

# An Intonational Study of Focus and Word Order Variation in Mexican Spanish

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## 1. Preliminaries

In general, for languages which allow a flexible order of major constituents, the grammatical variations of simple sentences are truth-conditionally equivalent regardless of the constituent sequences and of the intonational patterns. In Spanish, for instance, the six logically possible variations of sentences containing three constituents, namely, subject, verb, and object are felicitous in the context of a broad question such as *Qué pasó?* ‘What happened?’. Nonetheless, each variation may differ in the pragmatic information it conveys. A canonical order gives general information of the event and the participants as in sentence (1b).

- (1) a. What happened?  
b. Miguel quemó el menú. (SVO)  
‘Miguel burned the menu.’

In contrast, when the subject is in non-canonical position as in sentences (2b) and (3b), the more parsimonious pragmatic meaning of these sentences is one that either answers a question requesting confirmation of a specific individual in the discourse as in (2a) ‘*Who burned the menu?*’, or selects one from a set of individuals to whom the event can be attributed, as in (3a) ‘*Did Juan or Miguel burn the menu?*’.

- (2) a. Who burned the menu?  
b. Quemó el menú Miguel. (VOS)  
‘Miguel burned the menu.’
- (3) a. Did Juan or Miguel burn the menu?  
b. Quemó el menú Miguel. (VOS)  
‘MIGUEL burned the menu.’

We account for the empirical facts described above as a contrast of different types of focus. We agree with Vallduví and Engdahl (1996) in considering the notion of focus primarily as a pragmatic operation that provides relational new information in a given context. However, we do not consider that there is a single factor which defines focus alone, rather, we regard focus as a complex notion where intonational, semantic and syntactic conditions and constraints converge.

Following ideas first mentioned in Jackendoff (1972), and later elaborated in Rooth (1985, 1996) and Büring (1999, 2001) we define the different types of foci primarily by the notion of question-answer congruence. Informally, a question will restrict the set of

possible answers, and the focused constituent in the answer should address the information requested by the question. That is to say, a sentence  $P$  is a congruent answer to a given question  $Q$  if and only if the meaning of the question corresponds to the pragmatic value of the answer (see Buring 1999, 2000, Rooth 1992, 1996 for approaches to formal definitions). Questions function as restrictors over the scope of a focused constituent in the domain of a sentence. Thus, the question *What happened?* has a wide scope over the entire sentence, yielding a broad focus reading. A question such as *Who burned the menu?* restricts the scope of the answer to a participant of the event out of the set of all the possible individuals, yielding a narrow focus reading. Finally, in the question *Did Juan or Miguel burned the menu?*, the disjunction limits the scope of the answer to a subset of the possible participants already given in the question, forcing to a contrastive reading. Let us illustrate the question-answer congruence pattern modifying the diagram proposed in Rooth (1996).

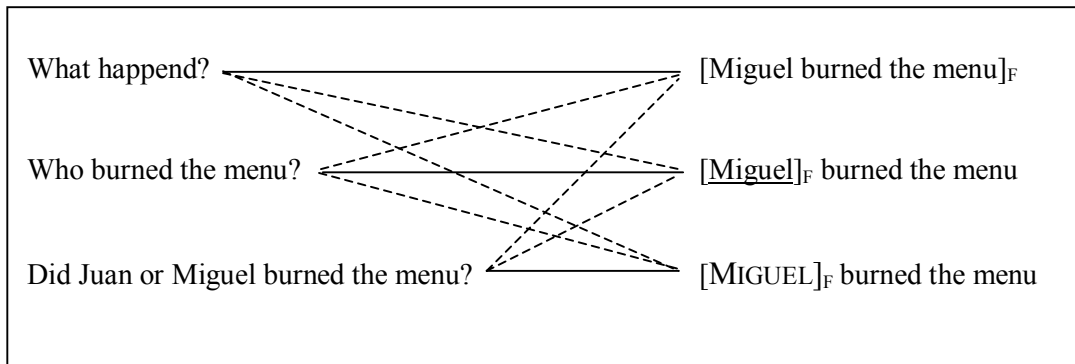


Figure 1. Question-answer congruence diagram (adopted from Rooth 1996)

In figure 1, the solid lines indicate appropriate question-answer pairs, the dashed lines indicates inappropriate pairs and the brackets mark the domain of focus. The original model proposed by Rooth predicts the same focus marking in the answers corresponding to questions such as *Who burned the menu?* and *Did Juan or Miguel burned the menu?*. The fact that in both cases the f-marked constituent is the subject of the sentence is a problem not explained by the model. We hypothesize that even the f-marking of narrow and contrastive focus in the semantics is the same, the contrast between the two could be maintained at intonational level. Therefore, as a working hypothesis, we will assume a distinction between narrow and contrastive foci; the difference will be marked by underlines for narrow focused constituents and by capital letters for contrastive focused constituents.

