Mexican Spanish Intonation[*]

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1. Introduction

The goal of this chapter is to describe the basic intonational tunes found in Central Mexican Spanish and specifically the variety of Mexican Spanish spoken in the Distrito Federal (or México DF) and to present the inventory of nuclear pitch accents and boundary tones found in this Spanish variety using the Sp_ToBI labelling conventions proposed by Beckman et al. (2002), Face and Prieto 2007 and later Estebas-Vilaplana and Prieto (2008). Although there is prosodic diversity in Mexican Spanish, this article will focus on the variety spoken in Mexico DF, whose metropolitan area is inhabited by about twenty million people (almost one-fifth of the population of the country). By establishing a labelled dataset of Central Mexican Spanish utterances which includes the main intonation contours of this variety we will allow for further crossdialectal comparison among the tunes of several varieties.

Previous studies on Mexican Spanish intonation have described a variety of intonation contours from a phonetic and a phonological point of view (see Matluck 1951, Kvavic 1974, 1979, Sosa 1999, Prieto et al. 1995, Ávila 2003, Ávila in press, Beckman et al. 2002, Martín Butragueño 2003a, 2003b, 2004, 2005, 2006a, 2006c, Velázquez 2008a, 2008b, and others; see Martín Butragueño 2006b for a review). One of the most peculiar intonation contours found in Mexican Spanish is the so-called 'circumflex' nuclear configuration, a contour characterized by a particular rising-falling movement. These contours were described as early as Matluck (1951), later discussed by Quilis (1993) and Sosa (1999) and have been recently analysed in depth in Martín Butragueño's work (2004, 2006a, in press). However, little attempt has been made to provide an inventory of all the pitch accents and boundary tones of the dialect, an inventory which must include a characterization of the F0 contours used for different pragmatic meanings (yet see Martín Butragueño 2006a, the DIME project in López 2005, work on interrogatives and requests by Ávila 2003 and Orozco 2008, 2010, work on adverbs by Mora in press, and analyses of extrapredicative themes and discourse

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markers by Martín Butragueño 2003a, 2008). In this chapter we would like to provide a further contribution to the description of Mexican Spanish intonation by examining new empirical data and typical tunes of several sentence types within the tenets of the Sp_ToBI framework in the Autosegmental-Metrical (AM) approach to intonational analysis (see Hualde 2003 and Sosa 2003 for a review).

The chapter is organized as follows. Section 2 describes the proposed pitch accents and boundary tones found in Mexican Spanish, section 3 presents the basic intonation contours for a variety of sentence types and, finally, the last section concludes with a summary of the main findings and a chart of the basic nuclear configurations or *tonemas*.

## 2. Mexican Spanish intonational phonology

2.1. The pitch accents

The analysis of the elicited sentences in our corpus of Mexican Spanish was carried out using the Sp_ToBI labelling system. The inventory of pitch accents and boundary tones is based on the proposals put forth in Face and Prieto (2007) and Estebas-Vilaplana and Prieto (2008).

Table 1 summarizes the inventory of possible pitch accents that have been observed in our corpus of Mexican Spanish. A schematic representation and description of the corresponding contours and the utterances where they are commonly found is also included.

Table 1: *Inventory of monotonal and bitonal pitch accents in Mexican Spanish and their schematic representations*
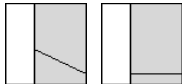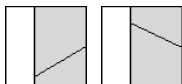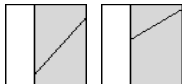
Monotonal pitch accents

	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, contradiction statements, information-seeking yes-no questions, echo yes-no questions, imperative yes-no questions, polite invitation or request yes-no questions, echo wh- questions and vocatives.
	H*	This accent is phonetically realized as a high plateau with no preceding F0 valley. In our data, it is attested in prenuclear position in broad focus statements, contradiction statements, confirmation yes-no questions, wh- questions and invitation 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, exclamative statements, statements of the obvious, wh- questions, echo wh- questions, exclamative wh- questions, imperative wh- questions, commands, gentle requests and vocatives.

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	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. In our corpus it is attested in the prenuclear position of broad focus statements, exclamative statements and imperative yes-no questions.
	L*+H	This accent is phonetically realized as a F0 valley on the accented syllable with a subsequent rise on the postaccentual syllable. In our corpus, it is attested in the prenuclear position of counterexpectational echo yes-no questions and echo wh-questions.
	H+L*	This accent is phonetically realized as a F0 fall within the accented syllable. In our data, this accent is found in prenuclear position in imperative wh- questions.

2.2. The boundary tones

Table 2 below shows the inventory of attested boundary tones found at the end of nuclear configuration*s*. It is assumed that some final pitch movements can be better described by means of bitonal boundary tones (i.e. with two tonal targets). The mid tone M% proposed by Beckman et al. (2002) as a possible boundary for Sp_ToBI is also considered useful to describe the nuclear configurations in our corpus.

Table 2: Inventory of monotonal and bitonal boundary tones in Mexican Spanish and their schematic representations
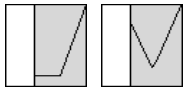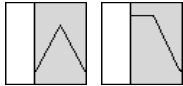
Monotonal boundary tones		
	L%	L% is phonetically realized as a low sustained tone or a falling tone at the baseline of the speaker. It is attested at the end of broad and narrow focus statements, exclamative statements, exclamative wh- questions, imperative wh- questions, commands and vocatives.
	M%	M% is phonetically realized as a rising or falling movement to a target mid point. It is found in exhortative wh- questions, uncertainty statements and vocatives.
	H%	H% is phonetically realized as a rising pitch movement coming from a low or high pitch accent. It is attested in confirmation-seeking yes-no questions.
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 typical of polite invitations and request yes-no questions.

	LH%	LH% is phonetically realized as a F0 valley followed by a rise. It is attested in information-seeking yes-no questions, echo yes-no questions and imperative yes-no questions.
	HL%	HL% is phonetically realized as a F0 peak followed by a fall. It is found in contradiction statements, wh- questions, requests and vocatives.
	LM%	LM% is phonetically realized as a F0 valley followed by a movement to a target mid point. It is found in statements of the obvious.

3. Basic intonational patterns in Mexican Spanish

As in all other chapters, the elicitation of the data was conducted in semi-spontaneous fashion through a guided questionnaire based on that proposed by Prieto (2001) and adapted for the *Atlas interactivo de la entonación del español* (Prieto and Roseano coords. 2009-2010). In this methodology the subject is presented with a series of situations, each intended to elicit a particular type of utterance by an inductive method. The questionnaire is designed to evoke everyday situations in which a wide range of intonation contours are naturally produced, contours that are otherwise difficult to produce in laboratory conditions. For instance, the speakers have to produce an utterance as a response to prompts like: 'You enter the house of a friend of yours, Marina, to pick her up. But once inside, you can't see her. Call out her name to see if she is there' or 'You have never been so cold in all your life. What do you say?' The guided questionnaire elicits a variety of sentence types (statements, yes-no questions, wh- questions, imperatives) that convey different pragmatic meanings (incredulity, confirmation, obviousness, etc.).

Three female native speakers from México DF aged 27 and 28 were recorded in a soundproofed room at the Universitat Autònoma de Barcelona using a PMD660 Marantz professional portable digital recorder and a Rode NTG2 condenser microphone. The three speakers were young urban women with a Master's-level university education. The guided questionnaires were administered by a native speaker of the dialect (Itzel Moreno) and one of the authors. A total of 207 sentences were obtained and an acoustic and perceptual analysis was carried out in order to apply the ToBI annotation. The results of the analysis were compared in Mexico with the production of a female Spanish speaker from México DF aged 15 responding to a control interview. For each sentence, waveforms, pitch tracks and wideband spectrograms were displayed with Praat speech analysis software (Boersma and Weenink 2010) and then annotated manually using the Sp_ToBI labelling conventions, which are based on the first Sp_ToBI proposal (Beckman et al. 2002) as well as its revised version (Face and Prieto 2007, Estebas-Vilaplana and Prieto 2008).

