

UNIVERSITY OF CALIFORNIA

Los Angeles

The Intonational Phonology

of Porteño Spanish

A thesis submitted in partial satisfaction  
of the requirements for the degree Master of Arts  
in Linguistics

by

John Patrick Barjam

2004



The thesis of John Patrick Barjam is approved.

---

Bruce Hayes

---

Patricia Keating

---

Sun-Ah Jun, Committee Chair

University of California, Los Angeles

2004

## **Table of Contents**

List of Figures .....	v
List of Tables .....	viii
1. Introduction.....	1
1.1. Previous Work .....	1
1.2. Project Outline .....	3
2. Language Background .....	4
2.1. Segmental Inventory .....	4
2.2. Stress .....	6
2.3. Hiatus Resolution.....	6
2.4. Syntax .....	7
2.5. Spanish Orthography .....	9
3. Methods.....	10
3.1. Subjects .....	10
3.2. Corpus .....	10
3.3. Recording Procedure.....	12
3.4. Recording Environment .....	13
3.5. Digitization and Processing .....	13
3.6. Tiers .....	14
4. Analysis.....	17
4.1. Prosodic Structure of Porteño .....	17
4.2. Underlying and Surface Tones.....	18
4.3. Pitch Accents .....	18
4.3.1. Allotones of /L+H*/ .....	20
4.3.2. Allotones of /L+ <sup>^</sup> H*/ .....	23
4.3.3. Peak Timing .....	25
4.4. Intermediate Phrase Boundary Tones .....	26
4.5. Intonation Phrase Boundary Tones .....	29
4.6. Disjuncture Types .....	29
4.7. Summary of Structural Elements .....	30
5. Tonal Distribution Patterns .....	33
5.1. Declaratives.....	33
5.1.1. Simple Declaratives .....	34
5.1.2. Complex Declaratives and Intermediate Phrasing .....	41
5.2. Interrogatives .....	45
5.2.1. Wh-Questions .....	46
5.2.2. Yes/No Questions .....	49
5.2.3. Echo Questions .....	53
5.2.4. Final L-H% sequences and Gender Differences .....	54
5.2.5. Summary .....	55
5.3. Focus .....	56
5.3.1. Declarative Focus.....	57
5.3.2. Yes/No Focus.....	63

5.4. Imperatives.....	66
6. Discussion.....	69
7. Conclusion .....	72
Appendix.....	73
A. Speaker Demographics .....	73
B. Sentence Paradigm.....	74
References.....	80

## List of Figures

Figure 1. Example of proposed tiers in a declarative sentence. Speaker: the author. "Maria spoke of Malaga?" <i>María hablaba de Málaga.</i> ] ] .....	16
Figure 2. Porteño Intonational Model.....	18
Figure 3. Example of a /L+H*/ pitch accent realized as a L+!H* in a declarative sentence. Speaker: the author. "Maria spoke of Malaga?" <i>María hablaba de Málaga.</i> ] ]...	19
Figure 4. Example of a /L+^H*/ pitch accent realized as a L+^H* in a focus declarative sentence. Speaker: the author. "Maria spoke of MALAGA." <i>¿María hablaba de MÁLAGA?</i> ] ] .....	20
Figure 5. Example of a default contour pitch accent. Speaker: AC. "Maria swam to the lake." <i>María nadó al lago.</i> ] ] .....	21
Figure 6. Example of an undershot L target. Speaker: AC. "Manuel swims to the lake." <i>Manuel nada al lago.</i> ] ] .....	22
Figure 7. Example of L+^H* before an intermediate phrase tone. Speaker: GC. "Maria ate bananas, oranges, and grapes." <i>María comía bananas, ] naranjas, y uvas.</i> ] ] .....	24
Figure 8. Example of L+^H* as nuclear pitch accent. Speaker: AC. "Did the grandma swim in the lake?" <i>¿Nadaba la nona en el lago?</i> ] ] .....	25
Figure 9. Example of a delayed pitch accent. Speaker: AM. "Maria swam." <i>María nadó.</i> ] ] .....	26
Figure 10. Example of H- before H%. This is the first half of the sentence "When I was hungry, I ate a banana." Speaker: AM. <i>Cuando tenía hambre, ] ] comí una banana</i> .....	27
Figure 11. Example of an H- in medial position. This is the first half of the sentence "The boy who robbed the store also robbed the bank on the corner." Speaker: AC. <i>El niño que robó el mercado ] también robó el banco de la esquina.</i> .....	28
Figure 12. Example of pitch accent alignment. Speaker: AC. "The pretty tangerine." <i>La mandarina linda.</i> ] ] .....	34
Figure 13. Example of the free variant L+!H* as a nuclear pitch accent in declaratives. Speaker: AC. "I told him/her to return my binoculars." <i>Le dije que me devuelva mi largavista.</i> ] ] .....	36
Figure 14. Example of five syllable stress lapse. Speaker: AC. "Maria will savor the grape." <i>María saboreará la uva.</i> ] ] .....	37
Figure 15. Example of a delayed pitch accent. Speaker: AM. "Maria swam." <i>María nadó.</i> ] ] .....	38
Figure 16. Example of delay causing a gradual fall. Speaker: AM. "Laura swam to the lake." <i>Laura nadó al lago.</i> ] ] .....	39
Figure 17. Example of a longer declarative sentence. Speaker: AC. "Maria swam to the lake." <i>María nadó al lago.</i> ] ] .....	40
Figure 18. Example of stress clash. Speaker: AC. "Manuel swims to the lake." <i>Manuel nada al lago.</i> ] ] .....	41

Figure 19. Example of a list reading. Speaker: GC.	
"Maria ate bananas, oranges, and grapes." <i>María comía bananas, ] naranjas, y</i> <i>uvas. ] ]</i> .....	42
Figure 20. Example of a high rise. First half of the sentence "When I was hungry, I ate a banana." Speaker: AM. <i>Cuando tenía hambre, ] ] comí una banana.</i> .....	44
Figure 21. Example of a high plateau. This is the first half of the sentence "The pretty girl that watched the airplane dreamed of flying." Speaker: AM.	
<i>La niña linda ] que miraba al avión soñaba con volar.</i> .....	44
Figure 22. Example of a wh-question. Speaker: GC.	
"From whom did you receive the letter?" <i>¿De quién ] recibistes el libro? ]</i> .....	46
Figure 23. Example of pitch accent realization in narrow pitch range. Speaker: AC.	
"What did the grandma read in the garden?" <i>¿Que leía la nona en el jardín? ] ]</i> .....	47
Figure 24. Example of a single word wh-question. Speaker: AC. "Who?" <i>¿Quién? ] ]</i> .....	48
Figure 25. Example of a yes/no question. Speaker: AC.	
"Did the grandma swim in the lake?" <i>¿Nadaba la nona en el lago? ] ]</i> .....	50
Figure 26. Example of a non-upstepped yes/no nuclear pitch accent. Speaker: GC.	
"Did the grandma swim?" <i>¿Nadaba la nona? ] ]</i> .....	51
Figure 27. Example of a one word yes/no question. Speaker: MB.	
"Did he/she swim?" <i>¿Nadaba? ] ]</i> .....	52
Figure 28. Example of an echo question. Speaker: AC.	
"Laura swam to the lake?" <i>¿Laura nadaba al lago? ] ]</i> .....	53
Figure 29. Example of a flat boundary tone in a wh-question produced by a male speaker. Speaker: GC. "From whom did you receive the book?" <i>¿De quién ] recibistes el</i> <i>libro? ]</i> .....	54
Figure 30. Example of a late rising boundary tone in a wh-question produced by a female speaker. Speaker: MB. "From whom did you receive the book?" <i>¿De quién ]</i> <i>recibistes el libro? ]</i> .....	55
Figure 31. Example of the non-focus declarative version of "Maria had Gaby's banana." Speaker: AC. <i>María tenía la banana de Gaby. ] ]</i> .....	58
Figure 32. Example of the focus version of "MARIA had Gaby's banana." Speaker: AC. <i>MARÍA tenía la banana de Gaby. ] ]</i> .....	59
Figure 33. Example of focus in sentence medial position. Speaker: AC. "Maria has Gaby's BANANA." <i>María tenía la BANANA ] de Gaby ]</i> .....	60
Figure 34. Example of a pitch accent loss due to focus. Speaker: AM. "MARIA had Gaby's banana." <i>MARÍA ] tenía la banana de Gaby. ]</i> .....	61
Figure 35. Example of slight focus. Speaker: AC. "The grandma swam." <i>La nona nadó.</i> <i>] ]</i> .....	62
Figure 36. Example of pitch range increase in yes/no questions. Speaker: AM.	
"Maria HAD Gaby's banana?" <i>¿María TENÍA la banana de Gaby? ] ]</i> .....	64
Figure 37. Example of L+H* on focused word. Speaker: AC. "Maria had Gaby's BANANA?" <i>¿María tenía ] la BANANA de Gaby? ] ]</i> .....	65

Figure 38. Example of an imperative sentence. Speaker: AC. “Give him/her the gift!”  
*Dale el regalo* ] ]..... 67

Figure 39. Example of a yes/no question. Speaker: AC. “Did the grandmother swim?”  
*Nadaba la nona* ] ]..... 68



**List of Tables**

Table 1. Porteño Consonant Inventory ..... 5  
Table 2. Porteño Vowel Chart ..... 5  
Table 3. Examples of Complex Declaratives..... 12  
Table 4. Summary of Phonemic and Allotonic Pitch Accents..... 32  
Table 5. Summary of Break Indices ..... 33  
Table 6. Declarative Non-Focus/Focus Peak Realization..... 62  
Table 7. Yes/No Question Non-Focus/Focus Peak Realization. .... 66

## **Acknowledgements**

There are many people that played integral roles in the creation of this paper. First of all, I would like to thank my committee members, Sun-Ah Jun, Bruce Hayes, and Patricia Keating for their endless constructive comments, suggestions, and encouragements. Without their guidance and advice, this project would have remained wishful thinking. Second, I would like to thank the speakers that agreed to help me in this project, (AC, AM, GC, IF, MB, and MM). They willingly endured the seemingly endless prosodic paradigms used in this project. Third, I must thank my family and friends here and in Argentina for their support in times of lucidity and insanity. I must also thank them for taking time from their hectic lives to help me find speakers. Without their help, finding these six in such a short timeframe would have been a grueling task. Finally, I would like to thank all the speakers of Porteño Spanish for without their variety in their speech, life would not be as interesting.

ABSTRACT OF THE THESIS

The Intonational Phonology

of Porteño Spanish

by

John Patrick Barjam

Masters of Arts in Linguistics

University of California, Los Angeles, 2004

Professor Sun-Ah Jun, Chair

This study describes the intonational patterns of Porteño Spanish within an Autosegmental-Metrical (AM) (Ladd 1996) approach. Six monolingual Porteño speakers produced ninety-nine sentences which include declaratives, interrogatives, imperatives, and focused declarative and focus yes/no questions. An analysis of the pitch contours suggest that there are two underlying phonemic pitch accents, L+H\* and L+<sup>^</sup>H\*, realized as five different allotones. It is shown that the phonemic pitch accents are crucial in distinguishing between declaratives and yes/no questions. Evidence is also presented showing the existence of two phonemic intermediate phrase tones, L- and H-, which have three allotones, and two intonation phrase boundary tones. It was also found that peaks

are realized earlier when focused than when not focused in both declaratives and yes/no questions.

# The Intonational Phonology of Porteño Spanish

## **1. Introduction**

Porteño Spanish is the dialect of Spanish spoken in Buenos Aires and the surrounding area. The purpose of this project is to propose an analysis of Porteño Spanish intonation in hopes of expanding our knowledge of Spanish intonation in general and of intonational theory.

### **1.1. Previous Work**

The study of Spanish intonation has its roots in the work of Navarro Tomás (1944). In this work, Navarro Tomás describes five *tonemas* (“tones”) that are present in a variety of dialects. He describes these five tones as the following: falling tone, a rising tone, a mid-falling tone, a mid-rising tone, and a mid plateau tone. This work laid the foundation for subsequent research on Spanish intonation. The most recent such studies are done within a framework known as an Autosegmental-Metrical (AM) phonology of intonation (Bruce 1977, Pierrehumbert 1980, Pierrehumbert and Beckman 1988, Ladd 1996).

According to Ladd (1996), an AM approach identifies phonologically distinct elements in the prosodic contour whose description can provide a mapping which can lead back to the acoustic stream. He further states that an AM approach makes the following four assumptions: (1) the tonal structure is linear; (2) pitch accents are distinct from stress, yet pitch accents are linked to stressed syllables; (3) pitch accents should be

represented by level (high or low) tones; and (4) each pitch accent should account for the local trend of the contour, e.g. downstepping to account for declination.

Sosa (1999) studied Porteño intonation under this approach, and claimed that declarative sentences and yes/no questions in Porteño have two non-final pitch accents (a high falling contour tone,  $H^*+L$ , which is higher in yes/no questions due to an initial high boundary tone, and a lowered high peak,  $H^*$ ). The two sentence types differ in that declaratives end with a low pitch accent ( $L^*$ ) and low final boundary tone ( $L\%$ ), while yes/no questions end in a rising contour pitch accent ( $L+H^*$ ) and a high final boundary ( $H\%$ ). McGory and Díaz-Campos (2002) claim that declarative sentences in Porteño use two rising contour pitch accents, one with a low pitch present on the stressed syllable ( $L^*+H$ ) and the other with a high on the stressed syllable ( $L+H^*$ ), one high falling pitch accent ( $H^*+L$ ), and four types of intonation phrase boundary tones: high ( $H\%$ ), mid ( $M\%$ ), low ( $L\%$ ), and rising ( $LH\%$ ). Both of these intonational theories propose a fairly rich tonal inventory. I propose instead that there are only two underlying pitch accents types, and that these can account for all the pitch contours in Porteño.

Besides the work of Sosa and McGory and Díaz-Campos, the use of an AM approach was used by Nibert (2000) to claim that earlier peak alignments in narrow focus are not due to two different pitch accents but one pitch accent that is followed by an intermediate phrase tone, à la Prieto et al. (1995). Face (2001a) uses an AM framework to account for early peaks alignment in focus sentences. He refutes Nibert's claim that intermediate phrases exist and that earlier alignment is due to the presence of the same two pitch accents used by McGory and Díaz-Campos in declaratives. The patterns found

in narrow focus for Porteño generally support the patterns described by Nibert; for further details see Section 5.3.

The status of an intermediate phrase in Spanish intonation has been controversial in the literature. The difficulty of proving its existence is complicated by the fact that the prosodic markers of the intermediate phrase boundary overlap with those of the intonational phrase boundary. Both phrase boundaries trigger a pitch reset in the following phrase, and are marked by phrase final lengthening. The difference is often phonetic, with stronger or weaker degree of phrase final pause. But these two prosodic units can also be distinguished by some phonological features such as tone types. In general, Garrido, Llisterri, de la Mota, Ríos (1995) claim Castilian Spanish uses intermediate phrase boundaries: (1) between a long subject and a long predicate, (2) between a noun phrase and its relative clause, and (3) in an enumerated list.

Beckman et al. (2002) have proposed a pan-Spanish transcription inventory within an AM framework. This system claims that Spanish as a whole possesses seven pitch accents, including default peaks ( $L^*+H$ ,  $L+H^*$ ,  $H+L^*$ ,  $H^*$ ), downstepped peaks ( $L^*+!H$  and  $L+!H^*$ ), and upstepped peaks ( $\grave{L}+H^*$ ), and three intonation boundary tones, a low ( $L\%$ ), a mid ( $M\%$ ), and a high ( $H\%$ ).

## **1.2. Project Outline**

The remainder of this thesis is laid out as follows: Section 2 presents some background information for Porteño Spanish, Section 3 describes the methods used in obtaining and analyzing the intonation data, Section 4 provides the analysis, i.e., the

patterns found in Porteño intonation, Section 5 demonstrates an application of the analysis from Section 4 to a variety of sentences, Section 6 discusses how the model of intonational phonology obtained through this study fits those found in other dialects of Spanish, and Section 7 offers concluding remarks.

## **2. Language Background**

Porteño is a dialect of Spanish spoken in Buenos Aires. According to a 2001 census, there are approximately 2,768,772 inhabitants in the city and 11,200,000 in the metropolitan area.<sup>1</sup>

Due to its history, Porteño has been heavily influenced by immigrants speaking European languages, especially Italian. As those immigrating populations have been incorporated into the main culture, their languages were also incorporated in the form of word borrowings and perhaps also intonation. In fact, Porteño is easily identified by other speakers of Spanish, and the basis of identification is often its intonational properties, which have led people to refer to Porteño speakers as “singing” when they talk.

### **2.1. Segmental Inventory**

Porteño has twenty-eight consonants and five vowels. The consonant inventory of Porteño is shown in Table 1. Consonants in parentheses are allophones.

---

<sup>1</sup> All census figures are from [www.demographia.com](http://www.demographia.com).



	bilabial	labiodental	interdental	dental	alveolar	palato-alveolar	palatal	velar	uvular	glottal
stop	p b			t d				k g		
fricative	(β)	f	(ð)		s	(ʃ) ʒ		x (χ)	(χ)	( <sup>h</sup> ) ( <sup>h</sup> )
affricate						tʃ				
nasal	m	(m̥)		(n̥)	n		ɲ	(ŋ)		
tap					r					
trill					r					
central approximant							j			
lateral approximant				(l̥)	l					

**Table 1. Porteño Consonant Inventory**

There are five primary vowels in Porteño. They are distributed as in the vowel chart presented in Table 2:

	front	central	back
high	i		u
mid	e		o
low		a	

**Table 2. Porteño Vowel Chart**

Spanish also has diphthongs and triphthongs. Diphthongs consist of one high vowel with any other vowel, and triphthongs are formed by a non-high vowel surrounded by two

high vowels. Examples of diphthongs and triphthongs are: *puerta* [ˈpuerta] “door”, *piel* [p̺iel] “skin”, and *buey* [b̺e̺i] “ox”.

## 2.2. Stress

As in other dialects of Spanish, stress in Porteño is placed primarily on the penultimate syllable. Although this is not the only syllable that can carry stress, it is the most common. However, the placement of stress is phonemic and can be used to differentiate between words such as *hablara* [aˈblara] “to talk - subjunctive” and *hablará* [ablaˈra] “to talk - future”. Content words generally have one stressed syllable, while function words are generally unstressed.

## 2.3. Hiatus Resolution

In casual speech, hiatus is resolved in two ways: (1) deletion of a segment, or (2) diphthong formation. Segmental deletion usually occurs with two identical vowels.

[maˈri aβlaˈra]  
María hablará.  
maria talk-FUT  
“Maria will talk.”

In the above example, the last final /a/ in *María* overlaps with the initial /a/ in *hablará* resulting in the loss of one of the segments. This deletion makes this sentence homophonous with *Marí hablará* [ma'ri aβla'ra].

Diphthong formation occurs when two different vowels, one high vowel paired with any other vowel, occurs within the same syllable (as presented in Section 2.1).

María comía naranjas y uvas  
maria eat-PST oranges and grapes  
“Maria ate oranges and grapes.”

In this example, *y* [i] and the /u/ in *uvas* [ˈuβas] combine to form a diphthong [ju]. Instances of hiatus resolution are quite frequent in the data and often make the determination of syllabification difficult.

## 2.4. Syntax

The basic word order for normal declarative sentences is SVO, as in the following example:

María compró la revista  
maria buy-PST the-FEM magazine  
“Maria bought the magazine.”

Porteño allows direct and indirect objects to be replaced by clitic pronouns. However, unlike most dialects of Spanish, it allows clitic doubling with the indirect

object. Thus, the object being replaced can be present along with the clitic as in the following example:

María lo vió a José  
maria him-CL see-PST to jose  
“Maria saw him.” (him = José)

Wh-questions are formed by placing the Spanish equivalent to a wh-phrase (*quién* “who”, *qué* “what”, *cuándo* “when”, *dónde* “where”, *por qué* “why”, *cómo* “how”) at the beginning of the sentence and inverting the subject and the verb.

¿Dónde está la carta?  
where is the letter  
“Where is the letter?”

Yes/no questions can be formed with or without subject-verb inversion, as shown below:

Compró María el regalo?  
bought Maria the gift  
“Did Maria buy the gift?”

María compró el regalo?  
Maria bought the gift  
“Did Maria buy the gift?”

Further discussion about interrogatives will be presented in Section 5.2.

## 2.5. Spanish Orthography

Spanish orthography is relatively transparent. For present purposes, all that is crucial is the way stress is marked. Overt marking of stress using a written accent respects the following rules (Garner et al. 2000):

- (1) A written accent is placed on a final stressed syllable if it is stressed and the word ends in a vowel, an ‘n’, or an ‘s’, e.g. *fundó* “he/she founded”, *botón* “button”, *hacés* “you do (2<sup>nd</sup> person, informal)”.
- (2) A written accent is placed on a penultimate syllable if it is stressed and the final syllable does not end in a vowel, ‘n’, or ‘s’ (except for wh-words which are always have a written stress on the penultimate syllable), e.g. *fútbol* “soccer”, *cuándo* “when”.
- (3) A written stress is always placed on an antepenultimate stressed syllable, e.g. *último* “last”.
- (4) An accent is placed on an ‘i’ or ‘u’ that breaks a diphthong, e.g. *María* “Maria”, *día* “day”.

Otherwise, stress is not marked orthographically; thus *campo* [ˈkampo], *puerta* [ˈpuɛrta], and *azul* [aˈsul].

