

Castilian Spanish Intonation *

Eva Estebas-Vilaplana^a and Pilar Prieto^b

Universidad Nacional de Educación a Distancia^a
Institució Catalana de Recerca i Estudis Avançats - Universitat Pompeu Fabra^b

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 based on the Autosegmental-Metrical (AM) approach to intonational analysis (Pierrehumbert 1980, Pierrehumbert and Beckman 1988, Ladd 1996 and Gussenhoven 2004, among others), which describes intonational patterns by means of two tones, H and L, associated with metrically strong syllables and 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, Prieto, Estebas-Vilaplana and Vanrell in press, and 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 (Escandell-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, such 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 helped to build up a fuller 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 and Alcoba and Murillo 1999, among others).

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,

* We would like to express our gratitude to the editors for their inspiring feedback on this chapter. 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 at the 4th Sp_ToBI workshop: *Transcription of Intonation of the Spanish Language* (Las Palmas de Gran Canaria, June 2009). 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 grants FF12009-07648/FILO and CONSOLIDER-INGENIO 2010 CSD2007-00012, awarded by the Spanish Ministerio de Ciencia e Innovación.

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 statements of the obvious, uncertainty and contradiction statements, confirmation yes-no questions, and counterexpectational yes-no and wh- questions, to mention a few. The data described in this study were gathered by means of a guided questionnaire (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 initial proposal of Sp_ToBI (Beckman et al. 2002) as well as the revised version (Face and Prieto 2007, Estebas-Vilaplana and Prieto 2008).

The chapter is organized 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 summarize the most important points of this study and compare the main tonal configurations with those found in other varieties of Spanish. 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 phonetic realizations. This inventory of pitch accents and boundary tones follows the proposal for Sp_ToBI first put forth by Beckman et al. (2002) and later revised by Face and Prieto (2007) and 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 is consistent with 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 H accents had the option of being realized with either downstep or upstep.








The revised Sp_ToBI proposal (Estebas-Vilaplana and Prieto 2008) introduces two main differences with respect to its predecessor. First, it incorporates the three-way distinction between 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 between 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 contour 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 information-seeking yes-no

questions (L*+H) and broad focus statements (L+>H*). As noted, the three-way distinction between rising accents is maintained in this study.

The second difference between the traditional Sp_ToBI proposal and the revised version is the introduction of the monotonal L* pitch accent. This accent involves a low plateau within the limits of the accented syllable and is observed in the nuclear position of broad focus statements and information-seeking 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 monotonal and bitonal pitch accents in Castilian Spanish and their schematic representations

<i>Monotonal pitch accents</i>		
	L*	This accent is phonetically realized as a low plateau at the minimum of the speaker's range. In our corpus, it is found in the nuclear position of broad focus statements and information-seeking yes-no questions (with a rising contour).
	H*	This accent is phonetically realized as a high plateau with no preceding F0 valley. In our data, it is attested as one of the possible choices for nuclear position in echo and rhetorical wh-questions.
<i>Bitonal pitch accents</i>		
	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 narrow focus statements, counterexpectational yes-no and wh-questions, statements of the obvious, commands and vocatives, among other sentence types.
	L+¡H*	This pitch accent is phonetically realized as a very steep rise to a peak located in the accented syllable. It contrasts with L+H* in F0 scaling. It is used in echo yes no-questions and counterexpectational questions.
	L+>H*	This accent is phonetically realized as a rising pitch movement on the accented syllable with the F0 peak aligned with the postaccidental syllable. It is attested in the prenuclear position of broad focus statements.
	L*+H	This accent is phonetically realized as a F0 valley on the accented syllable with a subsequent rise on the postaccidental syllable. This accent is found in the prenuclear position of information-seeking yes-no questions.
	H+L*	This accent is phonetically realized as a F0 fall within the accented syllable. It is attested in nuclear position in imperative and confirmation yes-no questions (with a falling contour).

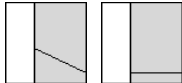
2.2. The boundary tones

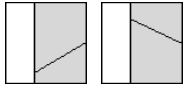
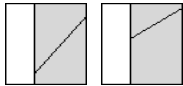

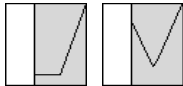
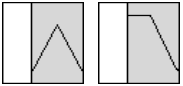

In Castilian Spanish, the tonal movements at the end of an intonation unit show a certain degree of complexity. Sometimes this complexity arises from the presence of more than one tonal target after the nuclear tone. Other times it is derived from the fact that the final pitch contour is neither high nor low but attains a mid level pitch. Both types of pitch configuration 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 account for the complex pitch trajectories at the end of utterances, Estebas-Vilaplana and Prieto (2008) proposed 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 plateau 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. submitted). Since in the original AM model pitch movements could 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 is transcribed as !H% and the sustained mid tone as !H!H%. Beckman et al. (2002) decided to use a more transparent transcription for the mid tone, M%. Though it adds a new level of tonal description (M), we regard this notation as much clearer than using downstep symbols and thus made use of it in both the revised Sp_ToBI proposal (Estebas-Vilaplana and Prieto 2008) and the present study.

Table 2 includes a slightly modified version of the inventory of monotonal and bitonal boundary tones proposed in Estebas-Vilaplana and Prieto (2008) for the description of Castilian Spanish. In principle, the same inventory of boundary tones can appear both at the end of a major phrase (intonation phrase) and at the end of a minor phrase (intermediate phrase). When boundary tones signal the end of an intermediate phrase they are marked with a hyphen (e.g. H-, L- LH- and HL-).

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

<i>Monotonal boundary tones</i>	
	<p>L% L% is phonetically realized as a low sustained or falling tone at the baseline of the speaker. It is attested at the end of broad and narrow focus statements, commands, echo yes-no questions, etc.</p>

	M%	M% is phonetically realized as a rising or falling movement to a target mid point. It is attested in uncertainty statements. It is also found in rhetorical wh- questions, commands and vocatives.
	H%	H% is phonetically realized as a rising pitch movement coming from a low or high pitch accent. It is found at the end of non-final constituents and confirmation yes-no questions.
<i>Bitonal boundary tones</i>		
	HH%	HH% is phonetically realized as a sharp rise at the end of the phrase which usually attains the highest level of the speaker's range. It is found at the end of information-seeking yes-no questions and counterexpectational yes-no and wh- questions.
	LH%	LH% is phonetically realized as a F0 valley followed by a rise. It is attested in counterexpectational yes-no questions.
	HL%	HL% is phonetically realized as a F0 peak followed by a fall. It is typical of contradiction statements, invitation wh- questions and requests.
	LM%	LM% is phonetically realized as a 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. As noted, the data presented in this study were gathered by means of an intonation guided questionnaire (based on Prieto 2001 for Catalan) which consisted of 69 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 hypothetical situations to which they are asked to react. The Castilian Spanish version of the Catalan questionnaire (as well as the adaptations to other Spanish varieties) can be found in the *Atlas interactivo de la entonación del español* (Prieto and Roseano coords. 2009-2010).

Two female speakers from the centre of Spain (Madrid) aged 42 and 45 recorded the utterances. 69 sentences were recorded for each speaker. To obtain data for each tune, speakers were given a context and asked to produce an utterance in 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 noisily and you can't listen to the news on TV. Ask them to quiet down.' One of the main advantages of using this type of context-based questionnaire is that you can gather, in a semi-spontaneous way, a wide variety of different tunes which are difficult or impossible to obtain by means of a reading task or in spontaneous speech.

The guided questionnaire included the following kinds of sentences: 1) statements, 2) questions (yes-no questions and wh- 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 broad focus statements, the data also included narrow focus statements, exclamative statements, statements of the obvious, contradiction statements and uncertainty statements. Perceptual and acoustic analyses of the utterances were performed using Praat (Boersma and Weenink 2010).

3.1. Statements

3.1.1. Broad focus statements

Statements with a broad focus intonation typically show a L+>H* pitch accent in prenuclear position, indicating that the rising contour is realized within the accented syllable and the F0 peak is produced on the postaccentual syllable. A progressively falling contour starts after the final prenuclear syllable and lasts 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 contour has been found in other Romance languages such as Catalan (Prieto et al. 2008, Prieto in press) and is also common in other varieties of Spanish, such as Argentinian Spanish (Gabriel et al. this volume), Mexican Spanish (de-la-Mota et al. this volume) and Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume). The intonational movement of a broad focus statement with a prenuclear accent and a nuclear accent in Castilian Spanish is illustrated in figure 1.

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 the correction of a wrongly interpreted item. The first intonation unit (*no*) is produced with a rising pitch accent and a fall to a mid pitch, described as L+H* M-. This mid tone realization is typically observed as a tonal continuation marker. 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).

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 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 see 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*.

Narrow focus contradiction statements are similar to correction statements, that is, statements whose intention is to clearly indicate that what the speaker says is right and definite. Contradiction statements involve a L* nuclear accent followed by a bitonal boundary tone (HL%). This is exemplified in figure 4 for the utterance *¡Que irán a Lima!* ‘They are going to Lima, for sure’. The prenuclear configuration shows a L+>H* pitch accent.

The L* HL% nuclear configuration to express a contradiction 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.

3.1.2.2. Exclamative statements

In utterances with an exclamative nuance, as in *¡Qué olor a pan tan bueno!* ‘What a lovely aroma 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 can be observed in figure 5. 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*).

3.1.2.3. Statements of the obvious

Figure 6 includes an example of a sentence which conveys obviousness and certainty on the part of the speaker: *¡Sí, mujer, de Guillermo!* ‘Yes, woman, Guillermo’s [of course]!’. The sentence is uttered with two tone units. The first one is produced with a rising pitch movement L+H* on the nuclear accent (mujer) followed by a L- boundary tone. The second one includes a L+H* nuclear accent followed by a bitonal boundary tone with low and mid targets (LM%). The final pitch movement in the contour of figure 6 is interpreted as L+H* LM%. It conveys obviousness, and contrasts with the L+H* LH% final contour which is used in counterexpectational yes-no questions (see section 3.2.2.1 below). 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 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, which is the same one used in emphatic and contrastive statements, has also been found in our Castilian Spanish data.