This section describes the basic nuclear configurations found in Mexican Spanish within the Sp_ToBI framework. We consider broad and narrow focus statements, yes-no questions, wh- questions, imperatives and vocatives. Some of the non-neutral (biased) intonation patterns related to the elicited meanings and nuances obtained from the questionnaires are also discussed and exemplified with new empirical data. This is done, for instance, with contradiction statements, statements of the obvious and invitation questions, among others.

3.1. Statements

3.1.1. Broad focus statements

Figure 1 shows the waveform, spectrogram and F0 pitch track of the broad focus statement *Ana tomó limonada* 'Ana had lemonade' produced with L+>H* prenuclear pitch accent followed by a L* L% nuclear configuration (see Quilis 1993: 456, Prieto, Van Santen and Hirschberg 1995, Sosa 1999: 195). The final low nuclear configuration in broad focus statements is quite common in other dialectal varieties of Spanish. For example, it has been found in Argentinian Spanish (Gabriel et al. this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume), Castilian Spanish (Estebas-Vilaplana and Prieto this volume), Ecuadorian Andean Spanish (O'Rourke this volume), and Venezuelan Andean Spanish (Astruc et al. this volume). Yet as we will see below, this is not the most frequent pattern found in Mexican Spanish spontaneous speech.

Prenuclear L+>H* rising pitch accents in Mexican Spanish have been studied in depth by Prieto, van Santen and Hirschberg (1995), Prieto, Shih and Nibert (1996) and Prieto (1998). Their results reveal that the L F0 valley is aligned near the onset of the stressed syllable and that the peak location depends on the position of the syllable within the utterance. In prenuclear accents the peak is not temporally aligned with the accented syllable but rather displaced forward. Although the rise starts at the beginning of the stressed syllable, it usually ends in the posttonic syllable (though the position depends on the right-hand prosodic environment). This delayed peak can be analysed as a L+>H* pitch accent (Face and Prieto 2007). These findings are also consistent with results from Castilian Spanish (Navarro Tomás 1944, Llisterri, Machuca, de-la-Mota, Riera and Ríos 2003, de-la-Mota 1995, 1997, 2005, Face 1999, 2003). Moreover, there is a progressive lowering in broad focus sentences, also called downstep, whereby each peak usually falls to a lower F0 value than the preceding one.

Mexican Spanish also presents broad focus statements with a so-called circumflex final pattern, which may also be present in other sentences. The circumflex pattern consists of a variety of contours with a rising pitch acent associated with the nuclear accented syllable followed by a sharp fall at the edge. Sosa (1999: 189) remarks that in Mexican Spanish this configuration can be related to statements without a particular narrow focus. In his analysis of Puebla Mexican Spanish, Willis (2005) found that speakers used both patterns (circumflex and downward) in all contexts, although there were individual preferences. Quilis (1993: 456) points out that this nuclear configuration is also attested in Canarian and Puerto Rican Spanish.

The most common and prototypical cases of statement intonation previously found by Martín Butragueño (2004) in his analysis of sociolinguistic interviews end in circumflex configurations such as L+¡H* L% and L+H* L% (with a smaller rising). There are also other possible configurations, namely L+¡H* L- H%[1], the absence of a fall after the tonal peak

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[1] Note that the label L-H% describes an edge with two boundary tones, one from the intermediate phrase and the next from the intonational phrase. In the most recent revisions of Sp_ToBI it is argued that this complexity can be avoided and therefore just one complex boundary tone LH% is proposed at the end of intonational phrases.

(shown as M%, H%, H-) and several other different patterns, most of them downward L* L%. The prototypical pitch accent of a circumflex is considered to be L+¡H*, which is usually followed by a lowering in the boundary tone. Other similar configurations which can be closer or less close to the prototypical configuration (and which may be genetically related variants of same theme) can also be perceived as circumflex. Some of the circumflex patterns described by Martín Butragueño for Mexican Spanish with data from sociolinguistic interviews, however, were not attested in the corpus we used here. Remember that the three subjects who participated in our interview were young urban women with higher education, and this might explain the differences found in circumflex configurations. Some configurations, such as L+¡H* L- H%, might be less common among women, among speakers from a high social status and in formal speech (see Martín Butragueño 2004: 30 and 2006a: 28 for discussion). Taking into account data from men and women with different sociolinguistic profiles and ages, Martín Butragueño (in press) shows that there are social differences in the use of intonational patterns in Mexican Spanish and possibly a diachronic change in progress.

In our corpus of semi-spontaneous interviews, the use of circumflex configurations was attested in both broad and narrow focus statements (among other types of sentences). Figure 2 shows the L+H* L% pattern observed in broad focus statements. The final contour is a combination of a rising pitch accent with the peak aligned at the end of the stressed syllable followed by a falling movement to the L% edge tone. A similar pattern has also been attested in Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega this volume), Domincan Spanish (Willis, this volumen) and Chilean Spanish (Ortiz et al. this volume).

As we will see below, similar circumflex movements have been found in other utterances. Pragmatic correlates like focal interpretation, information status and speaker commitment (among other factors) are related to the variety of circumflex contours, which can be slight or very steep. Circumflexes are particularly relevant from the pragmatic and sociolinguistic perspective and the variation found in Mexican Spanish can be understood as the effect of a series of factors in variationist terms.

3.1.2. Biased statements

3.1.2.1. Narrow focus statements

In Castilian Spanish, words in narrow contrastive focus are highlighted by using a pitch accent where the peak is reached earlier within the syllable than in broad focus statements without a particular emphasis. Moreover, the pitch excursion is wide, so there is a difference in pitch scaling, and there is also a longer duration and higher intensity (de-la-Mota 1995, 1997, Face 2002, Cabrera Abreu and García Lecumberri 2003). The pragmatic-informative value of these utterances can thus be distinguished by using such intonational cues. This circumflex movement has also been related to emphasis marking in Spanish (Navarro 1944: 164, Quilis 1993, Machuca and de-la-Mota 2006, de-la-Mota and Rodero to appear, and others).
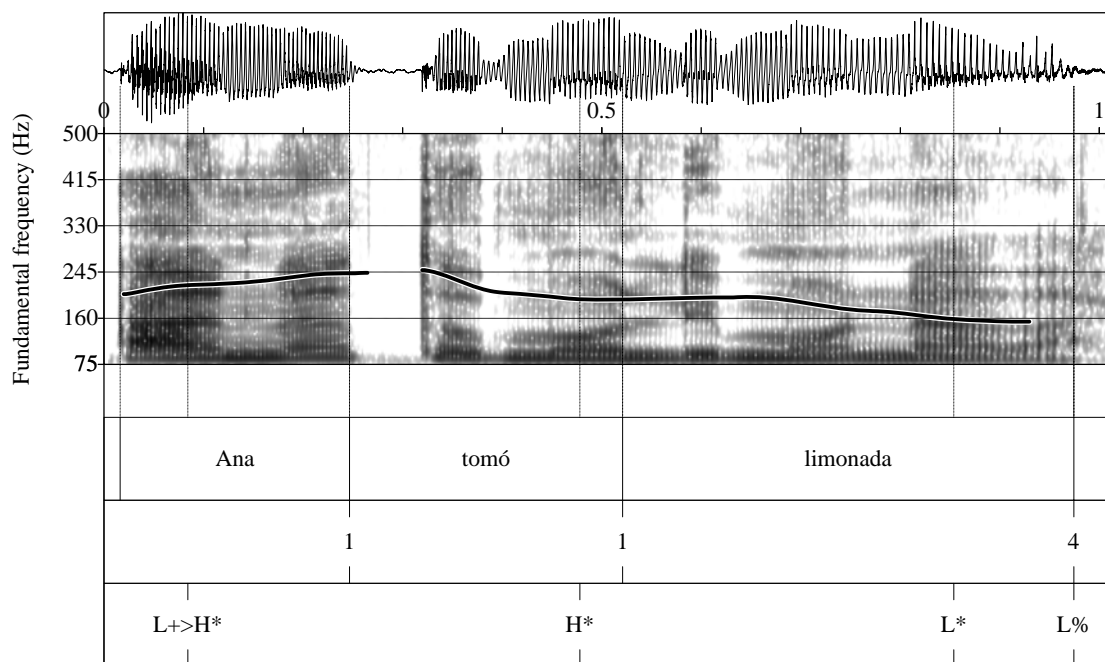
Figure 1: *Waveform, spectrogram and F0 trace for the broad focus statement* Ana tomó limonada *'Ana had lemonade' produced with a L* L% nuclear configuration.*
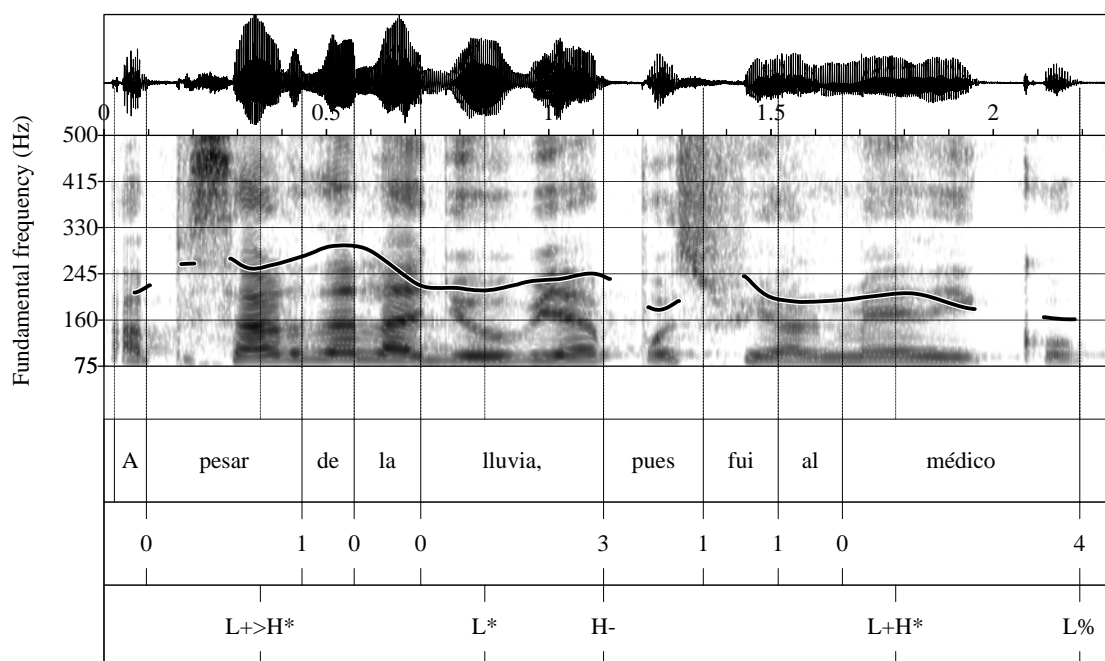