### 3. Methods

#### 3.1. Subjects

The data described here were obtained from five<sup>2</sup> monolingual (monodialectal) native speakers of Porteño Spanish, three male and two female, who were born and educated in Buenos Aires and were between the ages of 17 and 37. Subjects filled out consent forms and were all paid unless they refused payment. A full distribution of speaker demographics can be seen in Appendix A, *Speaker Demographics*.

#### 3.2. Corpus

Ninety-nine sentences were designed to cover four sentence types: sixty-three declarative sentences, fourteen interrogative sentences, seventeen focus sentences, and five imperative sentences (for a complete list of the sentences used in this project, see Appendix B, *Sentence Paradigm*).

Creation of the basic paradigms followed the prescription set by Bruce (1977) for Swedish:

“For the same sentence frame the following parameters are systematically varied: 1) the word accent in different positions of a sentence, 2) the placement of sentence accent and for a subset of sentences the domain of focus, 3) for one position the number of syllables and the placement of stress in the test words and consequently also the number of syllables between the stressed syllables, 4) final vs. non-final position for the same word, 5) the phrase structure of a part of the sentence containing either one word (a compound) or two words.” (Bruce 1977, p. 25)

---

<sup>2</sup> Due to pitch tracking problems, data from a sixth speaker could not be used in the analysis.

By following most of the principles described above (all but (5)), the simplest sentences were constructed to begin with one of three test words: in this case, proper names which contained final stress, maNUEL, or stress on the penultimate syllable, maRIa/LAUra. The sentences were then completed by the addition of a verb which provided an alternating stress pattern. This can be seen from examples (1) and (2) where the stressed syllable is represented by capital letters:

- 1) María nada.  
ma.RI.a. NA.da.  
maria swims  
“Maria swims.”
- 2) Manuel nadó  
ma.NUEL. na.DO  
manuel swam  
“Manuel swam.”

These alternating stressed-unstressed sentences were altered by the addition or subtraction of unstressed syllables between stresses (see examples 28-31 in Appendix B) to determine how the size of the interstress interval in sentence medial position would affect the realizations of the pitch accents. Unstressed syllables were also added to the beginning of the sentence to test the effect of initial lapses. (see examples 32-37 in Appendix B).

More complex constructions were created through the use of relative clauses, subordinate clauses (e.g. “while” clauses), coordination between two sentences or two subjects, and verbal ellipsis, to test for the possible existence of intermediate phrases.

Representative examples are shown in Table 3 (the rest are given in 54-63 in Appendix B).

relative clause	La niña que miraba al avión soñaba de volar. the girl that watched to the plane dreamed of flying "The girl that watched the plane dreamed of flying."
coordination	María comía bananas, naranjas y uvas. maria ate bananas oranges and grapes "Maria ate bananas, oranges, and grapes."
"while" clauses	Mientras María guardaba la comida, Manuel lavaba los tenedores. while maria put away the food manuel washed the forks "While Maria put away the food, Manuel washed the forks."
verbal ellipsis	Manuel miraba al (a+el) avión y María la lancha. manuel watched to the plane and maria the boat "Manuel watched the plane and Maria the boat."

**Table 3. Examples of Complex Declaratives**

The rest of the corpus was divided into interrogative sentences, focused sentences, and imperatives. Interrogative sentences were divided into wh-questions and yes/no questions, which invert the order of the subject and the verb (examples 74-77 in Appendix B) and those which do not (examples 85-91 in Appendix B).

### **3.3. Recording Procedure**

Sentences were presented to subjects one at a time using index cards, with each sentence hand-written on a card. The cards which contained the declarative, interrogative, and imperative sentences were shuffled to pseudo-randomize their order. The focus sentences were randomized separately and were not included with the other three sets, because they required special instructions. Subjects were asked to read the sentences



three times in order to ensure a proper recording. Subjects were asked to repeat a sentence if they made a mistake in their production or if their speech did not sound natural. They were also asked to briefly pause after each repetition to avoid producing sentences with a list intonation.

### **3.4. Recording Environment**

Because data were collected in the field, speakers were recorded individually in their own homes in the quietest available room. Recordings were made with a Shure SM10A dynamic head mounted microphone in order to reduce the ambient background noise. The microphone was connected to a Marantz PMD222 tape recorder with a built-in amplifier. The gain on the recorder was adjusted in order to eliminate token clipping. An initial set of five practice sentences was used to gauge the appropriate gain level at which the rest of the recording session was conducted.

### **3.5. Digitization and Processing**

Recordings were digitized by connecting the tape recorder to a Toshiba Satellite S255 laptop and using PitchWorks (Scicon R&D). Digitization was done at a 22 kHz sampling rate and a 16-bit quantization rate. For each speaker this digitization yielded ninety-nine speech files, each containing the three repetitions of the same sentence.

A first stage of processing selected one repetition from each set of three by displaying waveforms and pitch tracks made using a Cepstral extraction method within a

45 ms window, a 50 Hz frequency deviation, a 2% tracking threshold, and a calculation range between 70 and 500 Hz<sup>3</sup>. Display ranges of each pitch track were adjusted depending on the range of each speaker. The best token was chosen using the following criteria: (1) The token which presented the clearest pitch track and (2) If more than one acceptable pitch track existed, then the token that sounded most natural, in the judgment of the author, was chosen.<sup>4</sup> By “most natural” I mean that the token sounded as it would if the person had said it in an unscripted conversation. All analysis for this project was based on the selected ninety-nine tokens.

### **3.6. Tiers**

An Autosegmental-Metrical approach to the transcription of tone from an intonational contour allows the use of certain “tiers” of information. These tiers are divided into two types: (1) prosodic and (2) context. The prosodic tiers contain prosodic information pertinent to the Autosegmental-Metrical analysis, while the context tiers usually contain extra information that helps the reader to understand aspects of the specific token. The proposed prosodic tiers established for use, which are similar to tiers proposed by Beckman and Hirschberg (1994) for English, are a syllable tier, a tone tier, and a break index tier; while the context tiers are a word tier, a gloss tier, and a miscellaneous (misc.) tier.

---

<sup>3</sup> These settings were held constant across all speakers. Adjustment of the calculation range did not yield clearer pitch tracks in sections of the pitch tracks with heavy creak.

<sup>4</sup> The author is a native speaker of Porteño Spanish.

The **syllable** tier shows the syllabification of the words in the **words** tier. Since stress is phonemic in Spanish, it is important to verify that pitch accents are indeed properly aligned to the stressed syllables. The timing of peak alignment with respect to the stressed syllable is important in determining the type of pitch accent. To differentiate stressed from unstressed syllables, the stressed ones are placed between parentheses, e.g. [manda'rina] “manda(ri)na”. For the purposes of this project, the syllable tier will be the third tier, as seen in Figure 1.

The **tone** tier contains a posited structural representation of the contour consisting of discrete tones aligned to particular syllables. In principle, the entire contour could be reconstructed, given the syllables and the tones. It is hypothesized that tones come in two kinds: low (L) and high (H). In the data studied here, virtually every stressed content word bears a pitch accent, and every sentence a final boundary tone. This represents the topmost tier in Figure 1.

The **break** index tier is used to mark different levels of disjuncture. The levels of disjuncture mark how a sequence of words is grouped into a prosodic structure. The disjunctures in this tier range from the merging of two words across a lexical boundary all the way up to the disjuncture between two whole phrases. This is seen as the fifth tier of Figure 1.

The remaining three tiers are context tiers.

The **word** tier contains the words in the utterance as they are written in Spanish, which is seen as the second tier in Figure 1. As noted in Section 2.5 above, Spanish

orthography unambiguously marks stress. If two words were contracted, they were not separated. Instead they were written in their contracted form i.e. *al* [al] (a + el) “to the”.

The **gloss** tier contains a word-for-word English translation of the words from the words tier, present as the fourth tier in Figure 1.

The miscellaneous (**misc**) tier is used for three purposes. The first is to record possible non-speech events that can be present in the acoustic stream, such as coughs, laughs, sneezes, yawns, etc. The second is to mark irregularities such as elided consonants, unexpected diphthongization, etc. The third, and most important for present purposes, is to indicate which word was to be focused. This tier is not always used and is only found where one of the above condition is necessary, i.e. Figure 4.

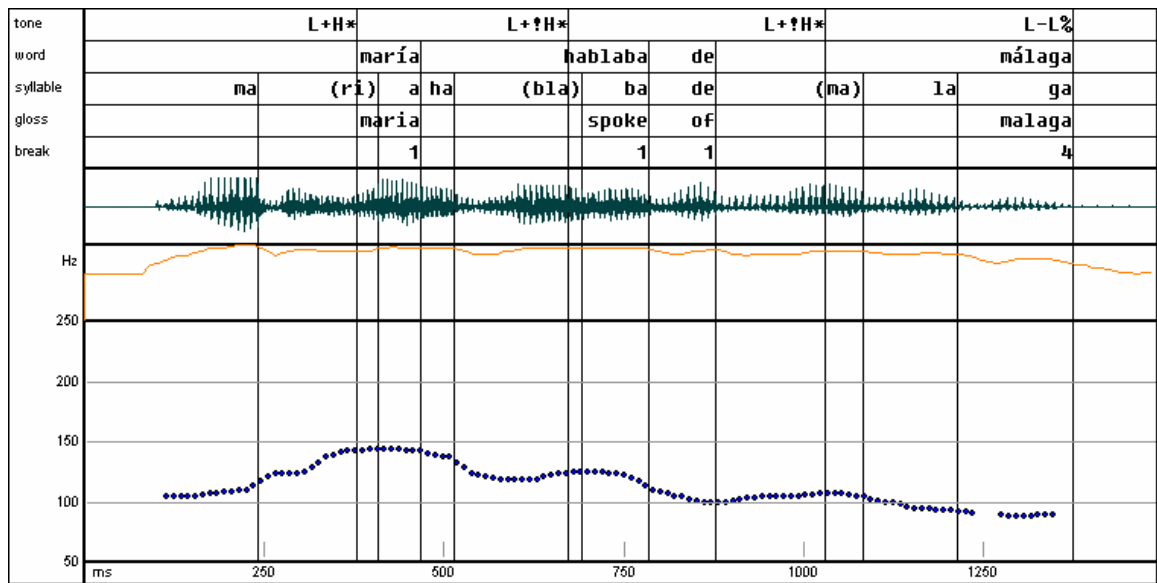


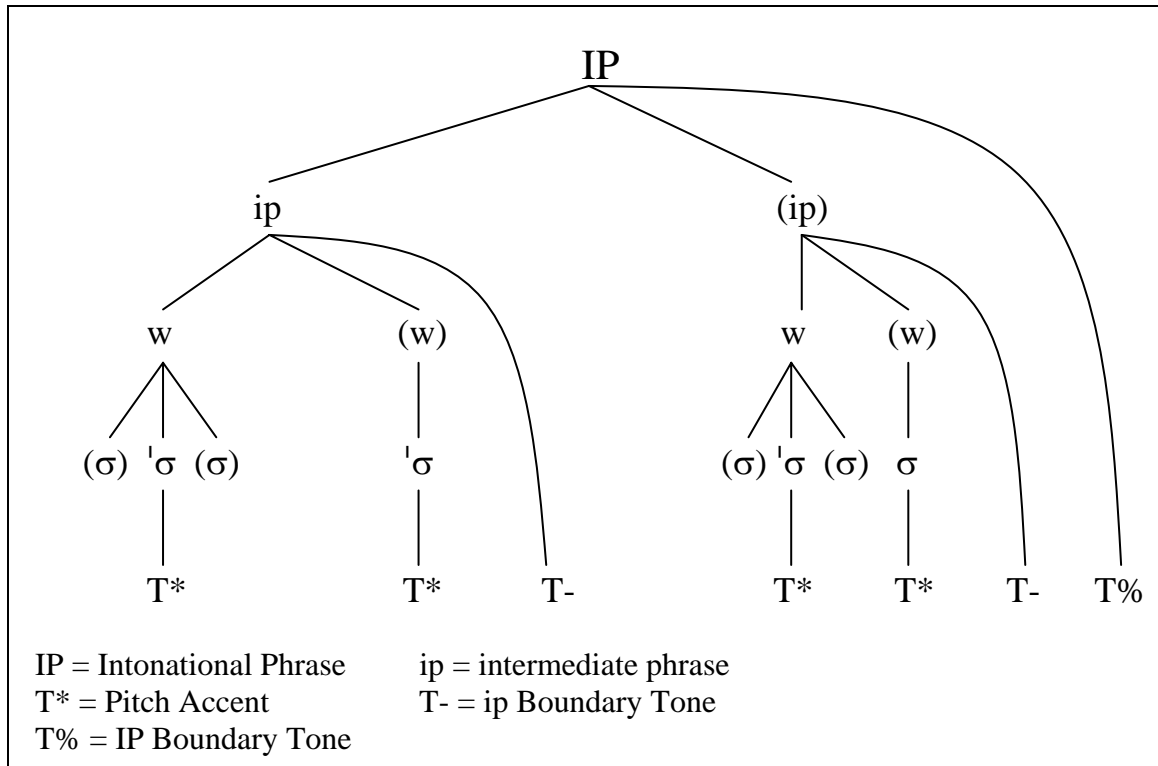
Figure 1. Example of proposed tiers in a declarative sentence. Speaker: the author.  
 "María spoke of Málaga?" *María hablaba de Málaga.* ] ]  
 | | | |  
 L+H\* L+!H\* L+!H\* L-L%

All data used in this project will be of the form found in Figure 1. An in depth description of the analysis of Figure 1 will be given in Section 4.3z.

## 4. Analysis

### 4.1. Prosodic Structure of Porteño

The prosodic structure that will be developed here for Porteño is shown in Figure 2, following concepts from Beckman and Pierrehumbert (1986). The syllable is in the lowest level and the word is one level higher. It is hypothesized that, as in English, Porteño has two prosodic units above the word: the **intermediate phrase (ip)**, which is composed of one or more **words (w)**; and an **intonation phrase (IP)**, which is composed of one or more intermediate phrases. The intermediate phrase is marked by a **phrasal tone (T-)** at its right edge; while the intonation phrase is marked by a **boundary tone (T%)**, also at the right edge. Each ip has at least one **pitch accent (T\*)**, which is associated with a stressed syllable.



**Figure 2. Porteño Intonational Model**

## 4.2. Underlying and Surface Tones

The surface diversity of pitch patterns in Porteño is complex. Despite this complexity, the surface variation can be seen as the result of just two underlying pitch accents, two phrase tones, and two boundary tones.

## 4.3. Pitch Accents

The two phonemic pitch accents are both contour rises. They are both represented as a high (H) peak which is anchored to the stressed syllable (indicated by a \* after the H) and a low (L) that is usually present immediately before the H. In the AM framework,

these two underlying pitch accents are noted as /L+H\*/ and /L+<sup>^</sup>H\*/. Figure 3 and Figure 4 show, with a near minimal pair (produced by the author<sup>5</sup>), that these two pitch accents are distinct. The final pitch accent (nuclear pitch accent) in the declarative sentence in Figure 3 takes the preferred L+H\* nuclear pitch accent (in this case realized as a downstep; all non-initial pitch accents are lowered due to predictable recursive downstepping, discussed below and in Section 5.1). Compared to Figure 3, Figure 4 has the upstepped L+<sup>^</sup>H\* nuclear pitch accent (discussion of the upstepped pitch accent will be presented shortly). The nuclear pitch accent in these two sentences is crucial to distinguish the difference between sentence types (declaratives versus interrogatives).

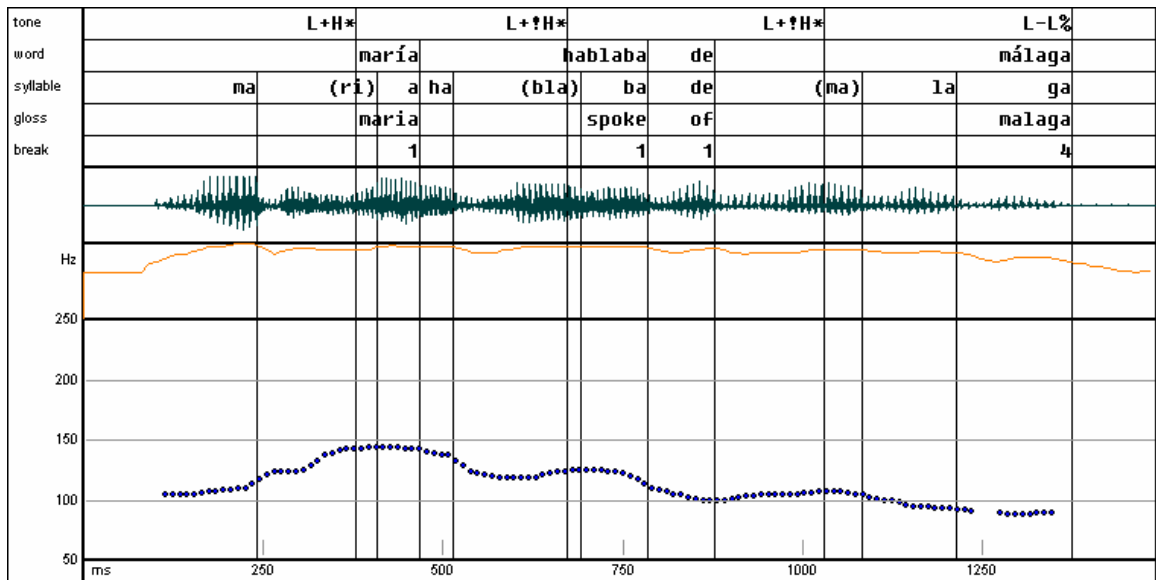


Figure 3. Example of a /L+H\*/ pitch accent realized as a L+!H\* in a declarative sentence. Speaker: the author. "María spoke of Malaga?" *María hablaba de Málaga.* ] ]  
| | | |  
L+H\* L+!H\* L+!H\* L-L%

<sup>5</sup> Throughout this project, I have resisted introducing data recorded by myself. However, since no minimal pair emerged from the original data set, I have included these two tokens for illustrative purposes. The contrast is abundantly instantiated in non-minimal pairs in the original data.

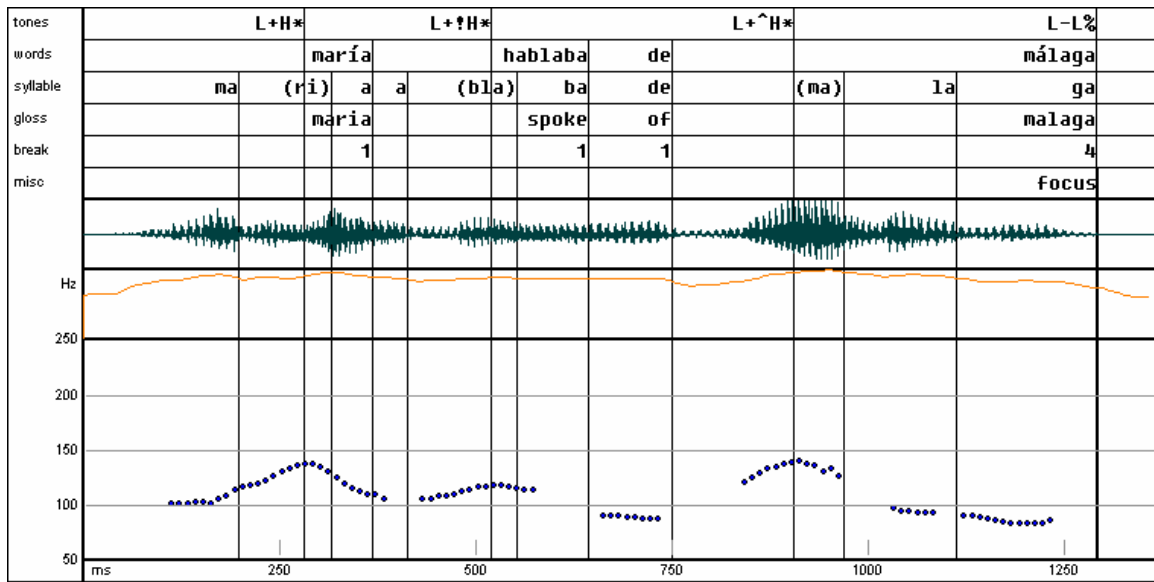


Figure 4. Example of a /L+^H\*/ pitch accent realized as a L+^H\* in a focus declarative sentence. Speaker: the author. "Maria spoke of MÁLAGA." [¿María hablaba de MÁLAGA? ] ]

|            |            |            |            |  
 L+H\*   L+!H\*   L+^H\*   L-L%

#### 4.3.1. Allotones of /L+H\*/

The rising pitch accent /L+H\*/ has many different allotonic variants. Four involve different contour shapes: L+H\*, L+!H\*, !H\*, and H\*. In addition, there are further allotones that differ in the timing of their peak realization rather than their pitch contour; these are discussed in Section 4.3.3.

The L+H\* allotone is usually found on the first pitch accented word of the phrase when it is preceded by at least one stressless syllable. As mentioned above, this contour tone represents a high peak that is aligned with a stressed syllable with an immediately preceding low valley at least 20-50 Hz below the H peak. This allotone can be as seen in Figure 3 and Figure 4 above as well as Figure 5 below.



