

Castilian Spanish Intonation*

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1. Introduction

The aim of this chapter is to present the basic intonational tunes found in Castilian Spanish within the Sp_ToBI system of prosodic annotation (Beckman et al. 2002, Estebas-Vilaplana and Prieto 2008). This system is a follow-up of the Autosegmental-Metrical (AM) approach of intonational analysis (Pierrehumbert 1980, Pierrehumbert and Beckman 1988, Ladd 1996, Gussenhoven 2004, among others) which describes intonational patterns by means of two tones, H and L, associated to metrically strong syllables and to the edges of the F0 contours. This model has been used to describe the intonational patterns of several languages including Castilian Spanish (Sosa 1999, 2003, Face 2001, 2002a, 2002b, 2002c, Beckman et al. 2002, Hualde 2002, Ramírez Verdugo 2005, Estebas-Vilaplana 2006, Face and Prieto 2007, among others) and it has been used in studies that examine the interrelation between Castilian Spanish intonation and other areas of linguistics, such as pragmatics and semantics (Escadell-Vidal, 1996, 1999 and 2002).

The description of Castilian Spanish intonation has a long tradition beginning with the works of Navarro Tomás in the first half of the 20th century (Navarro Tomás 1918, 1939, 1944). In these early descriptions the modelling of Spanish intonation was in line with the British school of intonational analysis. Thus, the typical tunes of Spanish utterances were described by means of *tonemas* ('tones') that represented the tonal configurations of the pitch movements, as for example, *cadencia* ('falling tone'), *anticadencia* ('rising tone') and *suspensión* ('level tone'). Further works on Spanish intonation expanded and developed Navarro Tomás's initial analyses and contributed to have a more thorough overview of the field with more specific descriptions (Kvavik and Olsen 1974, Quilis 1975, 1981, Quilis and Fernández 1985, Canellada and Kuhlmann Madsen 1987, de-la-Mota 1995, Alcoba and Murillo 1999, among others).

* We would like to express our gratitude to the editors Pilar Prieto and Paolo Roseano for giving us very inspiring feedback on this paper. This work has also benefited from the comments of Mercedes Cabrera, Francisco Vizcaíno, M^a Jesús López-Bobo and Miguel Cuevas-Alonso to whom we are very grateful. This study was presented in the *IV Sp_ToBI workshop: Transcription of Intonation of the Spanish Language* (Las Palmas de Gran Canaria, June 2009). The ppt presentation can be found at <http://prosodia.upf.edu/home/ca/papi09.php>. We are indebted to the audience at this workshop for fruitful discussions and very useful feedback. This research has been funded by grant 2009 SGR-70, awarded by the Generalitat de Catalunya, and by grants FFI2009-07648/FILO and CONSOLIDER-INGENIO 2010 “Bilingüismo y Neurociencia Cognitiva CSD2007-00012” awarded by the Spanish Ministerio de Educación y Ciencia.

In this chapter we would like to provide a further contribution to the description of Castilian Spanish intonation by examining new empirical data and typical tunes of several sentence types within the tenets of the Sp_ToBI framework. The types of sentences that will be examined for Castilian Spanish are the following: broad and narrow focus statements, wh- questions, yes-no questions, commands, requests and vocatives. We also include the analysis of several biased sentences, that is, sentences with specific meanings and nuances, such as, obviousness statements, anti-expectational questions or exhortative questions, to mention a few. The data described in this study have been gathered by means of an intonation survey (Prieto 2001) which consisted of a variety of situations, each intended to elicit a given type of intonation. The analysis of the data is based on the first proposal of Sp_ToBI (Beckman et al. 2002) and on its revised version (Estebas-Vilaplana and Prieto 2008).

The chapter is organised as follows. Section 2 introduces the inventory of pitch accents and boundary tones found in Castilian Spanish in line with the works of Beckman et al. (2002) and Estebas-Vilaplana and Prieto (2008). It also takes into consideration other investigations on Spanish intonation within the AM model that are relevant for the present study. In section 3 we describe the basic intonation patterns found in Castilian Spanish for a variety of sentence types. Finally, in the conclusion, we summarise the most relevant points of this study and compare the main tonal configurations with those found in other varieties. We also include the typical nuclear configurations for the different kinds of sentences.

2. Castilian Spanish intonational phonology

In this section we will present the inventory of pitch accents and boundary tones attested in Castilian Spanish together with their Sp_ToBI labels and their phonetic realizations. The inventory of pitch accents and boundary tones is based on the first Sp_ToBI proposal (Beckman et al. 2002) and on the revised version (Estebas-Vilaplana and Prieto 2008). Examples of these tonal units are provided in section 3 along with examples of the most common intonational patterns in Castilian Spanish.

2.1. The pitch accents

The original Sp_ToBI system (Beckman et al. 2002) described the intonational patterns of Spanish by means of three bitonal pitch accents: L^{*}+H (rising accent with the F0 peak on the postaccentual syllable), L+H^{*} (rising accent with the F0 peak aligned with the end of the accented syllable) and H+L^{*} (falling accent within the accented syllable). This proposal follows the traditional distinction between prenuclear accents with a late rising peak (L^{*}+H) and nuclear accents with an early rising peak (L+H^{*}) described in Sosa (1999), Face (2001) and Hualde (2003). The first Sp_ToBI proposal also included a monotonal pitch accent (H^{*}) which was mainly used for those cases where no F0 dip was observed before the accented syllable. All the H accents had the option of being realized with downstep or upstep.

The revised Sp_ToBI proposal (Estebas-Vilaplana and Prieto 2008) introduces two main differences with respect to the original one. First, it incorporates the three-way

distinction of rising accents described in Face and Prieto (2007). This study maintains the category L+H* to describe an accent with the peak aligned within the limits of the accented syllable but distinguishes two types of accents with a late peak: 1) L*+H which accounts for a low F0 during the accented syllable with a rising movement starting on the postaccentual syllable and 2) L+>H* which is used to describe a rising F0 trajectory within the accented syllable with a peak on the postaccentual (see section 3.1.1 for more details). This distinction is clearly observed in the prenuclear position of yes-no questions (L*+H) and broad focus statements (L+>H*). The three-way distinction of rising accents was incorporated in the revised Sp_ToBI proposal and is maintained in this study.

The second difference between the traditional Sp_ToBI proposal and the revised one is the introduction of the monotonous L* pitch accent. This accent involves a low plateaux within the limits of the accented syllable and it is observed in the nuclear position of broad focus statements and yes-no questions.

Table 1 reproduces the inventory of pitch accents proposed in Estebas-Vilaplana and Prieto (2008) for the description of Castilian Spanish.

Table 1: Inventory of monotonous and bitonal pitch accents and their schematic representations in Castilian Spanish

Monotonous pitch accents

	L*	This accent is phonetically realized as a low plateaux at the minimum of the speaker's range. In our corpus, it is found in the nuclear position of broad focus statements and yes-no questions (with a rising contour).
	H*	This accent is phonetically realized as a high plateaux with no preceding F0 valley. In our data, it is attested as one of the possible choices for nuclear position in yes-no questions and in wh- questions.

Bitonal pitch accents

	L+H*	This accent is phonetically realized as a rising pitch movement during the accented syllable with the F0 peak located at the end of this syllable. It is commonly found in the nuclear position of broad and narrow focus statements, anti-expectational questions, calls, statements of the obvious, among others.
	L+>H*	This accent is phonetically realized as a rising pitch movement on the accented syllable with the F0 peak aligned with the postaccentual syllable. It is attested in the prenuclear position of broad focus statements.

	L*+H	This accent is phonetically realized as an F0 valley on the accented syllable with a subsequent rise on the postaccentual syllable. This accent is found in the prenuclear position of yes-no questions and requests.
	H+L*	This accent is phonetically realized as an F0 fall within the accented syllable. It is attested in nuclear position in yes-no questions (with a falling contour).

2.2. The boundary tones

The tonal movements at the end of an intonation unit have always shown a certain degree of complexity. Sometimes this complexity arises from the presence of more than one tonal target after the nuclear tone. Other times it is derived from the fact that the final pitch trajectory is neither high nor low but it attains a mid level pitch. Both types of pitch configurations are difficult to describe within the parameters of the AM model, which only considers two possible types of boundary tones, H% and L%. In order to overcome these kinds of problems several proposals have been taken into consideration. In Sosa (1999), for example, the complex final movements were described by means of a nuclear bitonal pitch accent with a trailing tone (i.e. T*+T) followed by a boundary tone (L% or H%). For instance, a final fall-rise F0 movement would be described as H*+L H%. Nibert (2000), on the other hand, would account for this complex pitch trajectory by means of a L- phrase accent (signalling the end of an intermediate phrase) followed by a H% boundary tone (at the end of the intonation phrase): H* L-H%. Both notations, though, present some problems. Sosa's proposal discards the possibility of having a bitonal pitch accent with a leading tone (i.e. T+T*) in nuclear position if the final pitch movement shows more than one target, since a trailing tone is needed to account for the final complex contour. The main problem with Nibert's proposal, on the other hand, is the necessity to incorporate the phrase accent category which has been shown to be unnecessary in Spanish since the final accent is usually located at the end of sentences in Spanish (see Sosa 1999 and Vizcaíno Ortega et al. 2008).

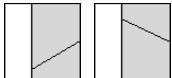
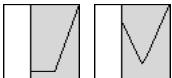
In order to account for the complex pitch trajectories at the end of utterances, Estebas-Vilaplana and Prieto (2008) decided to incorporate bitonal boundary tones, that is, tones with two tonal targets, similar to those found in bitonal pitch accents. This proposal allows bitonal pitch accents with a leading tone in the nuclear position followed by complex pitch movements at the end of the utterance. Thus a fall-rise pitch movement at the end of a contour can now be described by means of a L+H* nuclear accent followed by a bitonal boundary tone LH%.

As far as final mid level pitch is concerned, the first Sp_ToBI proposal (Beckman et al. 2002) decided to include a tonal category M% to account for a half-rise or mid level plateaux after a L+H* or H* pitch accent. Mid tones in sentence final position have been found in several languages, such as English (Beckman and Ayers-Elam 1997), Greek (Arvaniti and Baltazani 2005), German (Grice et al. 2005), Korean (Jun 2005) and

Catalan (Prieto et al. 2008, in press). Since in the original AM model pitch movements could only be described by means of two tones only (L and H), the notation of mid tones varies in the literature. For example, in Greek the mid tone was transcribed as !H% and the sustained mid tone was transcribed as !H!H%. Beckman et al. (2002) decided to use a more transparent transcription for the mid tone (M%). Even though it incorporates another level of tonal description (M), we think that this notation is much clearer than using downstep symbols and thus we stuck to it in the revised Sp_ToBI proposal (Estebas-Vilaplana and Prieto, 2008) and in the present study.

Table 2 includes the revised inventory of monotonal and bitonal boundary tones proposed in Estebas-Vilaplana and Prieto (2008) for the description of Castilian Spanish.

Table 2: Inventory of monotonal and bitonal boundary tones and their schematic representations in Castilian Spanish

Monotonal boundary tones		
	L%	L% is phonetically realized as a low sustained tone or a falling tone at the baseline of the speaker. It is attested at the end of broad and narrow focus statements, imperatives, falling yes-no questions, etc.
	M%	M% is phonetically realized as a rising or a falling movement to a target mid point. It is attested in uncertainty statements. It is also found in stylized calls.
	H%	H% is phonetically realized as a rising pitch movement coming from a low or a high pitch accent. It is found at the end of non-final constituents and inconclusive statements.
Bitonal boundary tones		
	HH%	HH% is phonetically realized as a sharp rise at the end of the phrase usually attaining the highest level of the speaker's range. It is found at the end of rising yes-no questions and echo questions.
	LH%	LH% is phonetically realized as an F0 valley followed by a rise. It is attested in echo question contours.
	HL%	HL% is phonetically realized as an F0 peak followed by a fall. It is typical of categorical statements and soft requests.
	LM%	LM% is phonetically realized as an F0 valley followed by a rise into a mid pitch. It is attested in statements of the obvious.