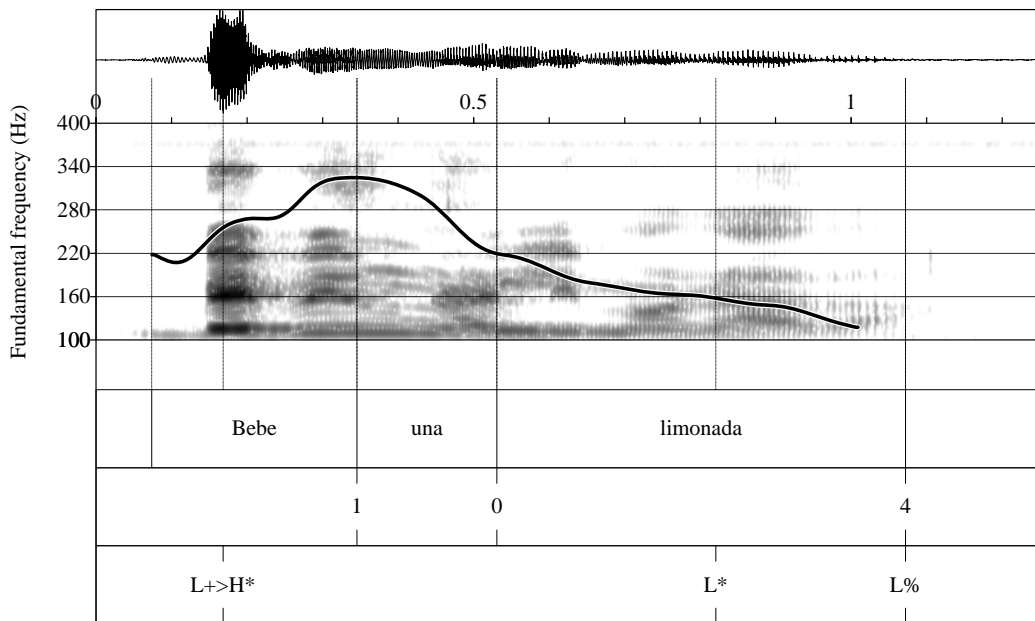


Figure 1: Waveform, spectrogram and F0 trace for the neutral statement Bebe una limonada ‘She is drinking lemonade’ produced with a L+>H* prenuclear accent and L* nuclear accent followed by a L% boundary tone.

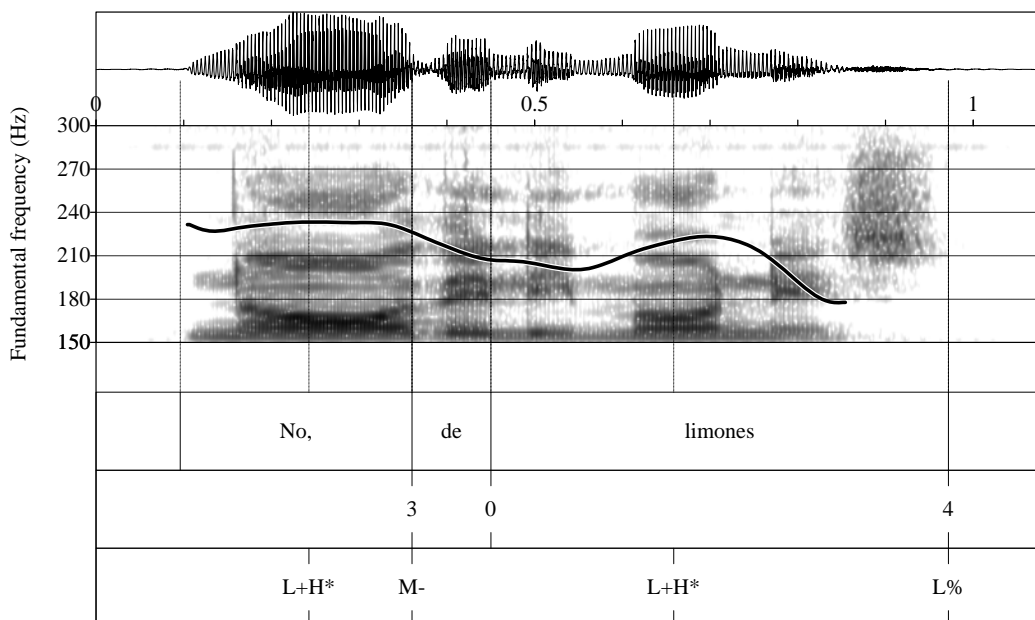


Figure 2: Waveform, spectrogram and F0 trace for the narrow focus statement No, de limones ‘No, of lemons’ produced with L+H* M- in the first tone unit and a L+H* L% nuclear configuration in the second tone unit.

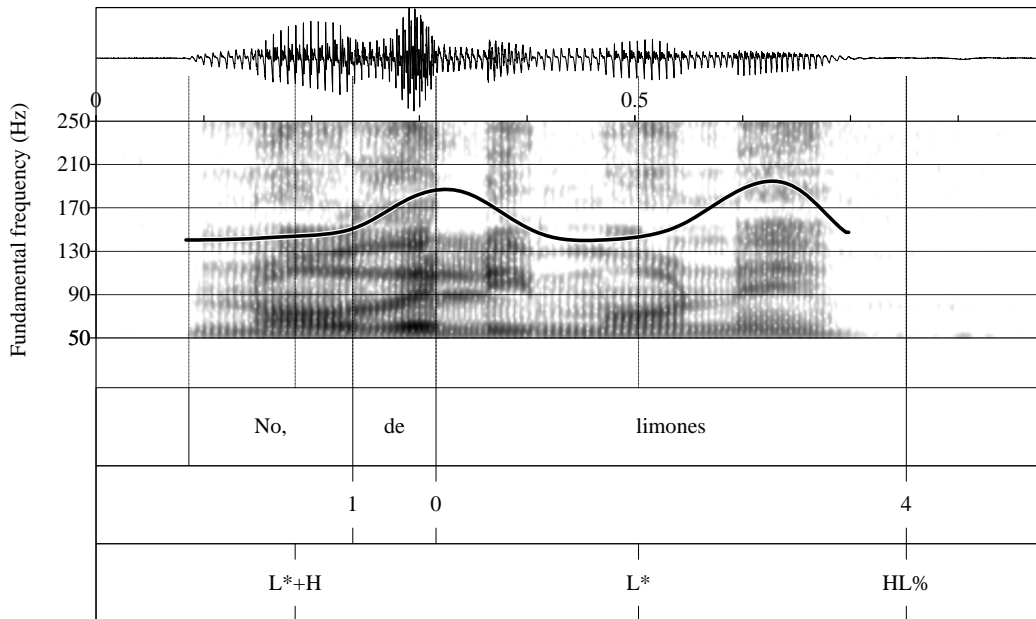


Figure 3: Waveform, spectrogram and F0 trace for the narrow focus statement No, de limones 'No, of lemons' produced with a L* HL% nuclear configuration.

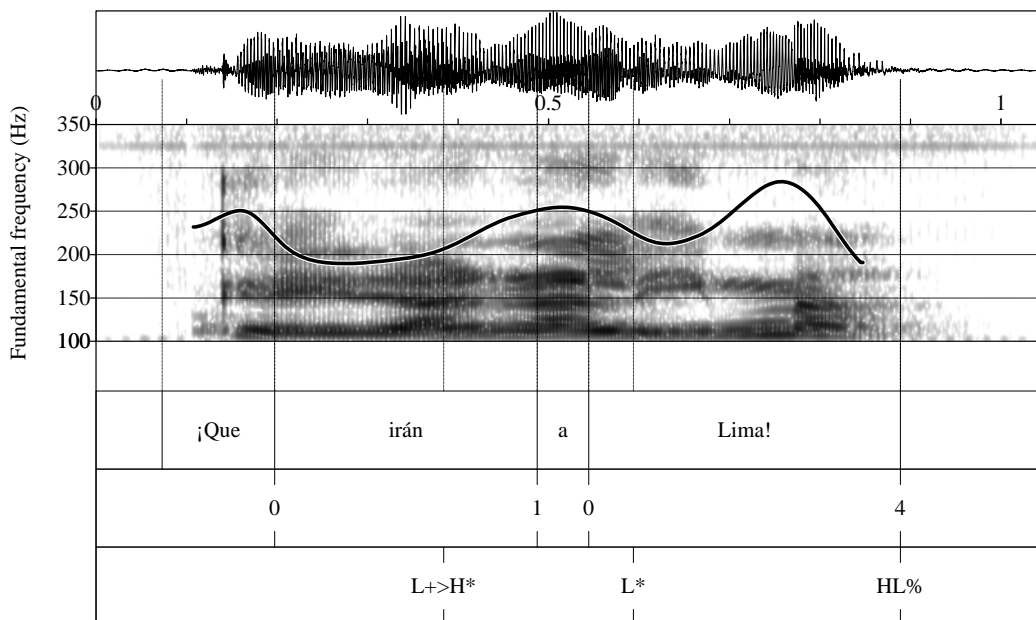


Figure 4: Waveform, spectrogram and F0 trace for the contradiction statement ¡Que irán a Lima! 'They're going to Lima, for sure!' produced with a L+>H* prenuclear accent and a L* HL% tonal configuration.

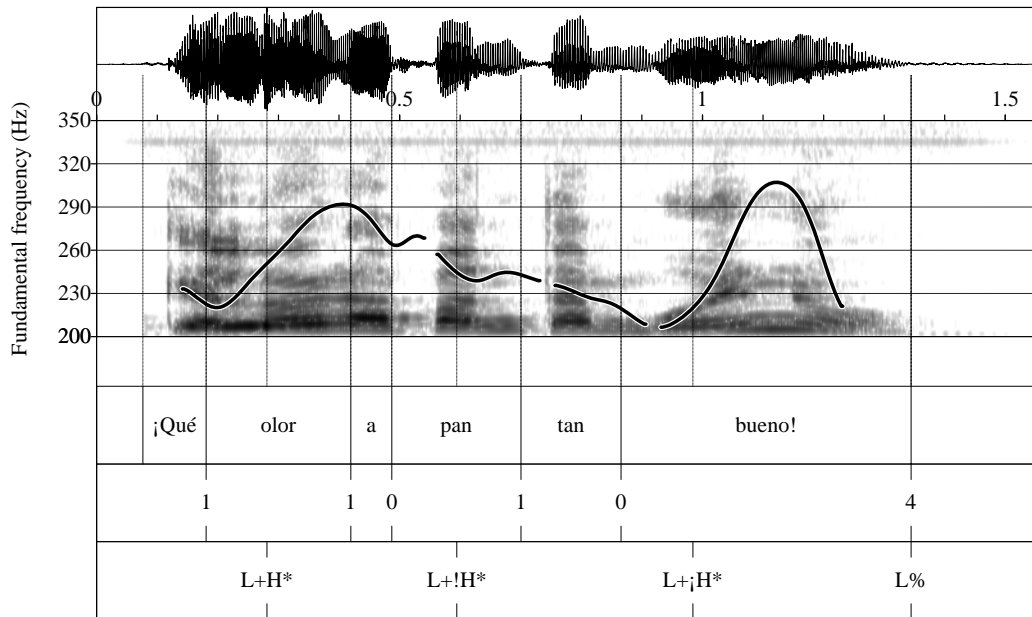


Figure 5: Waveform, spectrogram and F0 trace for the exclamation ¡Qué olor a pan tan bueno! ‘What a lovely aroma of bread!’ produced with two prenuclear L+H* pitch accents (the second one with downstep) and a L+¡H* L% nuclear configuration.