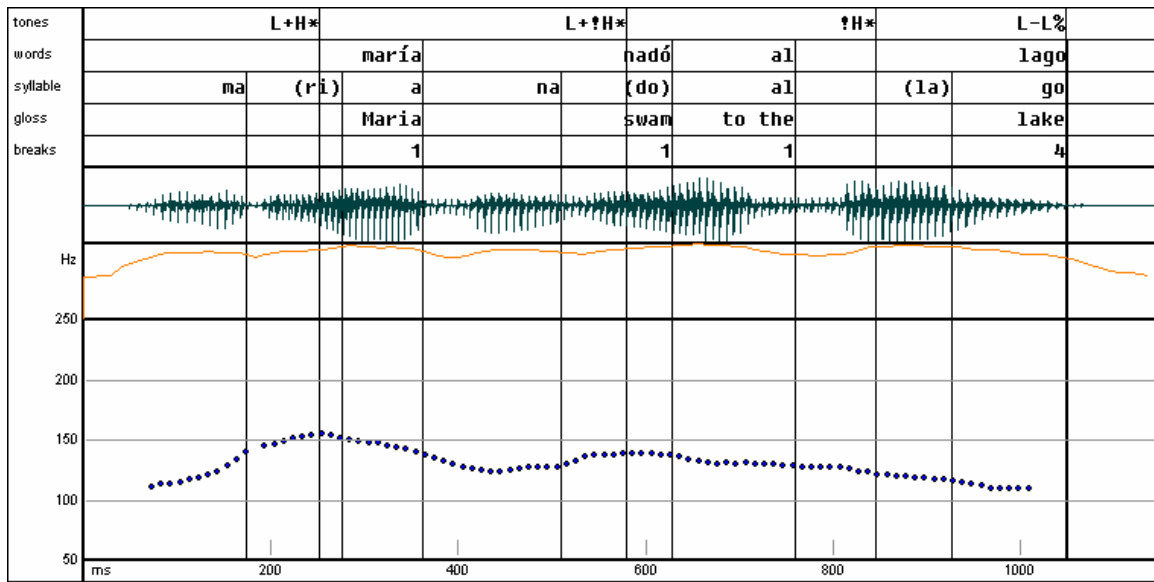


Figure 5. Example of a default contour pitch accent. Speaker: AC.

"María swam to the lake." *María nadó al lago.* ] ]

| | | |  
L+H\* L+!H\* !H\* L-L%

The L+!H\* and !H\* allotones arise when the underlying /L+H\*/ accent occurs in non-phrase initial position: the peak of any pitch accent after the first is downstepped, as seen in Figure 5. Successive pitch accents in Porteño are generally about 10 Hz lower than the preceding peak.

The rightmost pitch accent in a declarative sentence is normally represented by a simple !H\*. This means that the expected low is not realized before the peak, indicating an undershooting of the low target of the pitch accent when the pitch range is reduced toward the end of a phrase. An example of this allotone is given in Figure 12, in Section 5.1 on p. 34.

The fourth allotone of /L+H\*/ is a simple H\*. This allotone is present when the expected rising contour would be too close to the previous pitch accent, producing a tonal clash, or in initial position when the stressed syllable is too close to the left edge of the IP. This proximity causes an undershooting of the low target, and the L+H\* will be realized as a simple tone, as in the second accent of Figure 6, and the initial pitch accent in Figure 23 (p. 47) and Figure 38 (p. 67). In non-initial pitch accents, !H\* and H\* occur in apparent free variation, with no noticeable difference in meaning. Moreover, the !H\* versus H\* distinction here appears to be categorical, as all intermediate degrees of pitch decrease can be found. In this case, a H\* is used to provide a more precise surface transcription.

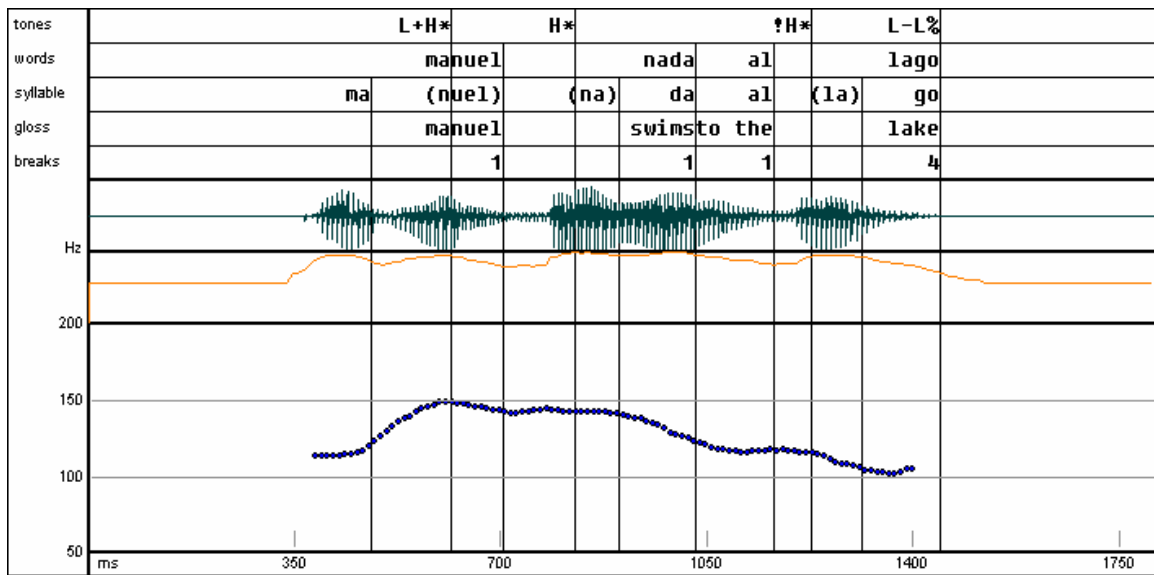


Figure 6. Example of an undershot L target. Speaker: AC.  
 "Manuel swims to the lake." *Manuel nada al lago.* ] ]

|     |     |     |  
 L+H\* H\* !H\* L-L%

### 4.3.2. Allotones of /L+<sup>^</sup>H\*/

The other phonemic tone, /L+<sup>^</sup>H\*/, has two allotones: L+<sup>^</sup>H\* and L+!H\*. The L+<sup>^</sup>H\*, as is true with the L+H\*, is anchored to the stressed syllable. However, L+<sup>^</sup>H\* marks a peak that is realized at either the same height or slightly lower (at least 5 Hz) than the preceding peak. L+<sup>^</sup>H\* thus contrasts with L+H\* in the same context because the latter accent would undergo downstep. For convenience, I will call L+<sup>^</sup>H\* “upstepped”, even in cases where it has the same pitch, rather than a strictly higher pitch, than the preceding pitch accent.

Upstepped peaks are found in two contexts. First, they occur in sentence medial positions immediately preceding an intermediate phrase break, as in the pitch accent on *bananas* in Figure 7. Functionally, the L+<sup>^</sup>H\* in this position is similar to the “continuation rise” of English (Pierrehumbert 1980), but, rather than being implemented as a boundary tone, it is realized as a pitch accent.

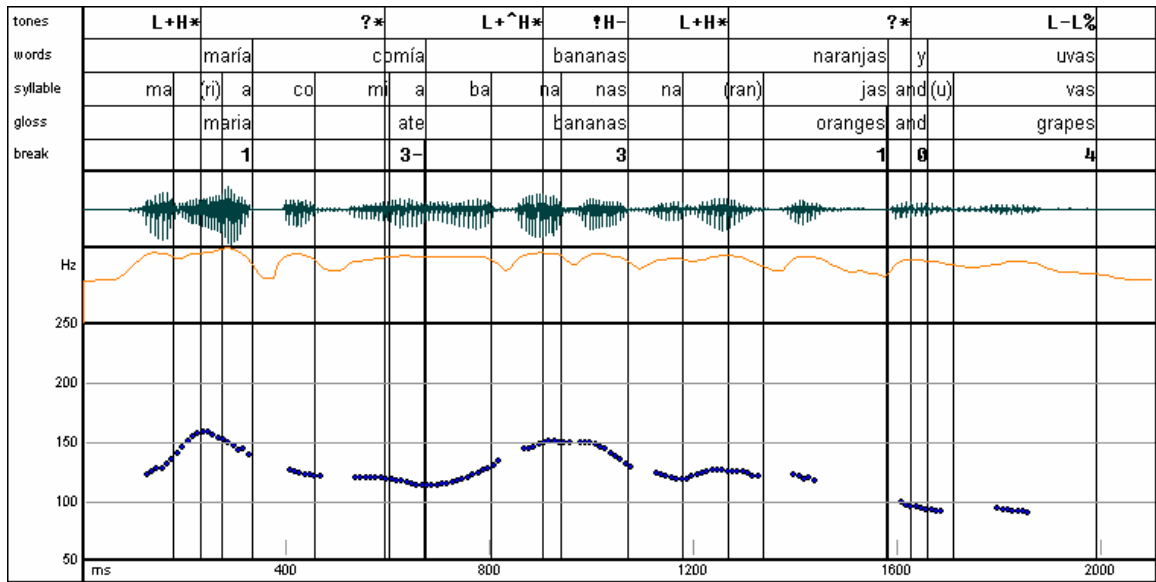


Figure 7. Example of L+^H\* before an intermediate phrase tone. Speaker: GC.

"María ate bananas, oranges, and grapes." *María comía bananas, ] naranjas, y uvas. ] ]*

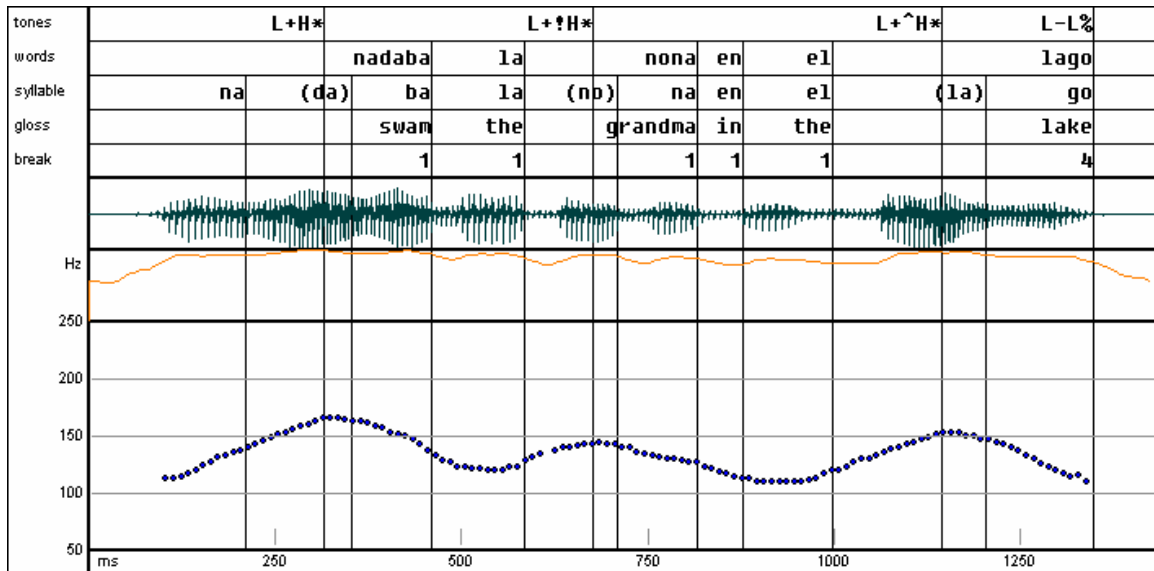
|            |            |            |            |            |            |  
 L+H\*    ?\*   L+^H\*   !H-   L+H\*   ?\*   L-L%

The second location that L+^H\* occurs is as the nuclear pitch accent of a yes/no question. For example, the pitch accent on *lago* in Figure 8 is not downstepped relative to *nona* and thus is a L+^H\*.

The second allophone of /L+^H\*/, L+!H\*, is realized on the nuclear pitch accent of a yes/no question when there is not enough material between it and the previous peak. For example, see Figure 26 in Section 5.2 on p. 51.

A note must be made concerning Figure 7; any uncertainty over the existence of a pitch accent is marked by a ‘?’\*. This convention, seen in Figure 7, indicates that a pitch accent could be present but the pitch contour does not permit this to be determined with absolute certainty.

More information about intermediate phrases is presented in Section 5.1, yes/no questions in Section 5.2, and focus and yes/no questions in Section 5.3.



**Figure 8. Example of L+^H\* as nuclear pitch accent. Speaker: AC.**  
 “Did the grandma swim in the lake?” [Nadaba la nona en el lago? ] ]  
 | | | |  
 L+H\* L+!H\* L+^H\* L-L%

### 4.3.3. Peak Timing

There is one further type of allotonic variation: all of the pitch accents mentioned thus far have “delayed peak” versions. They apparently occur as free variants of the basic non-delayed peaks and do not convey any semantic or pragmatic meaning. Delayed peaks are transcribed with a ‘<’ diacritic. Peaks can be realized rather late on a stressed syllable and in some cases can be found on the onset consonant of the following syllable (see Figure 9). More evidence for peak delay is presented in Section 5.1.

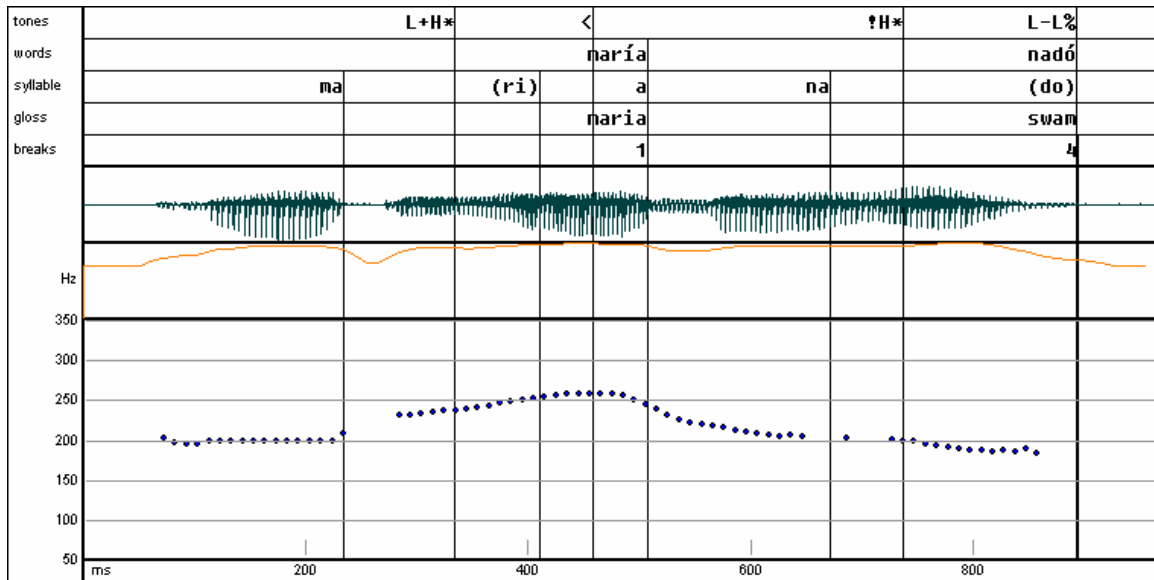


Figure 9. Example of a delayed pitch accent. Speaker: AM.

"Maria swam." *María nadó.* ] ]  
 | \ | | |  
 L+H\* < !H\* L-L%

In addition to late peaks, early peak realizations of the pitch accents are also attested in the data. However, since they are quite sporadic, they will not be analyzed in this paper.

#### 4.4. Intermediate Phrase Boundary Tones

Phonemically there are two types of intermediate phrase boundary tones (indicated by a '-' after the tone): a low, L-, and a high, H-. The L- is the most common phrase boundary in Porteño, as is evident from the data presented from all sentence types in Section 5 and all the examples presented thus far. An L- is realized on syllables after the nuclear pitch accent. Thus, when the nuclear pitch accent occurs early in a phrase, such as in wh-questions (Section 5.2) or focus sentences (Section 5.3), L- is realized as a

low plateau starting right after the nuclear pitch accented word and ending just before the rightmost syllable of the phrase. Wh-questions provide evidence that L- can combine with H% (see Figure 30 below).

The H- occurs infrequently, primarily in sentence medial position. It is characterized by either a continual rise into an intonation phrase H% boundary (Figure 10) or a mid plateau found in sentence medial positions (Figure 11).

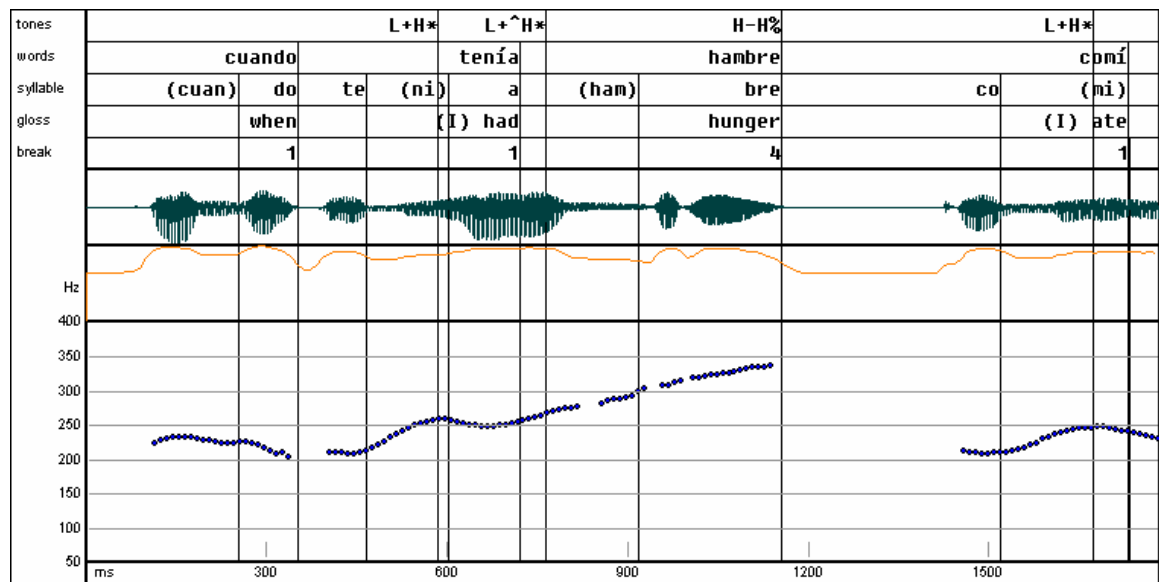
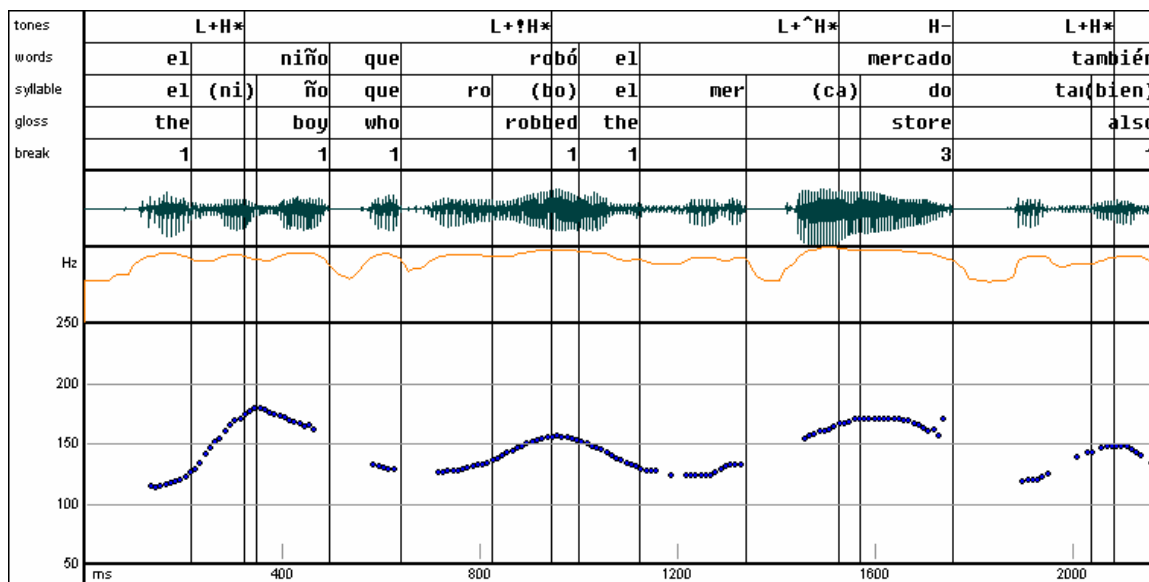


Figure 10. Example of H- before H%. This is the first half of the sentence "When I was hungry, I ate a banana." Speaker: AM. *Cuando tenía hambre, ] ] comí una banana.*

|            |            |            |            |  
 L+H\* L+<sup>^</sup>H\* L+<sup>^</sup>H\* H-H% L+H\*



**Figure 11.** Example of an H- in medial position. This is the first half of the sentence "The boy who robbed the store also robbed the bank on the corner." Speaker: AC.  
*El niño que robó el mercado ] también robó el banco de la esquina.*

L+H\*    L+!H\*    L+^H\*    H-    L+H\*

Besides the high rise, a second allotone of H- is a !H-. This phrasal boundary tone represents a mid tone in the pitch track (Figure 7). It is lower than the peak of the nuclear pitch accent immediately preceding this tone by approximately 15 Hz (thus lower than H-) and is higher than the lowest valley by approximately 20 Hz. Section 5.2, *Wh-Questions*, provides further evidence of the existence of the !H- in combination with L% in a one word wh-phrase. It is possible that !H- and H- are in free variation when it is found in sentence medial position followed by a L pitch target (cf. Figure 7 and Figure 11). However, I could not conclusively determine whether these two boundary tones must always be in free variation in this position.