3. Basic intonational patterns in Castilian Spanish

In this section we will present the basic intonational tunes for a variety of sentences in Castilian Spanish. The data presented in this study have been gathered by means of an intonation survey (based on Prieto 2001 for Catalan) which consisted of approximately 50 situations, each intended to elicit a given type of intonation. It is an inductive method in which the researchers present the subjects with a series of situations. The Spanish translation of the Catalan survey can be found in the *Atlas*: <http://prosodia.upf.edu/atlasentonacion/> (Prieto and Roseano 2010).

Two female speakers from the centre of Spain (Madrid) aged 42 and 45 recorded the utterances. 69 sentences were recorded for each speaker. For each tune, speakers were given a context and were asked to produce an utterance as a response to it. For example, in order to obtain an utterance with the typical intonation pattern of a request, speakers were provided with the following context: "Imagine that your grandchildren are playing very loud and noisy and you can't listen to the news on TV. Ask them to shut up." One of the main advantages when using this type of context-based questionnaire is that you can gather, in a semi-spontaneous way, a lot of different tunes which you can not normally obtain in a reading task or in spontaneous speech.

The survey included the following kinds of sentences: 1) statements, 2) questions (yes-no questions, wh- questions, echo questions), 3) imperatives (commands and requests) and 4) vocatives. For some of the utterances, non-neutral (biased) intonation patterns were also obtained. For example, apart from neutral statements, the data also included statements of the obvious, categorical statements or uncertainty statements. Perceptual and acoustic analyses of the utterances were performed using PRAAT (Boersma and Weenink 1992-2001) and Pitchworks.

3.1. Statements

3.1.1. Broad focus statements

Statements with a broad focus intonation show a L+>H* pitch accent in prenuclear position, indicating that the rising trajectory is realized within the accented syllable and the F0 peak is produced on the postaccentual syllable. A progressively falling contour starts after the last prenuclear syllable till the end of the sentence. The final pitch accent does not show any relevant pitch movement but is part of this progressive fall or "slide pattern" (Sosa 1999). Given the low F0 attained during the last accented syllable, this final movement is described by means of a L* pitch accent followed by a L% boundary tone. This pitch pattern is typical of other Romance languages such as Catalan (Prieto et al. 2008, Prieto in press) and it has also been found in other varieties of Spanish, such as Argentinian Spanish (Gabriel et al., this volume), Mexican Spanish (de-la-Mota et al., this volume) or Cantabrian Spanish (López-Bobo and Cuevas-Alonso, this volume), to mention a few. The intonational movement of a neutral statement with a prenuclear accent and a nuclear accent in Castilian Spanish is illustrated in Figure 1.

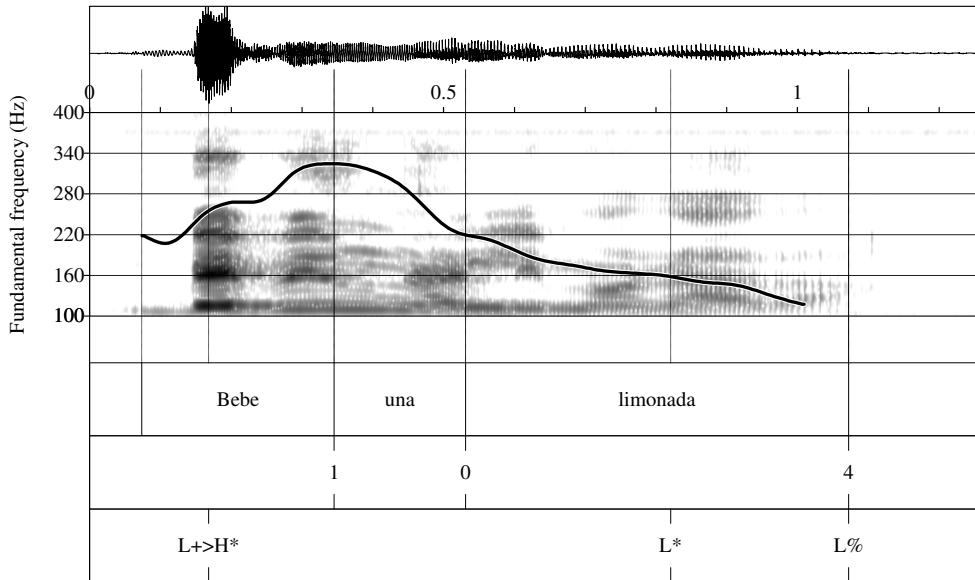


Figure 1: Waveform, spectrogram and F0 trace for the neutral statement Bebe una limonada ('s/he drinks a lemonade') produced with a L+>H* prenuclear accent and a L* nuclear accent followed by a L% boundary tone.

3.1.2. Biased statements

3.1.2.1. Narrow focus statements

The nuclear accent of narrow focus statements differs from that of broad focus in that a clear F0 peak is observed within the limits of the accented syllable. Thus, the pitch accent used to signal narrow focus is L+H* as opposed to L* which signals broad focus. In our corpus, L+H* is also found in other types of tunes such as the nuclear position of imperatives and echo yes-no and wh- questions. An example of a narrow focus statement is presented in Figure 2 for the utterance No, de LIMONES ('No, of LEMONS'). This tune was obtained as a correction of a wrongly interpreted item. The first intonation unit (*no*) is produced with a fall to a low pitch, described as L+H* L-. Even though no L target is observed in the F0 contour, we understand this as a case of undershoot L- which is very common in monosyllabic words. The second intonation phrase includes the focalized element which is produced with an early rising accent with the peak located at the end of the accented syllable followed by a L% boundary tone (L+H* L%). The L+H* L% configuration to express narrow focus is typical of all Spanish varieties (see the other chapters in this volume).

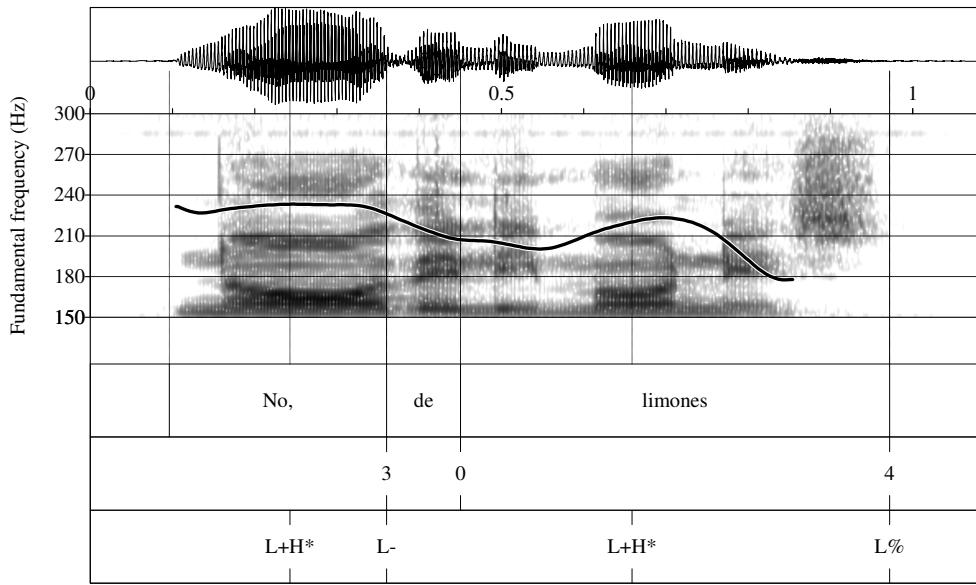


Figure 2: Waveform, spectrogram and F0 trace for the narrow focus statement No, de LIMONES ('No, of LEMONS') produced with L+H* L- in the first tone unit and a L+H* L% nuclear configuration in the second tone unit.

A different contour obtained for the narrow focus statement No, de LIMONES is presented in Figure 3. In this case, the nuclear configuration shows a H+L* nuclear accent followed by a bitonal boundary tone HL%. If we compare the pitch trace of this production with that of Figure 2 we can see clear differences in the nuclear tonal configuration. Whereas in Figure 3 there is a low pitch during the accented syllable followed by a complex F0 movement at the end of the contour, in Figure 2 the nuclear accent exhibits a high pitch followed by a fall. Furthermore, contrary to what we have observed in Figure 2, the utterance in Figure 3 is only produced with one tone unit and thus there are no relevant tonal movements at the end of *no*.

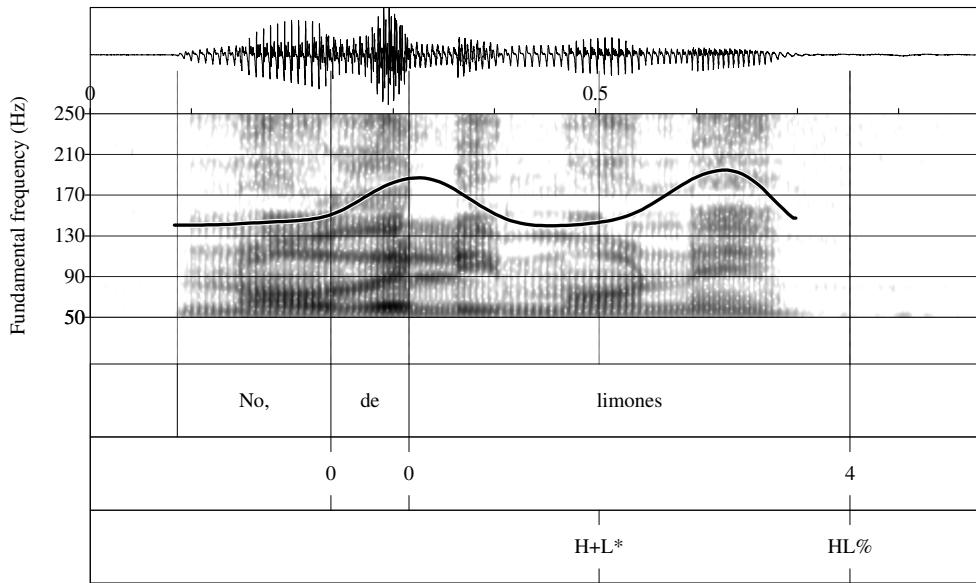


Figure 3: Waveform, spectrogram and F0 trace for the narrow focus statement No, de LIMONES ('No, of LEMONS') produced with a H+L* HL% nuclear configuration.

3.1.2.2. Exclamatives

In utterances with an exclamative nuance, as in *jQué olor a pan tan bueno!* ('What a lovely flavour of bread!') the nuclear accent is also produced with an early rising peak aligned within the limits of the accented syllable. In this particular example the nuclear accent also shows upstep with respect to the previous F0 peak (L+!H*), as it can be observed in Figure 4. The final boundary tone is L%. The prenuclear accents are also produced with the F0 peak anchored within the accented syllable (L+H*) as shown in the stressed syllables of *olor* and *pan*. The second prenuclear accent is downstepped (L+!H*).

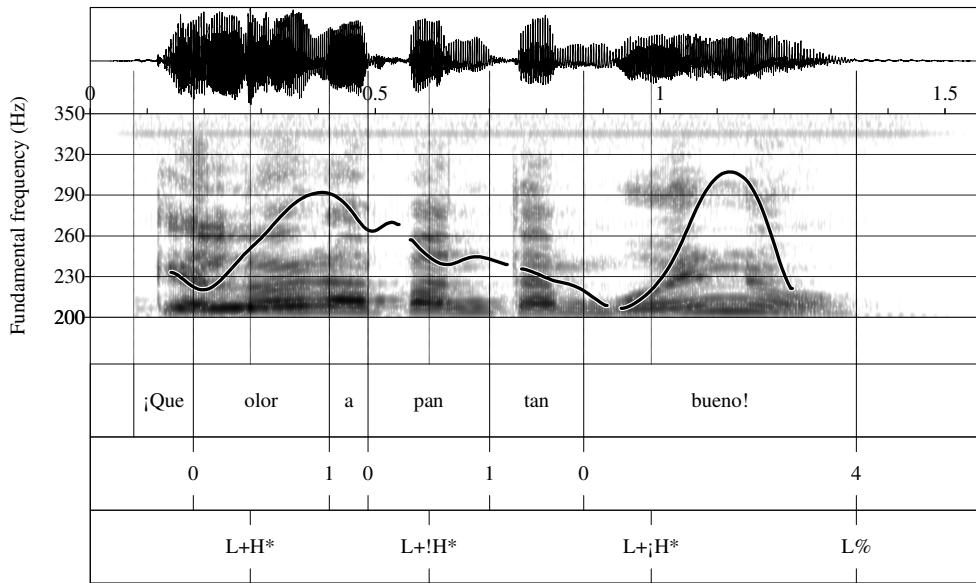


Figure 4: Waveform, spectrogram and F0 trace for the exclamative statement *¡Qué olor a pan tan bueno!* ('What a lovely smell of bread!') produced with two prenuclear *L+H** pitch accents (the second one with downstep) and a *L+iH** *L%* nuclear configuration.