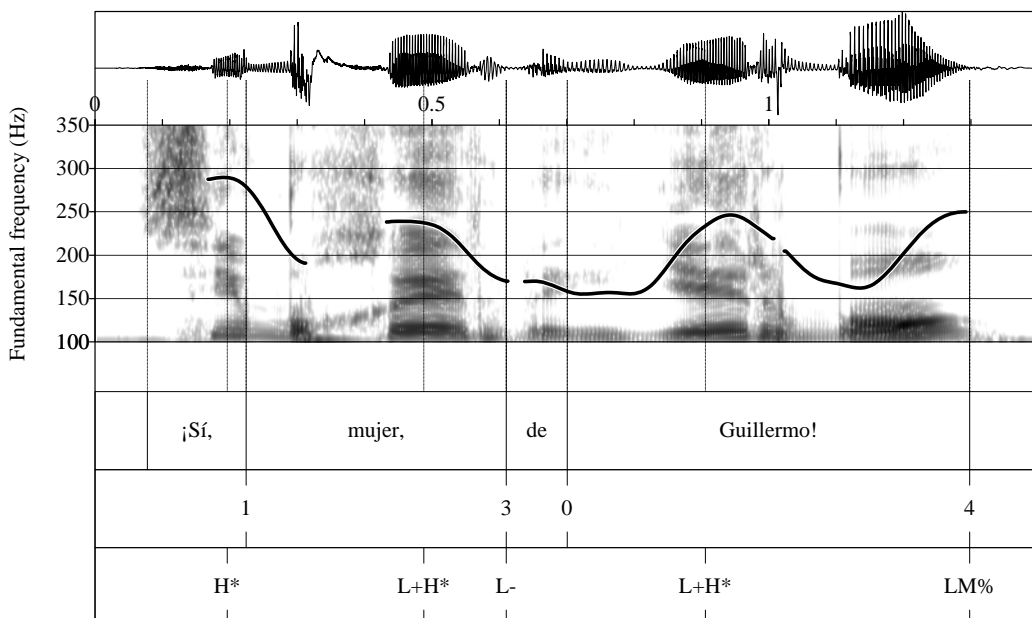


Figure 6: Waveform, spectrogram and F0 trace for the statement of the obvious ¡Sí, mujer, de Guillermo! ‘Yes, woman, Guillermo’s [of course]!’ produced with two tone units. The first one ends with H+L* L- and the second one consists of a L+H* nuclear accent followed by a LM% bitonal boundary tone.

3.1.2.4. Uncertainty statements

Uncertainty statements are a good example of utterances containing a M% boundary tone. The nuclear tone is produced with a L+H* pitch accent and the pitch then 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* ‘S/he may not like the present I have bought him/her’ 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 (Cabrera Abreu and Vizcaíno Ortega this volume) and Chilean 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*).

3.2. Questions

3.2.1. Yes-no questions

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 contour starts at the offset of the accented syllable. This is illustrated in figure 8 below for the sentence *¿Tiene mermelada?* ‘Have you got any jam?’. 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), Venezuelan Andean Spanish (Astruc et al. this volume), and Chilean Spanish (Ortiz et al. 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).

One of the questions that may arise from this tonal choice is whether we need a bitonal accent with two high targets to account for this kind of final rise and more importantly whether a HH% boundary tone contrasts with a H% boundary tone that has 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 contour (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 tangerines and lemons.'

¿Quieres mandarinas o limones?

HH- L* L%

'Would you like tangerines or lemons?'

The necessity of having 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 contrasts between four pitch levels at the end of sentences (L%, M%, H%, HH%) were examined. The data obtained in this study provide empirical evidence for the presence of four contrastive pitch levels at the edge of prosodic domains in Castilian Spanish.

3.2.2. Biased yes-no questions

3.2.2.1. Echo yes-no questions

Echo yes-no 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 yes-no 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 intonation pattern has already been reported in Escandell-Vidal (1999, 2002) and is illustrated in figure 10 for the sentence *¿Que son las nueve?* '(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 yes-no questions has also been found in Canarian (Cabrera Abreu and Vizcaíno Ortega this volume) and Argentinian Spanish (Gabriel et al. this volume).

Another type of echo yes-no question, this one with a counterexpectational connotation, has also been found in our data. This nuclear configuration is transcribed as L+H* LH% and is illustrated in figure 11 for the sentence *¿(Dices) que no vendrás?* '(Are you saying) that you aren't coming?' This nuclear pitch configuration contrasts with the nuclear configuration L+H* LM%, which expresses a statement of the obvious meaning (see figure 6 in section 3.1.2.3). Since they were spoken by the same informant, the two contours can be compared: while the end point of the boundary tone configuration LH% (figure 11) is 459 Hz, the end point of the LM% configuration is 253 Hz.

Another type of counterexpectational yes-no question consists of a contour involving 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?* '(Are you saying) that you aren't coming?' In this sentence there is no prenuclear accentuation. Similar rising nuclear trajectories for counterexpectational 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).

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, the prompt context for an imperative yes-no question was a grandmother talking to her grandchildren and asking them to be quiet. The example of the imperative yes-no question *¿Queréis callar?* ‘Would you please be quiet?’ is presented in figure 13. This sentence was produced with a L+>H* prenuclear accent followed by a H+L* L% nuclear configuration.

3.2.2.3. Confirmation yes-no questions

Confirmation-seeking rather than information-seeking questions 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 information-seeking yes-no questions (L*+H).

Another way of producing confirmation-seeking questions in our corpus is through the use of a rising contour L* H%. Figure 15 illustrates this contour with the confirmatory utterance *¿No te encuentras bien, eh?* ‘You aren’t feeling well, are you?’ Typically, the final rise of the confirmation-seeking question is lower than the final rise of the information-seeking question. We can compare the two contours as produced by the same speaker: while the utterance-final value for the final rise in figure 15 is 287 Hz, this value for the information-seeking question is 380 Hz (see figure 8). Consequently, we propose to introduce a phonological contrast between these two types of rising contours, a L* HH% for information-seeking questions and a L* H% for confirmation-seeking questions.

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).

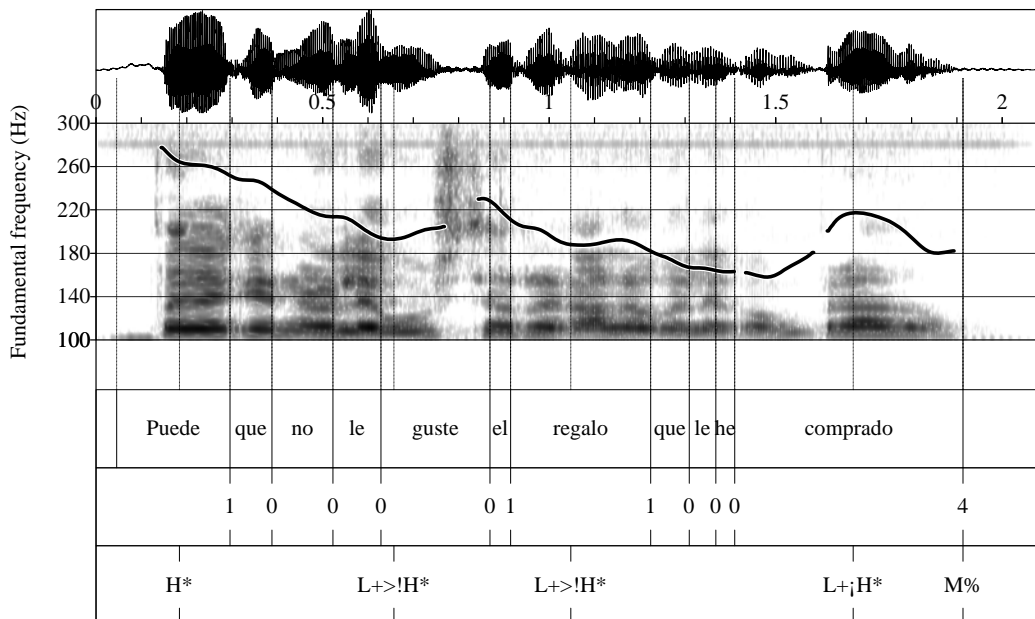


Figure 7: Waveform, spectrogram and F0 trace for the uncertainty statement Puede que no le gusta el regalo que le he comprado ‘S/he may not like the present I have bought him/her’ produced with a $L+;H^*$ nuclear accent followed by a $M\%$ boundary tone in the nuclear configuration.

