journalist BALANCES the disorder  
 The minister MODERATES the class  
 Jeremy MANAGES his company  
 Julie MEMORISED the name  
 Melanie's MENACING the hostages

## CATALAN

## Focus on the subject

## Oxytones

EN RAMON anava a Girona  
 LA MULLER vivia a Barcelona  
 LA MAMÀ regava els geranis  
 EL BARÓ mirava els estels  
 EN JOAN domina l'àlgebra  
 LA LLAYOR creixia amb la pluja  
ELL anava a Girona  
L'AU venia de l'illa  
L'OU bullia a l'olla  
JO menjava melmelada

## Focus on the verb

Els homes BEURAN aiguarden  
 L'Elena MUNYÍ l'ovella  
 L'Alba BALLÀ dues munyeires  
 Els nens SEURAN a la cadira  
 La mare MIRÀ la muntanya  
 La nena LLIMÀ la taula  
 En Juli DIU bajanades  
 La Glòria VE de Vilanova  
 En Jaume MOU la galleda  
 La Marina BEU llimonada

NOU miraven el mar  
DEU volien menjar

L'Àngela DEU dos rals  
 L'home VEU la sol.lució

## Paroxytones

LA LALI munyia l'ovella  
 LA ROSA llegia llibres  
 L'ELENA volia una nina  
 LA LLUNA mirava la platja  
 L'ISIDRE duia una gavardina  
 LA MARE menja arengades  
 L'HOME venia llimones  
 L'ALA lluïa amb el sol  
 L'AMO volia amanida  
 L'ANNA vivia a Vilavella  
 L'ILLA brillava amb el sol  
 L'EVA guardava monedes

Els homes LLIMAVEN l'armari  
 En Joan DOMINA l'àlgebra  
 En Manel ANAVA al museu  
 La Mireia REMENA l'olla  
 La Neus ANIMA les alumnes  
 En Jordi GUARDAVA medalles  
 La Mila NEGA la maionesa  
 La Rosa REGA els geranis  
 En Jordi MIRA les mones  
 L'Emili MANA els obrers  
 La Remei MIMA les nenes  
 La Ramona MULLA la roba

## Proparoxytones

LA LÀMINA lluirà amb el sol  
 LA MELANIE mira les novel.les  
 EL NÚMERO serà massa gran  
 LA MÍNIMA baixarà demà  
 LA NÒMINA serà més alta  
 EL NÒMADA menjava al carrer  
 L'ANIMA demanava descans  
 L'ÒLIBA dormia vora l'arbre  
 L'ÀNGELA manejava l'ordinador  
 L'ÀRBITRE demanava l'hora  
 L'INTEGRE no es pot calcular  
 L'AGUILA volava sobre el mar

Ell va dir AMAGA-LI la roba  
 Ell va dir ANIMA-LI la festa  
 Ell va dir ARREGLA-LI la casa  
 Ell va dir AGAFÀ-LI la mandarina  
 Ell va dir APUJA-LI la quantitat  
 Ell va dir INVENTA-LI la història  
 Els judadors CÀPIGUEN a l'estadi  
 En Jaume SÀPIGA la veritat  
 La noia SÀPIGA la sol.lució  
 Els homes SÀPIGUEN el camí  
 Els llibres CÀPIGUEN a l'armari  
 La nena CÀPIGA dins la vànova