3.1.2.3. Statements of the obvious

Figure 5 includes an example of a sentence which conveys obviousness and certainty on the part of the speaker: *iSí, mujer, de Guillermo!* ('Yes, from Guillermo, of course'). The sentence is uttered with two tone units. The first one is produced with a falling tone (*H+L**) on the nuclear accent (*mujer*) followed by a *L-* boundary tone. The tonal configuration to express obviousness includes a *L+H** nuclear accent followed by a bitonal boundary tone with low and mid targets (*LM%*). Even though the final pitch movement of the second tone unit reaches a rather high F0 in the contour of Figure 5, we still interpret it as *LM%* since this final trajectory contrasts with *LH%* which would be used in echo questions. The same final boundary tone (*LM%*) to express obviousness has been found in Mexican Spanish (de-la-Mota et al., this volume), Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega, this volume) and Puerto Rican Spanish (Armstrong, this volume). In other varieties, such as, Argentinian Spanish (Gabriel et al., this volume), Venezuelan Andean Spanish (Astruc et al., this volume), Ecuadorian Andean Spanish (O'Rourke, this volume) and Chilean Spanish (Ortiz et al., this volume), the nuclear tonal configuration of statements of the obvious involves an early rising accent *L+H** followed by a *L%* boundary tone. This tonal configuration is the same one used in emphatic and contrastive statements.

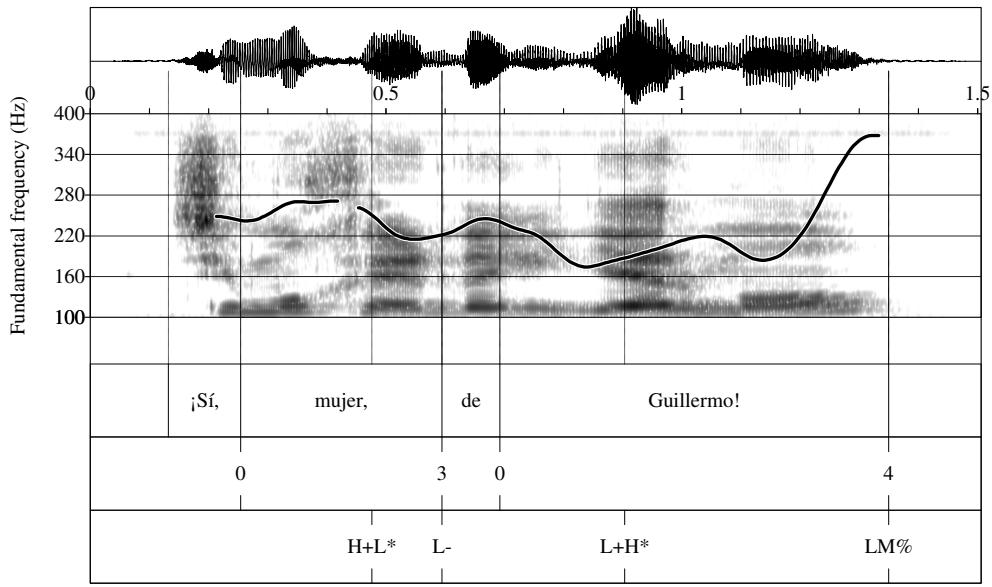


Figure 5: Waveform, spectrogram and F0 trace for the statement of the obvious *¡Sí, mujer, de Guillermo!* ('Yes, from Guillermo, of course!') produced with two tone units. The first one ends with H+L* L- and the second one has a L+H* nuclear accent followed by a LM% bitonal boundary tone.

3.1.2.4. Categorical statements

The intonation of categorical statements, that is, statements whose intention is to clearly indicate that what the speaker says is right and definite, involves a L* nuclear accent followed by a bitonal boundary tone (HL%). This is exemplified in Figure 6 for the utterance *iQue irán a Lima!* ('They'll go to Lima, for sure'). The prenuclear configuration shows a L+>H* pitch accent.

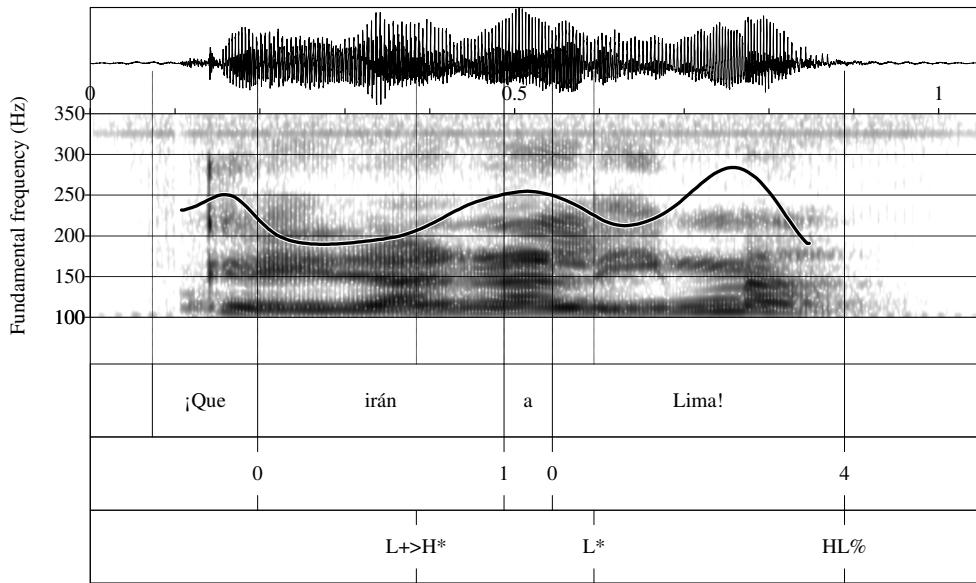


Figure 6: Waveform, spectrogram and F0 trace for the categorical statement *¡Que irán a Lima!* ('They'll go to Lima, for sure!') produced with a $L+>H^*$ prenuclear accent and a L^* $HL\%$ tonal configuration.

The L^* $HL\%$ nuclear configuration to express a categorical statement has also been found in Mexican Spanish (de-la-Mota et al., this volume). In other varieties, such as Venezuelan Andean Spanish (Astruc et al., this volume), Ecuadorian Andean Spanish (O'Rourke, this volume), Chilean Spanish (Ortiz et al., this volume), Argentinian Spanish (Gabriel et al., this volume) and Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega, this volume), these statements are produced with a high pitch accent ($(L)+H^*$) followed by a $L\%$ boundary tone.

3.1.2.5. Uncertainty statements

Uncertainty statements are good examples of a $M\%$ boundary tone. The nuclear tone is produced with a $L+H^*$ pitch accent and then the pitch falls into a mid level. Figure 7 illustrates an example of a statement conferring a meaning of uncertainty and doubt *Puede que no le guste el regalo que le he comprado* ('He might not have liked the present I bought') produced with a $L+H^*$ $M\%$ nuclear configuration at the end of the sentence. The final $M\%$ in uncertainty statements has also been found in other varieties, such as Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega, this volume) and Chilean (Santiago) Spanish (Ortiz et al., this volume). In Argentinian Spanish (Gabriel et al., this volume) a final $M\%$ boundary tone is also found in uncertainty statements. However, the nuclear accent preceding $M\%$ is low (L^*) rather than high. Finally, as illustrated in Figure 7, the accents in prenuclear position involve a $L+>H^*$ tone except for the first accent which shows a peak aligned within the accented syllable (H^*).

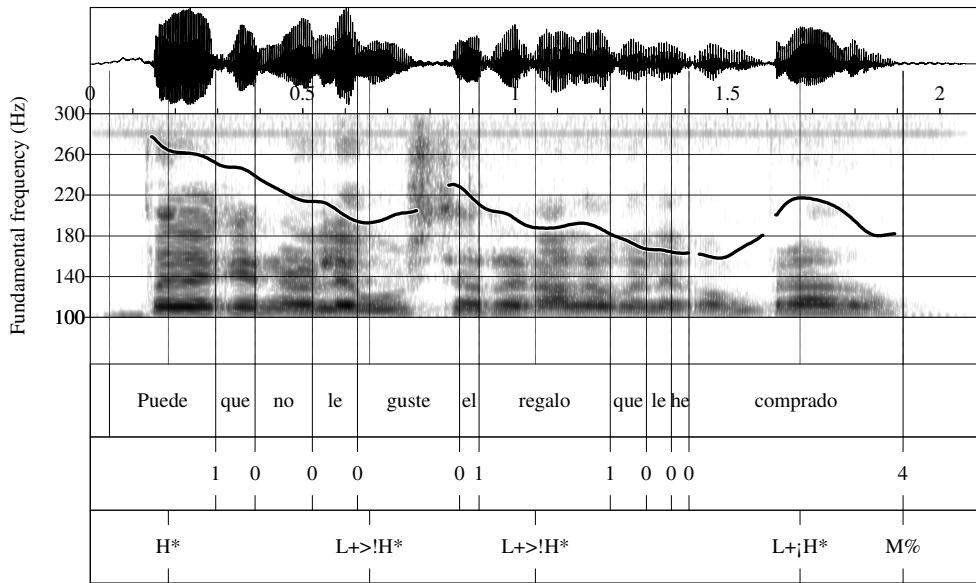


Figure 7: Waveform, spectrogram and F0 trace for the uncertainty statement Puede que no le guste el regalo que le he comprado ('He might not have liked the present I bought') produced with a L+H* nuclear accent followed by a M% boundary tone in the nuclear configuration.

3.2. Questions

3.2.1. Yes-no questions

Neutral information-seeking yes-no questions are produced with a L^{*}+H prenuclear accent which differs from the prenuclear accents examined so far (L+H*) in that the rising trajectory starts at the offset of the accented syllable. This is illustrated in Figure 8 below for the sentence ¿Tiene mermelada? ('Have you got some marmalade?'). The nuclear accent clearly shows a F0 dip which is interpreted as a L^{*} pitch accent. The final rising movement is described as HH% given the sharp rise observed at the end of the utterance. The L^{*} HH% nuclear configuration for information-seeking yes-no questions has also been observed in many other varieties, such as Cantabrian Spanish (López-Bobo and Cuevas-Alonso, this volume). In Mexican Spanish, the L^{*} HH% pattern has been found in invitation yes-no questions as reported in de-la-Mota et al. (this volume).

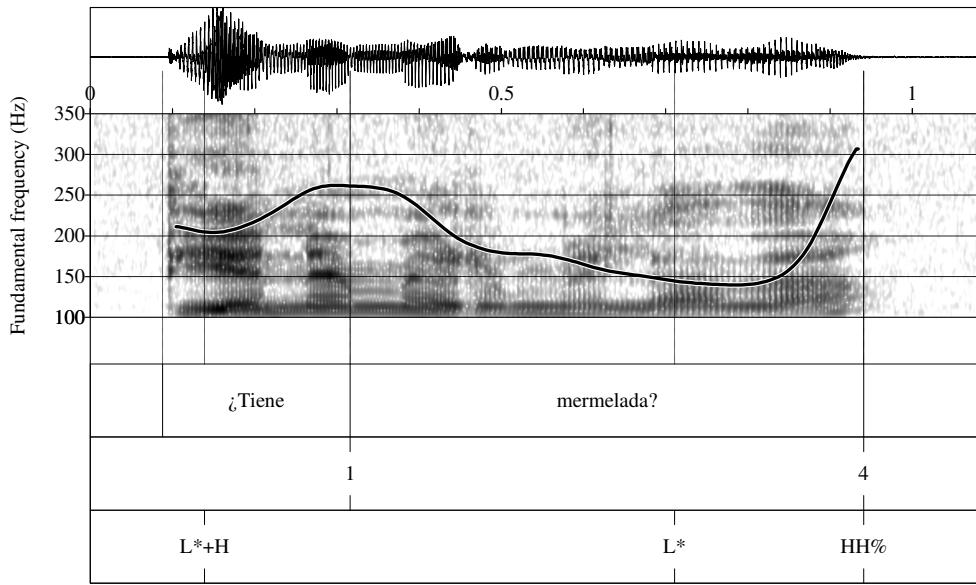


Figure 8: Waveform, spectrogram and F0 trace for the yes-no question *¿Tiene mermelada?* ('Have you got some marmalade?') produced with a L^*+H prenuclear accent and a L^* nuclear accent followed by a $HH\%$ boundary tone.