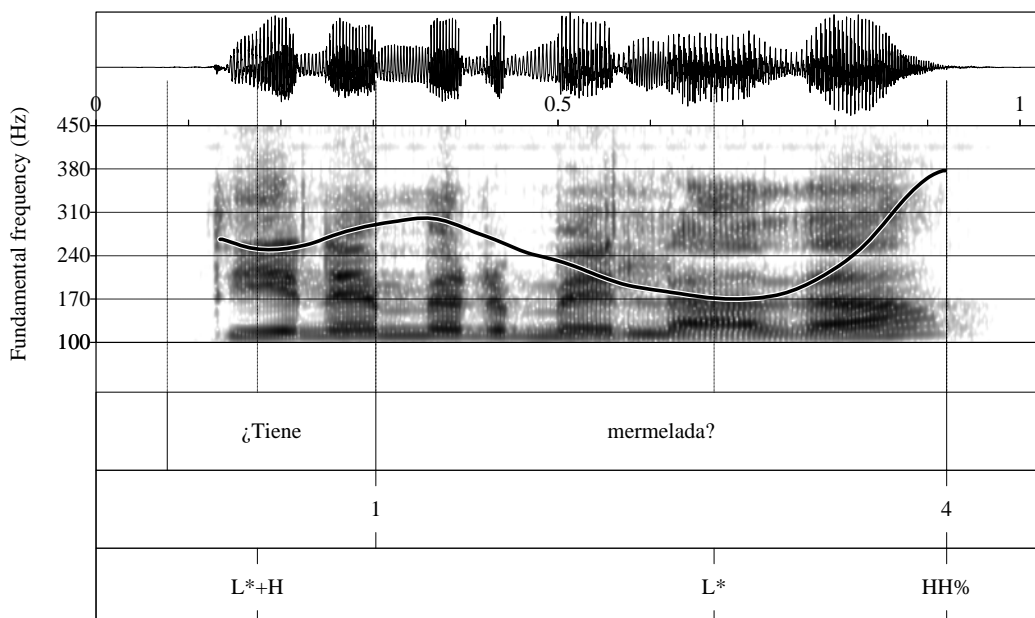


Figure 8: Waveform, spectrogram and F0 trace for the information-seeking yes-no question ¿Tiene mermelada? ‘Have you got any jam?’ produced with a L^*+H pre-nuclear accent and a L^* nuclear accent followed by a $HH\%$ boundary tone.

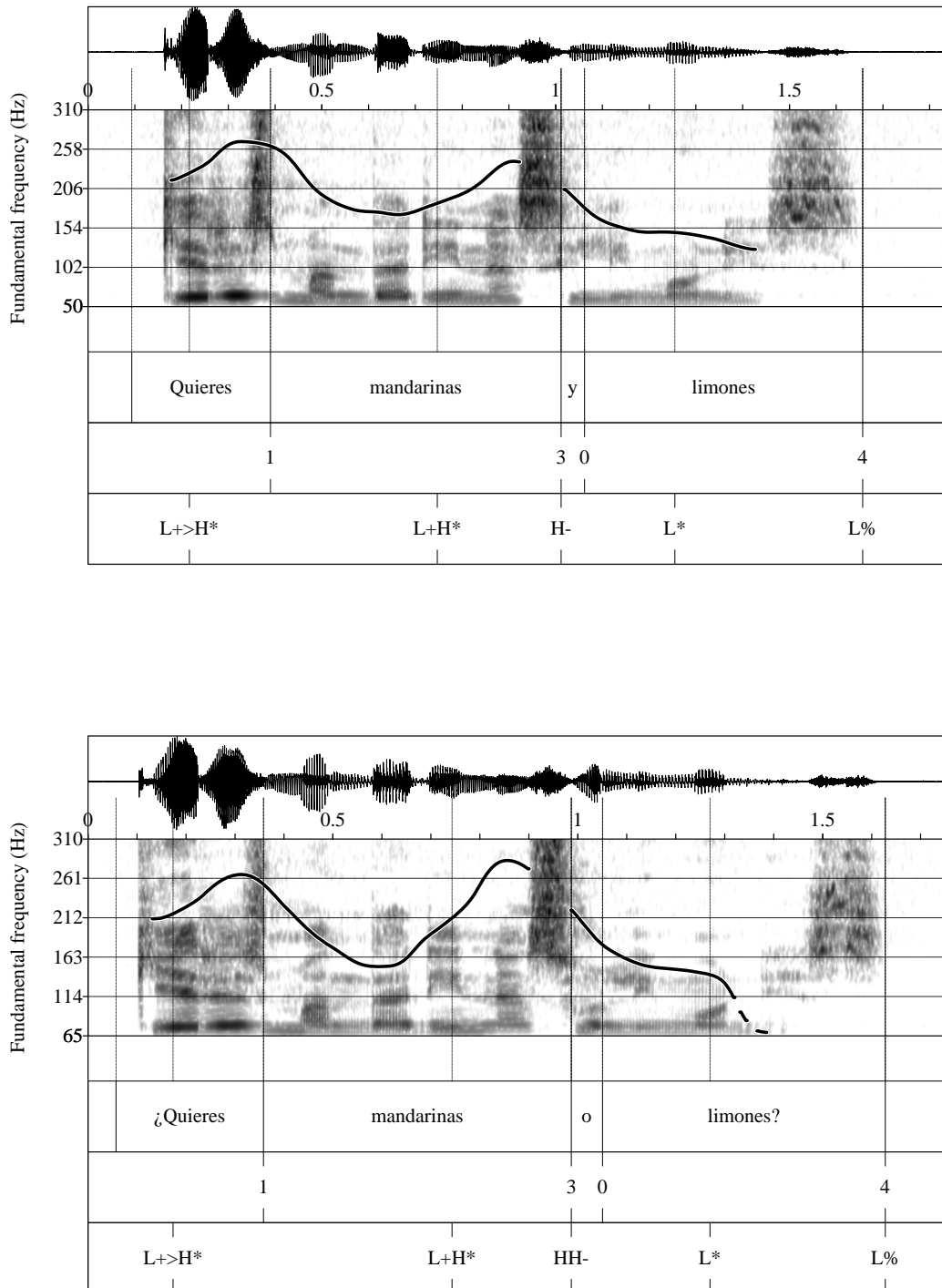


Figure 9: Waveform, spectrogram and F0 trace for two sentences (upper panel: statement with two constituents; lower panel: disjunctive question) showing the contrast between H- (at the end of the first constituent of the statement) and HH- (at the end of the first prosodic unit of the disjunctive question).

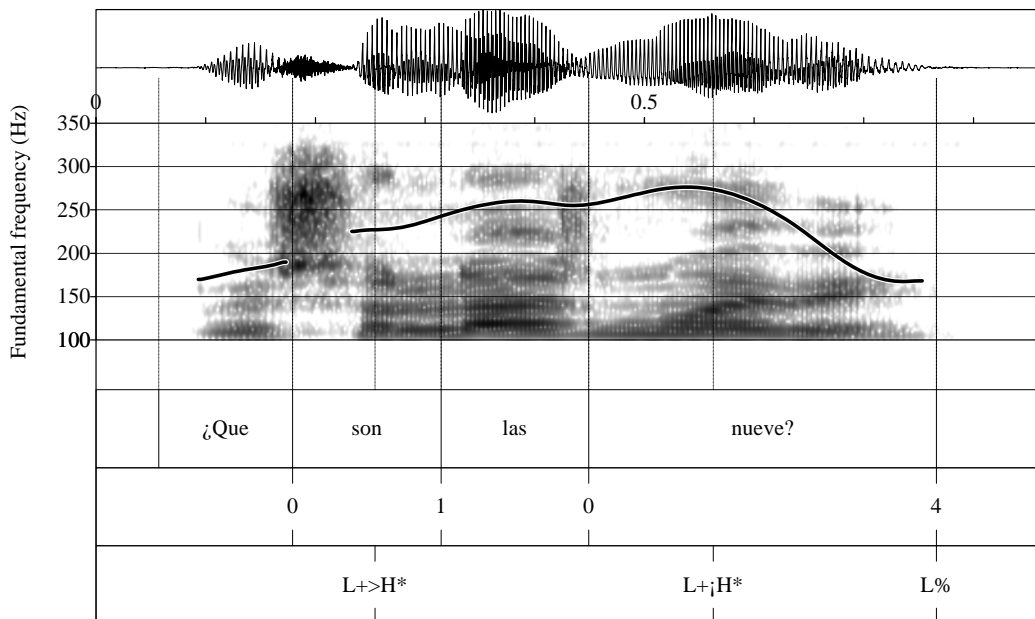


Figure 10: Waveform, spectrogram and F0 trace for the echo yes-no question *¿Que son las nueve?* 'Are you saying] that it's nine o'clock?' produced with a L+;H* L% nuclear configuration.

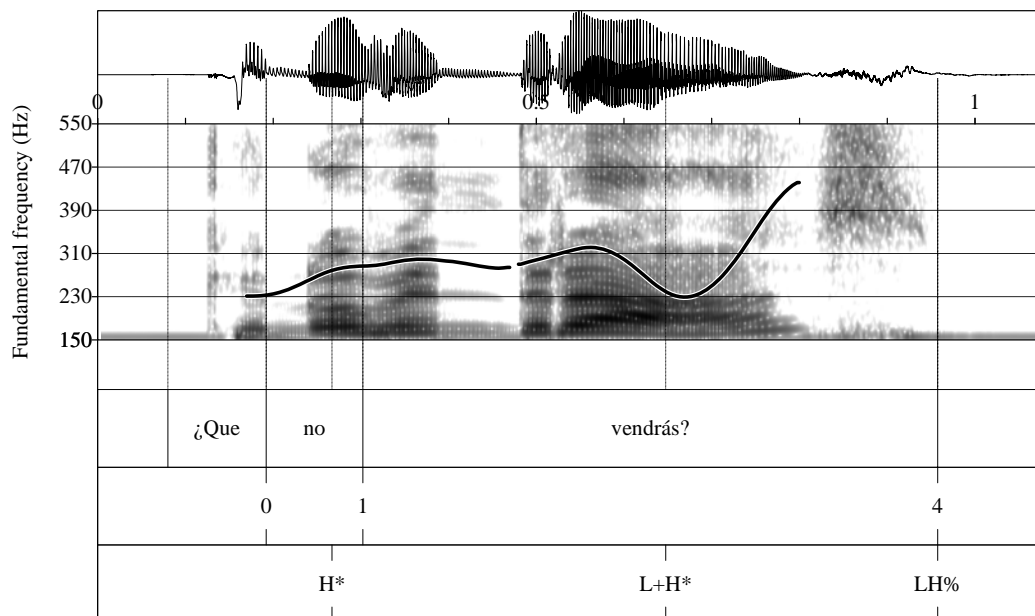


Figure 11: Waveform, spectrogram and F0 trace for the counterexpectational yes-no question *¿Que no vendrás?* 'Are you saying] that you aren't coming?' produced with a L+H* LH% nuclear configuration.