#### **4.5. Intonation Phrase Boundary Tones**

The final element on the tonal tier is the intonation phrase boundary tone. Here, there are two types of tones, a low tone, L% (Figure 8), and a high tone, H% (Figure 10). The L% is the most common phrasal boundary in Porteño. It marks the end of a sentence in all sentence types. On the other hand, H% usually is present in sentence medial, and in rare occasions, in sentence final position. See Figure 30 and Figure 29 for a contrasting minimal pair; Figure 30 in particular clearly shows the need for both T- and T%: here, the two tones are at separate levels and occur in clearly distinct locations.

#### **4.6. Disjuncture Types**

A discussion of boundary tones cannot be fully understood without an understanding of disjuncture types. Disjuncture types are distinguished here with break indices. The lowest break index represents a contraction of two words that results in a resyllabification and merger. A break index '0' is used for this type of break (for example, see Figure 7). The second level is the disjuncture which separates two words in the middle of a phrase, and is transcribed by a '1'. The third level represents an intermediate phrase break. This is larger than the default disjuncture between two words and is given a break index of '3'. The final level marks an intonational phrase break, which is larger than the default disjuncture between intermediate phrases, and is given the index of '4'.

Along with these indices, two diacritics are employed here. The first is a '-'. This diacritic has been used to represent an uncertainty between two break indices (e.g.

Beckman and Hirschberg (1994) uses 3- to represent uncertainty between 2 and 3). The second is a ‘p’, which marks the presence of a hesitation pause. This pause is located in a position where a phrasal boundary is not expected and the index number present before it (e.g. 1p, 2p) represents the expected disjuncture. See Section 5 for more information on break indices.

#### 4.7. Summary of Structural Elements

In summary, in Porteño there are two phonemically specified pitch accents (each with several allotones), two phrase tones (with three allotones), and two intonational boundary tones. These different realizations are summarized in Table 4. There are four levels of break indices (0, 1, 3, 4) and their definitions are summarized in Table 5.

Phonemic Tone	Allotones	Context Found
/L+H*/	L+H*	This pitch accent describes a rising contour in which the peak is realized on the stressed syllable. It is realized on the initial pitch accent of a phrase, if enough material is present.
	H*	This pitch accent marks the peak on a stressed syllable which does not have an apparent rise into the peak. This is generally found when there is not enough time for the low to be realized: either too close to the left edge of a phrase or when there is

		stress clash.
	L+!H*	This pitch accent represents a rising contour with a downstepped peak on a stressed syllable.
	!H*	This pitch accent represents a downstepped peak on a stressed syllable that does not have any apparent rise, generally due to stress clash or a narrow pitch range.  It is generally used to mark the nuclear pitch accent of declarative sentences.
/L+^H*/	L+^H*	This pitch accent represents a rising contour with an upstepped peak on a stressed syllable. It signifies a peak that is higher than the previous peak. It occurs as the nuclear pitch accent of an IP-medial ip boundary, the nuclear pitch accent on yes/no questions, and focused words (see Section 5.3).
	L+!H*	This allotone is realized on a /L+H*/. However, this variation is realized as the nuclear pitch accent of yes/no questions when it is next to the leftmost pitch accent of the phrase (see Figure 26).
L-	L-	This represents a low intermediate phrase tone. It only appears sentence finally.
H-	H-	This represents a high intermediate phrase tone. It is manifested as either a continuation rise into a high

		intonation phrase boundary tone or a high plateau in a sentence medial position.
	!H-	This represents a high intermediate phrase tone that falls to a mid level in both sentence medial and final positions.
L%	L%	This represents a low intonational phrase boundary tone. It is found either utterance medially or finally.
H%	H%	This represents a high intonational phrase boundary tone. It is generally found utterance medially. When in combination with an H-, it represents a continued high rise boundary.
?*		This diacritic represents a possible pitch accent that cannot be said to conclusively exist.
<		This diacritic represents a pitch accent that has been delayed to the syllable to the right of the stressed syllable.

**Table 4. Summary of Phonemic and Allotonic Pitch Accents**

0	This disjuncture marks the fusion of two words, especially contractions that produce resyllabification.
1	This represents the default disjuncture between two words within an ip.
3	This index represents an intermediate phrase disjuncture.

4	This represents an intonational phrase disjuncture. This disjuncture is used to mark the end of one whole prosodic phrase.
p	This diacritic marks the presence of a hesitation pause. This pause is not an indicator of any real phrasal boundary.
-	This diacritic represents an uncertainty on the part of the transcriber between two possible break indices. ‘-‘ is added before the index which is higher of the two indices.

**Table 5. Summary of Break Indices**

## **5. Tonal Distribution Patterns**

The types of pitch accents, phrase tones, and boundary tones determine the possible contributions of intonation to communication. In the following sections, intonational properties of focus and of three different sentence types (declaratives, interrogatives, and imperatives) will be discussed.

### **5.1. Declaratives**

McGory and Díaz-Campos (2002) summarize the literature regarding declarative sentences and report that, in various dialects of Spanish, the basic pattern has a pitch accent on every stressed content word, the pitch accent of every content word after the first is downstepped, and there is a fall to a low boundary tone after the nuclear pitch

accent. It has further been shown as early as Navarro Tomás (1944) that pre-nuclear pitch accents are realized late within a stressed syllable.

With these tendencies in mind, this section will explore and describe the prosodic trends of declarative sentences. This will be done by first exploring basic patterns in simple declaratives, which establish tone alignment, and then by moving to more complex sentences which include two or more intermediate phrases.

### 5.1.1. Simple Declaratives

As was mentioned in Section 3.6, a syllable tier shows the syllabification of the words. The syllabification can be used to determine the tonal alignment of a pitch accent on the stressed syllable.

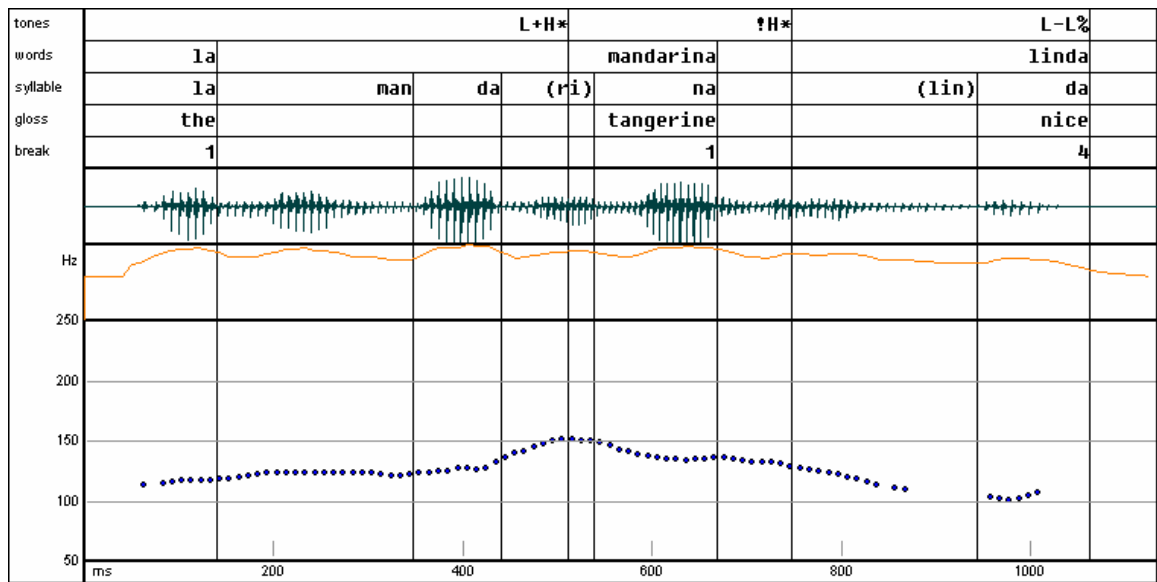


Figure 12. Example of pitch accent alignment. Speaker: AC.

“The pretty tangerine.” *La mandarina linda.* ] ]

| | | |  
L+H\* !H\* L-L%

Figure 12 shows that when there are three stressless syllables before the stressed syllable, *ri*, the f0 peak of the L+H\* accent is realized during the stressed syllable and the rise into the peak is realized immediately preceding the stressed syllable, resulting in a L+H\*.

Also evident from this token is that there is a !H\* pitch accent on the last word, *linda*. If no pitch accent exists on the last word, then we would expect that the pitch contour would fall immediately after *mandarina* and stay low. However, in this case, the f0 stays rather high until the beginning of the stressed syllable of the last word, *lin*, and falls thereafter. This suggests that this downstepped pitch accent is the last one, thus, a nuclear pitch accent, before the intermediate boundary tone, transcribed here by an L-, and an intonational phrase boundary tone, transcribed by an L%. For further discussion of intermediate phrases, see to Section 5.1.2.

Although by far the most common type of nuclear pitch accent in declaratives is !H\*, it can also be L+!H\*, as seen in Figure 13.

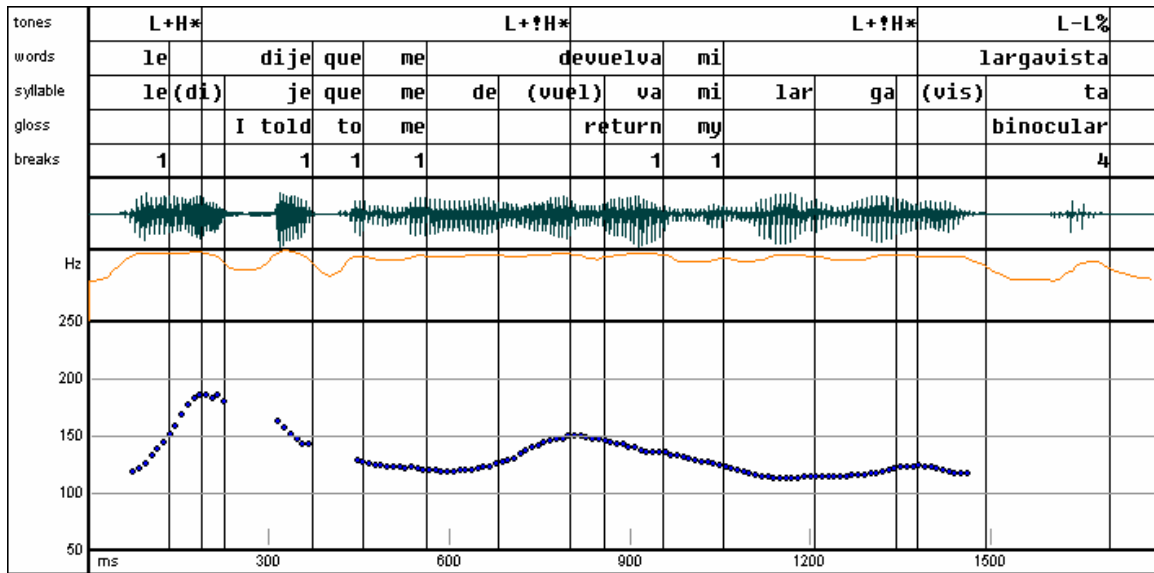


Figure 13. Example of the free variant L+!H\* as a nuclear pitch accent in declaratives. Speaker: AC. “I told him/her to return my binoculars.” *Le dije que me devuelva mi largavista.* ] ]  
 | | | |  
 L+H\* L+!H\* L+!H\* L-L%

The realization of L+!H\* in this example could be due to the number of syllables between the nuclear pitch accent and the preceding pitch accent. That is, the L+!H\* may occur when there is enough material before the nuclear pitch accent and a !H\* occurs otherwise. However, this is not always true, because cases do exist in which enough segmental material is present and yet nonetheless a simple !H\* is chosen (see Figure 18, p. 41). Furthermore, there is no apparent meaning distinction between !H\* and L+!H\* in the nuclear pitch accent position. These facts suggest that !H\* and L+!H\* are in free variation.

The anchoring of the rise to the stressed syllable can also be seen in phrase medial position when there are enough unstressed syllables present between pitch accents. A



long sequence of unstressed syllables can usually be identified by a typical low plateau as seen in Figure 13 and Figure 14 below.

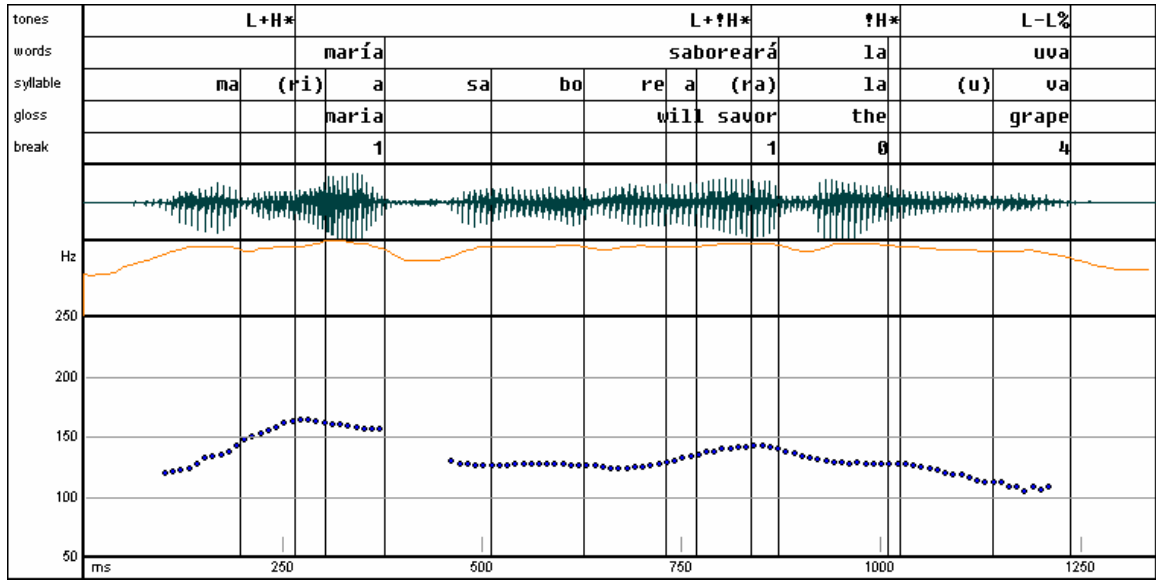


Figure 14. Example of five syllable stress lapse. Speaker: AC.

“Maria will savor the grape.” *María saboreará la uva.* ] ]

|            |            |            |            |  
L+H\*      L+!H\*   !H\*   L-L%

One further note must be made about the realization of the pitch accents in Porteño. As mentioned by Navarro Tomás (1944) and on p. 25 above, peaks generally are realized late in the stressed syllable. This tendency for other dialects of Spanish holds true thus far for Porteño, as seen in *María* in Figure 14 and *mandarina* in Figure 12. In general, when contour tones are used, the peaks are realized on average 75% - 91% into the stressed syllable<sup>6</sup>. See Section 5.3 for more information about peak alignment and its interaction with focused words.

<sup>6</sup> Due to time constraints, the data come from measurements done on two of the five speakers, one male and one female.

Although in most instances the peak occurs within the stressed syllable, there are instances in which the peak occurs on a post-tonic syllable, as illustrated by Figure 15.

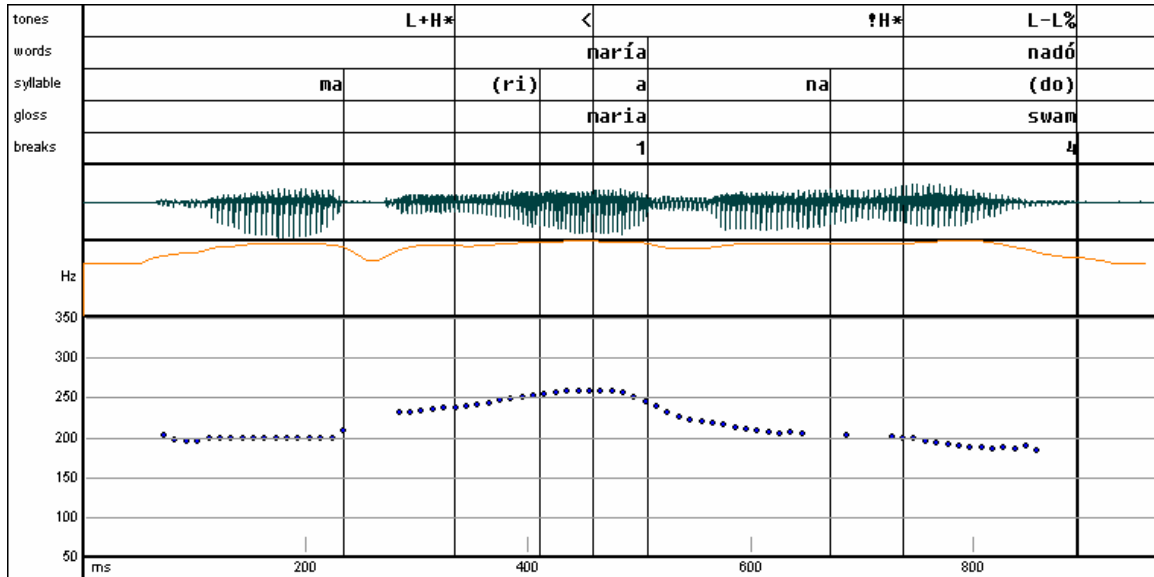


Figure 15. Example of a delayed pitch accent. Speaker: AM.

“Maria swam.” *María nadó.* ] ]  
 | \ | | |  
 L+H\* < !H\* L-L%

In the case of peak delay, peaks are realized either on the onset consonant or the beginning of the vowel of the post-tonic syllable, but the stressed syllable is still perceived as bearing a high tone. This suggests that the delayed peak is the phonetic realization of the L+H\* pitch accent, and not due to a different type of pitch accent. The location of the delayed peak is marked as a ‘<’ as in Figure 15.

Figure 16 shows another example of delayed peaks. In Figure 16, the peak is realized at the beginning of the post-tonic syllable, *ra*, and falls earlier than Figure 15. Some speakers tend to produce delayed peaks more often than other speakers and some prefer more delay than others.

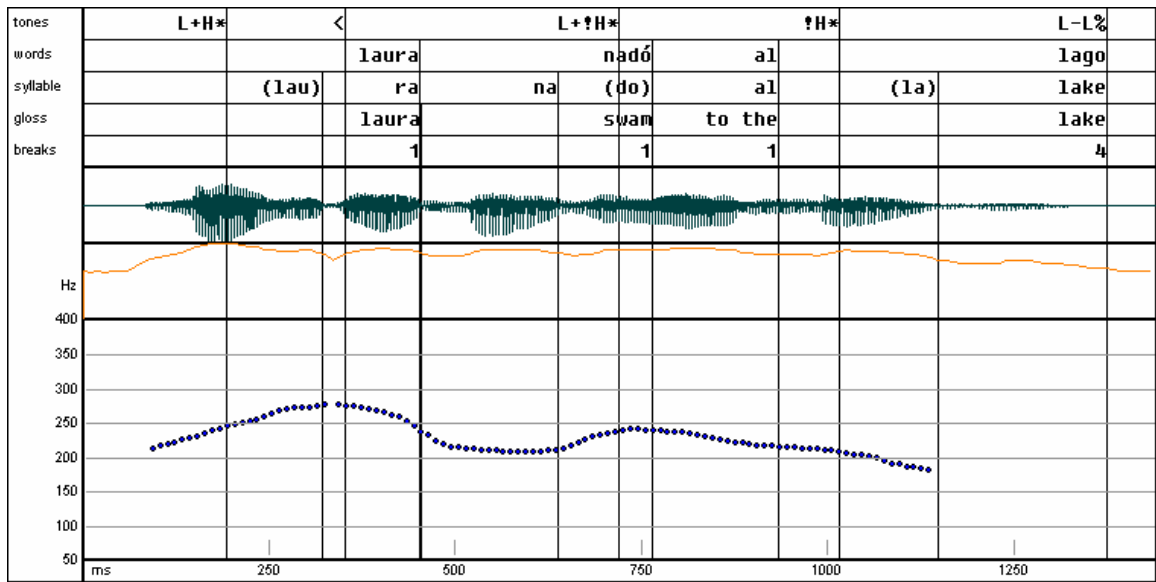


Figure 16. Example of delay causing a gradual fall. Speaker: AM.

“Laura swam to the lake.” *Laura nadó al lago.* ] ]

|    \    |    |    |    |  
 L+H\* < L+!H\* !H\* L-L%

So far, we have examined the shape and timing of pitch accent realization when the pitch accent is the first or the last in the phrase. When an utterance has three pitch accents, as shown in Figure 17 (also see Figure 13, Figure 14, and Figure 16), the second pitch accent is realized in a similar manner to the first pitch accent, namely a bitonal pitch accent aligned to the stressed syllable. The main difference between the first and second pitch accent is that the second pitch accent is lower than the first, i.e. downstepped. Under normal conditions, when more content words are added, the downstepping pattern is repeated on all non-initial content words. Since downstepping of pitch accents is predictable in Porteño, downstepped pitch accents (L+!H\* or !H\*) are not considered underlying pitch accents.