In Spanish the three types of focus over NPs in subject and object functions are obtained in both canonical and non-canonical orders by means of intonational patterns, as illustrated in the paradigms in (4-9). In this paper, we will address only the aspects related to the intonational properties of focus in Spanish, leaving for further research the discussion about the formal pragmatic and syntactic analyses associated to these focus constructions.

(4) Miguel quemó el menú.	Broad Focus	}	Canonical
(5) <u>Miguel</u> quemó el menú.	Narrow Focus		
(6) MIGUEL quemó el menú.	Contrastive Focus		
(7) Quemó el menú Miguel.	Broad Focus	}	Non-canonical
(8) Quemó el menú <u>Miguel</u> .	Narrow Focus		
(9) Quemó el menú MIGUEL. 'Miguel burned the menu.'	Contrastive Focus		

A comprehensive study of the interaction between word order variation, focus and their intonational realization has not been pursued before. In this study we intend a first approach to the issue. In order to do so, we performed a phonetic/intonational study of three focus types, broad, narrow and contrastive focus of subject and object NPs in two different word orders, canonical and non-canonical. The structure of this paper is as follows: In section 2, we will briefly summarize previous approaches, syntactic and intonational analyses, to the Spanish focus. In section 3, we will describe the experimental design of our study. In section 4 we will present the results and discussion of the experiments and in section 5 we will recapitulate the main findings of our study.

## 2. Word order variation and focus

### 2.1 Syntactic approaches

Previous studies have proposed syntactic approaches to the word order variation related to focus phenomena in Romance languages. In Italian, for instance, postverbal subjects are focalized even when the constituent does not bear any particular stress (Calabrese 1992). Belletti and Shlonsky (1995) account for postverbal subjects and postposed objects (VP PP NP) by proposing a strategy of structural focalization in which the specifier of a Focus Phrase (FP) is projected to the right edge of the sentence.

Other proposals give more emphasis to the role of prosody in the phenomenon of focus related word order variation. According to this approaches, the focused phrase occupies the sentence final position in Romance languages, a position which is prosodically prominent (Zubizarreta 1998). Zubizarreta noted that nuclear stress falls in sentence final position in Spanish. She claimed that focused constituents move to sentence final position in order to get the nuclear stress of the sentences.

Although syntactic approaches acknowledge the crucial role of intonation in the analysis of focus and word order variation, often they limit their description to an impressionistic observations of the intonational properties of different focus types without any analyses supporting their claims.

### 2.2 Intonational approaches

The prosodic characteristics of nuclear stress in Spanish have been described in a number of studies since Navarro Tomas (1944). Most studies coincide in the basic observation

that in Spanish the alignment of the F0 peak with respect to the stressed syllable depends on its position in the sentence. Thus, in sentence final position, the F0 peak is realized within the stressed syllable but in non-final position, the F0 peak is realized after the stressed syllable. Recent studies have analyzed the pattern of Spanish based on an Autosegmental Metrical model (Ladd 1996). The proposals can be divided in two major trends, which we will informally label as the ‘two pitch accent view’ and the ‘one pitch accent view’. The first analysis, proposed by Sosa (1991) for Caracas Spanish and Face (2001) for Madrid Spanish, suggests that the pitch accent of sentence final position is L+H\* whereas that of non-final position is L\*+H. The second analysis proposed by Prieto (1998) and Prieto *et al.* (1995, 1996) maintains that there is only one pitch accent, H\*. In this proposal the late alignment of the F0 in non-final position is treated as a delaying of the H target peak relative to the stressed syllable, a condition that holds unless it is repelled leftward by an upcoming accent or boundary.

Analyses on the intonational patterns of focus constructions in Spanish are rather scarce. A few recent studies on this issue have suggested that the realization of focus is also related to peak alignment. Face (2001), for instance, claimed that the F0 peak of narrow focused constituents is aligned within the stressed syllable, while the F0 peak of broad focused constituents is delayed with respect to the stressed syllable.

However, there has not been any specific phonetic or intonational study addressing the interaction between word order variation and focus in Spanish. Thus, the primary purpose of our study is to investigate the phonetic properties and intonational patterns of different focus types and their interaction with word order variation in Spanish.

### 3. Production data and experimental design

#### 3.1 Corpus

The corpus used in this study was composed of declarative sentences containing the target words examined in this study. The target words were the locus of CF and NF. The target word occurred in two different word orders: canonical and non-canonical. The target words functioned as the grammatical subjects and objects of the elicited sentences. Examples in (10-13) illustrate the corpus designed in this study. Sentences (10) and (11) show the target words (subject and object, respectively) occurring in canonical word order. Sentences in (12) and (13) show the same target words occurring in non-canonical order.