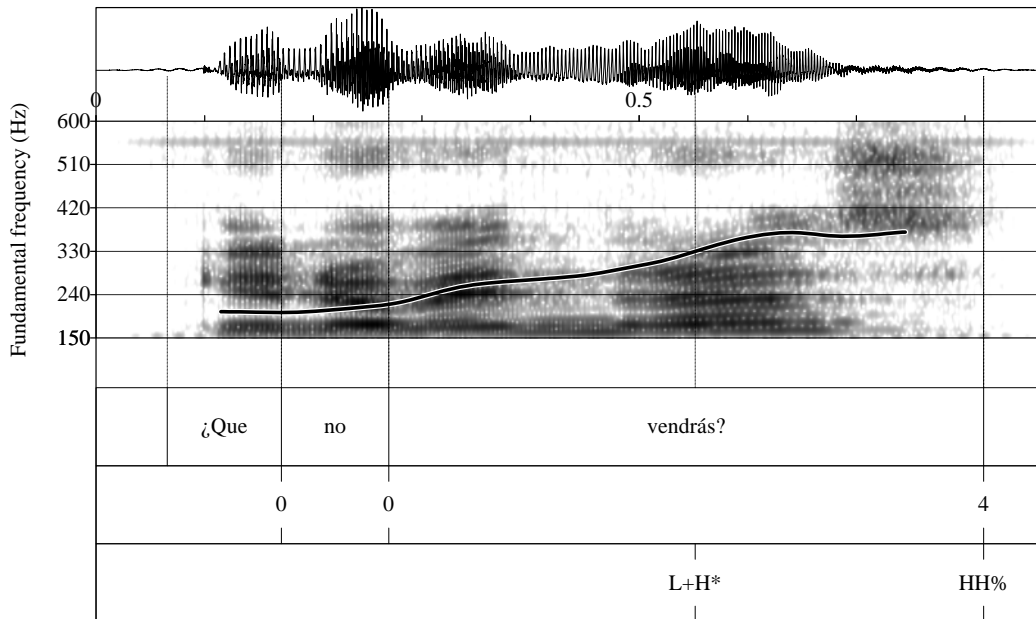


Figure 12: Waveform, spectrogram and F0 trace for the counterexpectational yes-no question *¿Que no vendrás?* [Are you saying] that you aren't coming?' produced with a L+H* HH% nuclear configuration and no prenuclear accentuation.

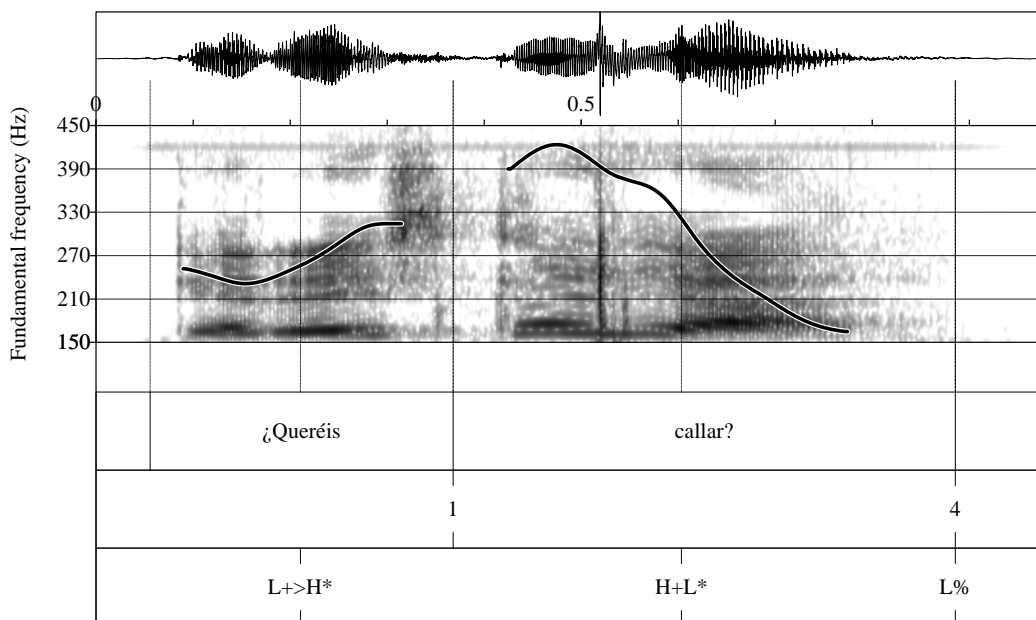


Figure 13: Waveform, spectrogram and F0 trace for the imperative yes-no question *¿Queréis callar?* 'Would you please be quiet?' produced with a L+>H* nuclear accent and H+L* L% nuclear configuration.

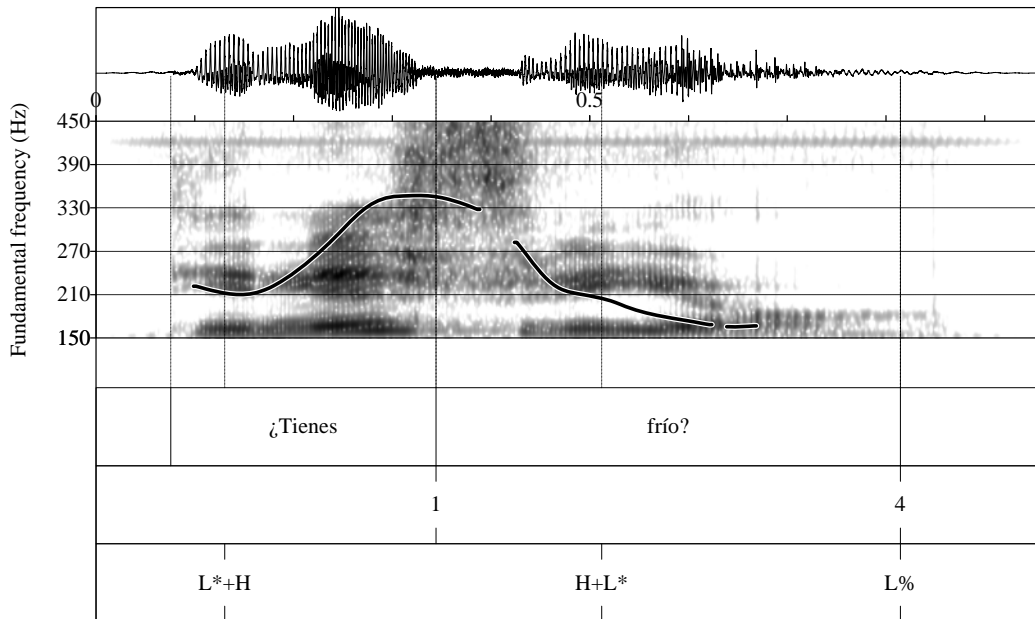


Figure 14: Waveform, spectrogram and F0 trace for the confirmation yes-no question *¿Tienes frío?* 'Are you cold?' produced with a L*+H prenuclear accent and H+L* nuclear accent followed by a L% boundary tone.

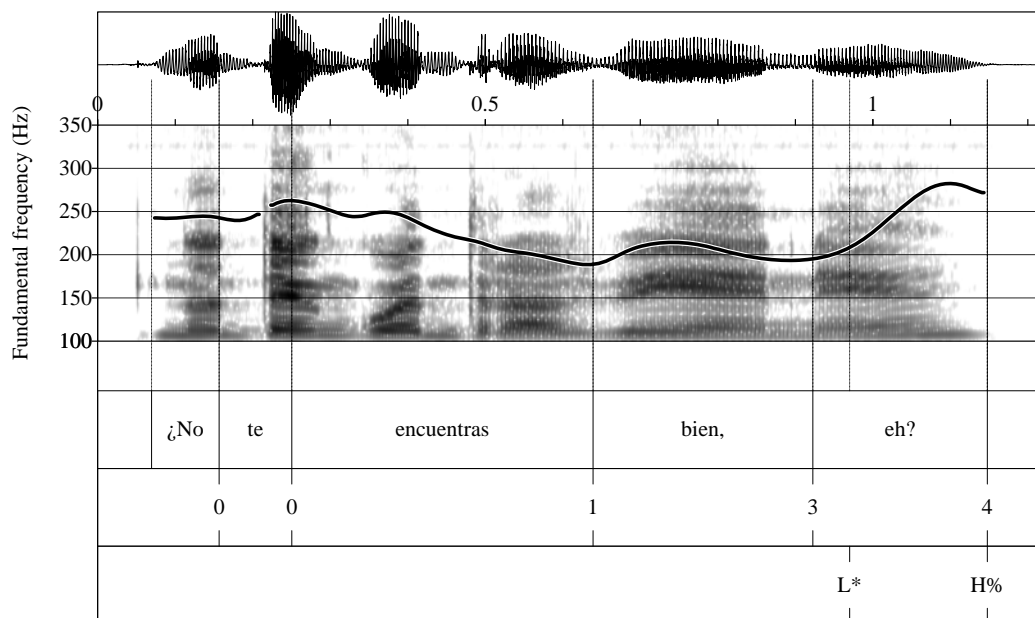


Figure 15: Waveform, spectrogram and F0 trace for the confirmation yes-no question *¿No te encuentras bien, eh?* 'You aren't feeling well, are you?' produced with a L* nuclear accent followed by a H% boundary tone.

3.2.3. Wh- questions

Information-seeking wh- questions are produced with two possible patterns in the nuclear configuration: a falling contour (L* L%) or a rising contour (L* HH%), which expresses a nuance of interest and greater speaker involvement in the speech act. The two patterns are illustrated in figure 16 for the sentences *¿Qué hora es?* ‘What time is it?’ Both sentences present a high tone (H*) pitch accent in the prenuclear position (note that the wh- word *qué* is produced at the same pitch level in both examples (see the two panels in figure 16).

The L* L% nuclear configuration (sometimes with a H+L* pitch accent) for information-seeking 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 contour 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 17, which depicts the sentence *¿Que dónde voy?* ‘[Did you ask me] where I’m going?’ In this case, the speaker produces an upstepped nuclear accent followed by a low boundary tone (iH* L%). Here 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 a counterexpectational nuance and likewise involves a sharp final rise. This is illustrated in the lower panel of figure 17 for the same sentence. In this contour, a nuclear L+iH* pitch accent is followed by a HH% boundary tone. A H* prenuclear accent is produced in the first syllable of the word *dónde*.