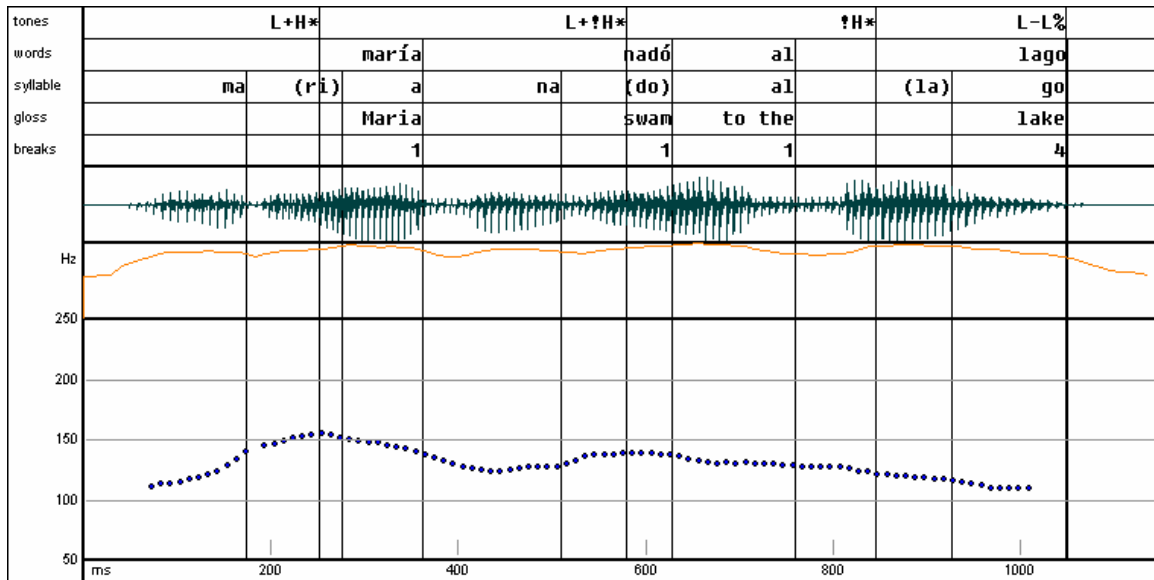


Figure 17. Example of a longer declarative sentence. Speaker: AC.

“María swam to the lake.” *María nadó al lago.* ] ]

|            |            |            |            |  
 L+H\* L+!H\* !H\*    L-L%

A pitch accent may not be fully realized if it is too close to another pitch accent (stress clash). Figure 18 shows that when there is not enough time between the two stressed syllables, the predicted L+!H\* tone is undershot and realized as a high plateau and thus transcribed by a H\* (not !H\* because the difference in peaks is less than 10 Hz). In general, undershooting due to stress clash occurs when two stressed syllables are separated by fewer than two unstressed syllables (i.e. compare Figure 17 and Figure 18).

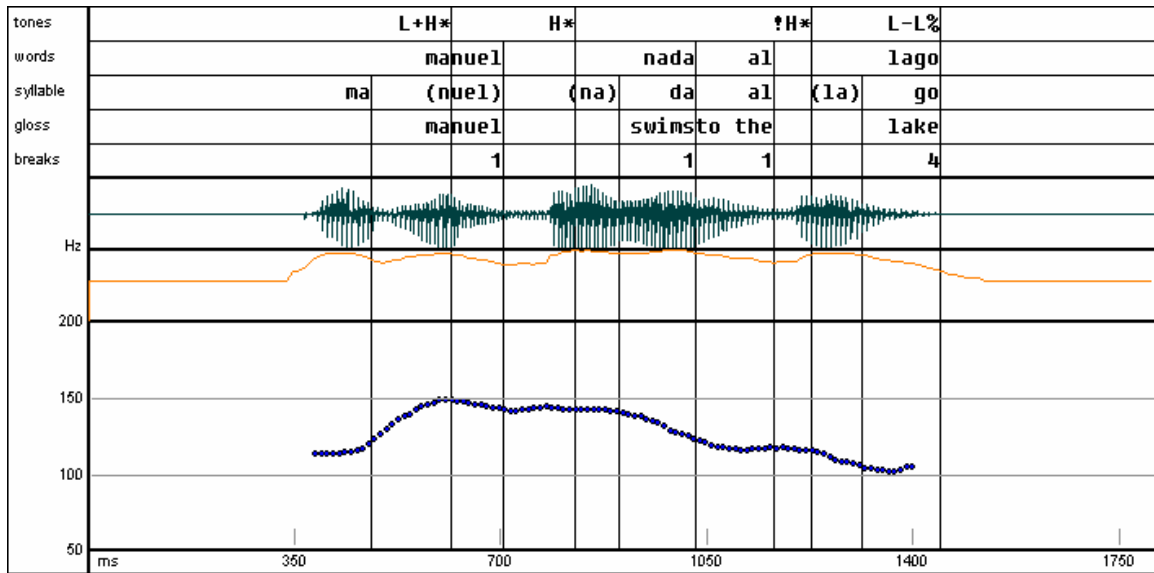


Figure 18. Example of stress clash. Speaker: AC.  
 “Manuel swims to the lake.” *Manuel nada al lago.* ] ]  
 | | | |  
 L+H\* H\* !H\* L-L%

In summary, declarative sentences in general begin with a L+H\*. In most cases, the pitch accents will generally be aligned with the stressed syllable, and if they are not, they are delayed to the initial portion of the post-tonic syllable. Almost all pitch accents after the initial will be downstepped with respect to the previous peak. Stress clash will cause pitch accents to be undershot or lost. The most common boundary tones are L- as an intermediate phrase tone and L% as an intonation phrase tone.

### 5.1.2. Complex Declaratives and Intermediate Phrasing

The purpose of analyzing the pitch contours of complex declaratives was to find evidence for intermediate phrases (ip). In syntactically complex sentences, a prosodic boundary in sentence medial position often arises.

In other languages, the presence of an intermediate phrase is marked in various ways: by some degree of lengthening, in some cases by an audible break, by a phrase boundary tone, or by a pitch reset (Beckman and Pierrehumbert 1986). Porteño has all of these indicators, plus one more. When the ip boundary is in sentence medial position, the ip is marked by a different type of nuclear pitch accent.

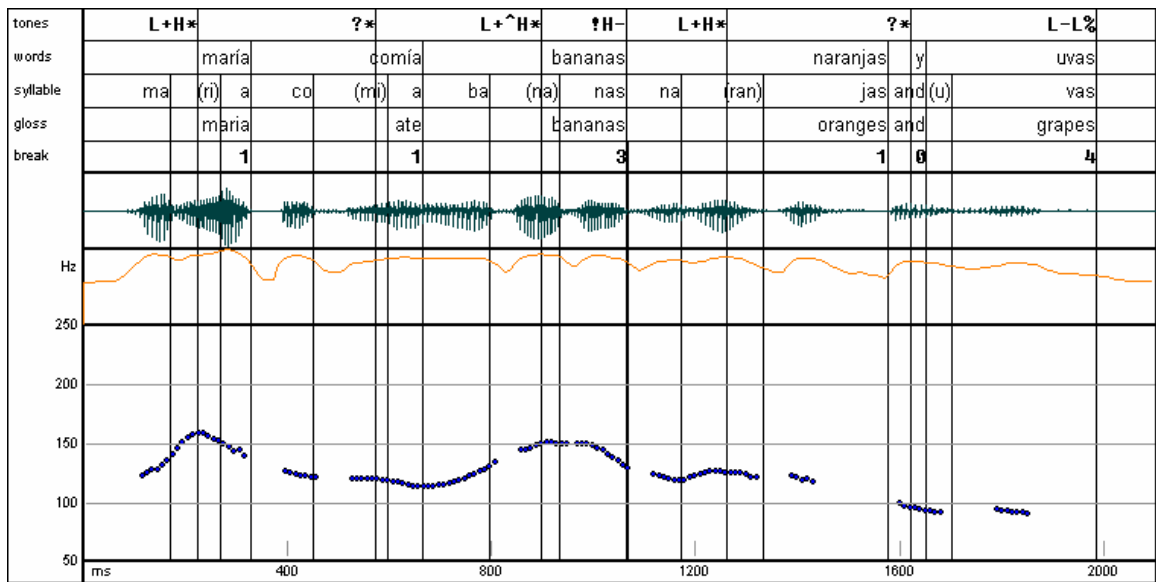


Figure 19. Example of a list reading. Speaker: GC.

"María ate bananas, oranges, and grapes." *María comía bananas, ] naranjas, y uvas. ] ]*

|        |        |        |        |        |        |        |  
 L+H\*    ?\*    L+^H\*    !H-    L+H\*    ?\*        L-L%

Figure 19, which represents a type of sentence similar to Liberman and Pierrehumbert's (1984) "berries" lists, shows that after the initial pitch accent there is a content word with a very weak peak (because it cannot be determined whether there is a pitch accent in this position, a ?\* is placed where the pitch accent label would normally be present). The pitch accent on *bananas* should be downstepped compared to the preceding pitch accent, but it reaches as high as the first pitch accent of the phrase, even though there is no

phrase break before this word, which would trigger a pitch reset. This pitch accent is accordingly transcribed as  $L+^H$ . After the upstepped pitch accent, there is an audible disjuncture which is larger than the default word boundary but smaller than the utterance final break. Due to a mid fall, this disjuncture is marked with a !H- intermediate phrase tone. Furthermore, the last syllable of this phrase shows some degree of lengthening.

It was found that in declarative sentences, upstepped nuclear pitch accents only occur before an intermediate phrase break in sentence medial position. In contrast, nuclear pitch accents on the rightmost intermediate phrase of declarative sentences are never upstepped; instead, they will always have either a  $L+!H^*$  or  $!H^*$ .

Intermediate phrases are also marked by a boundary tone, of the type H-. The distribution of phrase boundary tones (T-) in the analysis proposed here is defective: while H- and L- contrast with each other at the end of a sentence (see Section 5.2 below), only H- occurs at a break in the middle of a sentence. In sentence medial position, where H- occurs, it is subject to allophonic free variation, as for example in Figure 19 vs. Figure 21. This seems to carry no semantic meaning, so I posit that Figure 19 has an allotone, !H-, which occurs in free variation with H-. There is, however, an additional possibility in the middle of a sentence: it is possible to break up a sentence into two separate IPs, as in Figure 20. Here, I assume that the tones at the end of the first IP are H- followed by H%.

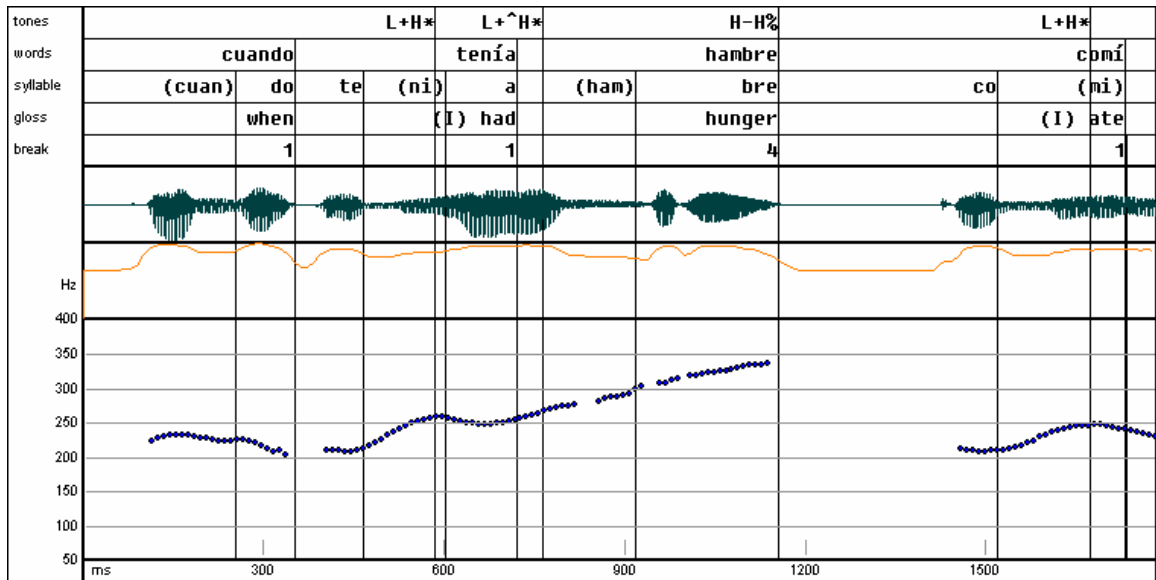


Figure 20. Example of a high rise. First half of the sentence "When I was hungry, I ate a banana."

Speaker: AM. *Cuando tenía hambre, ] ] comí una banana.*

| | | | |  
 L+H\* L+^H\* H-H% L+H\*

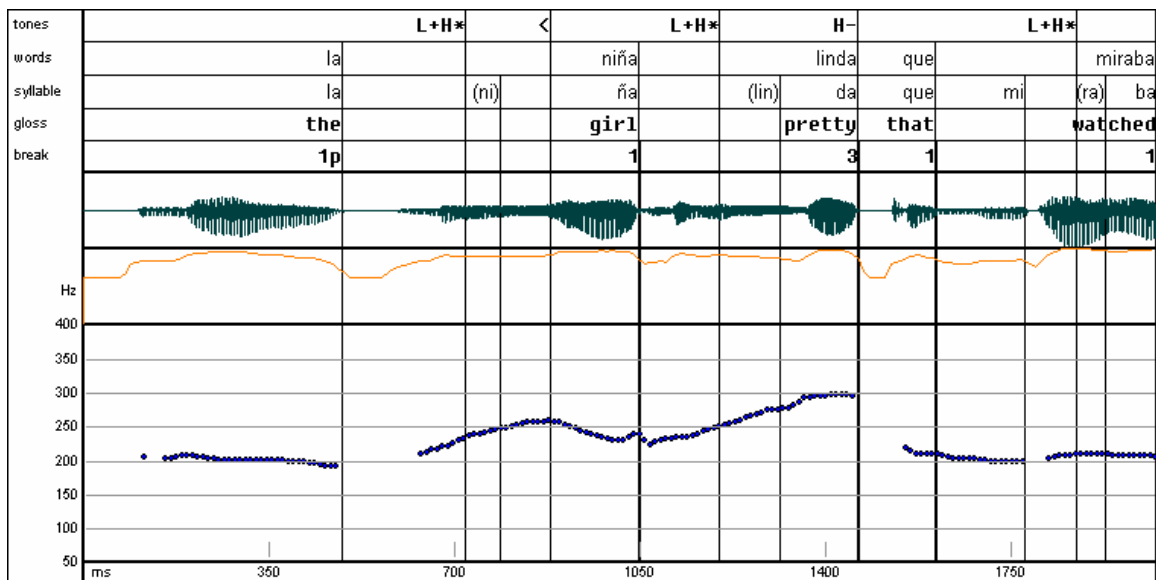


Figure 21. Example of a high plateau. This is the first half of the sentence "The pretty girl that watched the airplane dreamed of flying." Speaker: AM.

*La niña linda ] que miraba al avión soñaba con volar.*

| \ | | |  
 L+H\* < L+H\* H- L+H\*



One final note should be made about Figure 21. The first word, *la*, is marked with a break index of 1p. It has been mentioned in Section 4.2, a ‘p’ is placed after a break in which the speaker hesitates in their production. This hesitation in Figure 21 resembles an intermediate phrase boundary due to the lengthening and the pause after the determiner. However, these cues are not intended by a speaker as a phrase boundary, but are markers of a disfluency in speech.

This section has shown the existence of intermediate phrases in Porteño. An intermediate phrase is marked by phrase final lengthening, a possible slight pause, and a boundary tone. There seem to be three types of intermediate phrase tones: L-, H-, and !H-. Among these, L- typically occurs in sentence final intermediate phrases, and H- and !H- occur in sentence medial intermediate phrases, yet not in complementary distribution. When an intermediate phrase is sentence-medial, the nuclear pitch accent is L+<sup>H</sup>\*, different from the nuclear pitch accent of sentence final ip (i.e. L+!H\* or !H\*).

## 5.2. Interrogatives

It was shown in Section 5.1 that five allotones of /L+H\*/ must be posited to account for the intonational patterns present in Porteño declaratives. In this section, it will be shown that these same five pitch accents can also account for the intonation pattern in interrogatives. The two types of interrogatives examined are wh-questions and yes/no questions.

### 5.2.1. Wh-Questions

It was mentioned in Section 2.4 that wh-questions are formed by placing a wh-word at the beginning of the sentence and performing subject-verb inversion.

Prosodically, the wh-word has the greatest emphasis in the sentence and bears the nuclear stress. As a result, the pitch contour of a wh-phrase has the pattern seen in Figure 22 below.

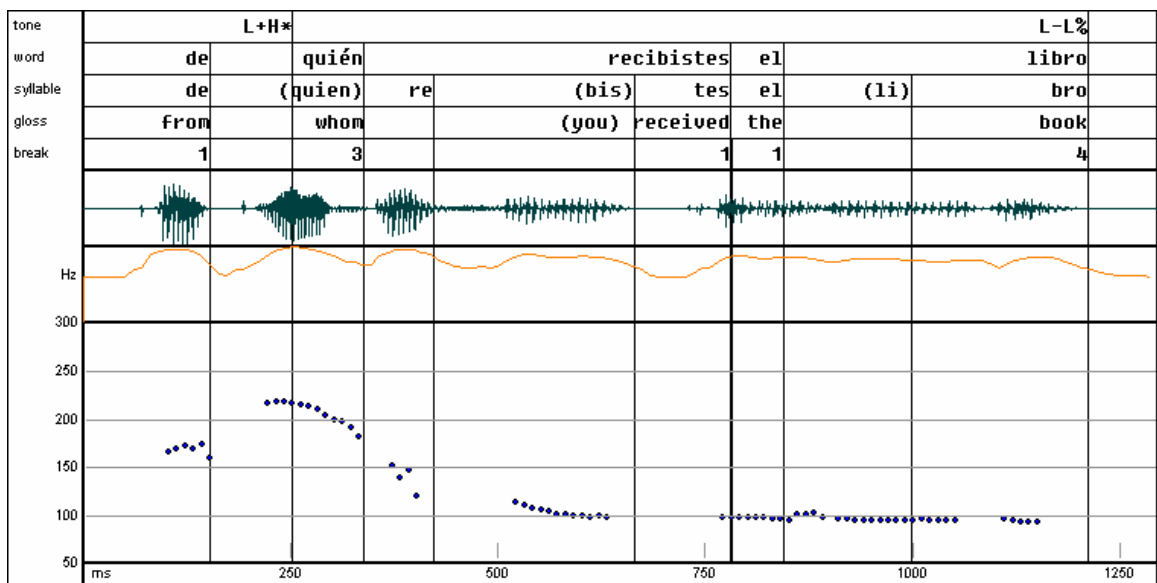


Figure 22. Example of a wh-question. Speaker: GC.  
 “From whom did you receive the letter?” *¿De quién ] recibistes el libro? ]*

| | |  
 L+H\* L- L%

The first pitch accent, on the wh-phrase, is a L+H\*, and the rest of the words are deaccented, meaning that their pitch accents are lost. Deaccented words show a low pitch plateau suggesting that, as in English, the L- intermediate phrase tone is anchored to the end of the wh-phrase and deaccents all pitch accents rightward from the nuclear pitch accented word until the end of the intonational phrase. The presence of the intermediate

phrase tone between the wh-phrase, *de quién*, and *recibistes* is transcribed with a break index of ‘3’.

Not all sentences with wh-phrases undergo complete deaccenting, however. It is not predictable which tokens will have complete deaccenting and which will not. If pitch accents are not completely lost, the low intermediate phrase boundary tone (L-) is realized, as usual, on the right edge of the last stressed syllable of the intermediate phrase and the post-wh word pitch accents are preserved but realized in a narrow pitch range, as seen in Figure 23.

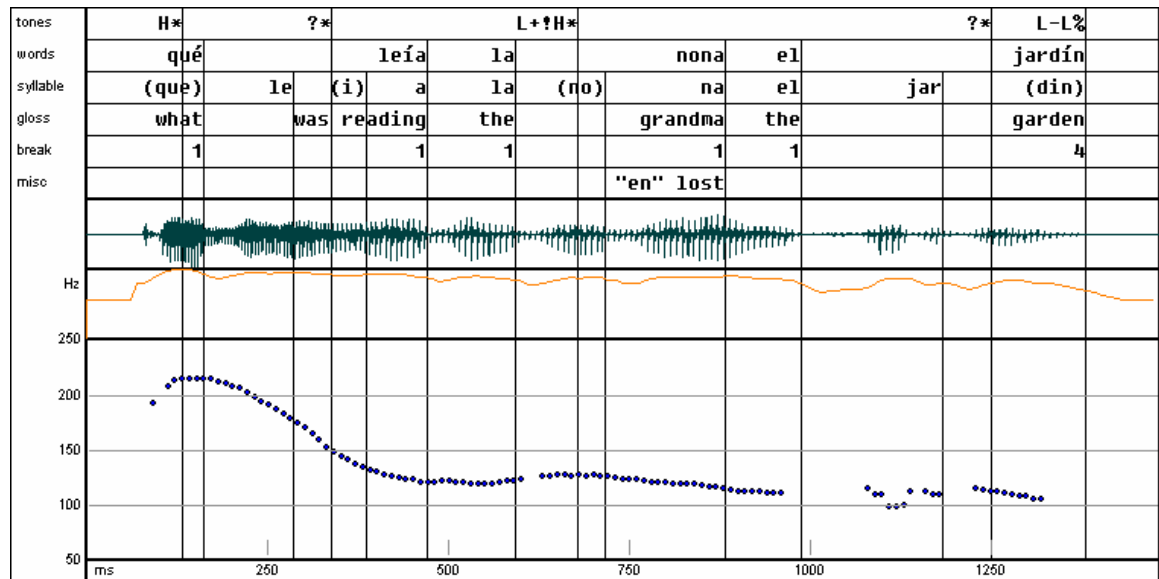


Figure 23. Example of pitch accent realization in narrow pitch range. Speaker: AC.