##### A. Canonical word order

- (10) *Miguel quemó el menú.* (SVO)  
 ‘Miguel burned the menu.’  
 (11) *Miguel quemó el menú en el bar* (SVQPP)  
 ‘Miguel burned the menu in the bar.’

##### B. Non-canonical word order

- (12) *Quemó el menú Miguel.* (VS)  
 (13) *Miguel quemó en el bar el menú.* (SVPPQ)



## 3.2 Subjects

Six subjects (three female, three male) participated in the study. The data from one male speaker was discarded due to defective recording. All participants were monolingual native speakers of Mexican Spanish from Mexico City. Their age ranged from 19 to 30.

## 3.3 Phonetic analyses

We observed various acoustic and intonational properties of target words and their environment. For narrow and contrastive focus constructions, the focused constituents were considered as the target words. For broad focus construction, the NPs corresponding to those in narrow and contrastive focus constructions were considered as the target words. The data were analyzed using the PitchWorks software.

### 3.3.1 Durational properties

We measured the durations of (i) target words, (ii) stressed and unstressed syllables of target words, and (iii) sentences.

### 3.3.2 Pitch accent

The pitch track was inspected for every sentence. The pitch accents of target words and sentence final words were identified. In our analysis we considered H\* as a basic pitch accent. This basic pitch accent hypothesis relies on the assumption that the lexically stressed syllable is always associated with high pitch.<sup>1</sup> The variations of this basic pitch accent were established in order to account for the dynamic aspects of tune to text alignment in the speech continuum. We consider that the specific realization of the high pitch with respect to the segmental material is a matter of phonetic implementation.

We propose an inventory of four pitch accent variation of H\* for the labeling of Mexican Spanish. The basic H\* corresponds to a high F0 peak aligned with the stressed syllable. Figure 2 illustrates a representative case of H\*. This particular utterance is a sentence with broad focus intonation. As shown in the pitch track the first syllable of the word *Beto* gets the highest F0 value and the second syllable follows a downtrend. H\*> is exemplified in figure 3. The defining characteristic of this pitch accent type is that the high F0 peak is realized after the stressed syllable, in this sense, we will refer to this pattern informally as a ‘shifted high pitch’ and it corresponds to the ‘late peak alignment’ of other studies. With H\*= we describe a pitch accent where the high F0 peak is realized in the stressed syllable and spreads to the next syllable. Figure 4 shows how the high F0 is preserved in the stressed syllable and further extended to the following syllable. ^H\* stands for a high F0 peak which is against downstep trend. For instance in Figure 5 the

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<sup>1</sup> There is well-known evidence that lexical stress is signalled by different acoustic cues such as higher pitch, longer duration, and stronger amplitude, in order of relative importance. As high pitch is the main correlate of stress, we would like to extrapolate this relation to the analysis of intonational patterns, such that our analysis can dispense with low pitch (L) associated with a stressed syllable. Our hypothesis can be supported by neurophysiological evidence indicating that stronger amplitude triggers excitation of the auditory nerve fibers towards the base of the cochlea (Chatterjee and Zwislocki 1997).

high F0 track of the constituent labeled with  $\wedge H^*$  clearly breaks the inertia of the regular downstep pattern of declarative sentences. As a heuristic procedure we assigned a pitch accent of this type when the F0 of  $H^*$  was higher than the preceding  $H^*$  in the utterance.