Figure 2: *Waveform, spectrogram and F0 trace for the broad focus statement* A pesar de la lluvia, pues fui al médico *'I went to the doctor's despite the rain' produced with a L+H* L% nuclear configuration.*

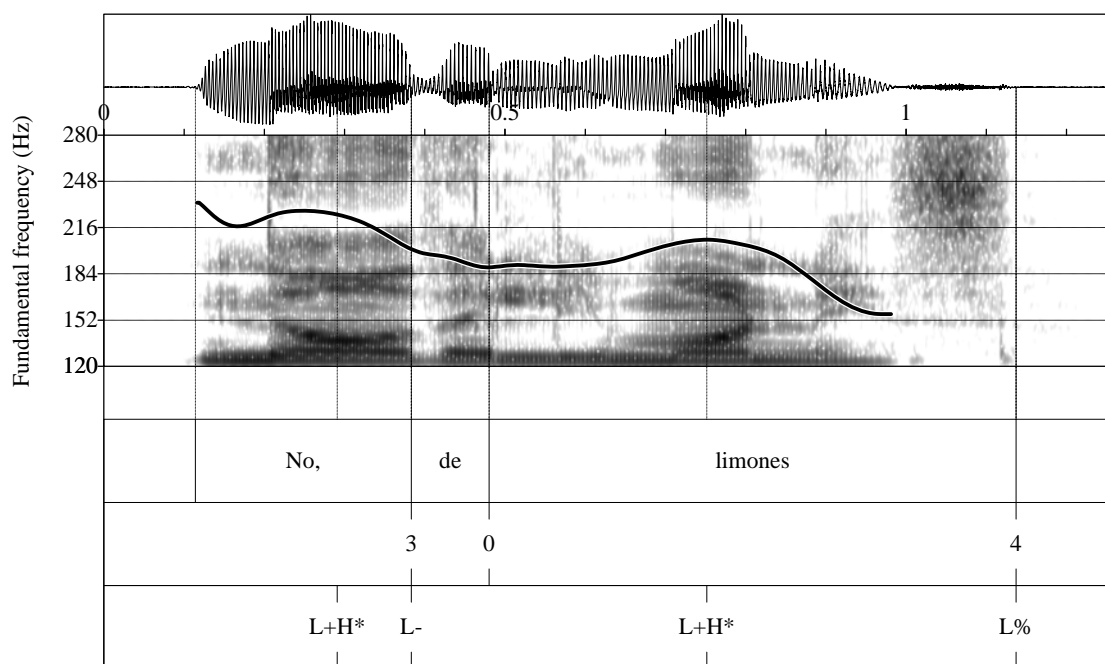**Figure 3:** *Waveform, spectrogram and F0 trace for the narrow focus statement No, de li<u>mo</u>nes 'No, I want lemons' produced with a L+H* L% nuclear configuration.*

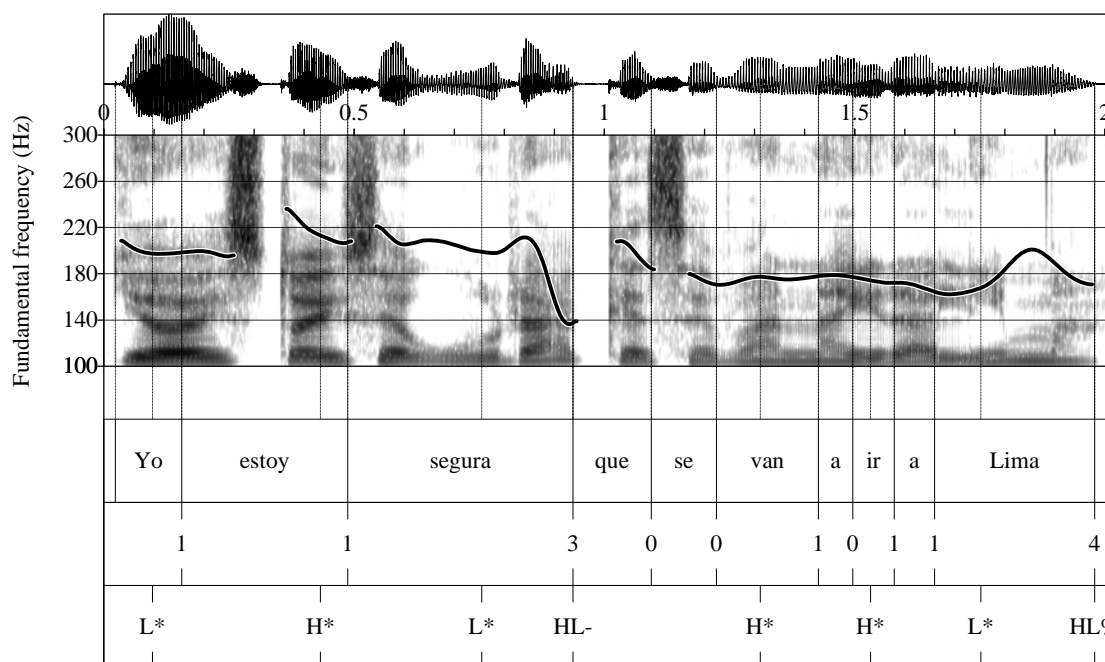**Figure 4:** *Waveform, spectrogram and F0 trace for the contradiction statement <u>Yo</u> es<u>toy</u> se<u>gu</u>ra que se <u>van</u> a <u>ir</u> a <u>Lima</u> 'I am sure that they are going to Lima' produced with a L* HL% nuclear configuration.*

In Mexican Spanish when the highlighted element is in final position the nuclear configuration is also L+H* L% (see figure 3). This configuration is likewise used in Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume), Castilian Spanish (Estebas-Vilaplana and Prieto this volume), Chilean Spanish (Ortiz et al. this volume), Ecuadorian Andean Spanish (O'Rourke, this volume), Puerto Rican Spanish (Armstrong, this volume) and Venezuelan Andean Spanish (Astruc et al. this volume). The peak associated with the last pitch accent is located before the end of the stressed syllable, usually aligned at the end, and then falls to a minimum in the speaker's range. The focused element also seems to have a longer duration and higher intensity, since, as expected, the complexity of the movement is triggering longer durations (see Kim and Avelino 2003 and Martín Butragueño 2004 for Mexican Spanish). Some variation involving scaling can be found among realizations, probably due to differences in the degree of emphasis.