“What did the grandma read in the garden?” *¿Que leía la nona en el jardín? ] ]*

|                                  |                                  |                                  |                                  |  
 H\*                                  L+!H\*                                  ?\*                                  L-L%

In Figure 23, as seen with the declarative sentences, when there is not enough segmental material before the stressed syllable, the L+H\* has its L undershot and is realized as a peak without and apparent rise, i.e. H\* (compare the initial pitch accent rise with that of

Figure 22). The long gradual fall between the second and third word could be due to a reduced pitch accent on the second word, *leía*, but this cannot be confirmed and hence is transcribed with a ?\*. However, the pitch accent of *nona*, realized with a L+!H\*, cannot be attributed to an intermediate phrase pitch reset, since there is no indication of the pause or lengthening before the word *nona* which is typical with a boundary.

A parallel can be made between the tonal shapes of wh-phrases and focus phrases.

This similarity will become more apparent with the treatment of focus in Section 5.3.

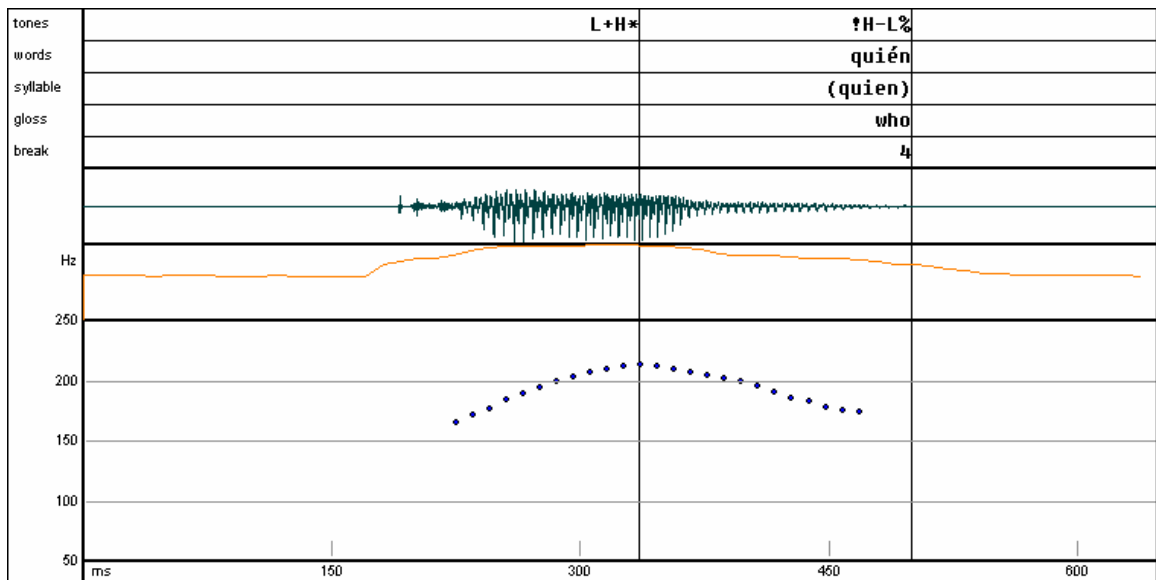


Figure 24. Example of a single word wh-question. Speaker: AC. “Who?” ¿Quién? ] ]  
 | | |  
 L+H\* !H-L%

The final phrasal boundary tone of a wh-phrase can vary depending on the amount of material present after the wh-phrase. When a wh-word is the only word in an utterance (Figure 24), the normal L-L% boundary tone which is present in wh-phrases is realized as a !H-L%. In other words, the low boundary is undershot and realized as a mid

tone, probably due to the increased amount of emphasis that is placed on the wh-word and to the lack of material after the wh-word. This implies that Porteño does not overly lengthen a phrase-final syllable in order to permit boundary tones to be fully realized. Instead, it employs a tonal truncation (Grabe 1998). This final “droop” to the middle of the pitch range is described in McGory and Díaz-Campos (2002) and Beckman et al. (2002) as a M%.

### **5.2.2. Yes/No Questions**

In Section 2.4, it was said that yes/no questions can be formed by subject-verb inversion or remain as in declarative sentences. Because the former is the more common of the two cases, it will be treated here first. The second type will be discussed in Section 5.3.

The basic prosodic pattern of subject-verb inverted yes/no questions is seen in Figure 25.

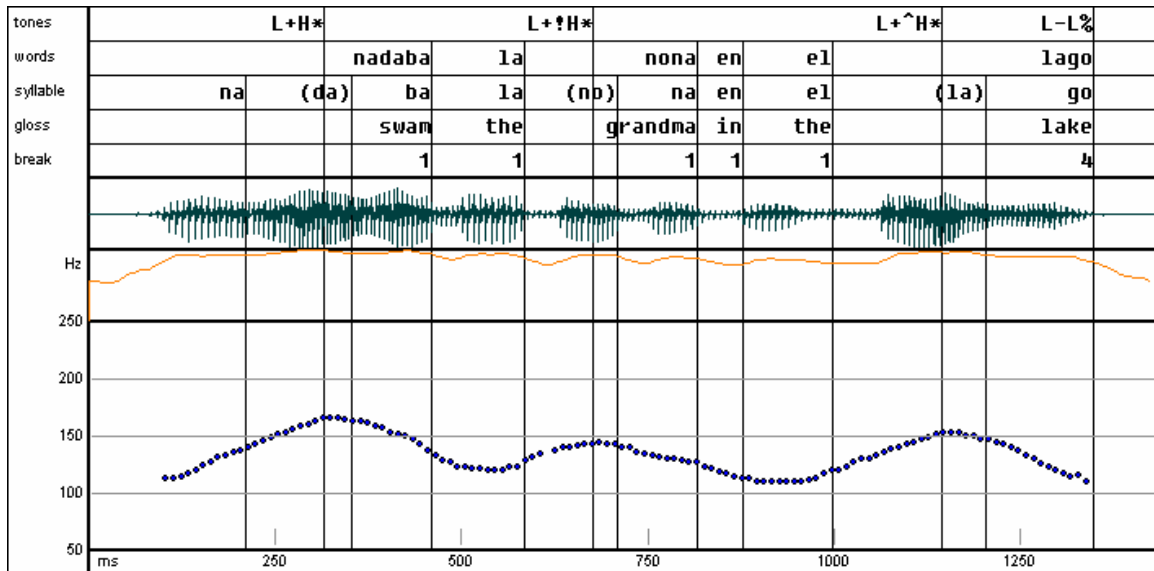


Figure 25. Example of a yes/no question. Speaker: AC.  
 “Did the grandma swim in the lake?” ¿Nadaba la nona en el lago? ] ]  
 | | | |  
 L+H\* L+!H\* L+^H\* L-L%

As can be seen from Figure 25, yes/no questions are almost identical to declarative sentences. Both declaratives and yes/no questions begin with a L+H\* pitch accent on the first stressed syllable of the utterance, followed by a downstepped pitch accent, and the phrase final tones are L-L%.

Despite the similarity between declarative sentences and yes/no questions, there is one fundamental difference, namely the nuclear pitch accent. In declaratives, it was shown that the preferred nuclear pitch accent is a /L+H\*/ (in one of its allotones !H\* or L+!H\*) while in yes/no questions the preferred nuclear pitch accent is a L+^H\*. This upstepped peak followed by L- at the end of yes/no questions gives a sharper fall, which seems similar to Navarro Tomás’ description of the steep fall of yes/no questions in some

varieties of Caribbean dialects, as well as Venezuelan Spanish discussed in Beckman et al. (2002).

This pattern is true for all cases in which there are three or more pitch accents within an ip. When there are just two pitch accents, the leftmost pitch accent is L+H\* while the nuclear pitch accent is lower than the preceding peak. As a result, I will use a L+!H\* to designate the nuclear pitch accent in sentences like Figure 26. This labeling emphasizes that the nuclear pitch accent is lower than the preceding peak. Underlyingly, this pitch accent is L+^H\* just like the other nuclear pitch accents of yes/no questions. One must note that in declarative sentences, L+H\* pitch accents surface as !H\* in the same context.

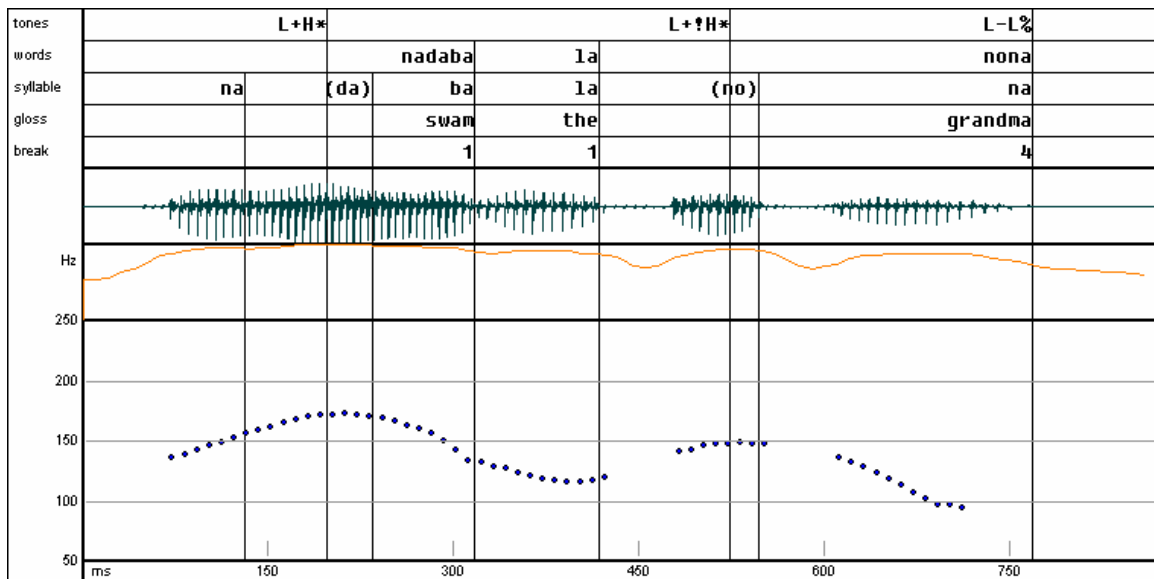
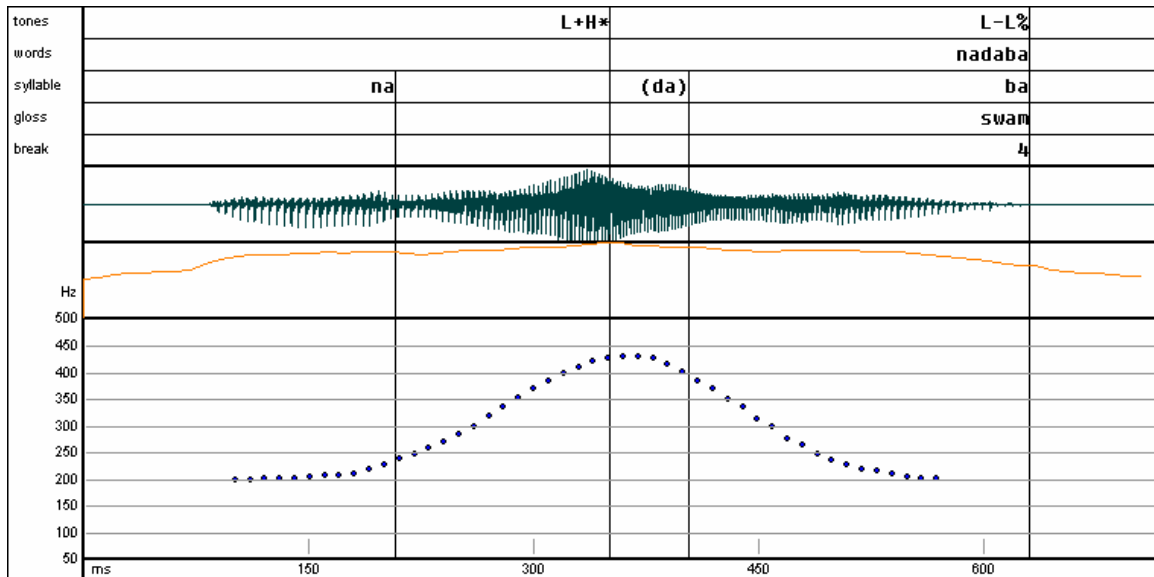


Figure 26. Example of a non-upstepped yes/no nuclear pitch accent. Speaker: GC.

“Did the grandma swim?” ¿Nadaba la nona? ] ]

|            |            |            |  
 L+H\*    L+!H\*    L-L%

When yes/no questions have only one word (Figure 27), the nuclear pitch accent is L+H\* and the boundary tone is L-L%. In such cases, the lows before and after the peak are fully realized (cf. Section 5.2.1 Figure 24, describing tonal truncation, and Figure 27).



**Figure 27. Example of a one word yes/no question. Speaker: MB.**

“Did he/she swim?” ¿*Nadaba?* ] ]  
 | |  
 L+H\* L-L%

This pitch accent appears to be similar to be upstepped compared to regular L+H\* pitch accents. Thus, I am assuming that this is a L+<sup>^</sup>H\* pitch accent that is anchored to the stressed syllable of nuclear pitch accent of yes/no questions. However, since this is the only pitch accent, the ToBI convention dictates that it must be labeled as L+H\*.





### 5.2.4. Final L-H% sequences and Gender Differences

It was shown in Section 5.2.1 that wh-questions prosodically end with a L intermediate phrase boundary tone and a L intonation phrase boundary tone (see Figure 29 below). While this remains the overall norm, there is a small subset of the data (four out of sixty interrogative sentences) displayed a slightly different contour: the intermediate phrase boundary tone remains a L- yet the intonation phrase boundary tone is a H% (Figure 30).

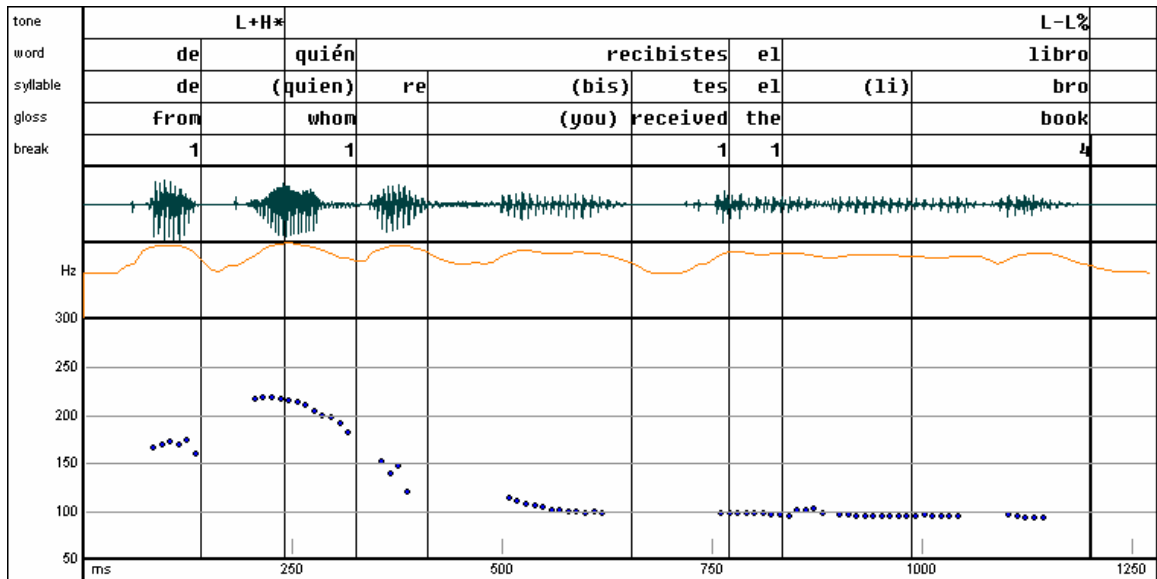
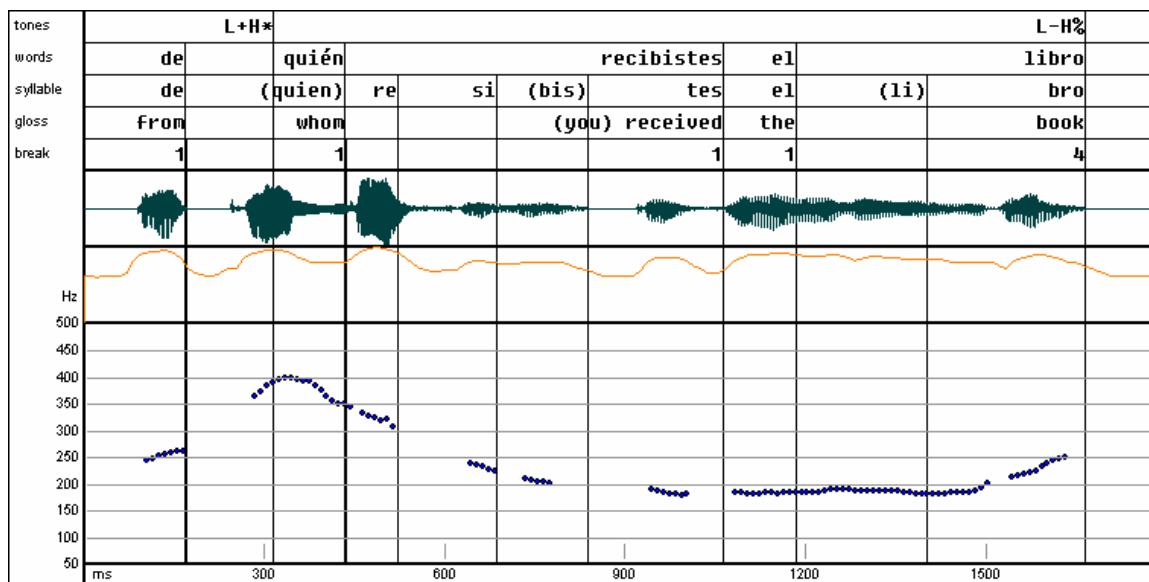


Figure 29. Example of a flat boundary tone in a wh-question produced by a male speaker. Speaker: GC. “From whom did you receive the book?” *¿De quién ] recibistes el libro? ]*

| |  
L+H\* L- L%



**Figure 30.** Example of a late rising boundary tone in a wh-question produced by a female speaker. Speaker: MB. “From whom did you receive the book?” *¿De quién ] recibistes el libro? ]*

|     |     |  
 L+H\* L-                     H%

The scarcity with which this rising contour boundary tone occurs does not permit one to predict when it will occur. The only generalization that can be extrapolated is that the rising contour was only produced by the two female speakers (cf. Figure 29, produced by a male speaker, and Figure 30, produced by a female speaker)<sup>8</sup>.

### 5.2.5. Summary

Interrogative sentences have been shown to possess a fundamental similarity with declarative sentences: use of underlying /L+H\*/ on pre-nuclear pitch accents. In contrast, the nuclear pitch accents in yes/no questions were shown to be underlyingly /L+^H\*/

<sup>8</sup> Although I am a native speaker of Porteño, this intonation sounds ill-formed. In general, my impression is that it sounds like English intonation rather than Porteño. Yet, these speakers are monolingual with very little exposure to English so a carryover from English intonation cannot explain this effect.

while in declaratives it was /L+H\*/. Furthermore, it was observed that pitch accents can be deaccented when following a wh-phrase. However, deaccenting is not predictable.

Interrogative sentences also presented evidence for a three-way contrast for boundary tones in sentence final position. In general, wh-questions followed the same pattern as declarative sentences, namely L-L%. However, there was a small subset that used a L-H%, which may be prosodically marked contours and hence why they were seldom produced. Finally, echo questions exhibited the third possible combination: H-H%.

### **5.3. Focus**

Beckman and Pierrehumbert (1986) claim that there are five characteristics that typically mark the presence of focus in English: (1) more extreme tone target values, (2) the presence of focus tones, (3) lengthened segment duration, (4) higher amplitudes, and (5) blocking of phonetic reduction. Although not all of these trends are always present for all focused words, at least one will be present in order to differentiate the focused word from a non-focused one. Even though these properties were proposed to describe the prosodic behavior of English, similar phenomena have been claimed to happen in many other languages. In this section the focus patterns of declarative sentences and yes/no questions in Porteño will be examined.

### 5.3.1. Declarative Focus

The intonational patterns of focused declarative sentences follow the general pattern seen in Section 5.1 for non-focused declaratives. As a result, the pitch accents used in declarative focus sentences are identical to those seen for non-focus declaratives:  $L+H^*$ ,  $H^*$ ,  $L+!H^*$ , and  $!H^*$  (see Section 5.1). The difference between focus and non-focus is that with focused declaratives is that the underlying pitch accent is  $/L+^H^*/$  instead of  $/L+H^*/$ . However, due to surface allotones for  $L+^H^*$ , the phonetic forms are as follows: the pitch accent on the focused word in intermediate phrase position is a  $L+^H^*$  (see Figure 33), or  $L+H^*$  if the first word in a phrase is focused (see Figure 32). Figure 31 and Figure 32 show the contrast between a regular declarative sentence and the same sentence with focus on *María* produced by the same speaker. As expected, Figure 31 shows the  $L+H^*$ ,  $L+!H^*$  combinations that represent declaratives.