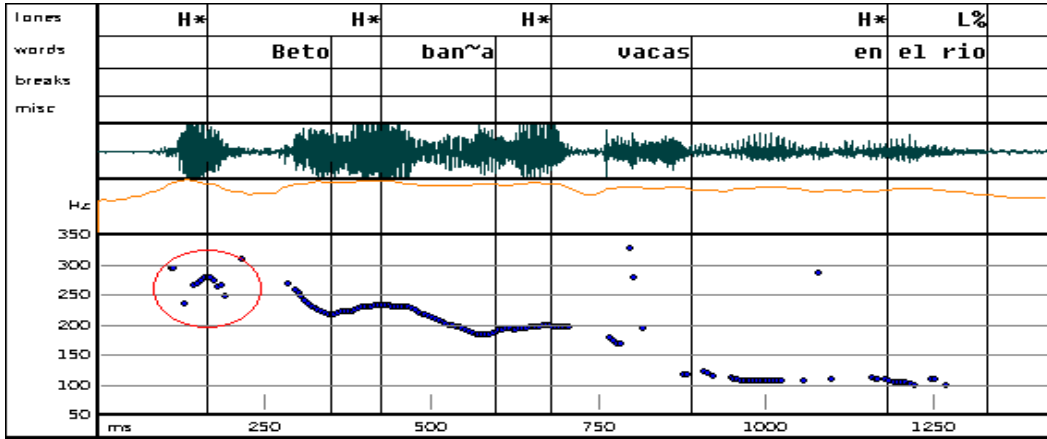


Figure 2.  $H^*$

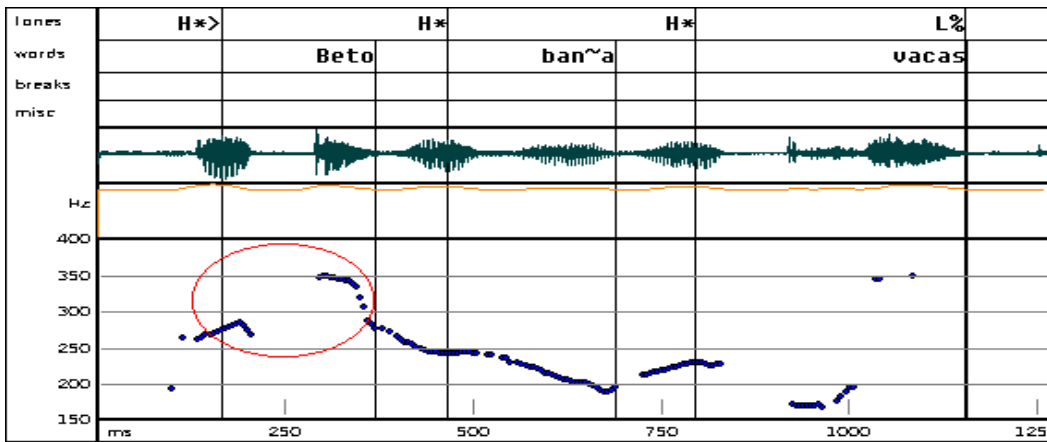


Figure 3.  $H^{*>}$

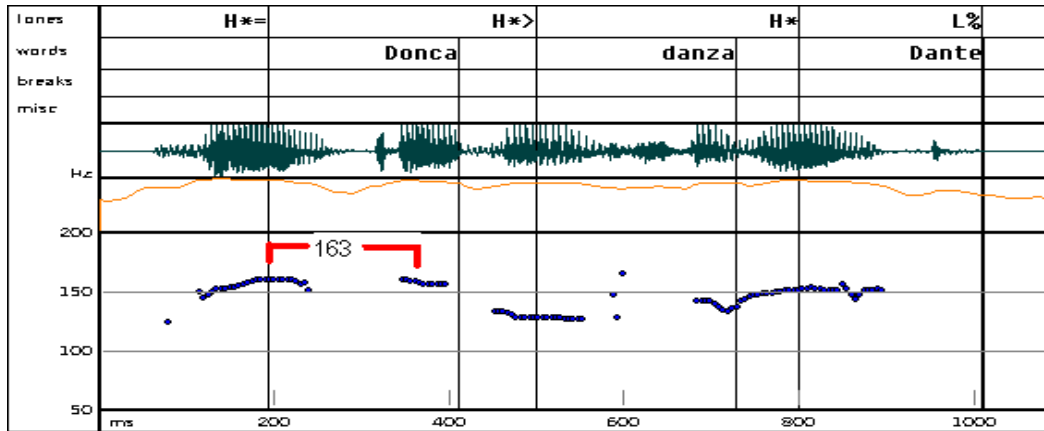


Figure 4. H\*=-

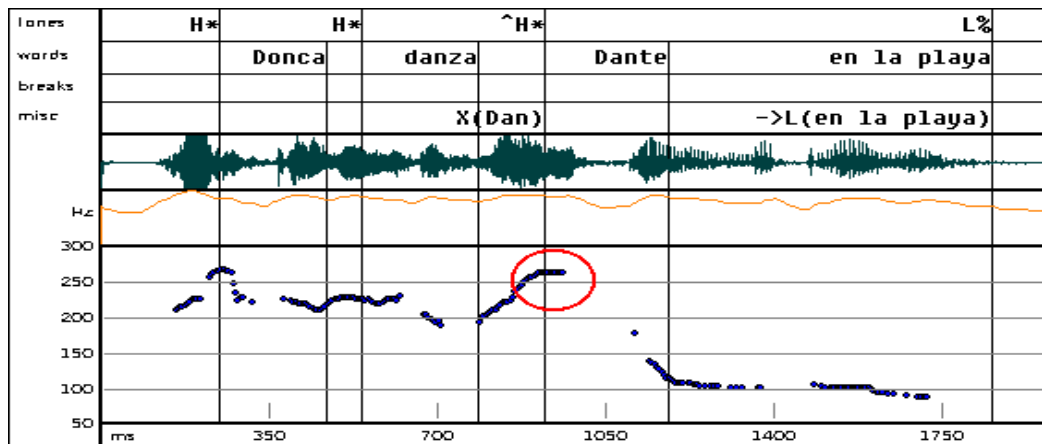


Figure 5. ^H\*

Table 1 summarizes the inventory of pitch accent variations we have identified in our data of Mexican Spanish.