There are some similarities between narrow focus correction statements and contradiction statements like *No, se van a ir a Lima* 'No, they are going to Lima'. In categorical statements without an explicit contradiction or negation, the speaker strongly indicates that there can be no reservations about what is said, since it is known for certain. Figure 4 shows the waveform, spectrogram and F0 contour of the categorical statement *Yo estoy segura que se van a ir a Lima* 'I am sure that they are going to Lima' realized with a L* HL% nuclear configuration. The low tone is temporally aligned with the stressed syllable, which is followed by a HL% edge movement realized in the posttonic syllable. Realizations with the peak aligned at the end of the accented syllable are also possible in Mexican Spanish, since there is a degree of variation due to subtle differences in meaning (see Estebas-Vilaplana and Prieto this volume about Castilian Spanish).

3.1.2.2. Exclamative statements

The nuclear L+H* L% circumflex contour can also be found in exclamatives. Scaling differences due to the degree of emphasis mentioned above for sentences with narrow focus are also present in exclamatives. Figure 5 illustrates a contour with a L+>H* prenuclear accent followed by a L+H* L% configuration. This nuclear contour is also found for exclamative sentences in Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume), Castilian Spanish (Estebas-Vilaplana and Prieto this volume), Chilean Spanish (Ortiz et al. this volume) and Puerto Rican Spanish (Armstrong this volume).

3.1.2.3. Statements of the obvious

Figure 6 shows the waveform, spectrogram and F0 pitch track of the statement of the obvious *[¿Cómo que de quién?] Pues… ¡de Guillermo!* 'Guillermo's [of course]!' produced with a L+H* LM% nuclear configuration. This nuclear configuration expresses a strong conviction on the part of the speaker and is phonetically realized by a rising pitch accent associated with the accented syllable followed by a complex LM% boundary tone configuration. The motivation behind positing a LM% configuration is that some Spanish dialects have a contrast between the L+H* LM%, which expresses a statement of the obvious meaning, and the L+H* LH% nuclear configuration, which expresses an insistent echo question. This type of pitch configuration has also been found in Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume), Castilian Spanish (Estebas-Vilaplana and Prieto this volume) and Puerto Rican Spanish (Armstrong this volume).
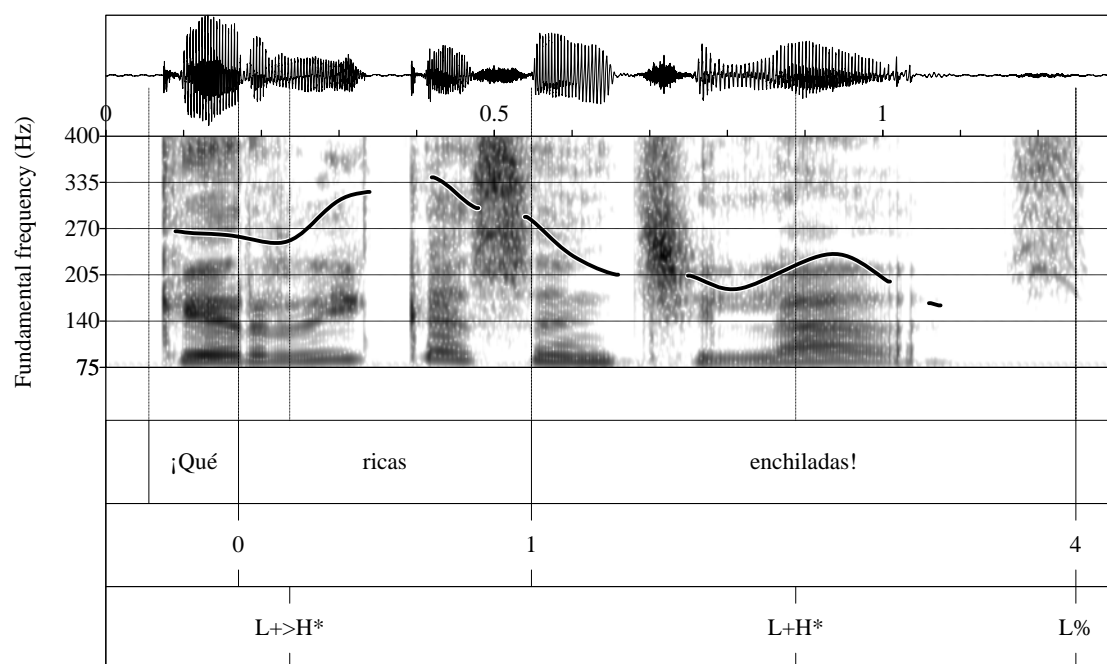
Figure 5: *Waveform, spectrogram and F0 trace for the exclamative statement* ¡Qué <u>ri</u>cas enchi<u>la</u>das! *'What tasty enchiladas!' produced with a L+H* L% nuclear configuration.*
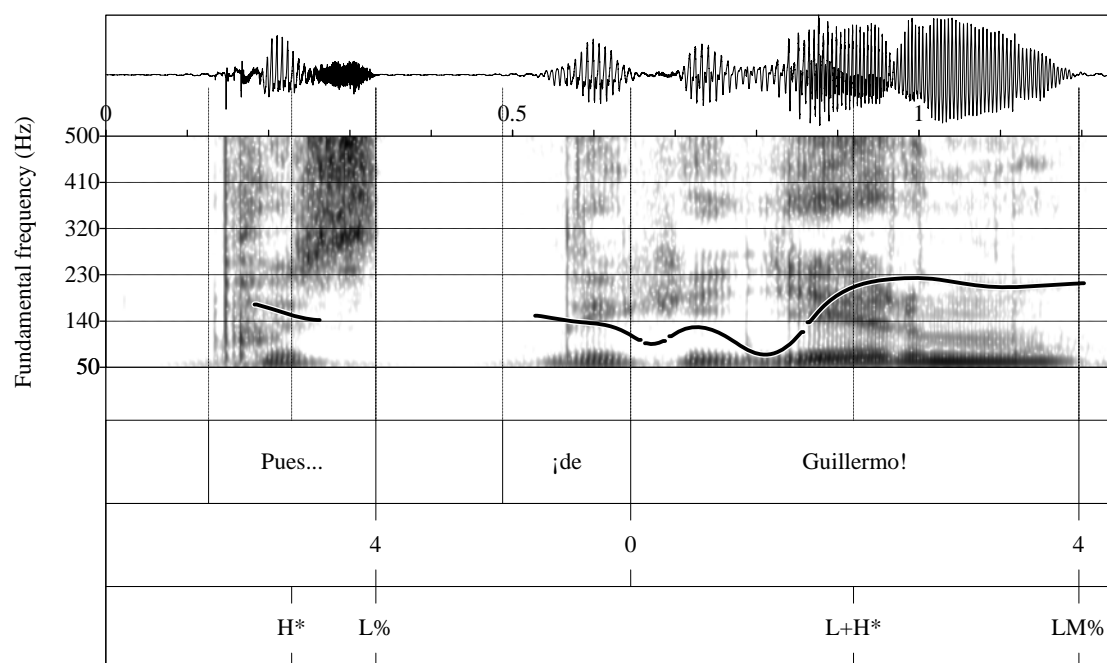

Figure 6: *Waveform, spectrogram and F0 trace for the statement of the obvious* [¿Cómo que de quién?] <u>Pues</u>… ¡de Gui<u>ller</u>mo! *'Guillermo's [of course]!' produced with a L+H* LM% nuclear configuration.*

3.1.2.4. Uncertainty statements

Sentences indicating some lack of sureness on the speaker's part like *Es posible que no le guste mi regalo* 'S/he may not like my present' in figure 7 show the nuclear configuration L+!H* M%, like in many other Spanish dialects. On the other hand, uncertainty can also be expressed linguistically by means of grammatical structures or lexical items (*Es posible* 'It is possible') and by prosodic lengthenings (the vocalic end of *regalo* 'gift').