One of the questions that may arise from this tonal interpretation is whether we need a bitonal accent with two high targets to account for such final rise and more importantly whether a $HH\%$ boundary tone contrasts with a $H\%$ boundary tone with only one tonal high target. The contrastive opposition between $H\%$ and $HH\%$ ($H-$ and $HH-$ at the end of a minor tone unit) has been observed at the end of the first constituent of a declarative sentence which shows a weak rise (marked $H-$) and at the end of the first constituent of a disjunctive question which exhibits a much higher rising trajectory (marked $HH-$). This is illustrated in Figure 9 for the following sentences reproduced from Estebas-Vilaplana and Prieto (2008).

Quieres mandarinas y limones.
 H- L* L%
 'You would like mandarines and lemons.'

¿Quieres mandarinas o limones?
 HH- L* L%
 'Would you like mandarines or lemons?'

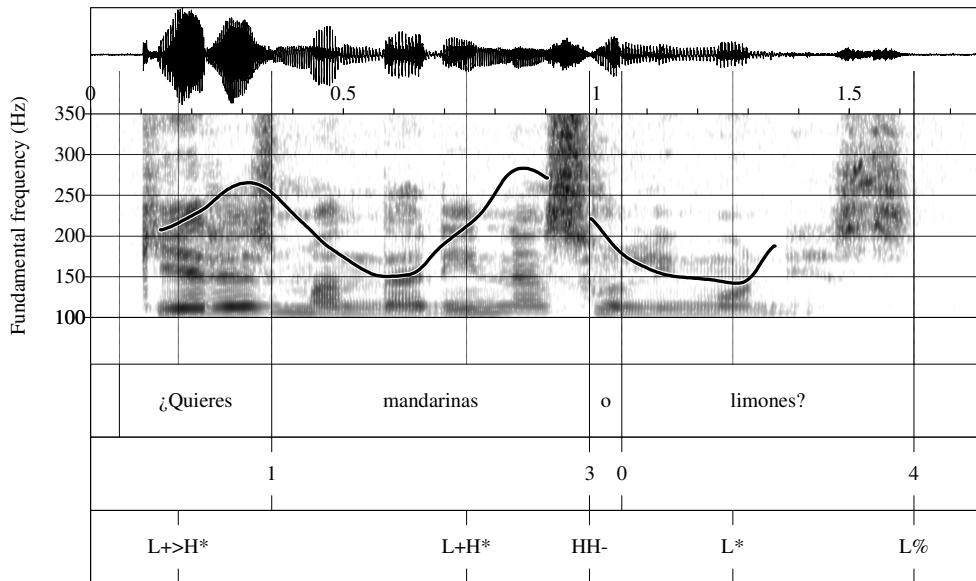
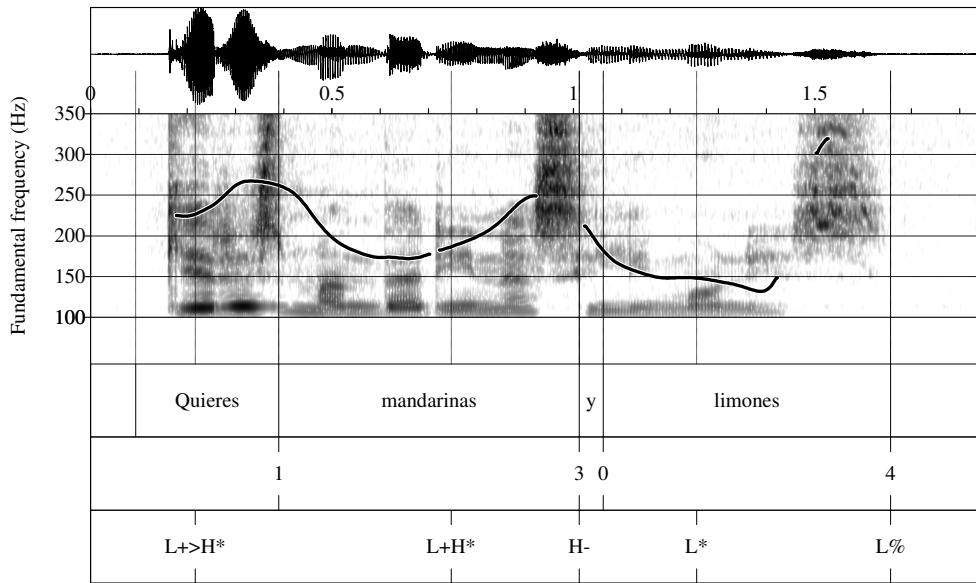


Figure 9: Waveform, spectrogram and F0 trace for two sentences (declarative with two constituents and disjunctive interrogative) showing the contrast between H- (at the end of the first constituent of the declarative sentence) and HH- (at the end of the first prosodic unit of the disjunctive question).

The necessity to have two levels of high boundary tones (H% and HH%) has also been attested in a recent study by Estebas-Vilaplana (2009) in which the tonal contrast between four pitch levels at the end of sentences (L%, M%, H%, HH%) were examined. The data obtained in this study provided evidence for the presence of four contrastive pitch levels at the edge of prosodic domains in Peninsular Spanish.

In our data, information seeking yes-no questions have also been produced with a different tonal pattern which triggers a nuance of politeness. This tonal configuration involves a H* nuclear accent followed by slight fall in pitch into a M% boundary tone. This is illustrated in Figure 10 which shows the same sentence as that in Figure 8 *¿Tiene mermelada?* produced with a L+>H* prenuclear accent and a H* M% nuclear configuration. A fall from a (L)+H* pitch accent to a M% boundary tone in yes-no questions with a polite nuance has also been reported for Argentinian Spanish (Gabriel et al., this volume) and Ecuadorian Andean Spanish (O'Rourke, this volume).

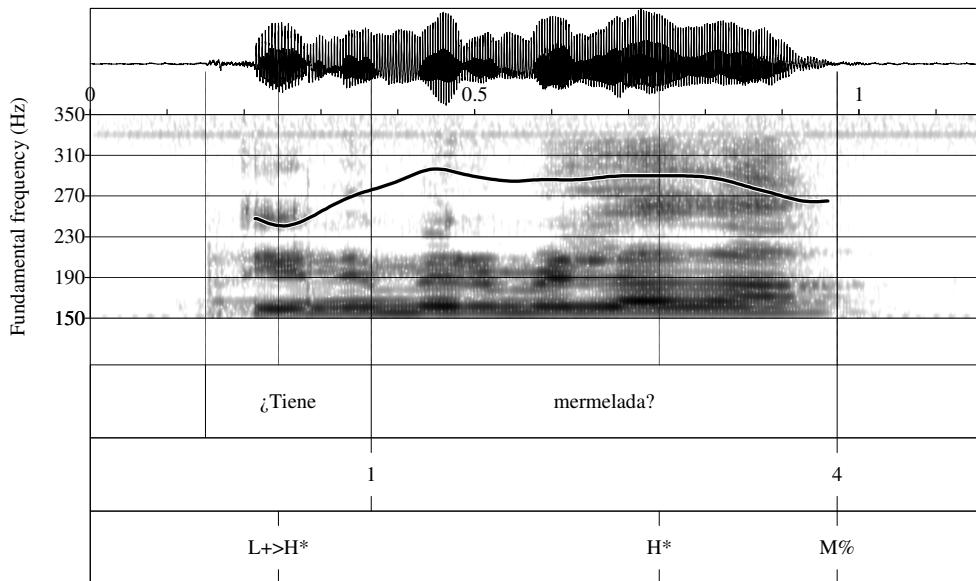


Figure 10: Waveform, spectrogram and F0 trace for the yes-no question (with a nuance of politeness) *¿Tiene mermelada?* ('Have you got some marmalade?') produced with a L+>H* prenuclear accent and a H* nuclear accent followed by a M% boundary tone.

3.2.2. Biased yes-no questions

3.2.2.1. Echo yes-no questions

Echo questions, also known as reiterative questions, are used to signal a failure to understand what one of the interlocutors in a conversation has just said. In our corpus, echo questions are produced with a L+>H* nuclear accent followed by a L% boundary tone. This nuclear tone involves an upstepped peak with respect to the preceding high accent. This tonal trajectory has already been reported in Escandell-Vidal (1999, 2002) and is illustrated in Figure 11 for the sentence *¿Que son las nueve?* ('(What are you saying) that it's nine o'clock?'). In this utterance a L+>H* prenuclear accent can also be observed on the word son. The nuclear configuration (L)+H* in echo questions has also been found in Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega, this volume) and Argentinian Spanish (Gabriel et al., this volume).

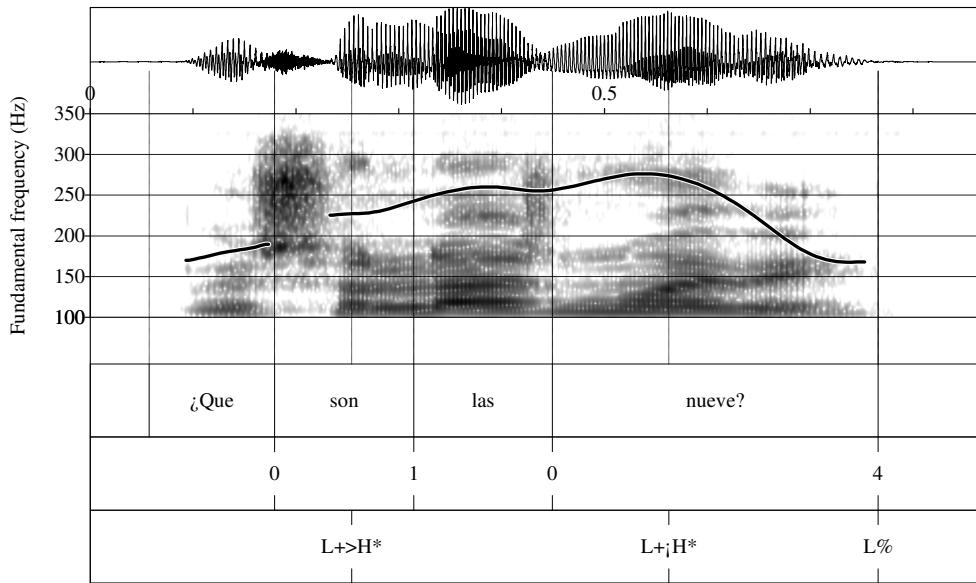


Figure 11: Waveform, spectrogram and F0 trace for the echo question *¿Que son las nueve?* ('(What are you saying) that it's nine o'clock?') produced with a $L+iH^* L\%$ nuclear configuration.

Another type of echo yes-no question with an antiexpectational connotation has also been found in our data. This type of contour involves a $L+H^*$ nuclear accent followed by a $HH\%$ boundary tone. The phonetic realization of this bitonal high accent almost reaches the maximum F0 pitch range of the speaker. An example is provided in Figure 12 for the sentence *¿Que no vendrás?* ('(What are you saying) that you aren't coming?'). In this sentence there is no prenuclear accentuation. Similar rising nuclear trajectories for antiexpectational yes-no questions have been found in Venezuelan Andean Spanish (Astruc et al., this volume), Argentinian Spanish (Gabriel et al., this volume) and Chilean Spanish (Ortiz et al., this volume).