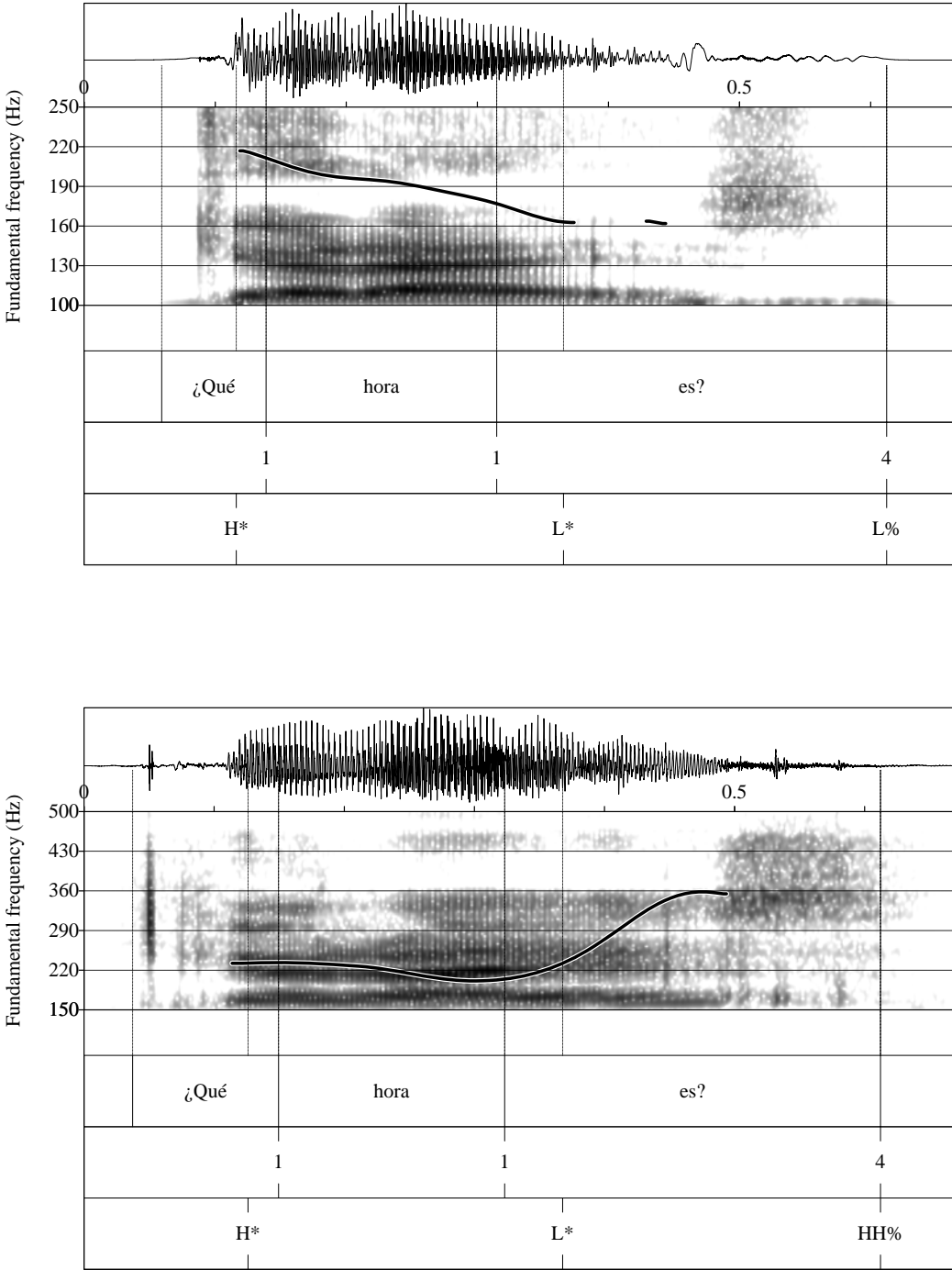


Figure 16: Waveform, spectrogram and F0 trace for two productions of the information-seeking wh-question *¿Qué hora es?* ‘What time is it?’ produced with a falling contour (L* L%—upper panel) and a rising contour (L* HH%—lower panel).

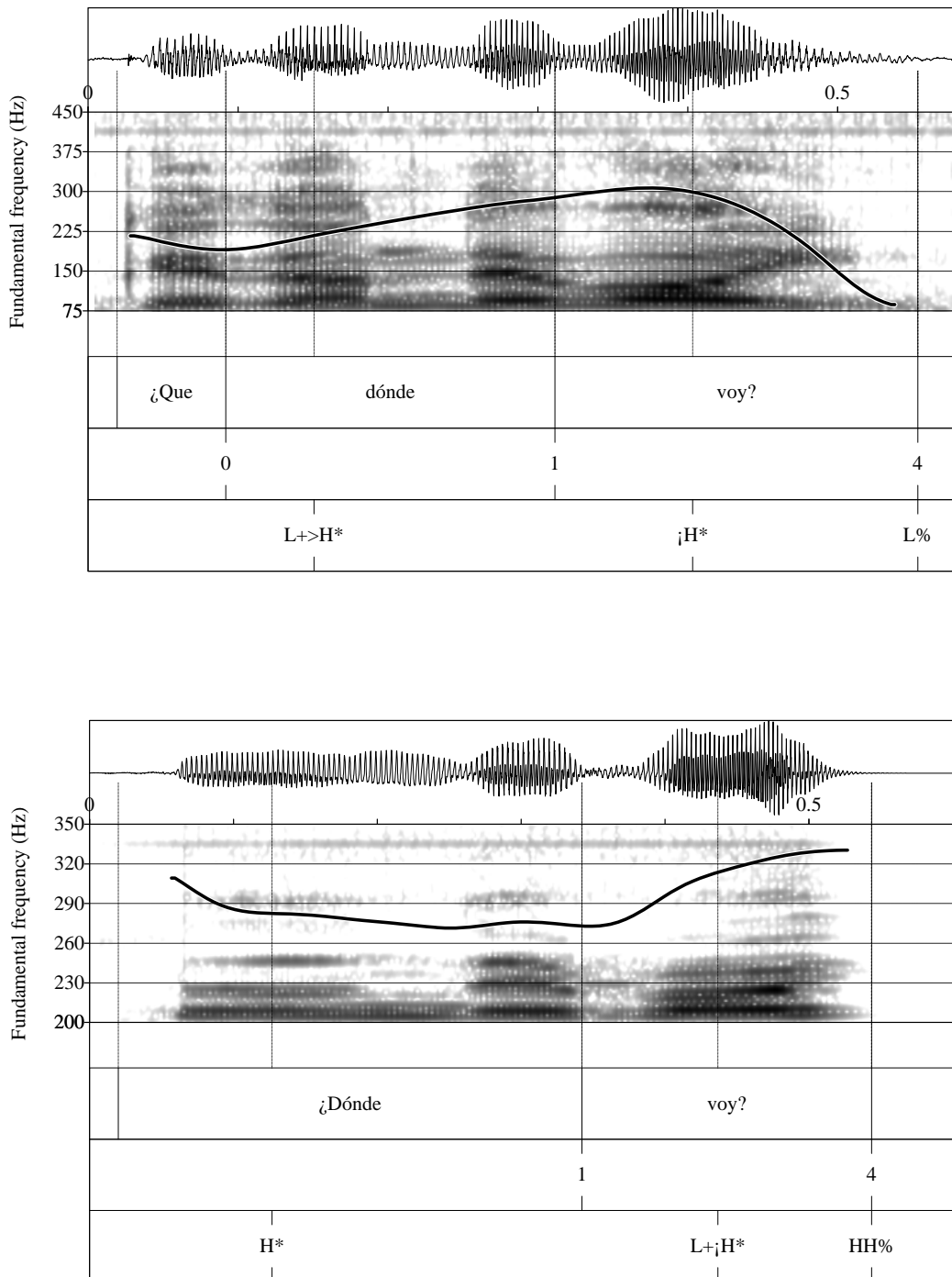


Figure 17: Waveform, spectrogram and F0 trace for two productions of the echo wh-question *¿Que dónde voy?* [Did you ask me] where I'm going? In the upper panel the nuclear accent shows an upstepped peak $\uparrow H^*$ followed by a $L\%$ boundary tone and preceded by a $L+\>H^*$ prenuclear accent. The F0 trace in the lower panel involves a rising nuclear configuration ($L+\uparrow H^*$ $HH\%$) preceded by a high prenuclear accent (H^*). This latter pattern has a counterexpectational nuance.

3.2.4.2. Imperative wh- questions

Sometimes wh- questions can be produced with an imperative nuance indicating that the speaker seeks not only an answer but also an action. An imperative wh- question *¿Cuándo lo harás?* ‘When are you going to do it?’ is illustrated in figure 18. Prenuclear accents show a rising contour 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.

In other contexts 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+iH* 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 19 for the sentence *¿Por qué no venís?* ‘Why don’t you come?’ No prenuclear accents are observed in this contour.

3.2.4.3. Rhetorical wh- questions

Rhetorical wh- questions involve an interrogation with no answer expected. An example of a rhetorical question is illustrated in figure 20 for the sentence *¿Qué harías sin mí?* ‘What would you do without me?’ The most interesting aspect of this tune is that the nuclear accent falls not on the last word but rather on the verb *harías*, which exhibits a H* nuclear pitch accent followed. The postnuclear part of the contour is the dislocated utterance *sin mí*, which exhibits 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 described in the proposition. The illocutionary strength with which this speech act is performed 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 21 for the sentence *Ven aquí, por favor* ‘Come here, please’ produced as 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 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.