3.2. Questions

3.2.1. Yes-no questions

Information-seeking yes-no questions in Mexican Spanish are usually produced with a high rise at the end of the utterance (Ávila 2003). Figure 8 shows the waveform, spectrogram and F0 contour of the information-seeking yes-no question *¿Tiene mermelada?* 'Have you got jam?', produced with a L* LH% nuclear pitch configuration. The last pitch accent is realized with a local pitch minimum L*. This low tone continues into the posttonic syllable and then rises dramatically at the end of the utterance. Thus the sentence-final syllable must be especially long in order to contain the two targets belonging to the boundary tone LH%.[2] Quilis (1993: 471), Sosa (1999: 200-202) and Ávila (2003) have also reported a higher and longer final rise in Mexican yes-no questions, a phenomenon which seems to be specific to this Spanish variety.

Prenuclear pitch accents in questions are produced with a rising pitch accent, either L*+ H or L+>H*. These patterns have also been found in Castilian Spanish (Sosa 1999, Cantero 2002, Martínez Celdrán, Fernández Planas and Fullana Rivera 2003). The pitch accent with the H peak aligned with the posttonic syllable in questions has been identified as L+>H* by de-la-Mota (2009). See also Ecuadorian Andean Spanish (O'Rourke this volume), Argentinian Spanish (Gabriel et al. this volume), Canarian Spanish (Cabrera Abreu and Vizcaíno Ortega this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume), Castilian Spanish (Estebas-Vilaplana and Prieto this volume), Chilean Spanish (Ortiz et al. this volume) and Venezuelan Andean Spanish (Astruc et al. this volume).

3.2.2. Biased yes-no questions

3.2.2.1. Echo yes-no questions

The nuclear configuration L* LH% is also attested in echo questions in Mexican Spanish, when the speaker is repeating the time information and asking if it has been correctly understood. This is the case of *¿Las nueve?* '[At] nine?' in Figure 9. One of the features that characterize these echo questions is the extreme height of the final boundary tone H%.

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[2] This complex boundary tone was proposed for Spanish by Díaz Campos and Tevis (2002), who analysed on the basis of a text read aloud by speakers of eight Spanish dialects. They found that LH% boundary tones are often related in discourse to continuative-non-final situations, as is the case in Mexican Spanish.
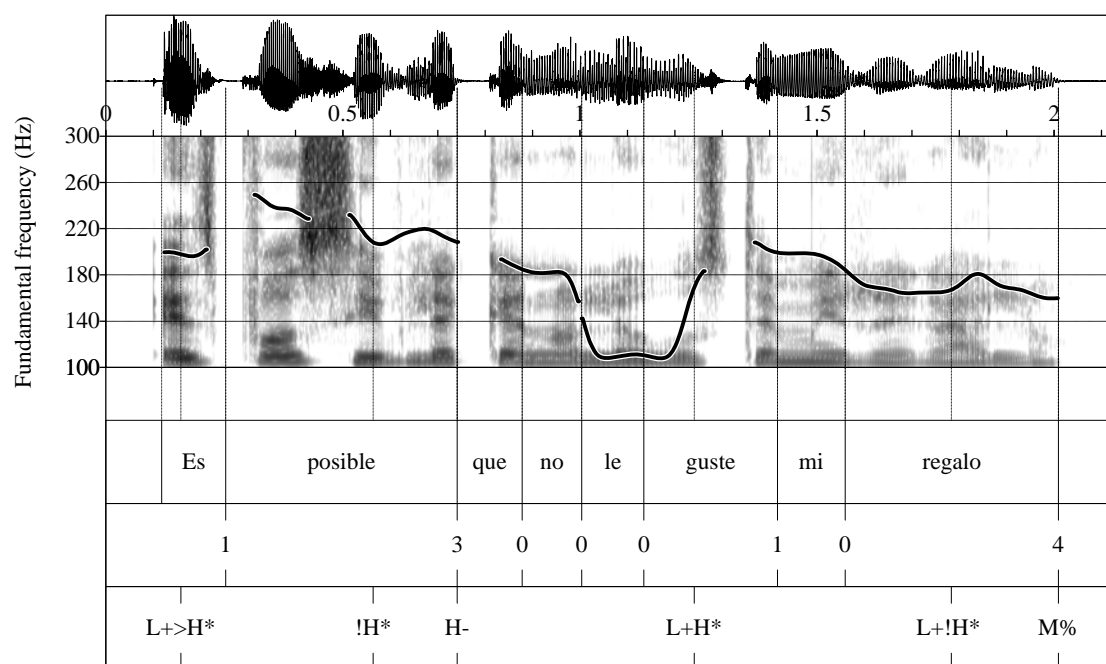
Figure 7: *Waveform, spectrogram and F0 trace for the uncertainty statement* Es po<u>si</u>ble que no le <u>gus</u>te mi re<u>ga</u>lo *'S/he may not like my present' produced with a L+!H* M% nuclear configuration.*
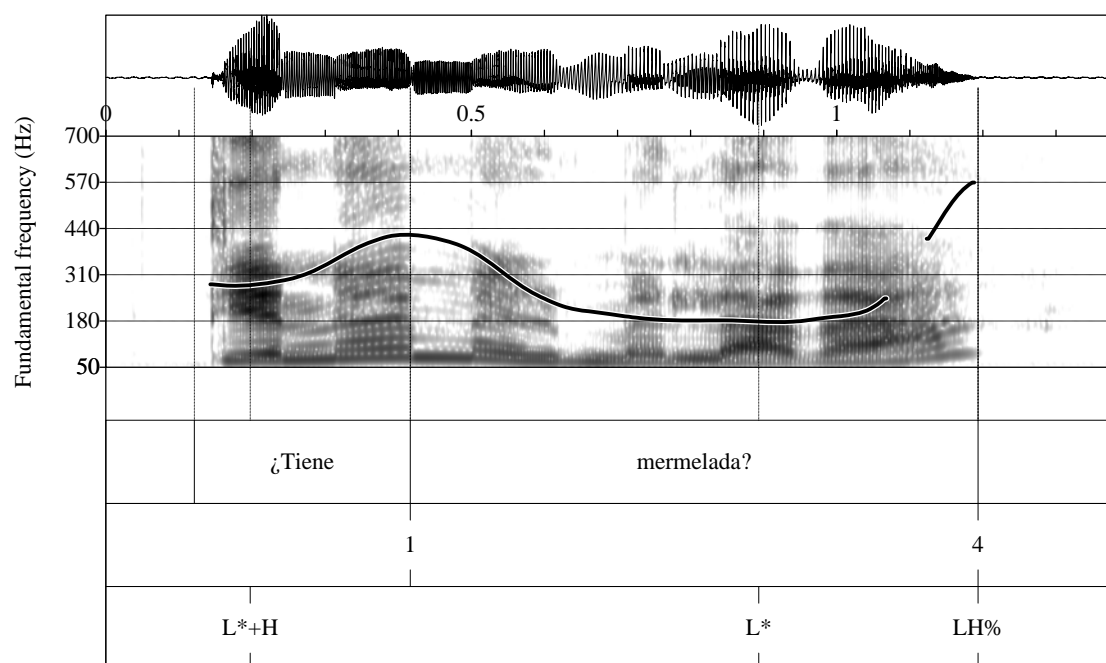

Figure 8: *Waveform, spectrogram and F0 trace for the information-seeking yes-no question* ¿<u>Tie</u>ne merme<u>la</u>da? *'Have you got jam?' produced with a L* LH% nuclear configuration.*

Counterexpectational yes-no questions show incredulity and surprise about something that has happened or that has been stated earlier in the conversation. This incredulity meaning is conveyed in the prenuclear accent by a low pitch aligned with the accented syllable and followed by a rise, i. e. by a L*+H prenuclear pitch accent. This contour is quite similar to the pattern found at the end of the utterance. The phonetic difference between information-seeking on one hand and echo and counterexpectational yes-no questions on the other lies in the duration and pitch height of the boundary tones, which have higher values in echo questions. This is, for instance, the case of the sentence *¡¿Tienes frío?!* 'You're cold?!' shown in figure 10.