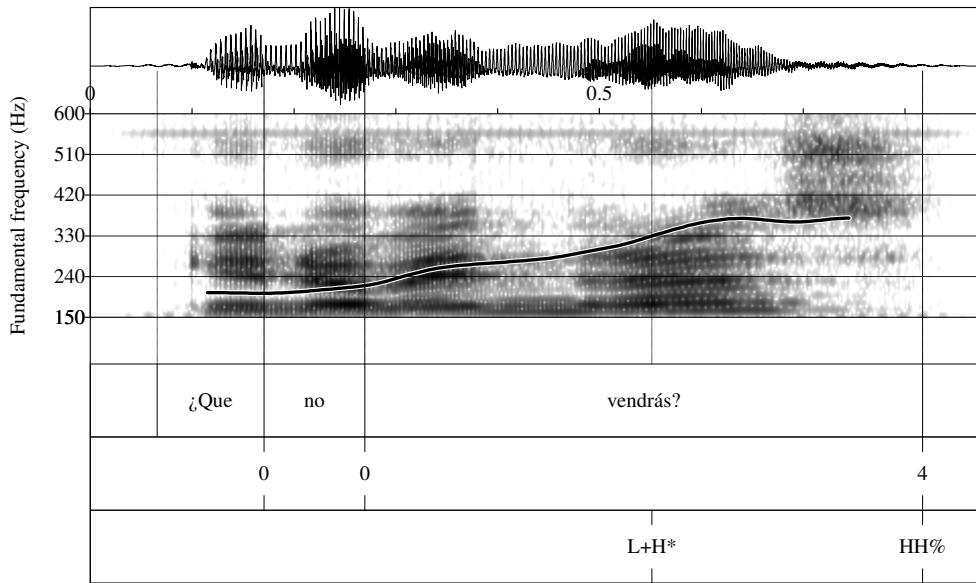


Figure 12: Waveform, spectrogram and F0 trace for the echo question *¿Que no vendrás?* ('(What are you saying) that you aren't coming?') produced with a *L+H* HH%* nuclear configuration and no prenuclear accentuation.

3.2.2.2. Imperative yes-no questions

Questions can also convey the illocutionary force of an order, that is, the speaker intends to force his/her interlocutor to do something. In our corpus, an imperative question was produced with a *L+>H** prenuclear accent followed by a *H+L* L%* nuclear configuration. An example of an imperative question *¿Queréis callar?* (Would you please be quiet?) is presented in Figure 13.

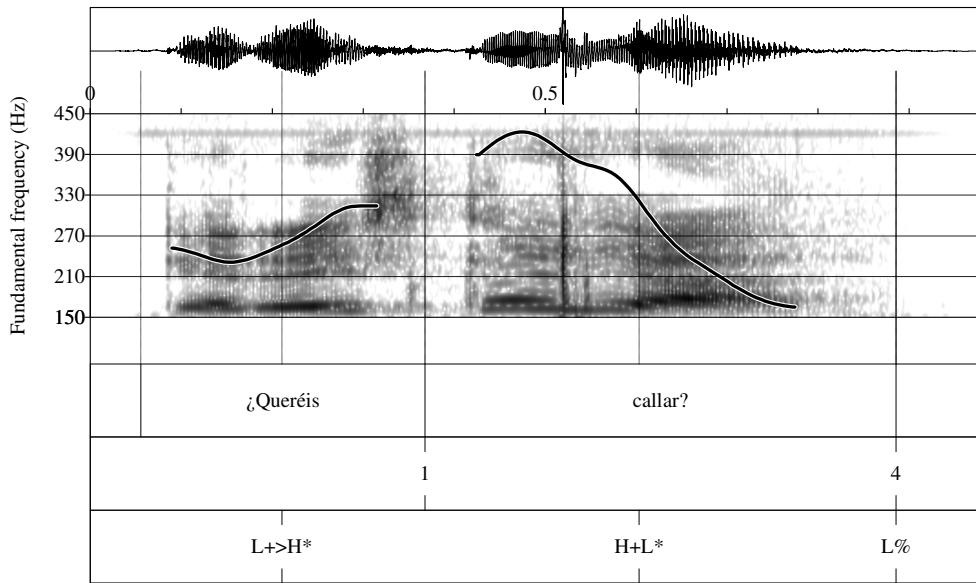


Figure 13: Waveform, spectrogram and F0 trace for the imperative question *¿Queréis collar?* (Would you please be quiet?) produced with a $L+>H^*$ nuclear accent and $H+L^* L\%$ nuclear configuration.

3.2.2.3. Confirmation yes-no questions

Finally, yes-no questions asking for confirmation rather than information are usually produced with a final fall which involves a $H+L^*$ nuclear accent followed by a $L\%$ boundary tone. This is exemplified in Figure 14 for the utterance *¿Tienes frío?* ('Are you cold?') which is pronounced with a nuance of surprise and disbelief. The prenuclear accent is the same as that of neutral information-seeking yes-no questions (L^*+H). In other varieties of Spanish, the nuclear configuration for confirmation yes-no questions shows very different tonal patterns. For example, the final pitch movement has been described as $L^* H\%$ in Ecuadorian Andean Spanish (O'Rourke, this volume), $L+H^* LH\%$ in Chilean Spanish (Ortiz et al., this volume) and $L+|H^*+L L\%$ in Argentinian Spanish (Gabriel et al., this volume).

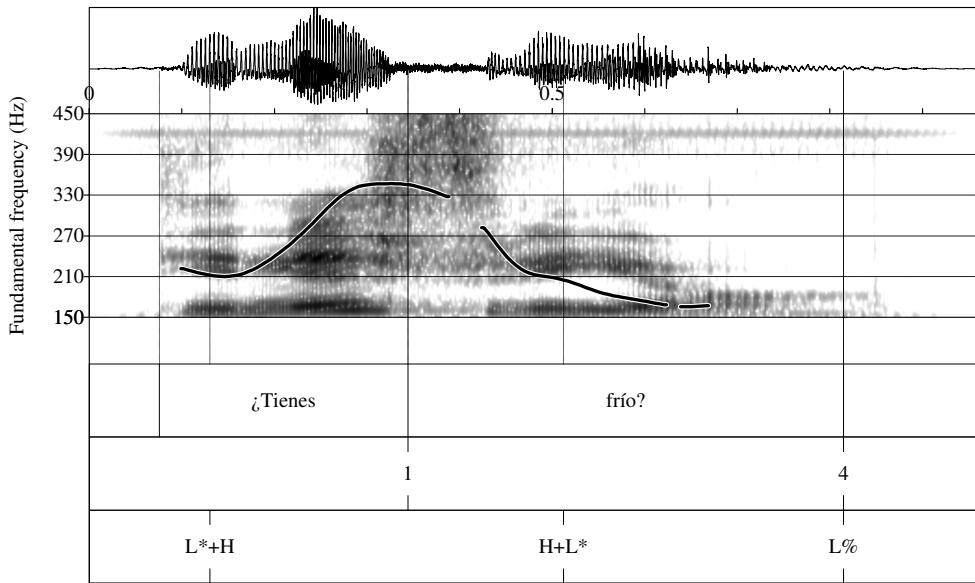


Figure 14: Waveform, spectrogram and F0 trace for the yes-no question (with a nuance of surprise) ¿Tienes frío? ('Are you cold?') produced with a L*+H prenuclear accent and a H+L% nuclear accent followed by a L% boundary tone.

3.2.3. Wh- questions

Wh- questions are produced with two possible patterns in the nuclear configuration: 1) a falling contour (L* L%) or 2) a rising contour (L* HH%). The two intonation trajectories are illustrated in Figure 15 for the sentences *¿Qué hora es?* ('What's the time?'). Both sentences present a high tone (H*) pitch accent in the prenuclear position.

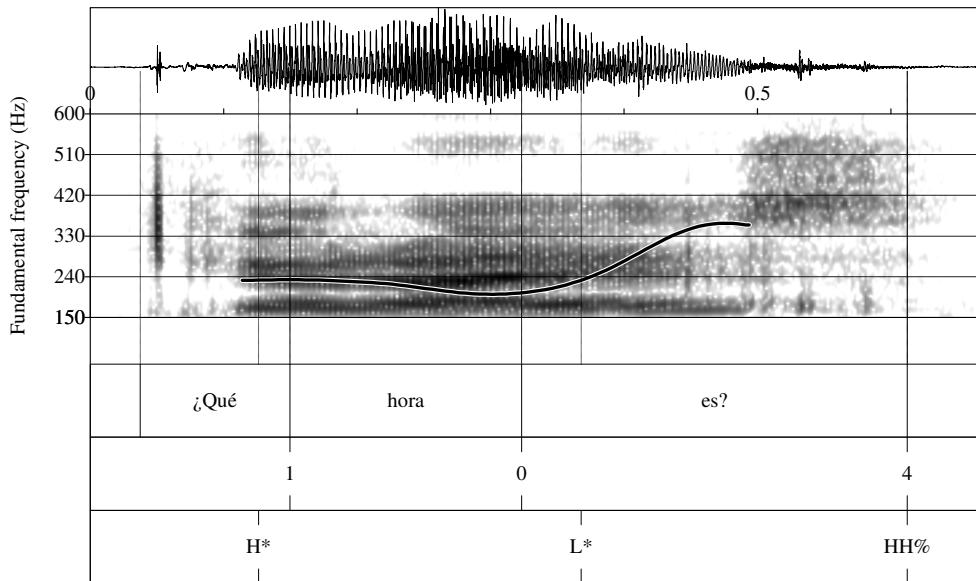
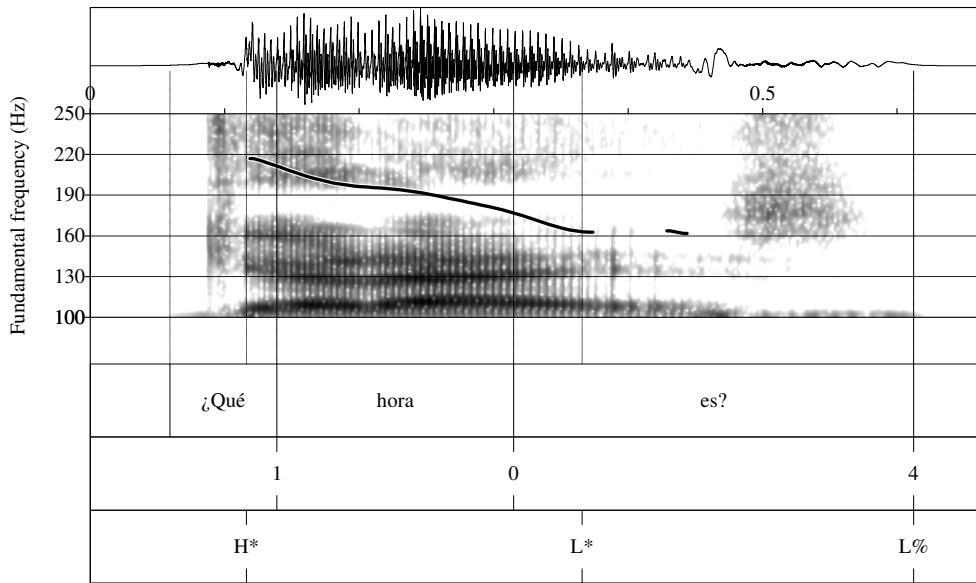


Figure 15: Waveform, spectrogram and F0 trace for two productions of the wh- question *¿Qué hora es?* ('What's the time?') produced with a falling contour ($L^* L\%$) and a rising contour ($L^* HH\%$).