Table 1. Pitch accent inventory

H*	H peak aligned with the stressed syllable
H*>	H peak after the stressed syllable
H*=-	H peak realized in the stressed syllable and spreads to the next syllable
^H*	H* is higher than the preceding H*

### 3.3.3 Other phonetic properties

Other intonational properties such as deaccenting, extra high pitch, and breaks were also considered and labelled accordingly in the transcription.

The total number of tokens used in the study summed 440 (for subject NPs: 5 speakers x 2 stress types x 2 word order types x 4 consonant types x 3 focus types; for object NPs in

canonical word order: 5 speakers x 2 stress types x 4 consonant types x 3 focus types; for object NPs in non-canonical word order: 5 speakers x 2 stress types x 4 consonant types x 2 focus types)<sup>2</sup>.

#### 4. Results and discussion

##### 4.1 Duration

The results showed that the duration of focused words was significantly longer in CF and NF than in BF ( $p < .0001$ ), and that there was no significant difference between CF and NF. The results held both in canonical and non-canonical word order. There was no interaction between the grammatical function of target words and focus type. Figure 6 shows the average duration of target words pooled across all the parameters.

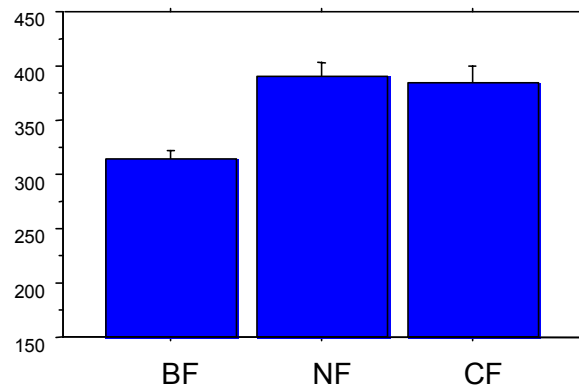


Figure 6. Average duration of target words  
(data pooled across grammatical function, word order, and speaker.)

Other correlations based on duration showed similar trends. For subjects in canonical word order the tendency was uniform in all three variables: stressed syllables of target words, unstressed syllables of target words, and the whole sentence. As for subjects in non-canonical word order the only significant interaction was observed in the duration of unstressed syllables of target words. Objects in canonical word order showed a significantly longer duration of stressed syllables and the entire sentence in NF than in BF. Objects in non-canonical word order did not show any significant durational difference among three focus types in all measurement parameters. Table 1 summarizes the results obtained.

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<sup>2</sup> BF reading cannot be obtained when the object NP is in non-canonical word order.

Table 2. Duration of stressed and unstressed syllables of target words, and overall sentence duration

	canonical subject	non-canonical	canonical object	non-canonical
Stressed syll. target w	B < C, N	no sig. diff	B < N	no sig. diff
Unstressed syll. target w	B < C, N	B < C, N	no sig. diff	no sig. diff
Sentence	B < C, N	no sig. diff	B < N	no sig. diff

The acoustic duration of various constructions showed that focused constituents had longer duration than non-focused constituents. It also showed that CF and NF can be distinguished from BF in most cases. Thus, our results show that duration plays a significant role in distinguishing focus types. Further, the results contribute to more evidence to the typological tendency, according to which the focused constituents are more prominent than non-focused constituents in terms of duration.

#### 4.2 Pitch Accent

All four variations of pitch accents were observed in all focus types. However, their frequency rate differed across focus types. The results showed that H\* has the most frequent distribution across all focus types. H\*> and ^H\* had high frequency rates in all three focus types, however their pattern of distribution showed different trends. According to our results, H\*> occurred evenly across all focus types, though its frequency was about half of that of H\*. Regarding ^H\*, the results showed a greater distribution of this pitch accent in CF and NF than in BF. H\*= was scarcely observed across all focus types. Figure 7 summarizes the distribution bars of pitch accents in terms of percentages.