Figures 8 and 10 illustrate two types of interrogative sentences as uttered by the same speaker (an information-seeking question and a counterexpectational echo question) that use the same nuclear configuration L* LH%. Crucially, the utterance-final posttonic syllable rises to 590 Hz in the information-seeking question (figure 8) but to 674 Hz (84 Hz more) in the echo question (figure 10). There is also a significant difference in duration. The duration of the utterance-final vowel [o] in the echo question (figure 10) is 298 ms., while the duration of the final vowel [a] in the information-seeking question (figure 8) is just 216 ms. This is particularly relevant since [a] is considered to have a longer intrinsic duration than [o].

3.2.2.2. Imperative yes-no questions

Yes-no questions can also be used to express commands. Again, among other possible realizations, the imperative yes-no question contour can be realized as a L* LH% nuclear pitch configuration, that is, a low pitch accent followed by a final LH% rise. Crucially, figure 11 shows that the highest peak in the imperative yes-no question *¿Se pueden callar?* 'Would you please be quiet?' is associated with the prenuclear L+>H* pitch accent. The F0 reaches 561 Hz in the syllable -*den* but just 496 Hz (65 Hz less) at the end of the utterance.

Polite invitation or request yes-no questions are used to offer something to the listener and are expressed by means of a different intonation contour (see Escandell-Vidal 1999, 2002, and Thorson et al. 2009 for Castilian Spanish). Figure 12 shows the waveform, spectrogram and F0 contour of the invitation yes-no question *¿Quieren caramelos?* 'Do you want some sweets?' produced with a L* HH% nuclear configuration, which consists of a low tone during the stressed syllable followed by a high rise in the posttonic.[3]

Although in Mexican Spanish both invitation and information-seeking yes-no questions end in a high rise, the starting point of this rise seems to be important for distinguishing between the two meanings. While an early rise in L* HH% seems to indicate the invitation meaning, a late rise L* LH% is used for information-seeking questions. Interestingly, a similar kind of contrast has been found in Castilian Spanish (see Escandell-Vidal 1996, 1999, Thorson et al. 2009, Estebas-Vilaplana and Prieto this volume). In this variety, invitation yes-no questions show a L+H* HH% contour, with an early rise which starts at the beginning of the stressed syllable, while the 'later' alignment is found in information-seeking yes-no questions, with a L* HH% configuration.

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[3] Regarding the potential contrastive differences found in Castilian Spanish between H%, showing a weak rise, and HH%, with a higher pitch excursion, see Estebas-Vilaplana and Prieto (2008).
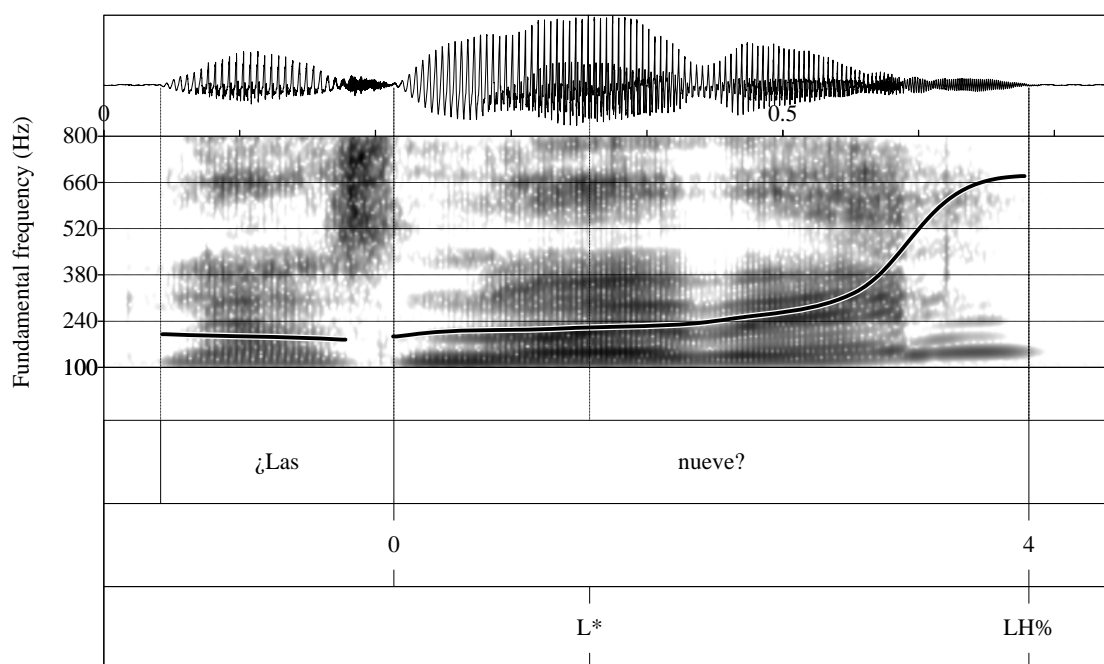
Figure 9: *Waveform, spectrogram and F0 trace for the echo yes-no question ¿Las <u>nue</u>ve? '[At] nine?' produced with a L* LH% nuclear configuration.*
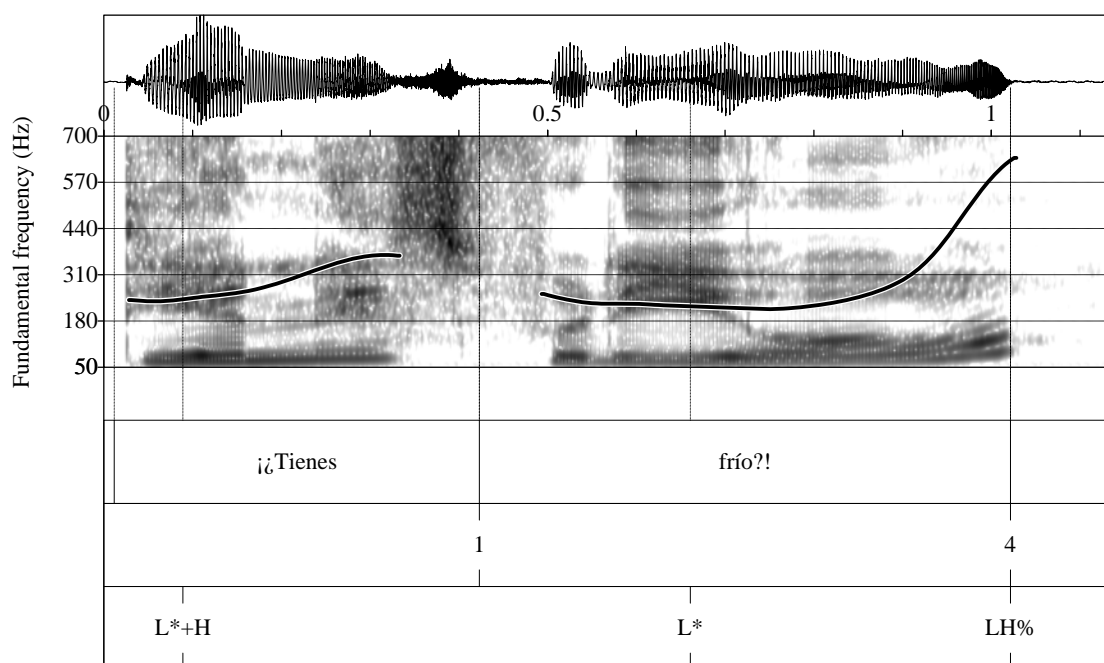