The $L^* L\%$ nuclear configuration (sometimes with a $H+L^*$ pitch accent) for neutral wh- questions has also been attested in Argentinian Spanish (Gabriel et al., this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso, this volume), Venezuelan Andean Spanish (Astruc et al., this volume) and Puerto Rican Spanish (Armstrong, this volume). The $L^* HH\%$ (sometimes $L^* H\%$) rising trajectory in wh-questions has been reported for Chilean Spanish (Ortiz et al., this volume), Ecuadorian

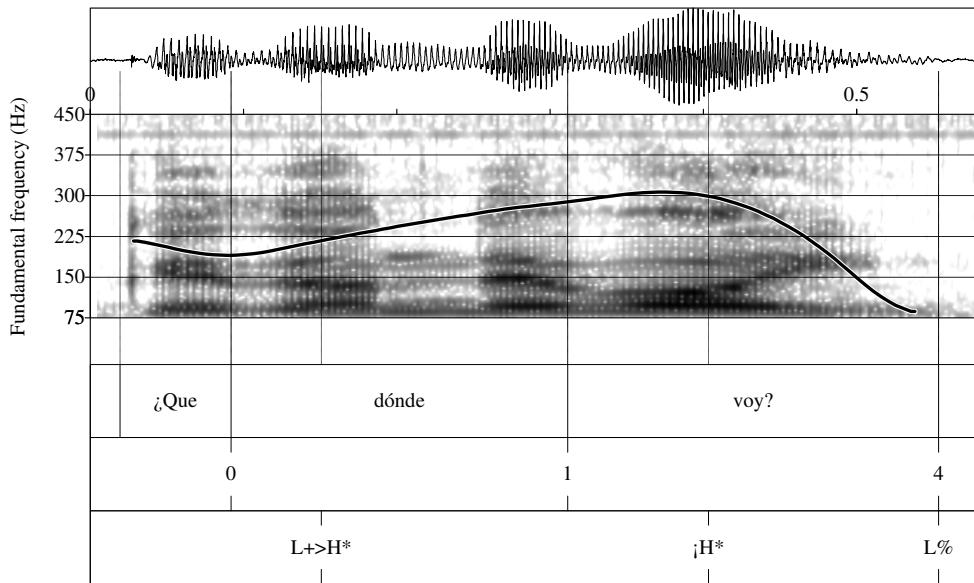
Andean Spanish (O'Rourke, this volume) and Puerto Rican Spanish (Armstrong, this volume)

3.2.4. Biased wh- questions

3.2.4.1. Echo wh- questions

Similar to echo yes-no questions, echo wh- questions are produced with two different patterns. The first one involves a fall in the nuclear configuration, as illustrated in the upper panel of Figure 16 which includes the sentence *¿que dónde voy?* ('(What have you asked me) where I go?'). In this case, the speaker produces an upstepped nuclear accent followed by a low boundary tone ($iH^* L\%$). In this case the preceding nuclear accent involves a rise with a displaced F0 peak ($L+>H^*$). As mentioned in section 3.2.2.1, Escandell-Vidal (1999, 2002) proposes an upstepped high accent ($L+iH^*$) as the typical nuclear accent in echo questions. In our example, the lack of a low leading tone is most probably due to the fact that a high prenuclear accent ($L+>H^*$) is located very near the nuclear one and there is no time to produce a low target before iH^* as in $L+iH^*$. However, we interpret iH^* as a truncated realization of $L+iH^*$.

The second pattern is similar to that of echo yes-no questions with an antiexpectational nuance and it involves a sharp final rise. This is illustrated in the lower panel of Figure 16 for the same sentence. In this contour, a nuclear H^* pitch accent is produced followed by a $HH\%$ boundary tone. A H^* prenuclear accent is produced in the first syllable of the word *dónde*.



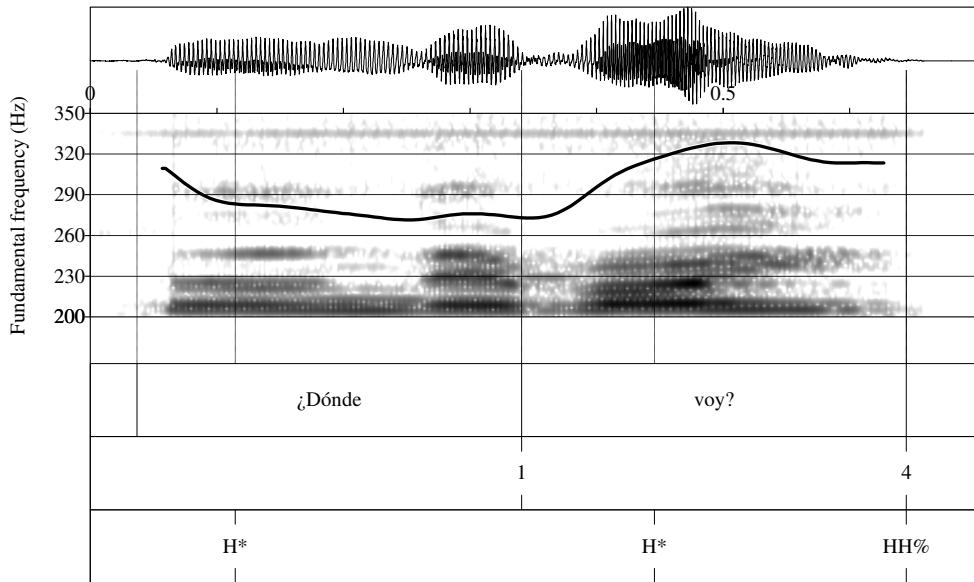


Figure 16: Waveform, spectrogram and F0 trace for two productions of the echo wh- question *¿Qué dónde voy?* ('(What have you asked me) where I go?'). In the upper pannel the nuclear accent shows an upstepped peak iH* followed by a L% boundary tone and preceded by a L+>H* prenuclear accent. The F0 trace in the lower pannel involves a rising nuclear configuration (H* HH%) preceded by high prenuclear accents (H*).

3.2.4.2. Imperative wh- questions

Sometimes wh- questions can be produced with an imperative nuance indicating that the speaker is not only looking for an answer but also for an action. An imperative wh- question *¿Cuándo lo harás?* ('When will you do it?') is illustrated in Figure 17. Prenuclear accents show a rising trajectory during the accented syllable with a displaced peak (L+>H*). The nuclear configuration is H+L* L%. In this case the nuclear accent shows a progressively falling F0 with no peak.

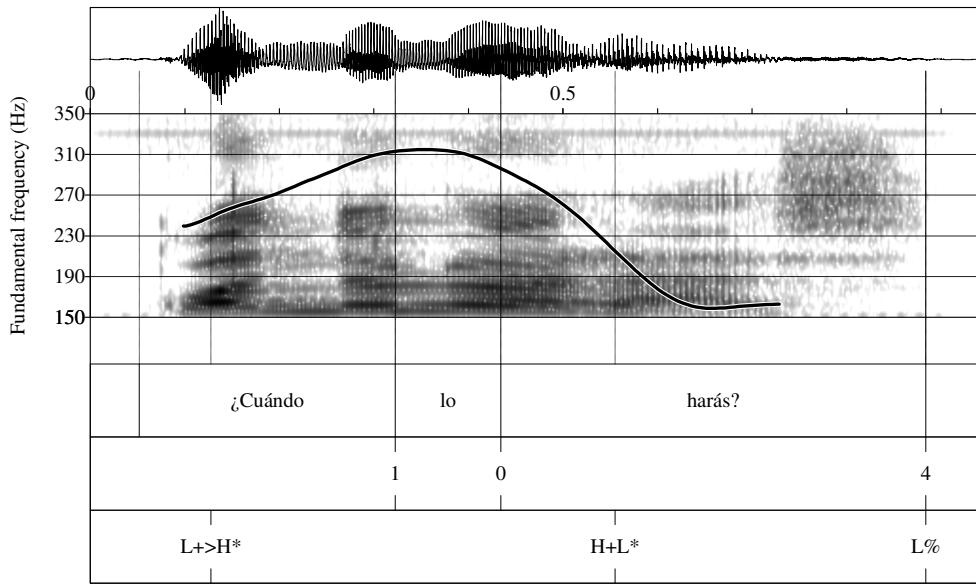


Figure 17: Waveform, spectrogram and F0 trace for the wh- question *¿Cuándo lo harás?* ('When will you do it?') produced with an imperative nuance. The nuclear configuration is H+L* L% and it is preceded by a L+>H* prenuclear accent.

Sometimes imperative wh- questions can also have a nuance of invitation, that is, the speaker offers his/her interlocutor the possibility of doing something. In this case the typical nuclear configuration includes a rising nuclear accent L+H* followed by a HL% boundary tone. This final tone involves a high pitch in the posttonic syllable/s followed by a fall. An example is provided in Figure 18 for the sentence *¿Por qué no venís?* ('Why don't you come?'). No prenuclear accents are observed in this contour.

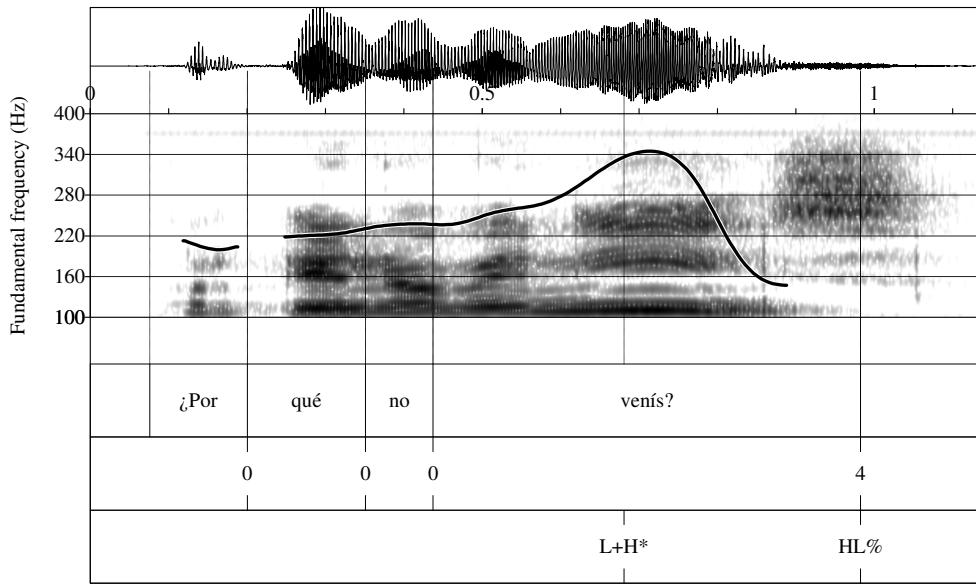


Figure 18: Waveform, spectrogram and F0 trace for an imperative wh- question produced with a nuance of invitation ¿Por qué no venís? ('Why don't you come?'). The nuclear configuration is L+H* HL%.

3.2.4.3. Rhetorical wh- questions

Rhetorical wh- questions involve an interrogation with no expected answer. An example of a rhetorical question is illustrated in Figure 19 for the sentence ¿Qué harías sin mí? (What will you do without me?). The most interesting aspect in this tune is that the nuclear accent does not fall on the last word but on the verb *harías* which exhibits a H* pitch accent. From this high accent the intonation falls in the posttonic syllable into a mid pitch (M%).

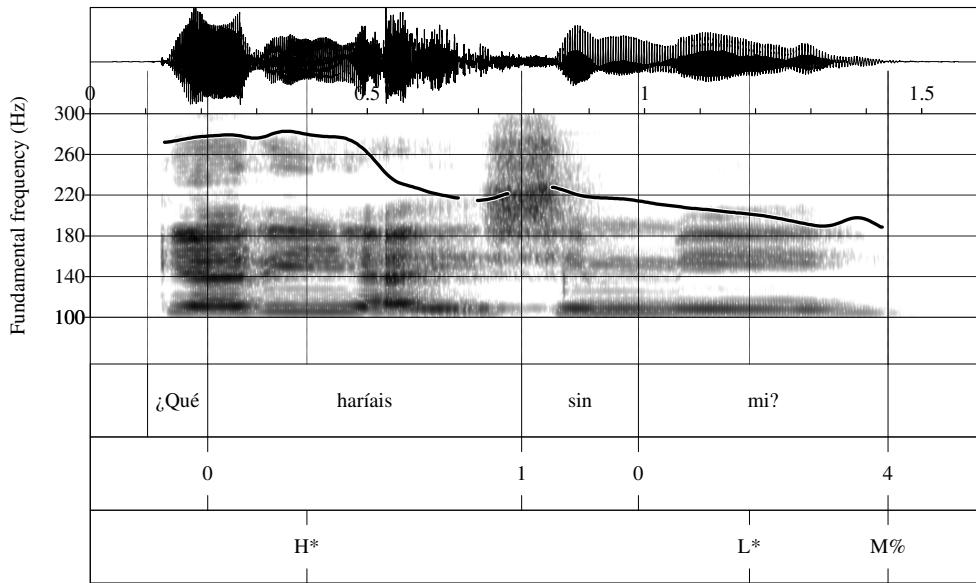


Figure 19: Waveform, spectrogram and F0 trace for the rhetorical wh- question *¿Qué harías sin mí?* ('What would you do without me?') produced with a H* pitch accent followed by a M% boundary tone.