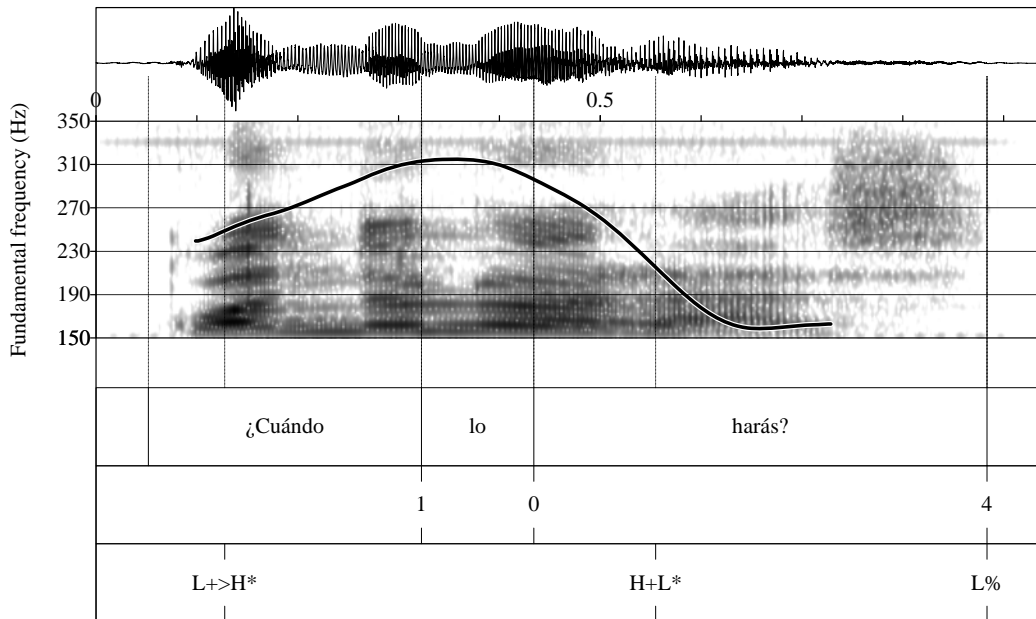


Figure 18: Waveform, spectrogram and F0 trace for the imperative wh- question *¿Cuándo lo harás?* 'When are you going to do it?' produced with an imperative nuance. The nuclear configuration is H+L* L% and it is preceded by a L+>H* prenuclear accent.

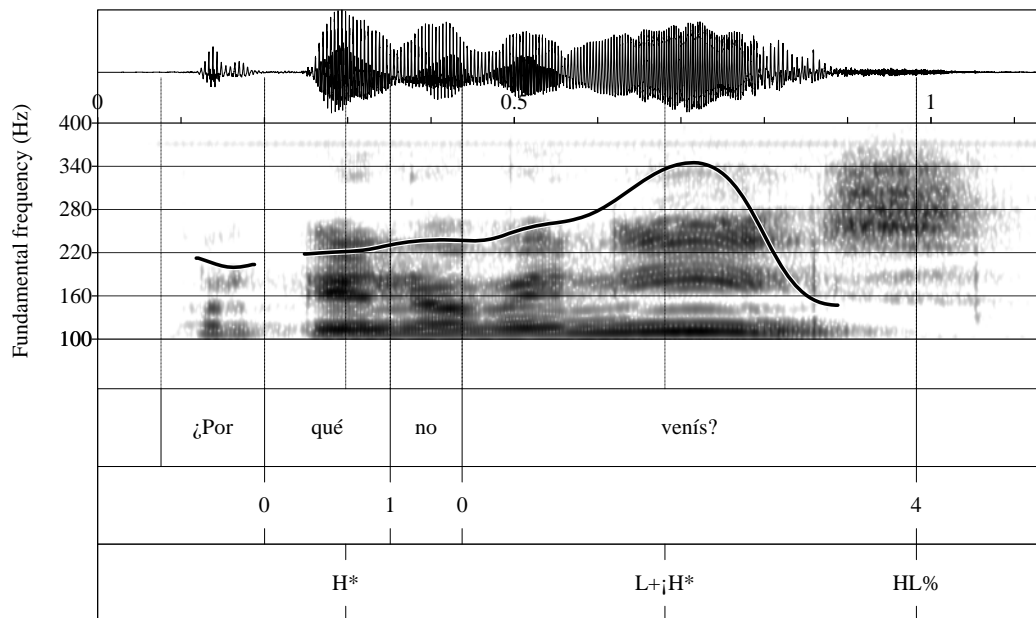


Figure 19: Waveform, spectrogram and F0 trace for an invitation wh- question produced with a nuance of invitation *¿Por qué no venís?* 'Why don't you come?' The nuclear configuration is L+¡H* HL%.

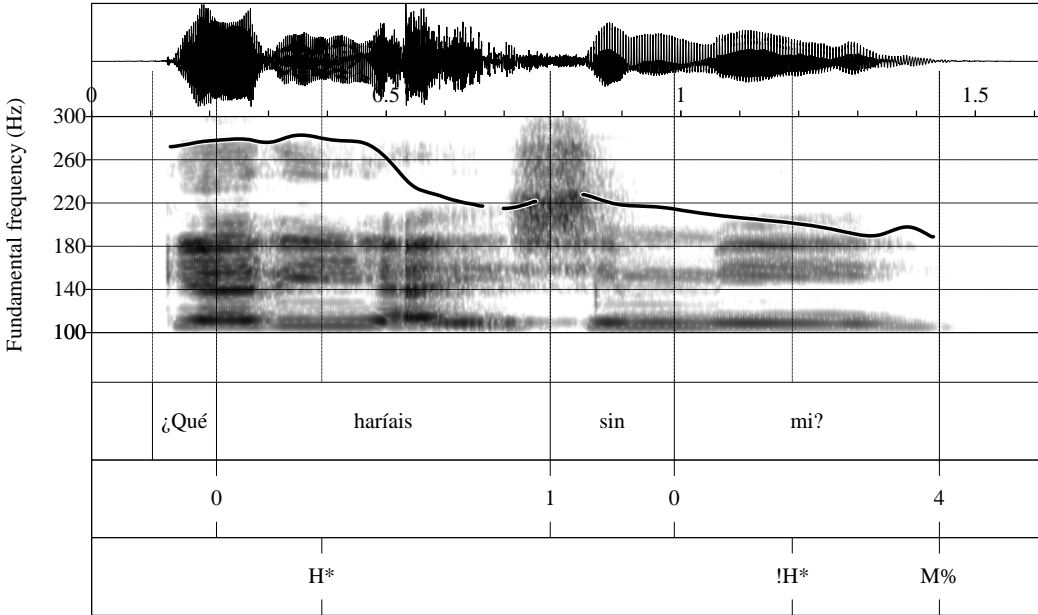


Figure 20: Waveform, spectrogram and F0 trace for the rhetorical wh-question *¿Qué harías sin mí?* ‘What would you do without me?’ produced with a H* pitch accent followed by a M% boundary tone.

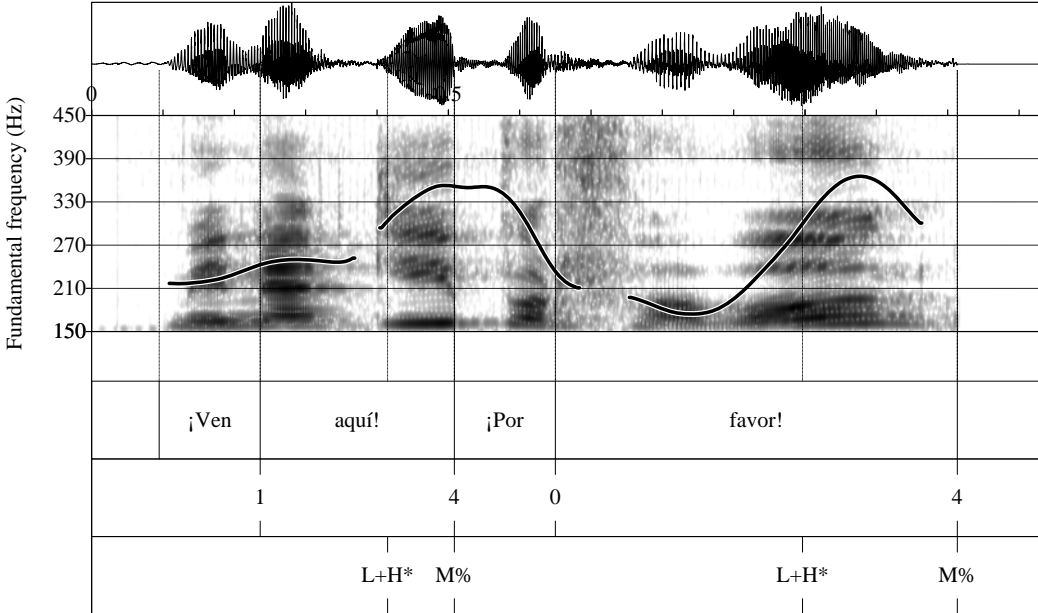


Figure 21: Waveform, spectrogram and F0 trace for the command *¡Ven aquí! ¡Por favor!* ‘Come here, please!’ produced as two intonation phrases with the same tonal configuration L+H* M%.

3.3.2. Requests

A common nuclear configuration for requests is a L* pitch accent followed by a HL% boundary tone. This is illustrated for the first (*va*) and the last (*hombre*) intonation phrases of the utterance *Va, vente al cine, hombre* ‘Come on, man, come (with us) to the cinema’ presented in figure 22. Though the pitch range is broader in the last phrase (*hombre*) than in the first (*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.

3.4. Vocatives

As in many other languages, the typical calling contour in Castilian Spanish is characterized by a sustained mid pitch. This is exemplified in figure 23 for the utterance *¡Marina!* which is produced with a L+H* nuclear accent followed by a fall in the F0 into a sustained mid pitch M% that lasts until the end of the sentence. This pattern has also been attested 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).

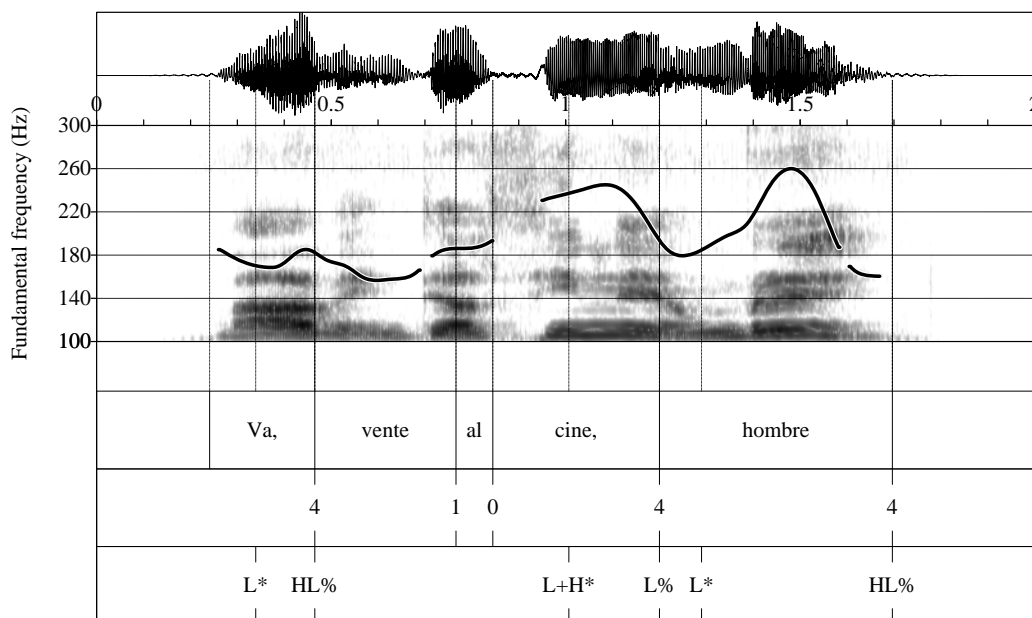


Figure 22: Waveform, spectrogram and F0 trace for the request *Va, vente al cine, hombre* ‘Come on, man, come (with us) to the cinema’ produced as three intonation phrases (L* HL%, L+H* L%, L* HL%).