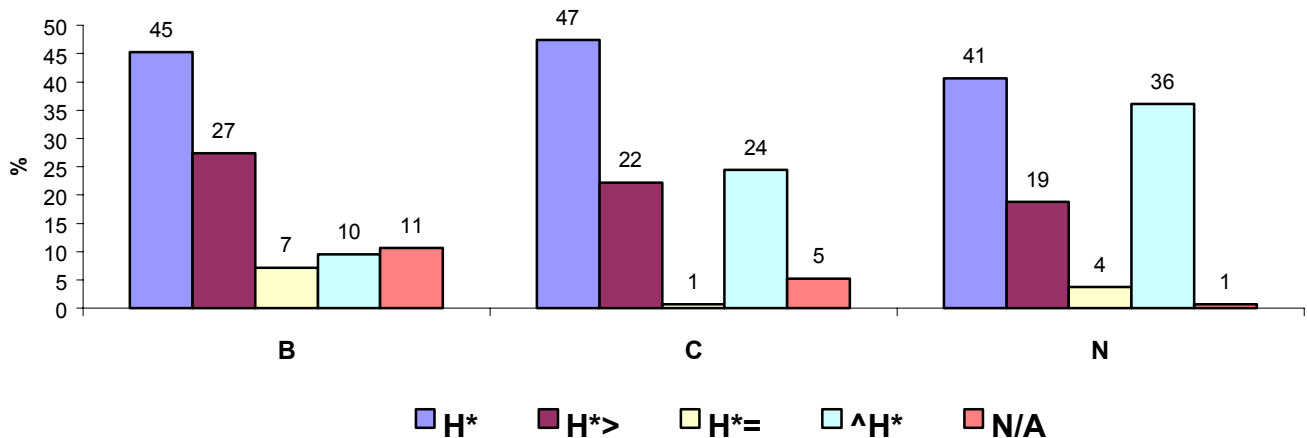


Figure 7. Pitch Accent distribution pooled across word orders

As shown in Figure 7, H\*>, the pitch accent type that indicates a peak shifting to the right, occurred in all focus types. This fact constitutes evidence against the claim that narrow focus tends to correlate with an ‘early peak’ while broad focus tends to correlate with a ‘late peak’ (Face 2001). Instead, our findings strongly indicate that there is no correlation between focus type and peak alignment. Accordingly, we can conclude that the shifting of H\* peak is not a property related to a specific focus type.

The frequency distribution obtained in Figure 7 shows that ^H\* had a higher incidence in CF and NF than in BF. This fact allows us to suggest that speakers tend to go against downstep trend of sentential intonation when they are in need of emphasizing a specific constituent in a sentence.

In our proposal, ^H\* represents a higher pitch associated with a constituent with respect to the preceding constituents in the utterance. In this sense, its pattern of distribution can be explained in a straightforward manner: in BF constructions all the constituents in the utterance are in the scope of similar focus prominence, but in CF or NF, the focused constituent should be marked as more prominent than other constituents in the utterance.

Concerning the relation between the distribution of pitch accent, word orders and focus types, the results showed that H\* occurred in all word orders. Other variations of this pitch accent were more restricted in their distribution. H\*= and H\*> occurred only in canonical word order. These two pitch accents occurred more often in subject than in object NPs. ^H\* tends to occur more in non-canonical word order.

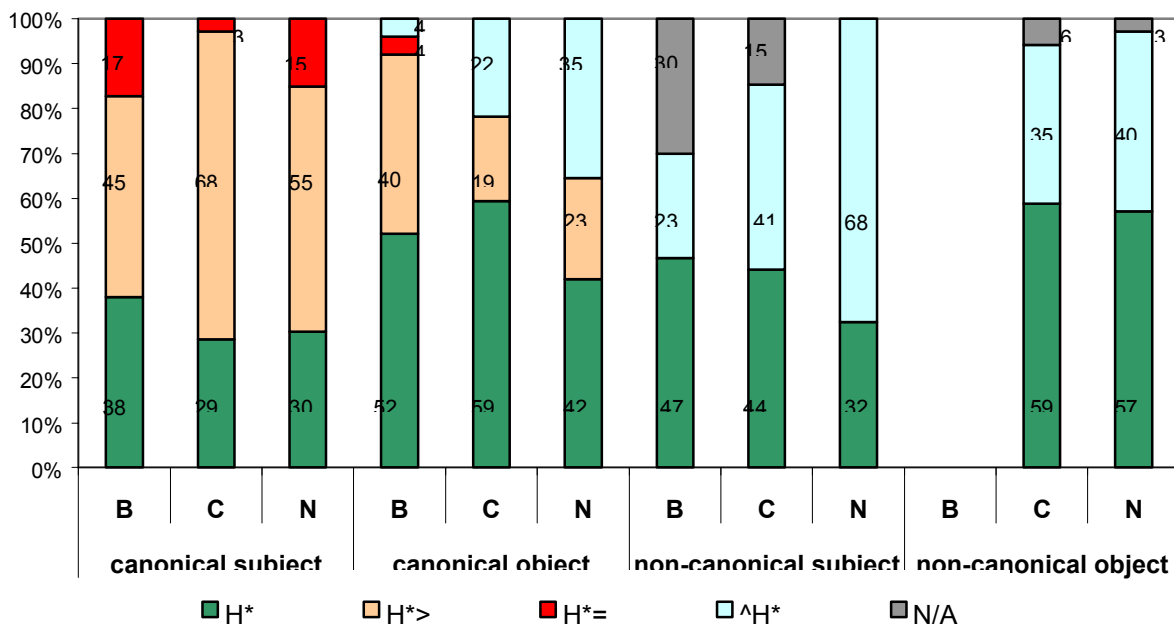


Figure 8. Pitch Accent distribution across word order and focus type

The occurrence of H\*= and H\*> limited to canonical word order indicates that there is a correlation between pitch accent type and word order. This is related to the fact that the