3.3. Imperatives: commands and requests

3.3.1. Commands

Imperative utterances are direct speech acts in which the speaker wants the hearer to perform the action in the proposition. The illocutionary strength with which the speech act is produced can go from a gentle request to a strong command. The most common tonal configuration for commands produced with a stronger illocutionary force is L+H* M%. This is illustrated in Figure 20 for the sentence *Ven aquí, por favor* ('Come here, please') produced with two intonation phrases with the same tonal configuration L+H* M%. This tonal movement has also been found in Chilean Spanish (Ortiz et al., this volume) and in Dominican Spanish (Willis, this volume). Another characteristic of strong commands is that they tend to be produced with an expanded pitch range which is used to express the urgency of the speech act.

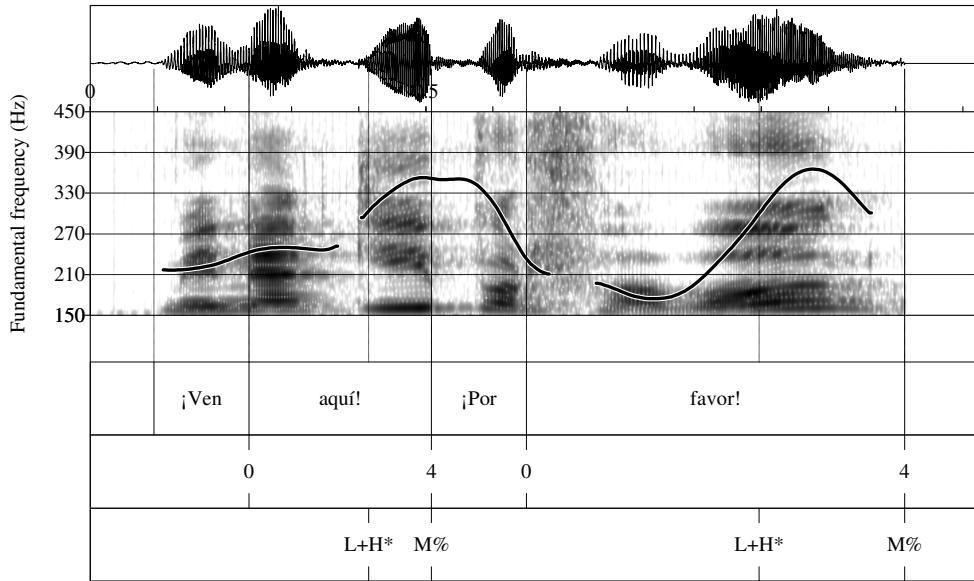


Figure 20: Waveform, spectrogram and F0 trace for the command *¡Ven aquí! ¡Por favor!* ('Come here, please!') produced with two intonation phrases with the same tonal configuration *L+H* M%*.

3.3.2. Requests

A common nuclear configuration for gentle requests is a L* pitch accent followed by HL% boundary tone. This is illustrated for the first (*va*) and the last (*hombre*) intonation phrases of the utterance *Va, vente al cine, hombre* ('Please, come to the cinema, darling') presented in Figure 21. Even though the pitch range is broader in the last phrase (*hombre*) than in the first one (*va*) both units have the same tonal characteristics: L* HL%. The intonation unit (*vente al cine*) is produced with a L+H* L% nuclear configuration. The L* HL% pattern has also been attested in Mexican Spanish (de-la-Mota et al., this volume) for request vocatives and in Puerto Rican Spanish (Armstrong, this volume) for exhortative commands.

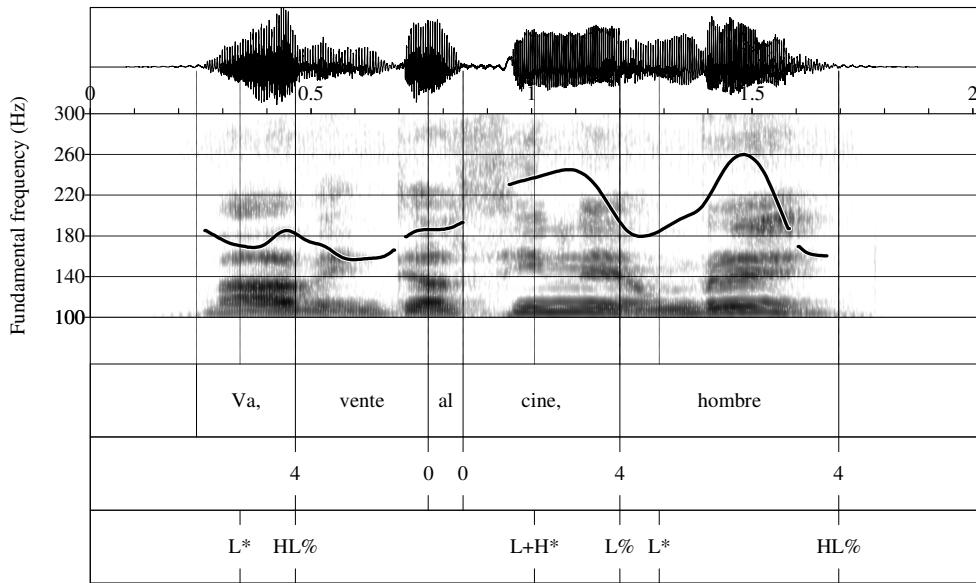


Figure 21: Waveform, spectrogram and F0 trace for the gentle request *Va, vente al cine, hombre* ('Please, come to the cinema, darling') produced with three intonation phrases ($L^* HL\%$, $L+H^* L\%$, $L^* HL\%$).

3.4. Vocatives

As in many other languages, the typical vocative chant in Castilian Spanish is characterised by a sustained mid pitch. This is exemplified in Figure 22 for the utterance *iMarina!* which is produced with a $L+H^*$ nuclear accent followed by a fall in the F0 into a sustained mid pitch until the end of the sentence (M%). This pattern has also been found in most varieties of Spanish, such as Venezuelan Andean Spanish (Astruc et al., this volume), Argentinian Spanish (Gabriel et al., this volume), Mexican Spanish (de-la-Mota et al., this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso, this volume), Chilean Spanish (Ortiz et al., this volume), Dominican Spanish (Willis, this volume) and Puerto Rican Spanish (Armstrong, this volume).

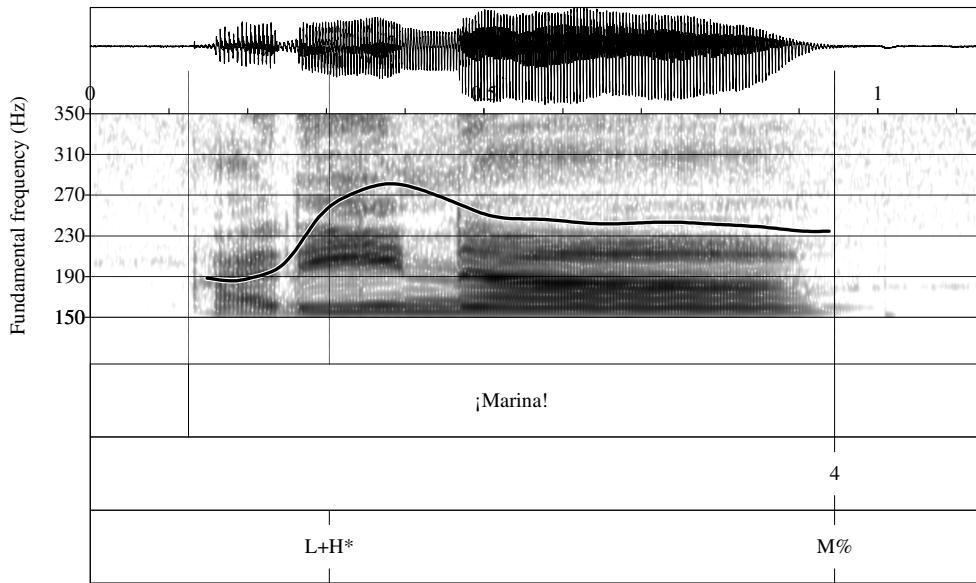


Figure 22: Waveform, spectrogram and F0 trace for the vocative ¡Marina! produced with a L+H* pitch accent followed by a M% boundary tone.

Finally, Figure 23 illustrates a variant of a calling contour used to express an insistent call. This tune involves a L+H* nuclear accent followed by a HL% boundary tone. A rising pitch trajectory is observed over the accented syllable and then the pitch remains high during the posttonic syllable which also shows a final fall. This pattern is also observed in Cantabrian Spanish (López-Bobo and Cuevas-Alonso, this volume), Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega, this volume), Mexican Spanish (de-la-Mota et al., this volume) and Puerto Rican Spanish (Armstrong, this volume).

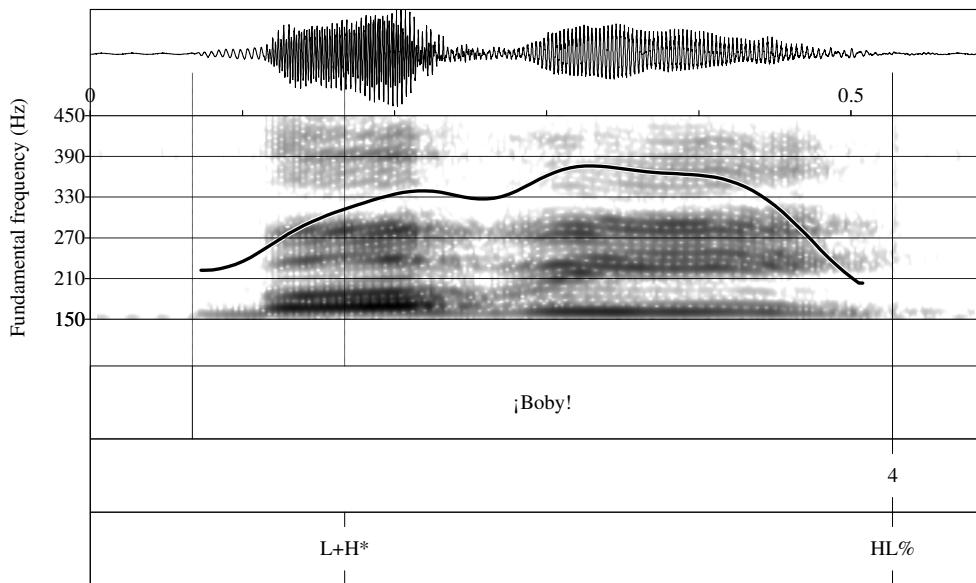


Figure 23: Waveform, spectrogram and F0 trace for the vocative ¡Bobo! produced with a L+H* pitch accent followed by a HL% boundary tone.

4. Conclusions

In this study we have analyzed a set of commonly occurring tunes for a variety of sentences in Castilian Spanish within the Sp_ToBI framework. In particular, we have examined the intonation patterns of statements, yes-no questions, wh- questions, imperatives and vocatives. We have also included the analysis of a variety of biased and marked tunes.

The tonal configurations obtained in this study have shown that some patterns are recurrent across dialects, such as the nuclear trajectories of broad (L* L%) and narrow focus (L+H* L%) statements. Other patterns, however, show much more dialectal variability. As far as statements are concerned, the major differences are found in statements of the obvious and in uncertainty statements. The former present two main patterns: L+H* LM% and L+H* L%. The first pattern is typical of Castilian Spanish, Mexican Spanish (de-la-Mota et al., this volume), Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega, this volume) and Puerto Rican Spanish (Armstrong, this volume). The L+H* L%, on the other hand, is found in Argentinian Spanish (Gabriel et al., this volume), Venezuelan Andean Spanish (Astruc et al., this volume), Ecuadorian Andean Spanish (O'Rourke, this volume) and Chilean Spanish (Ortiz et al., this volume).