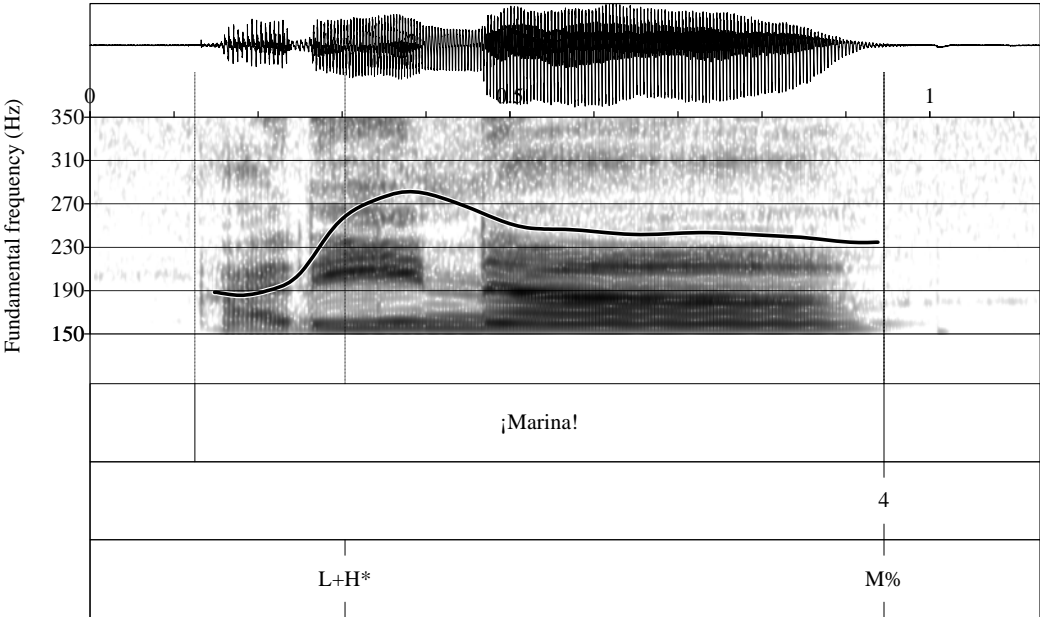


Figure 23: Waveform, spectrogram and F0 trace for the vocative ¡Marina! produced with a L+H* pitch accent followed by a M% boundary tone.

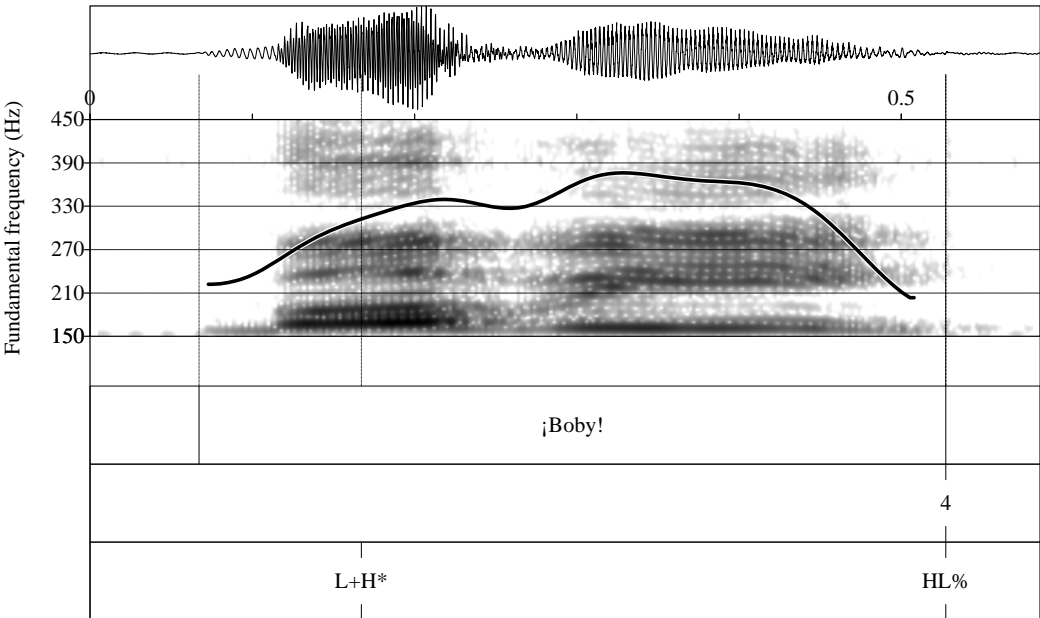


Figure 24: Waveform, spectrogram and F0 trace for the vocative ¡Boby! produced with a L+H* pitch accent followed by a HL% boundary tone.

Finally, figure 24 illustrates a variant of a calling contour used to express an insistent call, in this case to a wayward dog. This tune involves a L+H* nuclear accent followed by a HL% boundary tone. A rising pitch contour 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).

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 statements (L+H* L%). Other patterns, however, show much more dialectal variability and ways of expressing a particular prosodic meaning within the same dialect. As far as statements are concerned, the major differences are found in statements of the obvious and uncertainty statements. The former present two main patterns, L+H* LM% and L+H* L%. They can both occur in the same dialect, as is the case with our Castilian Spanish data, while in other dialects one of them may predominate. 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% pattern, 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%).

The typical configuration of information-seeking yes-no questions obtained from the Castilian Spanish data is L* HH%, also reported for Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume). This type of question presents great intonational variability across dialects, with some of the Caribbean dialects, for example, producing primarily falling contours of the type H+L* L%. In other varieties, such as Argentinian Spanish (Gabriel et al. this volume) and Ecuadorian Andean Spanish (O'Rourke this volume), information-seeking yes-no questions involve a H* M% nuclear configuration. For their part, confirmation-seeking yes-no questions are produced in Castilian Spanish either with a falling nuclear pattern (H+L* L%) or with a rising L* H% nuclear accent. One of the features of the rising intonation pattern found in confirmation-seeking questions is that the final rise is lower (L* H%) than that found in information-seeking questions (L* HH%).

In Castilian Spanish, wh- questions also show two tonal contours: 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).

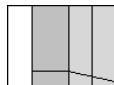
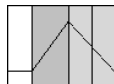
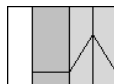
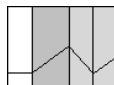
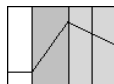
Echo questions (whether wh- questions or yes-no echo questions) show two possible patterns in Castilian Spanish: either L+iH* L%, or L+iH* HH% and L+H* LH% (the latter two with a counterexpectational nuance). The main feature of echo questions is the presence of an upstepped L+iH* nuclear accent. A L+iH* L% configuration is also found in Argentinian Spanish (Gabriel et al. this volume) and Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega this volume). L+iH* 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* L% like 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 well as in Mexican Spanish (de-la-Mota et al. this volume) and 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 in Castilian Spanish and their schematic representations

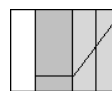
<i>Statements</i>		
Broad focus statements	L* L%	
<i>Biased statements</i>		
Narrow focus, exclamative statements	L+H* L%	
Narrow focus, contradiction statements	L* HL%	
Statements of the obvious	L+H* LM%	
Uncertainty statements	L+H* M%	

Questions

Yes-no questions

Information-seeking yes-no questions

L* HH%



Biased yes-no questions

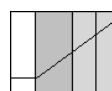
Echo yes-no questions

L+iH* L%



Counterexpectational yes-no questions

L+H* HH%

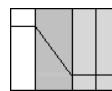


L+H* LH%



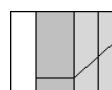
Imperative and confirmation yes-no questions

H+L* L%



Confirmation yes-no questions

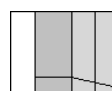
L* H%



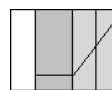
Wh- questions

Information-seeking wh- questions

L* L%



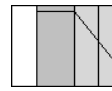
L* HH%



Biased wh- questions

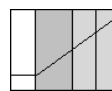
Echo wh- questions

iH* L%



Counterexpectational wh- questions

L+H* HH%



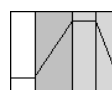
Exhortative and imperative wh- questions

H+L* L%



Invitation wh- questions

L+iH* HL%



Rhetorical wh- questions

H* M%



Imperatives: commands and requests

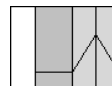
Commands

L+H* M%



Requests

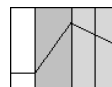
L* HL%



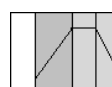
Vocatives

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. 2010. *Praat: doing phonetics by computer* [Computer program]. Version 5.1.31, retrieved 4 April 2010 from <http://www.praat.org/>
- 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/>, accessed 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. 3929-3991.
- . 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. G. Elordieta and M. Vigário (eds.)).
- 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 (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, Massachusetts Institute of Technology.
- Pierrehumbert, Janet B., and Mary E. Beckman. 1988. *Japanese Tone Structure*. Cambridge, Massachusetts: 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.). 2009-2010. *Atlas interactivo de la entonación del español*. Available at <http://prosodia.upf.edu/atlasentonacion/>, accessed March 21, 2010.
- Prieto, Pilar, Eva Estebas-Vilaplana and Maria del Mar Vanrell (In press). The relevance of prosodic structure in tonal articulation. Prosodic effects on peak alignment in Catalan and Spanish. *Journal of Phonetics*.
- Prieto, Pilar, Francesc Torres-Tamarit and Maria del Mar Vanrell (submitted). The role of tonal scaling in encoding intonational contrasts in Catalan. *Journal of Phonetics*.
- 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.