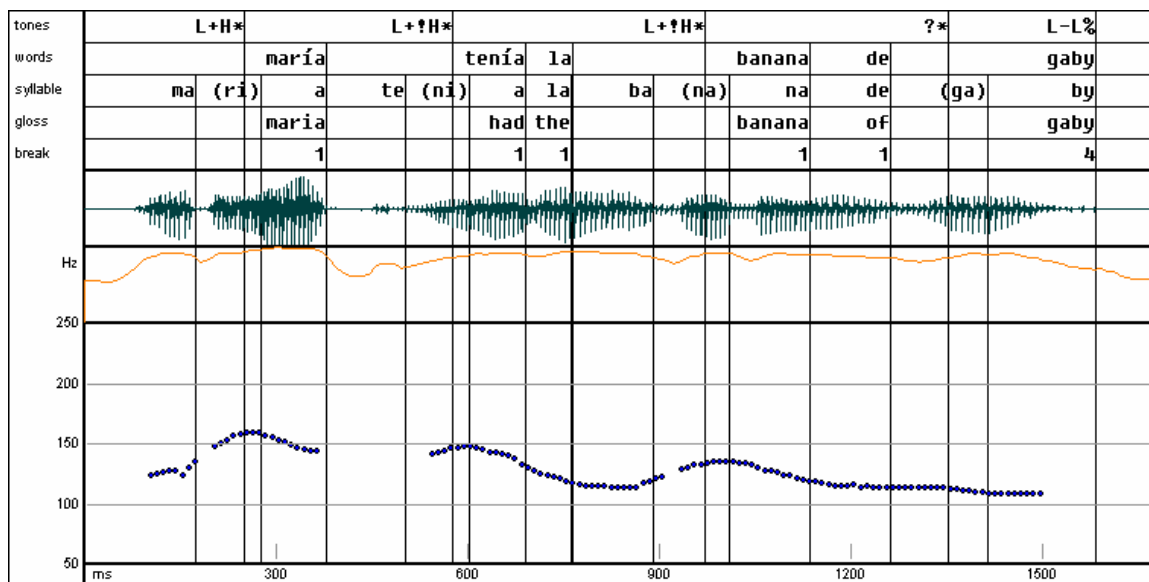


Figure 31. Example of the non-focus declarative version of "Maria had Gaby's banana." Speaker:

AC. *María tenía la banana de Gaby.* ] ]

$\begin{array}{cccccc}
| & | & | & | & | & | \\
L+H^* & L+!H^* & L+!H^* & ?^* & L-L\% & \\
\end{array}$

Figure 32 shows a register shift which results in an increase of the pitch range on the focused word, *María*, by approximately 50 Hz. Another property of focus sentences, as is true for English, seen in Figure 32 is that after the focused word, if the pitch accents are realized, they will generally be confined to a very narrow pitch range.

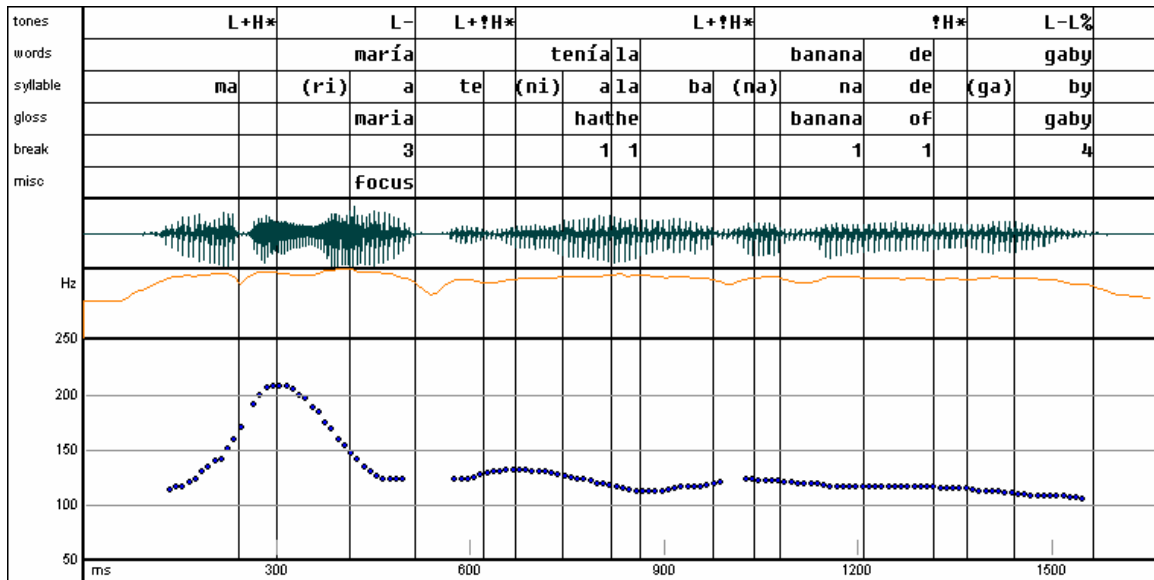


Figure 32. Example of the focus version of "MARIA had Gaby's banana." Speaker: AC.

*MARÍA tenía la banana de Gaby.* ] ]

| | | | |  
L+H\* L+!H\* L+!H\* !H\* L-L%

Figure 33 shows that when a sentence medial word is focused, a L+<sup>^</sup>H\* pitch accent is realized. The pitch accents that come before the focused word are the default pitch accents in the declarative sentence as seen in Figure 31.

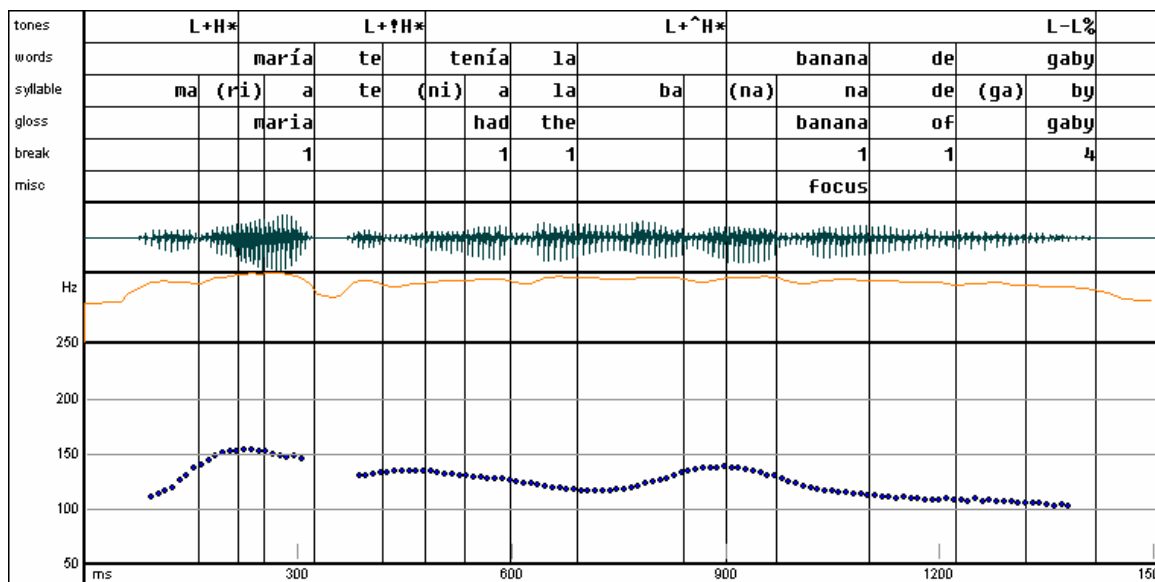


Figure 33. Example of focus in sentence medial position. Speaker: AC. "Maria has Gaby's BANANA." *María tenía la BANANA ] de Gaby ]*  
 L+H\* L+!H\* L+^H\* L- L%

Porteño allows for further differentiation of the focused pitch accent from all non-focused pitch accents by deaccenting all words after the focused element (Figure 34). Deaccenting thus causes the focused word to bear the nuclear pitch accent. As in English, the L- is realized at the end of the focused word and the pitch contour stays low until the end of the phrase, which is similar to the deaccenting seen in wh-questions in Section 5.2. As is also true for wh-questions, the presence of the intermediate phrase tone after the focus word is transcribed with a break index of '3'.



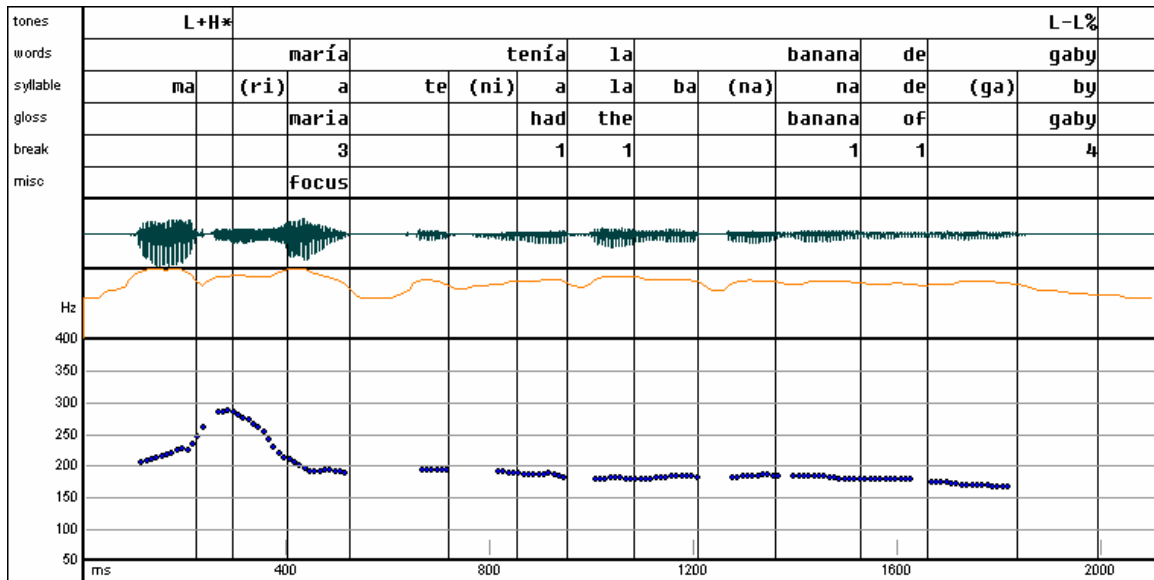


Figure 34. Example of a pitch accent loss due to focus. Speaker: AM. "MARIA had Gaby's banana." *MARÍA ] tenía la banana de Gaby. ]*  
 | | | | | | | | | | | | | |  
 L+H\* L- | L%

The degree of increase in the pitch range for a focused element results in one of two levels of focus. In Figure 32, Figure 33, and Figure 34, when there is a larger pitch range excursion on one word, the perception of the sentence is that the most emphasis possible is placed on that word. When there is only a smaller pitch excursion on one word, then only a slight focus is perceived on that word. This slight focus is realized with some lengthening of the focused element as well as less undershooting of the pitch accent tones. In Figure 35, where the last pitch accent is L+!H\*, which is not the most common nuclear pitch accent in declaratives, *nadó* is perceived as slightly focused.

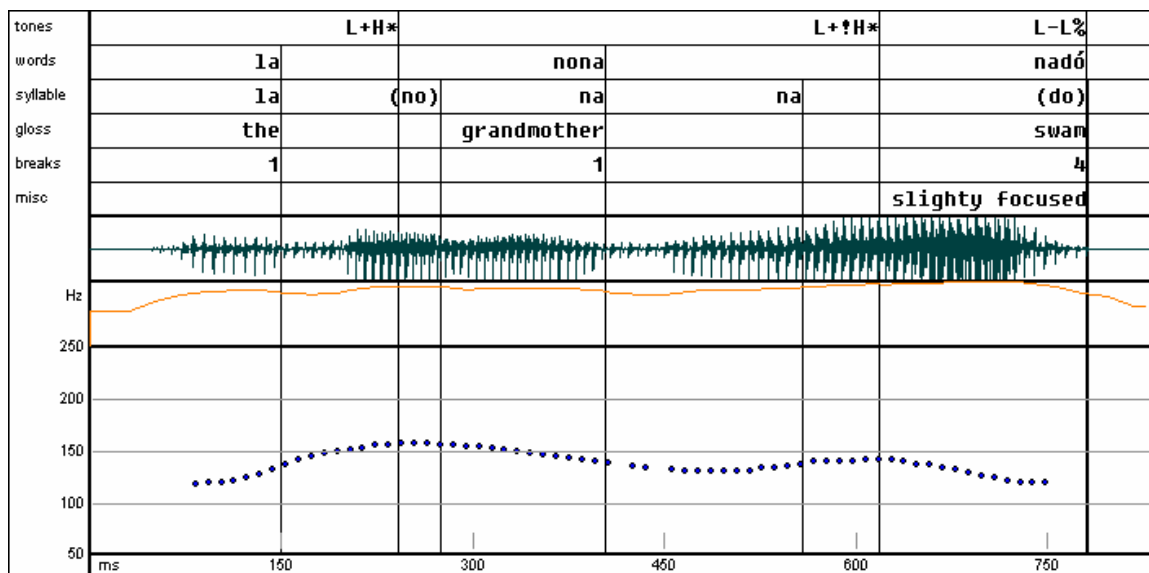


Figure 35. Example of slight focus. Speaker: AC. "The grandma swam." *La nona nadó.* ] ]  
 | | | |  
 L+H\* L+!H\* L-L%

Finally, focused words have an earlier peak than non-focused accented words. A quantitative comparison was made by measuring the time from the start of the stressed syllable to the peak. This was compared to the total duration of the stressed syllable. These measurements were compared by separate t-tests for two speakers, and the results are shown in Table 6.

Speaker: AC		
	Declaratives	Focus
Mean	0.75	0.36
t(123) = 7.27, p < 0.0001		
n = 125		
Speaker: AM		
	Declarative	Focus
Mean	0.91	0.59
t(95) = 3.33, p < 0.001		
n = 97		

Table 6. Declarative Non-Focus/Focus Peak Realization

The mean realization for non-focused declarative pitch accents is on average between 75% and 91% into the stressed syllable, depending on the speaker, while for a focused word it is on average 36% to 59%. These differences in timing are statistically significant for both speakers.

Hualde (2002) and Face (2001a) report that in Madrid Spanish, when a word is not focused, the peak is realized post-tonically. However, when a word is focused, the stress shifts from a post-tonic to the stressed syllable. In contrast, Table 6 shows that pitch accents are not realized post-tonically but late in the stressed syllable. Despite the differences in the exact realizations of the alignment, both Madrid Spanish and Porteño shift their pitch accents earlier in the stressed syllable when focused.

### 5.3.2. Yes/No Focus

Yes/no questions with focus are similar to their non-focused counterparts. As seen in declaratives, the focused word will in general have a higher peak than the peaks surrounding it and as a result will be labeled with either a  $L+^H^*$  (Figure 36), but  $L+H^*$  (Figure 37) if the focused word is phrase-initial.

The focused word in Figure 36, *tenía*, has upstepped pitch accent that is approximately 70 Hz higher than the previous peak.

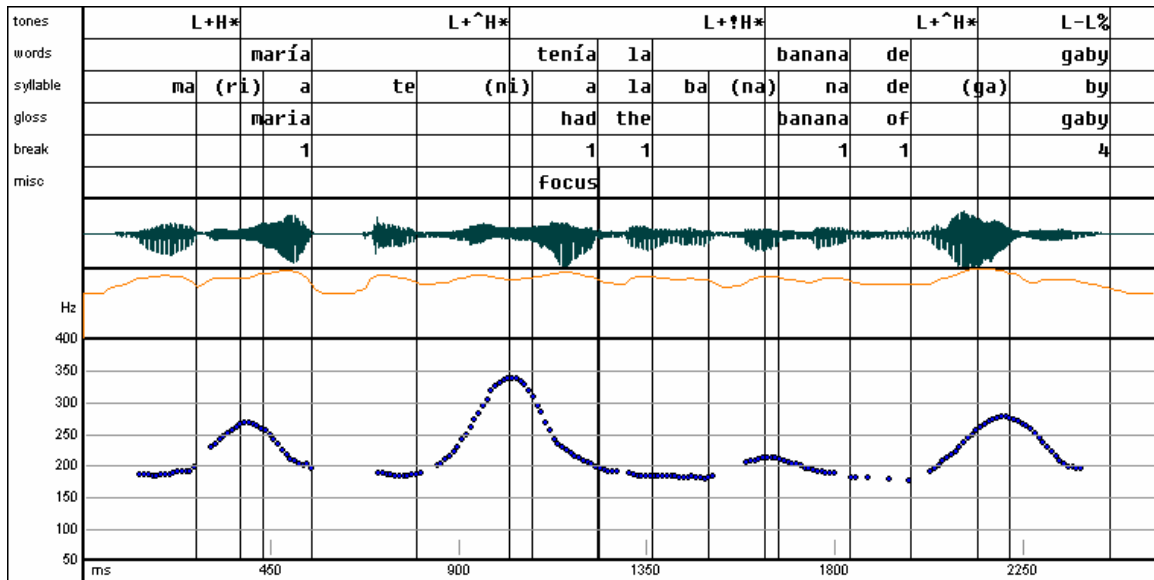


Figure 36. Example of pitch range increase in yes/no questions. Speaker: AM.

"Maria HAD Gaby's banana?" ¿María TENÍA la banana de Gaby? ] ]

|            |            |            |            |  
 L+H\* L+^H\* L+!H\* L+^H\* L-L%

Figure 37 shows the focused word, *banana*, is preceded by an intermediate phrase break. The intermediate phrase break causes a pitch to reset on the focused word. That is, the L tone of the pitch accent on the focused word is fully realized and gives a clear rise to the peak on the focused word.



declaratives, the peak of the focused pitch accent was realized earlier in the stressed syllable than the non-focused pitch accent.

Speaker: AC		
	Yes/No	Focus
Mean	0.80	0.67
t(18) = 2.30, p < 0.03		
n = 20		
Speaker: AM		
	Yes/No	Focus
Mean	0.95	0.79
t(16) = 2.50, p < 0.02		
n = 18		

**Table 7. Yes/No Question Non-Focus/Focus Peak Realization.**

As shown in Table 7, the peaks of L+H\* pitch accents in non-focused words were realized on average between 80% and 95% of the stressed syllable, while, on average focused words were within 67% to 79%. Although the differences in the peak realizations between focused and non-focused are smaller in interrogatives than in declaratives, the differences between focus and non-focus remains statistically significant.

#### **5.4. Imperatives**

Syntactically, imperatives are very different from other verb conjugations. They require dropping of subject pronouns and the mandatory attachment of direct and indirect object clitics onto the end of the verb.

¡Comprale el regalo!  
 Compra-le el regalo  
 Buy-IMP-CL(IO) the gift  
 “Buy him/her the gift!”

Even though imperatives are quite different from other verb tenses, sentences with imperatives are intonationally quite similar to yes/no questions. This similarity can be seen in Figure 38 and Figure 39.

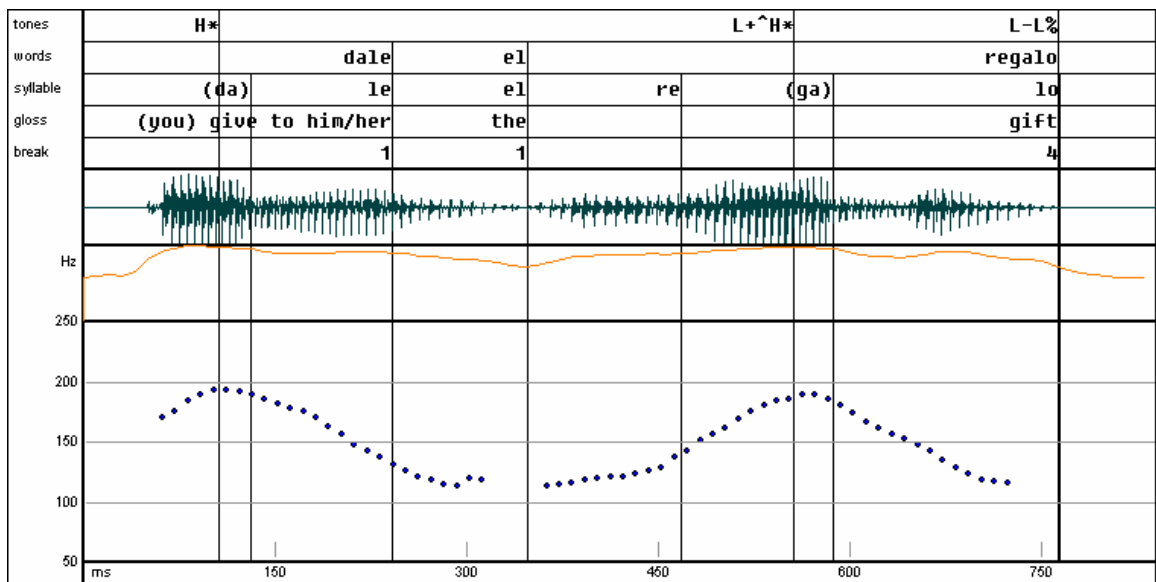


Figure 38. Example of an imperative sentence. Speaker: AC. “Give him/her the gift!”