focused constituent occurs at the sentence final position in non-canonical position. As noted in various studies, further shifting of pitch is not possible in the sentence final position in Spanish. We conjecture that this pattern is due to the existence of boundary tone (L% in declarative sentence). The shifting is blocked in this environment in order to avoid tonal crowding and to preserve the integrity of both the pitch accent and the boundary tone.

We found that peak alignment is more common in object in canonical position (SVOPP) than in subject in canonical position (SVO). Although we are unable to explain this pattern we would like to advance a number of conjectures: (a) this difference may reflect the structural asymmetry between subject and object or (b) the difference is due to syntactic conditions since the phonological material following the object belongs to an independent adjunct phrase in constructions of the type ‘SVOPP’, such that the syntactic phrasing may trigger the presence of a separate phonological phrase blocking the shifting.

### 3. Other phonetic cues

In addition to the phonetic parameter discussed above, we observed a number of other cues such as deaccenting, extra high pitch and breaks. A representative deaccenting pitch contour is illustrated in figure 9. As the pitch track shows there is no noticeable pitch accent after the focused constituent; the f0 track is uniform in the low values of the speaker’s range. Figure 10 shows an example of extra high pitch. In this pattern the high pitch of the focused constituent exceeds the normal pitch range of the speaker. Figure 10 also shows a break between the focused constituent and the rest of the utterance.