Figure 10: *Waveform, spectrogram and F0 trace for the counterexpectational echo question ¡¿<u>Tie</u>nes <u>frí</u>o?! 'You're cold?!' produced with a L* LH% nuclear configuration.*
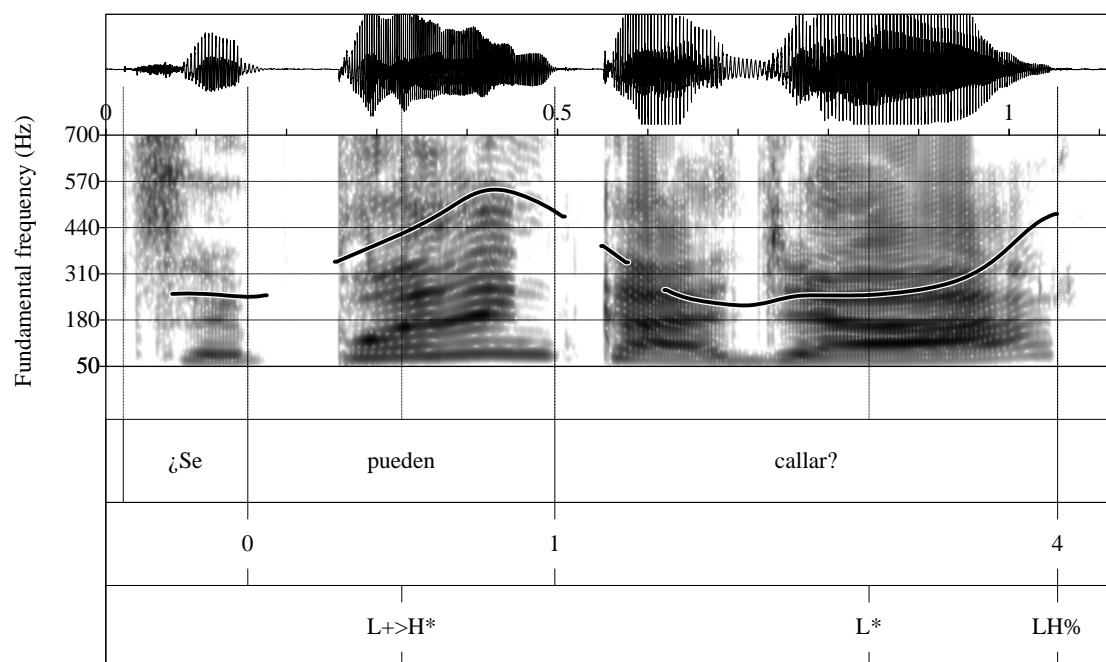
Figure 11: *Waveform, spectrogram and F0 trace for the imperative yes-no question ¿Se pue̱den callar? 'Would you please be quiet?' produced with a L* LH% nuclear configuration.*
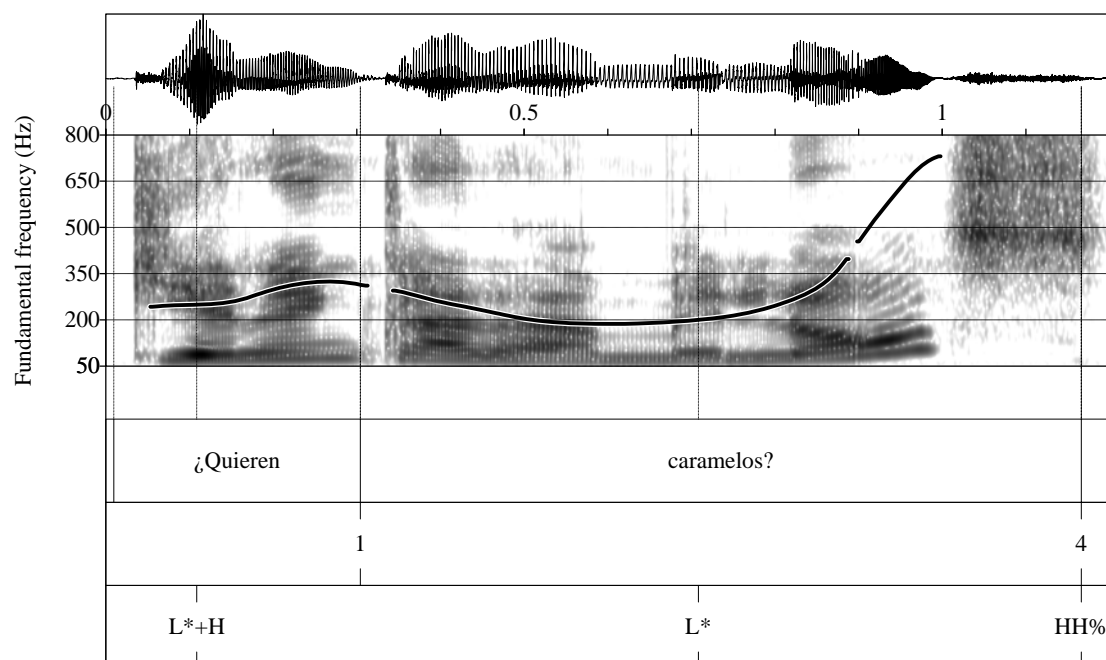

Figure 12: *Waveform, spectrogram and F0 trace for the invitation yes-no question ¿Quie̱ren cara̱melos? 'Do you want some sweets?' produced with a L* HH% nuclear configuration.*

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Figure 13 shows a schematic F0 representation of the types of nuclear configurations found in invitation yes-no questions and information-seeking yes-no questions, in both Castilian (Estebas-Vilaplana and Prieto this volume) and Mexican Spanish. The diagram shows that the same configuration, in this case L* HH%, can be attested in both varieties but may be used for different meanings. Further perceptual experiments should be able to elucidate whether there is a categorical phonological contrast between these two types of contours.
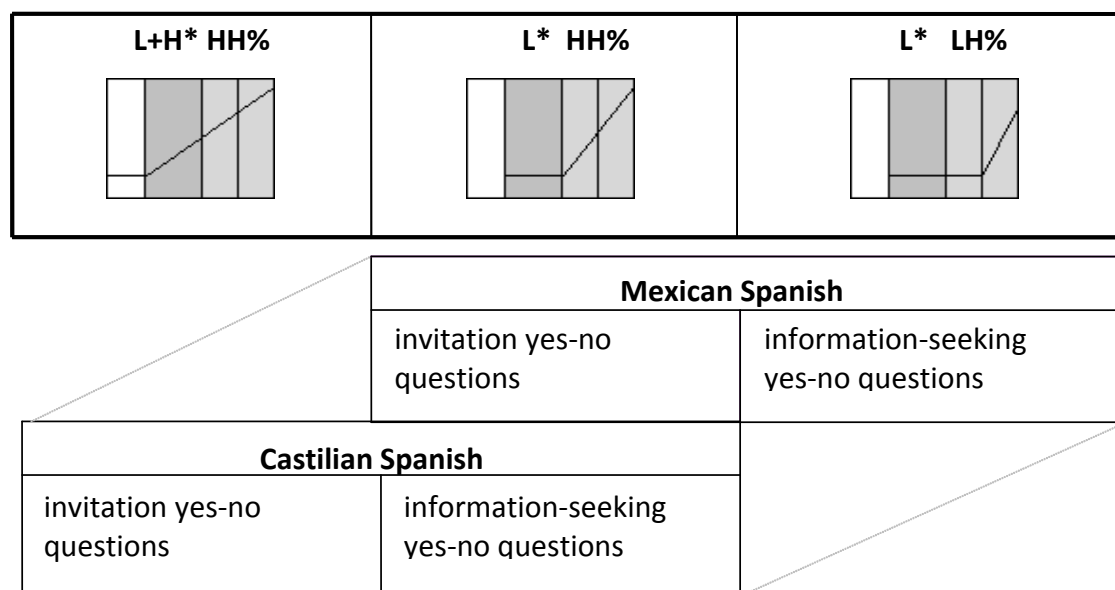

Figure 13: *Schematic F0 representation of the types of nuclear configurations found in invitation yes-no questions and information-seeking yes-no questions in Castilian and Mexican Spanish.*

3.2.2.3. Confirmation yes-no questions

In our corpus, confirmation-seeking sentences are elicited with a situation that prompts the speaker to ask for a confirmation of something that he or she already knows. In this specific case, the speaker is trying to confirm whether the listener really is going to have dinner with her, by asking *¿Entonces sí vienes a cenar?* 'So you are coming to dinner, then?' As can be seen in figure 14, the pitch rises at the edge, though it does not reach as high in the speaker's range as it can in some other types of questions. For this reason the nuclear configuration chosen is L* H%. The sentences in figures 8, 10 and 14, uttered by the same speaker, can be compared to illustrate this phenomenon. The final boundary tone reaches a very high value in the counterexpectational echo yes-no question (674 Hz, figure 10), only a moderately high value in the information-seeking question (590 Hz, figure 8) and a still lower value in the confirmation yes-no question (473 Hz, figure 14).