*Dale el regalo* ] ]  
 | | | | |  
 H\* L+^H\* L-L%

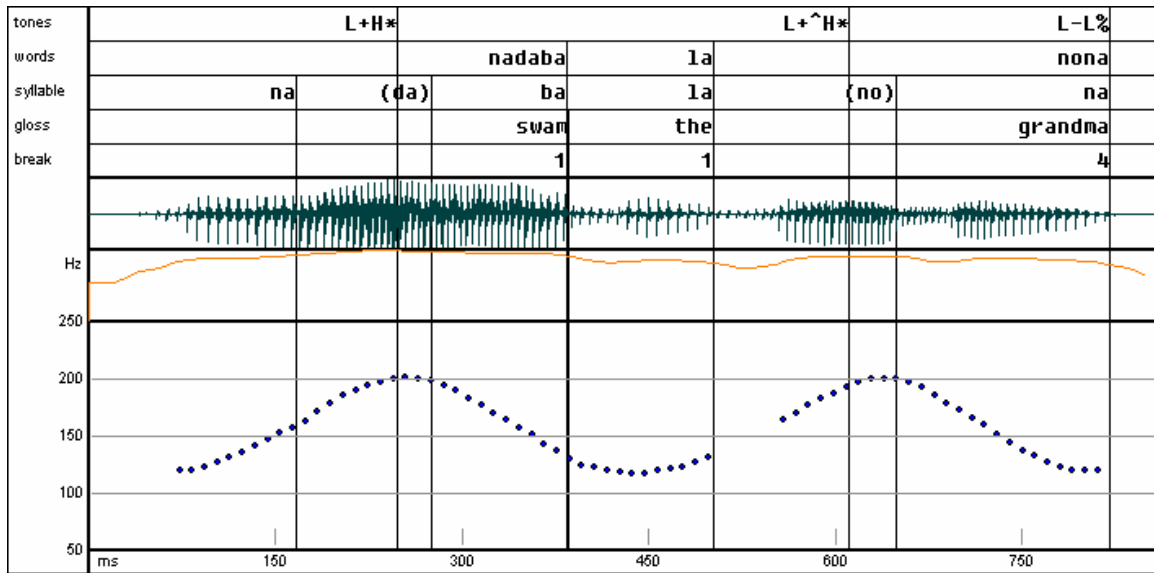


Figure 39. Example of a yes/no question. Speaker: AC. “Did the grandmother swim?”

*Nadaba la nona* ] ]  
 |        |    | |  
 L+H\*   L+^H\* L-L%

As can be seen from these two examples, there is very little difference between these two pitch tracks. The difference in how soon the first peak occurs is attributed to the presence of an extra unstressed syllable, *na*, in the interrogative sentence. Also, the presence of an extra stressless syllable, *el*, after *dale* in the imperative sentence causes the trough between the two peaks to be longer.

Given this similarity between the two pitch tracks, the difference in meaning between imperatives and yes/no questions is not intonational but instead solely relies on the verbal conjugation.



## 6. Discussion

In this presentation, I have argued that in Porteño there are two underlying pitch accents, /L+H\*/ and /L+^H\*/. These are realized as five allotones, and these are seen in all the syntactic structures examined, i.e. L+H\*, H\*, L+!H\*, !H\*, L+^H\*. Phonemic /L+H\*/ is fully realized when it is the first pitch accent of an utterance. If there is not enough material present before the phrase-initial stressed syllable, the L is undershot and a simple H\* occurs. All pitch accents after the first are downstepped, i.e., L+!H\* (or !H\* if not enough material between pitch accented syllables or if it is the last pitch accent of an Intermediate phrase).

It was found that the type of the nuclear pitch accent is critical in differentiating declarative sentences from yes/no questions. The most common nuclear pitch accent in declarative sentences is !H\*, similar to the findings in Alcoba and Murillo (1999), or its free variant L+!H\*. On the other hand, the nuclear pitch accent in Yes/no questions is usually an upstepped bitonal pitch accent, L+^H\*, similar to that described by Beckman et al. (2002) for Venezuelan Spanish. The other difference between declaratives and yes/no questions is that the latter is produced in larger pitch range than the former.

The current study found that Porteño has an intermediate phrase, and the phrase is marked by some degree of lengthening, weaker than intonation phrase final lengthening, as well as by a boundary tone, i.e., L-, !H-, H-, which underlyingly correspond to the two phonemic tones /L-/ and /H-/. The three different surface intermediate phrase allotones shown to exist in Porteño, when combined with an intonation phrase boundary tones, are consistent with the descriptions of three intonational boundary tones, L%, M%, H%,

presented by McGory and Díaz-Campos (2002). In the analysis presented here, their boundary tones are represented by the combination of the intermediate phrasal tone and the intonation phrase boundary tone, i.e., L-L% for their L%, H-L% for their M%, and H-H% for their H%. Besides accounting for their boundary tones, the analysis presented here can also account for the presence of a final late rise, i.e. L-H%, found at the end of certain wh-questions

The intermediate phrase in Porteño is marked phonologically and realized in similar positions within a sentence as those described by Garrido, Llisterri, de la Mota, Ríos (1995). When the intermediate phrase boundary occurs in intonation phrase medial position, the nuclear pitch accent is an upstepped bitonal pitch accent, L+<sup>H</sup>\*, in declaratives. Since the intonation phrase-medial intermediate phrase tone is either H- or !H-, it is possible that the H- phrasal tone causes the upstep. Further data should be examined to see if L- phrasal tone occurs in intonation phrase medial position.

The peak alignment of a pitch accent can be influenced by the presence of an intermediate phrase was argued to be relevant in the realization of focus. It has been noted by Sosa (1999), Willis (2000), and Face (2001a) that pitch accents peaks are realized differently if a word is focused or not. Face (2001a) states that in Madrid Spanish the pitch accents in broad focus sentences are realized almost 50% into the post-tonic syllable. However, in narrow focus sentences, all the pitch accents align with the stressed, focused syllable. To account for these effects, Sosa (1999), Willis (2000), and Face (2001a) claim that there are two pitch accents: the late peak alignment, L\*+H, as the default, broad focus, pitch accent, and the early peak alignment, L+H\*, as the narrow

focus pitch accent. On the other hand, Prieto et al.(1995), Hualde (2000), and Nibert (2000) claim that there is only one pitch accent, L+H\*, and following Prieto et al.'s finding that intermediate phrase tones cause earlier peak alignments, Nibert (2000) proposed that intermediate phrase tones are present after the narrow focused word.

The current data for Porteño declaratives suggest that, in general, pitch accent peaks are realized later in broad focused words than in narrow focused words. However, this was not consistent across speakers. The current data did not fully support Prieto et al.'s claims of earlier peak alignment due to a phrasal boundary immediately following the focused word. There were tokens in which a peak was realized late regardless of an intermediate phrase tone being present and vice versa. It seems that the peak alignments do not seem to be dependent on the presence of an intermediate phrase tone.

As a general trend, speakers produced a more delayed peak for non-focused words than the peak for focused words, but the absolute timing of peak delay between focused and non-focused words was not the same across speakers. Thus, focus is not marked by an absolute value of the timing in peak alignment but instead by a relative difference in timing. It seems that speakers are aware that a peak is being manipulated to distinguish broad versus narrow focus. This manipulation of peak timing can be a sixth property that marks the presence of focus in addition to the five proposed in Beckman and Pierrehumbert (1986).

## 7. Conclusion

The investigation of Spanish intonation enjoys a long history starting with the work of Navarro Tomás (1944). Since then, much work has been done to try to broaden the understanding of the specific patterns of different dialects and try to incorporate them into a unified theory. Beckman et al. (2002) summarizes studies done on a host of different dialects and concludes that Spanish has seven pitch accents and three intonation phrase tones.

It has been shown through this project that in Porteño there are only two underlying pitch accents,  $L+H^*$  and  $L+^{\wedge}H^*$ , which are phonetically realized as five different allotones:  $L+H^*$ ,  $H^*$ ,  $L+!H^*$ ,  $!H^*$ , and  $L+^{\wedge}H^*$ . It has also been shown that the five allotones are predictable and are derivable from normal phonological effects such as downstepping, undershooting due to stress clash, and pitch range compression. Furthermore, evidence was shown for the presence of two phonemic intermediate phrase tones,  $L-$  and  $H-$ . These two phrase tones are realized as three different variants:  $L-$ ,  $H-$ , and  $!H-$ . Finally, it was posited that there are two intonational phrase boundary tones,  $L\%$  and  $H\%$ . Although two boundary tones were posited, further investigation needs to be done to confirm the status of  $H\%$  as a phonemic boundary tone in sentence final position.

## Appendix

### A. Speaker Demographics

<u>Speaker</u>	<u>Age</u>	<u>Sex</u>
AC	17	M
AM	17	F
GC	32	M
IF	17	M
MB	30	F
MM	35	F

## B. Sentence Paradigm

Declaratives    Sentences

**Sentences 1-21 were used to determine default patterns.**

- |    |   |
|----|---|
| 1  | Laura nada<br>Laura swims<br>"Laura swims."   |
| 2  | Laura nadó<br>Laura swam<br>"Laura swam."   |
| 3  | María nada<br>María swims<br>"María swims."   |
| 4  | María nadó<br>María swam<br>"María swam."   |
| 5  | Manuel nadó<br>Manuel swam<br>"Manuel swam."  |
| 6  | La nona nada<br>The grandma swims<br>"The grandma swims."                                 |
| 7  | La nona nadó<br>The grandma swam<br>"The grandma swam."                                   |
| 8  | Laura nadaba<br>Laura swam<br>"Laura swam."   |
| 9  | María nadaba<br>María swam<br>"María swam."   |
| 10 | Manuel nadaba<br>Manuel swam<br>"Manuel swam."  |
| 11 | Laura nada al lago<br>Laura swims to the lake<br>"Laura swims to the lake."               |
| 12 | Laura nadó al lago<br>Laura swam to the lake<br>"Laura swam to the lake."                 |
| 13 | María nada al lago<br>María swims to the lake<br>"María swims to the lake."               |
| 14 | María nadó al lago<br>María swam to the lake<br>"María swam to the lake."                 |
| 15 | La nona nada al lago<br>The grandma swims to the lake<br>"The grandma swims to the lake." |
| 16 | La nona nadó al lago<br>The grandma swam to the lake                                      |

- 17 "The grandma swam to the lake."  
 Laura  
 "Laura"
- 18 Manuel  
 "Manuel"
- 19 María  
 "María"
- 20 Emilia  
 "Emily"
- 21 Nosotros teníamos nueve mandarinas  
 We had nine tangerines  
 "We had nine tangerines."

**Sentences 22-27 were used to determine stress clash effects.**

- 22 El niño llegó último  
 The boy arrived last  
 "The boy arrived last."
- 23 Él vino de la montaña  
 He came from the mountain  
 "He came from the mountain."
- 24 El libro está sobre la mesa  
 The book is on top of the table  
 "The book is on the table."
- 25 Él llegó último de todo  
 He arrived last of all  
 "He was the last to arrive."
- 26 Manuel nada al lago  
 Manuel swims to the lake  
 "Manuel swims to the lake."
- 27 Manuel nada al lago todas las mañanas  
 Manuel swims to the lake every the mornings  
 "Manuel swims to the lake every morning."

**Sentences 28-31 were used to see non-initial stress lapse effects.**

- 28 María vió a la uva  
 María saw the grape  
 "María saw the grape."
- 29 María lavó la uva  
 María washed the grape  
 "María washed the grape."
- 30 María lavará la uva  
 María will wash the grape  
 "María will wash the grape."
- 31 María saboreará la uva  
 María will savor the grape  
 "María will savor the grape."

**Sentences 32-27 were used to see initial rising.**

- 32 La mandarina linda  
 The tangerine nice  
 "The nice tangerine."
- 33 Una mandarina cayó del árbol

- A tangerine fell from the tree  
 "A tangerine fell from the tree."  
 34 La mandarina cayó del árbol  
 The tangerine fell from the tree  
 "The tangerine fell from the tree."  
 35 La naranja cayó del árbol  
 The orange fell from the tree  
 "The orange fell from the tree."  
 36 La fruta cayó del árbol  
 The fruit fell from the tree  
 "The fruit fell from the tree."  
 37 Fátima es un lugar sagrado  
 Fatima is a place sacred  
 Fatima is a sacred place

**Sentences 38-52 were used to see clitic effects, the status of words ending in '-mente', misc stress checking.**

- 38 Laura lo nada  
 Laura it swims  
 "Laura swims it."  
 39 Laura lo nadó  
 Laura it swam  
 "Laura swam it."  
 40 María lo nada  
 Maria it swims  
 "Maria swims it."  
 41 María lo nadó  
 Maria it swam  
 "Maria swam it."  
 42 La nona lo nada  
 The grandma it swims  
 "The grandma swims it."  
 43 La nona lo nadó  
 The grandma it swam  
 "The grandma swam it."  
 44 Laura decía de nadar al lago  
 Laura talked about swimming to the lake  
 "Laura talked about swimming to the lake."  
 45 Laura decía que quería ir al lago  
 Laura said that (she) wanted to go to the lake  
 "Laura said that she wanted to go to the lake."  
 46 La niña con la muñeca hinchada llegó última  
 The girl with the wrist swollen arrived last  
 "The girl with the swollen wrist arrived last."  
 47 Le dije que me devuelva mi largavista  
 him/her (I) told that me return my binoculars  
 "I told him/her to return my binoculars."  
 48 Manuel camina rápidamente  
 Manuel walks quickly  
 "Manuel walks quickly."  
 49 Manuel camina ligeramente  
 Manuel walks swiftly  
 "Manuel walks swiftly."



- 50 Laura se lo dió  
Laura him/her it gave  
"Laura gave it to him/her."
- 51 La luna sale entre las nubes  
The moon comes out through the clouds  
"The moon comes out through the clouds."
- 52 El sobre fue mandado por la niña  
The envelope was sent by the girl  
"The envelope was sent by the girl."
- 53 La niña no miraba a la lancha  
The girl not watched to the boat  
"The girl did not watch the boat."

**Sentences 54-63 were complex declaratives used to see the existence of intermediate phrases.**

- 54 María comía bananas, naranjas y uvas  
Maria ate bananas oranges and grapes  
"Maria ate bananas, oranges, and grapes."
- 55 Mientras María guardaba la comida, Manuel lavaba los tenedores  
While Maria put away the food Manuel washed the forks  
"While Maria put away the food, Manuel washed the forks."
- 56 Manuel miraba al avión y María la lancha  
Manuel watched the plane and Maria the boat  
"Manuel watched the plane and Maria the boat."
- 57 No. Manuel no miraba al avión.  
No. Manuel not watch the plane  
"No. Manuel didn't watch the plane."
- 58 La niña que miraba al avión soñaba de volar  
The girl that watched the plane dreamed of flying  
"The girl that watched the plane dreamed of flying."
- 59 La niña linda que miraba al avión soñaba de volar  
The girl pretty that watched the plane dreamed of flying  
"The pretty girl that watched the plane dreamed of flying."
- 60 El niño que robó el mercado también robó el banco de la esquina  
The boy that robbed the store also robbed the bank on the corner  
"The boy who robbed the store also robbed the bank on the corner."
- 61 Alguien le disparó a la sirvienta de la actriz que estaba en el balcón  
Someone her shot to the servant of the actress that was on the balcony  
"Someone shot the servant of the actress that was on the balcony."
- 62 María y el hermano de Manuel vieron el avión desde la ventana  
Maria and the brother of Manuel saw the plane from the window  
"Maria and Manuel's brother saw the plane from the window."
- 63 Cuando tenía hambre, comí una banana  
When (I) had hunger (I) ate a banana  
"When I was hungry, I ate a banana"

Interrogatives

- 64 ¿Quién?  
Who  
"Who?"
- 65 ¿Quién nadó?  
Who swam

- 66 “Who swam?”  
¿Quién nadó al lago?  
Who swam to the lake  
“Who swam to the lake?”
- 67 ¿Quién nadó desde el río al lago?  
Who swam from the river to the lake  
“Who swam from the river to the lake?”
- 68 ¿A quién le diste el libro?  
To whom him/her (you) gave the book  
“To whom did you give the book?”
- 69 ¿De quién recibiste el libro?  
From whom (you) received the book  
“From whom did you receive the book?”
- 70 ¿Qué leía la nona en el jardín?  
What read the grandma in the garden  
“What did the grandmother read in the garden?”
- 71 ¿Adónde está la carta?  
Where is the letter  
“Where is the letter?”
- 72 ¿Cuándo abrió el negocio?  
When opened the store  
“When did the store open?”
- 73 ¿Por qué salió tan cara la cuenta?  
Why come out so expensive the bill  
“Why was the bill so expensive?”
- 74 ¿Nadaba?  
(he/she) swam  
“Did he/she swim?”
- 75 ¿Nadaba la nona?  
swam the grandma  
“Did the grandma swim?”
- 76 ¿Nadaba la nona en el lago?  
swam the grandma in the lake  
“Did the grandmother swim in the lake?”
- 77 ¿Nadaba la nona desde el río al lago?  
swam the grandma from the river to the lake  
“Did the grandmother swim from the river to the lake?”

#### Focus

**The bolded word is focused.**

- 78 María tenía la banana de Gaby  
Maria had the banana of Gaby  
“Maria had Gaby's banana”
- 79 **María** tenía la banana de Gaby
- 80 María **tenía** la banana de Gaby
- 81 María tenía la **banana** de Gaby
- 82 María tenía la banana de **Gaby**
- 83 María tenía **la** banana de Gaby
- 84 María tenía la banana **de** Gaby
- 85 ¿María tenía la banana de Gaby?  
Maria had the banana of Gaby

	“Maria had Gaby’s banana?”
86	¿ <b>María</b> tenía la banana de Gaby?
87	¿María <b>tenía</b> la banana de Gaby?
88	¿María tenía la <b>banana</b> de Gaby?
89	¿María tenía la banana de <b>Gaby</b> ?
90	¿María tenía <b>la</b> banana de Gaby?
91	¿María tenía la banana <b>de</b> Gaby?
92	<b>María</b> lavó la uva Maria washed the grape “Maria washed the grape.”
93	María lavó <b>la uva</b>
94	María <b>lavó la uva</b>

### Imperatives

95	¡Dale el regalo a la niña! (You) give-him/her the gift to the girl “Give the gift to the girl!”
96	¡Dale el regalo! (You) give-him/her the gift “Give him/her the gift!”
97	¡Dámelo! (You) give-me-it “Give it to me!”
98	¡Andá al negocio! (You) go to the store “Go to the store!”
99	¡Hablá! (You) talk “Talk!”

## References

- Alcoba, Santiago, and Julio Murillo (1999). Intonation in Spanish. In *Intonation Systems: A Survey of Twenty Languages*. Daniel Hirst and Albert Di Cristo (eds.), 152-166. Cambridge, UK: Cambridge University Press.
- Beckman, Mary E., Manuel Díaz-Campos, Julia Tevis McGory and Terrell A. Morgan (2002). Intonation across Spanish, in the Tones and Break Indices framework. *Probus* 14: 9-36.
- Beckman, Mary E. and Julia Hirschberg (1994). *The ToBI Annotation Conventions*. Online MS. [http://www.ling.ohio-state.edu/~tobi/ame\\_tobi/annotation\\_conventions.html](http://www.ling.ohio-state.edu/~tobi/ame_tobi/annotation_conventions.html).
- Beckman, Mary E. and Janet B. Pierrehumbert (1986). Intonational Structure of Japanese and English. *Phonology Yearbook* 3: 255-309.
- Bruce, Gösta. (1977). *Swedish Word Accents in Sentence Perspective (Travaux de l'institute de linguistique de Lund 12)*. Lund: Lund University.
- Face, Timothy (2001a). Focus and early peak alignment in Spanish intonation. *Probus* 13: 223-246.

Garner, Caycedo, Debbie Rusch and Marcela Domínguez (2000). *¡Claro que sí!* Fourth Edition. Boston: Houghton Mifflin Co.

Garrido, Juan M., Joaquin Llisterri, Carme de la Mota, Rafael Marín and Antonio Ríos (1995). Prosodic markers at syntactic boundaries in Spanish. *Proceedings of the 13<sup>th</sup> International Congress of Phonetic Sciences*, 2: 370-373. Stockholm, KTH: Stockholm University.

Grabe, Esther (1998). *Comparative Intonational Phonology: English and German*. Doctoral Dissertation, Max-Plank-Institute and University of Nijmegen.

Hualde, José Ignacio (2000). Intonation in Spanish and the other Ibero-Romance languages: Overview and status quaestionis. Paper presented at the 30<sup>th</sup> Linguistic Symposium on Romance Languages, Gainesville, FL.

----- (2002). Intonation in Romance. Introduction to the special issue. *Probus* 14: 1-7.

Ladd, Robert (1996). *Intonational Phonology*. Cambridge, UK: Cambridge University Press.

Liberman, Mark and Janet Pierrehumbert (1984). Intonational Invariance under Changes in Pitch Range and Length. In *Language Sound Structure*. M. Aronoff and R. Oehrle (eds.), 157-233. Cambridge, MA: MIT Press.

McGory, Julia Tevis, and Manuel Díaz-Campos (2002). Declarative Intonation Patterns in Multiple Varieties of Spanish. In *Structure, Meaning, and Acquisition in Spanish*. James F. Lee et al. (eds.), 73-92. Somerville, MA: Cascadilla Press.

Navarro Tomás, Tomás (1944). *Manual de entonación española*. New York: Hispanic Institute in the United States.

Nibert, Holly Joy (2000). Phonetic and phonological evidence for intermediate phrasing in Spanish intonation. Doctoral dissertation, University of Illinois, Urbana-Champaign.

Pierrehumbert, J. (1980) *The Phonology and Phonetics of English Intonation*. MIT diss.

Pierrehumbert, J. and M. Beckman (1988). Japanese Tone Structure, *Linguistic Inquiry Monograph 15*. Cambridge, MA: MIT Press.

Prieto, Pilar, Jan Van Santen and Julia Hirschberg (1995). Tonal alignment patterns in Spanish. *Journal of Phonetics* 23: 429-451.

Scicon R&D, Inc. (1998). PitchWorks. <http://www.sciconrd.com/>.

Sosa, Juan Manuel (1999). *La entonación del español: Su estructura fónica, variabilidad y dialectología*. Madrid: Cátedra.

Wendell Cox Consultancy (2003). <http://www.demographia.com/dbx-buenosaires.htm>.

Willis, Erik W. (2000). Pitch accent alignment of declarative sentences in Dominican and Mexican Spanish. Paper presented at the 29<sup>th</sup> Annual Meeting of the Linguistics Association of the Southwest. Puebla, Mexico.