The most common tonal pattern for uncertainty statements in Castilian Spanish is L+H* M%. This configuration is also reported for Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega, this volume) and Chilean Spanish (Ortiz et al., this volume). Other varieties, such as Argentinian Spanish (Gabriel et al., this volume), show a final rising pattern (L* M%).

With respect to information-seeking yes-no questions, two nuclear configurations have been obtained in the Castilian Spanish data, namely, L* HH%, also reported for Cantabrian Spanish (López-Bobo and Cuevas-Alonso, this volume), and H* M% (with a nuance of politeness) found in Argentinian Spanish (Gabriel et al., this volume) and Ecuadorian Andean Spanish (O'Rourke, this volume). Confirmation yes-no questions are produced with a falling nuclear pattern in Castilian Spanish (H+L* L%). In other dialects, such type of question presents great intonational variability.

In Castilian Spanish, wh- questions also show two tonal trajectories: 1) a rising pattern (L* HH%), as in yes-no questions, and 2) a fall (L* L% or H+L* L%) which has also been attested in Argentinian Spanish (Gabriel et al., this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso, this volume), Venezuelan Andean Spanish (Astruc et al., this volume) and Puerto Rican Spanish (Armstrong, this volume).

Echo questions (both echo wh- questions and echo yes-no questions) show two possible patterns in Castilian Spanish: L+H* L% and L+H* HH% (this last one with an antiexpectational nuance). The L+H* L% configuration is also found in Argentinian Spanish (Gabriel et al., this volume) and Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega, this volume). L+H* HH% is typical of Venezuelan Andean Spanish (Astruc et al.,

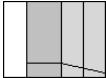
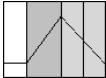
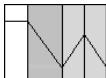
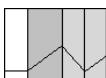
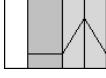
this volume), Argentinian Spanish (Gabriel et al., this volume) and Chilean Spanish (Ortiz et al., this volume).

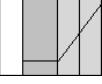
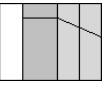
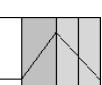
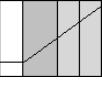
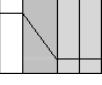
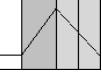
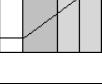
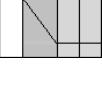
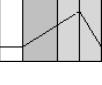
As far as the intonation of commands is concerned, the nuclear configuration obtained in Castilian Spanish is L+H* M% as in Chilean Spanish (Ortiz et al., this volume) and Dominican Spanish (Willis, this volume). For requests, the L* HL% pattern is attested in Castilian Spanish as in Mexican Spanish (de-la-Mota et al., this volume) and in Puerto Rican Spanish (Armstrong, this volume).

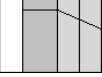
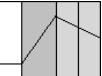
Finally, vocatives in Castilian Spanish are produced with two patterns, L+H* M% and L+H* HL%, which are also found in many other dialects.

To sum up, the nuclear pitch configurations (combinations of the final pitch accent and the following boundary tones) for Castilian Spanish are presented in the following chart for the different sentence types.

Table 3: Inventory of nuclear pitch configurations and their schematic representations in Castilian Spanish

<i>Statements</i>		
Broad focus statements	L* L%	
<i>Biased statements</i>		
Narrow focus and emphatic statements	L+H* L%	
	H+L* HL%	
Statements of the obvious	L+H* LM%	
Categorical statements	L* HL%	
Uncertainty statements	L+H* M%	

<i>Questions</i>	
<i>Yes-no questions</i>	
Neutral yes-no questions	L* HH%
	
Neutral yes-no questions (polite nuance)	H* M%
	
<i>Biased yes-no questions</i>	
Echo yes-no questions	L+H* L%
	
Antiexpectational echo yes-no questions	L+H* HH%
	
Imperative and confirmation yes-no questions	H+L* L%
	
<i>Wh- questions</i>	
Neutral wh- questions	H+L* L%
	
	L* HH%
	
<i>Biased wh- questions</i>	
Echo wh- questions	L+H* L%
	
Antiexpectational wh-questions	L+H* HH%
	
Exhortative and imperative wh- questions	H+L* L%
	
Invitation wh- questions	L+H* HL%
	

Rhetorical wh- questions	H* M%	
<i>Imperatives: commands and requests</i>		
Commands	L+H* M%	
Requests	L* HL%	
<i>Vocatives</i>		
Vocatives and calling contours	L+H* M%	
	L+H* HL%	

References

- Alcoba, Santiago, and Julio Murillo. 1999. Intonation in Spanish. In Hirst and Di Cristo (eds.), pp. 152-166.
- Arvaniti, Amalia, and Mary Baltazani. 2005. Greek ToBI. In Jun (ed.), pp. 84-117.
- Beckman, Mary, and Gayle Ayers-Elam. 1997. *Guidelines for ToBI labelling*. Available at http://www.ling.ohio-state.edu/research/phonetics/E_ToBI/, accessed July 5, 2009.
- Beckman, Mary, Manuel Díaz Campos, Julia T. McGory, and Terrell A. Morgan. 2002. Intonation across Spanish, in the Tones and Break Indices framework. *Probus* 14: 9-36.
- Boersma, Paul, and David Weenink. 1992-2001. *Praat: a system for doing phonetics by computer*. Available at <http://www.praat.org/>, accessed July 5, 2009.
- Bosque, Ignacio, and Violeta Demonte (eds.). 1999. *Gramática descriptiva de la lengua española*. Madrid: Real Academia Española - Espasa.
- Bover, August, Maria-Rosa Lloret, and Mercè Vidal-Tibbits (eds.). 2001. *Actes del Novè Col·loqui d'Estudis Catalans a Nord-Amèrica*. Barcelona: Publicacions de l'Abadia de Montserrat.
- Canellada, María Josefa, and John Kuhlmann Madsen. 1987. *Pronunciación del español*. Madrid: Castalia.
- de-la-Mota, Carme. (1995) *La representación gramatical de la información nueva en el discurso*. Universitat Autònoma de Barcelona. PhD Dissertation, available at <http://www.tesisenxarxa.net/TDX-0331108-112911/>, accesses July 5, 2009.
- Escandell-Vidal, Victoria. 1996. Intonation and procedural encoding in Spanish Interrogatives. In Gutiérrez-Rexach and Silva-Villar (eds.), pp. 35-54.

- . 1999. Los enunciados interrogativos. Aspectos semánticos y pragmáticos. In Bosque and Demonte (eds.), pp. 3929-2991.
- . 2002. Echo-syntax and Metarepresentation. *Lingua* 112: 871-900
- Estebas-Vilaplana, Eva. 2006. Word edge tones in Spanish prenuclear accents. *Estudios de Fonética Experimental* 15: 11-42.
- . 2009. Cuatro niveles de altura tonal en la frontera de frase en español peninsular. *Onomázein* 2: 11-32.
- Estebas-Vilaplana, Eva, and Pilar Prieto. 2008. La notación prosódica del español: una revisión del Sp_ToBI. *Estudios de Fonética Experimental* 17: 265-283.
- Face, Timothy L. 2001. *Intonational marking of contrastive focus in Madrid Spanish*. PhD dissertation. Ohio State University. Published by Lincom Europa in 2002.
- . 2002a. Local intonational marking of Spanish contrastive focus, *Probus* 14: 71-92.
- . 2002b. Spanish evidence for pitch accent structure, *Linguistics* 40: 319-345.
- . 2002c. *Intonational marking of contrastive focus in Madrid Spanish*. Munich: Lincom Europa.
- Face, Timothy L., and Pilar Prieto. 2007. Rising accents in Castilian Spanish: a revision of Sp-ToBI. *Journal of Portuguese Linguistics* 6.1: 117-146. (special issue on Prosody of Iberian Languages. Eds. G. Elordieta and M. Vigário).
- Grice, Martine, Mariapaola D'Imperio, Michela Savino, and Cinzia Avesani. 2005. Towards a strategy for labeling varieties of Italian. In Jun (ed.). pp. 55-83.
- Gussenhoven, Carlos. 2004. *The Phonology of Tone and Intonation*. Cambridge: Cambridge University Press.
- Gutiérrez-Rexach, Javier, and Luis Silva-Villar (eds.). 1996. *Perspectives in Spanish Linguistics*. Los Angeles: UCLA, Department of Linguistics.
- Hirst, Daniel, and Albert Di Cristo (eds.). 1999. *Intonation systems: a survey of twenty languages*. Cambridge: Cambridge University Press.
- Hualde, José Ignacio. 2002. Intonation in Spanish and the other Ibero-Romance languages: overview and status quaestionis. In Wiltshire and Camps (eds.), pp. 101-115.
- . 2003. El modelo métrico-autosegmental. In Prieto (ed.), pp. 155-184.
- Jun, Sun-Ah. 2005. *Prosodic Typology: The Phonology of Intonation and Phrasing*. Oxford: Oxford University Press.
- (ed.). 2005. *Prosodic Typology. The Phonology of Intonation and Phrasing*. Oxford: Oxford University Press.
- (ed.). In press. *Prosodic Typology II: The Phonology of Intonation and Phrasing*. Oxford: Oxford University Press.
- Kvavik, Karen H., and Carroll L. Olsen. 1974. Theories and methods in Spanish intonational studies. *Phonetica* 30: 65-100.
- Ladd, D. Robert. 1996. *Intonational Phonology*. Cambridge: Cambridge University Press.
- Navarro Tomás, Tomás. 1918. *Manual de pronunciación española*. Madrid: Centro de Estudios Históricos.
- . 1939. El grupo fónico como unidad melódica. *Revista de Filología Hispánica* 1: 3-19.
- . 1944. *Manual de entonación española*. New York: Spanish Institute in the United States.
- Nibert, Holly J. 2000: *Phonetic and phonological evidence for intermediate phrasing in Spanish intonation*. PhD Dissertation, University of Illinois at Urbana-Champaign.

- Pierrehumbert, Janet B. 1980. *The Phonetics and Phonology of English Intonation*. PhD Dissertation, Massachussets Institute of Technology.
- Pierrehumbert, Janet B., and Mary E. Beckman. 1988. *Japanese Tone Structure*. Cambridge, Massachussets: MIT Press.
- Prieto, Pilar. 2001. L'entonació dialectal del català: el cas de les frases interrogatives absolutes. In Bover, Lloret and Vidal-Tibbits (eds.), pp. 347-377.
- (ed.). 2003. *Teorías de la entonación*. Barcelona: Ariel.
- . To appear. The Intonational Phonology of Catalan. In Jun (ed.).
- Prieto, Pilar, Lourdes Aguilar, Ignasi Mascaró, Francesc Torres-Tamarit, and Maria del Mar Vanrell. 2008. L'etiquetatge prosòdic Cat_ToBI. *Estudios de Fonética Experimental* 18: 287-309.
- Prieto, Pilar, and Paolo Roseano. (coords.). 2010. *Atlas interactivo de la entonación del español*. Available at <http://prosodia.upf.edu/atlasentonacion/>, accessed March 21, 2010.
- Quilis, Antonio. 1975. Las unidades de entonación. *Revista Española de Lingüística*, 5: 261-279.
- . 1981. *Fonética y acústica de la lengua española*. Madrid: Gredos.
- Quilis, Antonio, and Joseph. A. Fernández, 1985. *Curso de fonética y fonología españolas*, Madrid: CSIC.
- Ramírez Verdugo, María Dolores. 2005. Aproximación a la prosodia del habla de Madrid. *Estudios de Fonética Experimental* 14: 309-326.
- Sosa, Juan Manuel. 1999. *La entonación del español*. Madrid: Cátedra.
- . 2003. La notación tonal del español en el modelo Sp_ToBI. In Prieto (ed.), pp. 185-208.
- Vizcaíno Ortega, Francisco, Eva Estebas-Vilaplana, Mercedes Cabrera Abreu, and Lluïsa Astruc Aguilera. 2008. La representación fonológica de la frontera prosódica en las interrogativas disyuntivas del español. *Language Design, Special Issue* 2: 31-38.
- Wiltshire, Caroline R., and Joaquim Camps (eds.). 2002. *Romance phonology and variation*. Amsterdam: John Benjamins.