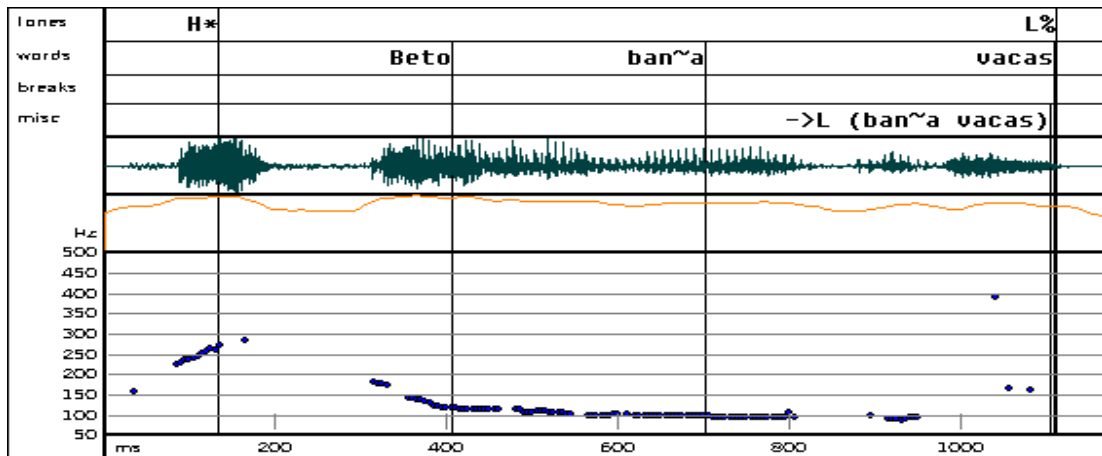


Figure 9. Deaccenting

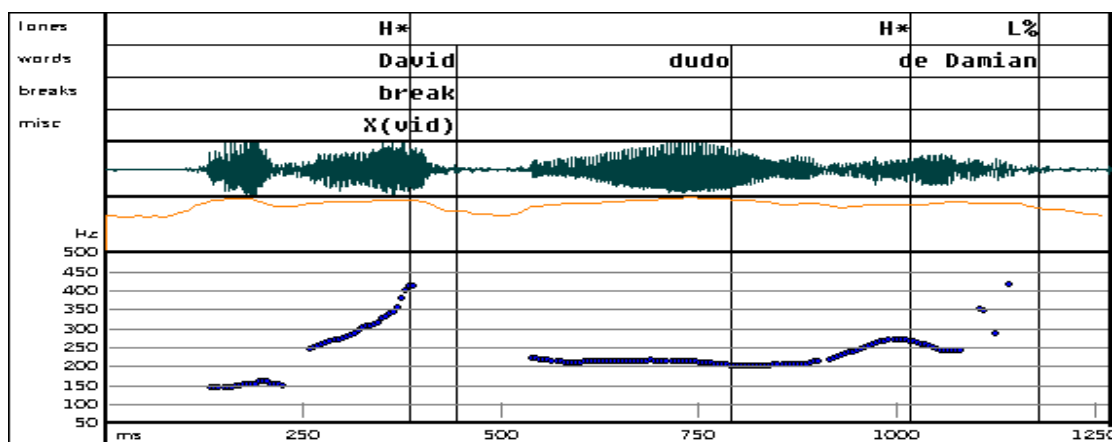


Figure 10. Extra high pitch and break

The distinction between CF/NF and BF was also encoded by other phonetic cues. Table 3 summarizes the results. The breaks before or after the target words were only observed in CF and NF and not in BF. Extra high pitch was mainly used in CF (19.3%) and NF (11.4%), but it was almost not observed in BF (1.9%). Deaccenting was most frequent in CF (12.1%). It was infrequently observed not only in BF (1.9%) but also in NF (3.6%). Thus, the relevance of these results is that the distinction between the two non-broad focus types can be made by deaccenting in CF but not in NF.

Table 3. Occurrence of other phonetic cues

	BF	CF	NF
Break	0.0%	10.0%	11.4%
Extra high	1.9%	19.3%	18.6%
Deaccenting	1.9%	12.1%	3.6%

## 5. Final Remarks

In this study, we have presented an analysis of the intonational patterns of focused constituents in different word orders. We have shown that duration is the most consistent cue in distinguishing contrastive and narrow focus types from broad focus. Although our data did not confirm a correlation between pitch accent and focus type we were able to observe a number of interesting correlations between pitch accent type and word order. One of the most robust results is that shifting of high pitch ( $H^{*>}$  and  $H^{*=}$ ) was not observed when a focused constituent occurred in non-canonical word order, that is, when the focused constituent is in sentence final position. This finding agrees with the claim that F0 peak alignment is a property correlated with sentence final position. However, our data provided additional evidence that these pitch accent types aligned to the stressed syllable ( $H^{*}$  and  $^{\wedge}H^{*}$ ) can occur in pre-final positions as well. Further research is necessary in order to determine whether this pattern corresponds to a phonological phrase final position rather than strictly to sentence final position, and to assure the correlation between focus related movement and prosody.

## References

Belletti, A. and U. Sholonsky. 1995. 'The order of verbal complements, a comparative study', *Natural Language and Linguistic Theory* 13, 489-526.

- Büring, D. 1999. 'Topic'. Bosch, Peter & Rob van der Sandt (eds) *Focus -- Linguistic, Cognitive, and Computational Perspectives*. CUP. 142-165
- Büring, D. 2000. 'On D-Trees, Beans, and B-Accents'. Manuscript
- Calabrese, A. 1992. 'Some Remarks on Focus and Logical Structures in Italian', *Harvard Working Papers in Linguistics* I.
- Chatterjee, M. and J. J. Zwillocki. 1997. 'Cochlear mechanisms of frequency and intensity coding. I. the place code for pitch'. *Hearing Research*, 111, 65-75.
- Contreras, Heles. 1976. *A Theory of Word Order with Special Reference to Spanish*. Amsterdam: North-Holland.
- Face, T. L. 2001. 'Focus and early peak alignment in Spanish intonation'. *Probus* 13, 223-246.
- Jackendoff, Ray. 1972. *Semantic Interpretation in Generative Grammar*, Cambridge, MA: MIT Press.
- Ladd, D. R. 1996. *Intonational Phonology*. Cambridge: Cambridge University Press.
- Navarro Tomás, T. 1944. *Manual de entonación española*. New York: Hispanic Institute in the United States.
- Prieto, Pilar. 1998. 'The scaling of the L values in Spanish downstepping contours' *Journal of Phonetics*, 26:3, 261 - 282.
- Prieto, Pilar; Shih, Chilin; Nibert, Holly. 1996. 'Pitch Downtrend in Spanish', *Journal of Phonetics*, 24: 4, 445-473
- Prieto, Pilar, J. van Santen, J. Hirschberg. 1995. 'Tonal alignment patterns in Spanish' *Journal of Phonetics*, 23:4, 429 - 451.
- Rooth, Math. 1985. *Association with Focus*, PhD Dissertation. Amherst, MA: University of Massachusetts.
- Rooth, Math. 1992. 'A theory of focus interpretation'. *Natural Language Semantics*, 75-116.
- Rooth, Math. 1996. Focus. *The Handbook of Contemporary Semantic Theory*, S. Lappin (ed), 271-298. Blackwell publishers.
- Sosa, Juan Manuel. 1991. *Fonética y fonología de la entonación del español hispanoamericano*. Ph.D. Dissertation University of Massachusetts, Amherst.
- Vallduví, Enric and Elisabet Engdahl. 1996. 'The linguistic realization of information packaging', *Linguistics* 34, 3(459-519).
- Zubizarreta, Maria Luisa. 1998. *Prosody, Focus, and Word Order*. MIT Press.