3.2.3. Wh- questions

As has been noted in previous studies, there is great variability in wh- questions in Spanish varieties, including Mexican Spanish, since rising, falling and rising-falling patterns have all been found (Quilis 1993, Sosa 1999, Ávila 2003, Orozco 2008, 2010). In this study, the most common F0 contour found in wh- questions was produced with a circumflex contour L+H* HL% (fig. 15). This nuclear pitch configuration consists of a F0 rise associated with the last stressed syllable which continues during the onset of the following syllable. After the peak, the pitch falls to a low that is realized a bit higher than the initial low and which probably indicates politeness. A similar pitch contour can be found in Chilean Spanish (Ortiz et al. this volume).

Other circumflex configurations have also been attested in biased wh- questions. Exclamative and imperative wh- questions are similar, since the nuclear configuration L+H* L% can be used.

3.2.4. Biased wh- questions

3.2.4.1. Echo wh- questions

The echo wh- question *¿Que adónde voy?* 'You're asking me where I'm going?' in figure 16 acts as a kind of comprehension or perception check for an utterance which precedes it in the discourse. It shows a L*+H prenuclear accent followed by the unmarked L* LH% nuclear configuration. The last accented syllable starts low and then the pitch rises to a very high target edge.

Counterexpectational wh- questions such as that in figure 17 are similar to other emphatic constructions like narrow focus statements, where the L+H* L% configuration is also used. The rising pitch accent L+H*, which can be realized with different degrees of emphasis, is associated with the final stressed syllable, and the boundary tone is low.

3.2.4.2. Imperative wh- questions

When the speaker produces an interrogative but is trying to induce an action on the part of the listener as a result, the utterance can be considered a sort of command. This is the case of the sentence *Oye, ¿y cuándo me vas a colgar los cuadros?* 'Listen, so when are you going to hang up the paintings?' in figure 18. The nuclear configuration is phonetically realized as a rising pitch movement with a peak in the accented syllable followed by a fall to a low boundary tone in the posttonic.

Figure 19 shows the waveform, spectrogram and F0 pitch track of the invitation wh- question *Pero, ¿por qué no van a venir?* 'Why aren't you going to come?' produced by the same speaker with a L+¡H* M% nuclear configuration in an exhortative context (trying to cajole some friends). Presumably, the final M% tone in this configuration indicates the invitation function. In some invitation realizations, the end of the utterance can be lowered further in the speakers' range, with a drop in the local pitch register and even a creaky voice to mark the plea.
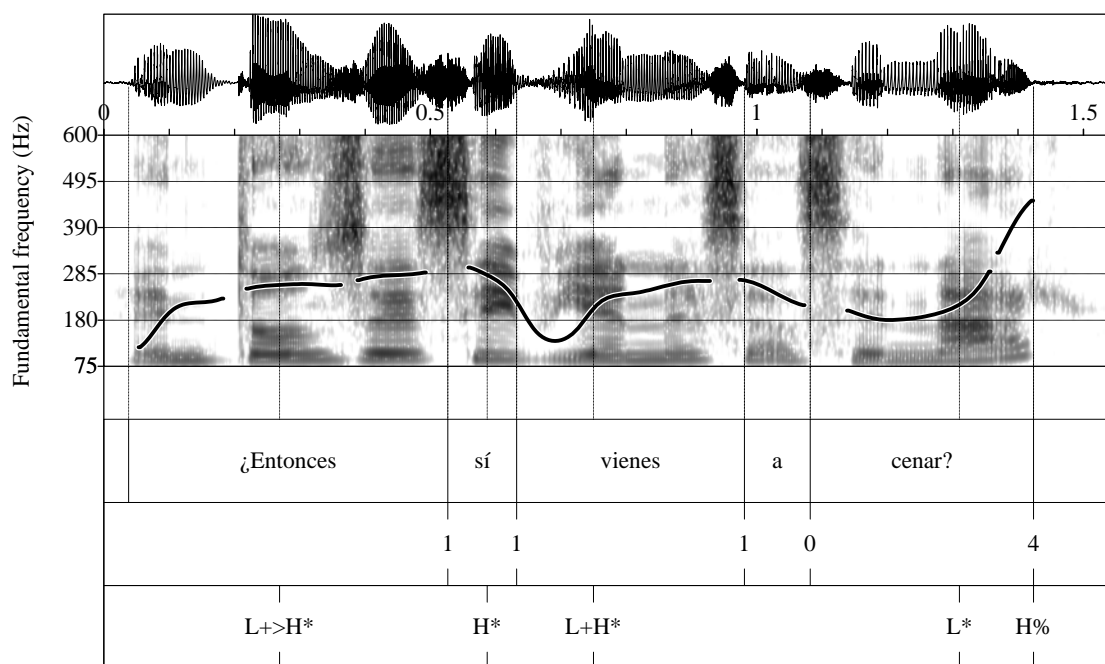
Figure 14: *Waveform, spectrogram and F0 trace for the confirmation yes-no question ¿En<u>ton</u>ces <u>sí</u> <u>vie</u>nes a ce<u>nar</u>? 'So you are coming to dinner, then?' produced with a L* H% nuclear configuration.*

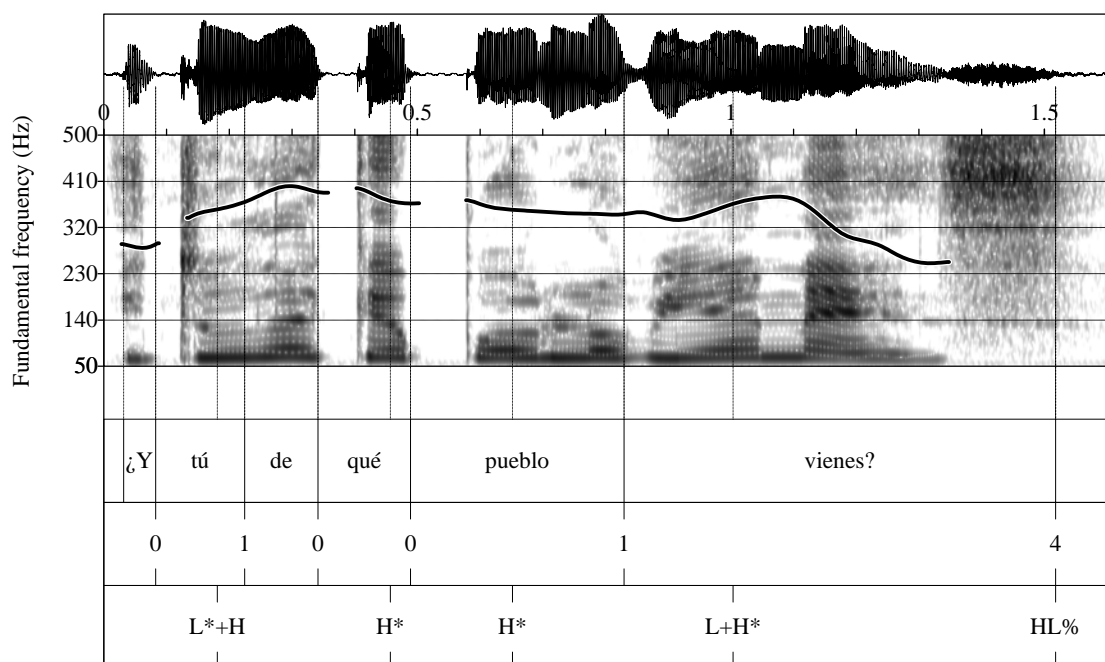
Figure 15: *Waveform, spectrogram and F0 trace for the information-seeking wh- question ¿Y <u>tú</u> de <u>qué</u> <u>pue</u>blo <u>vie</u>nes? 'And you, whereabouts are you from?' produced with a L+H* HL% nuclear configuration.*
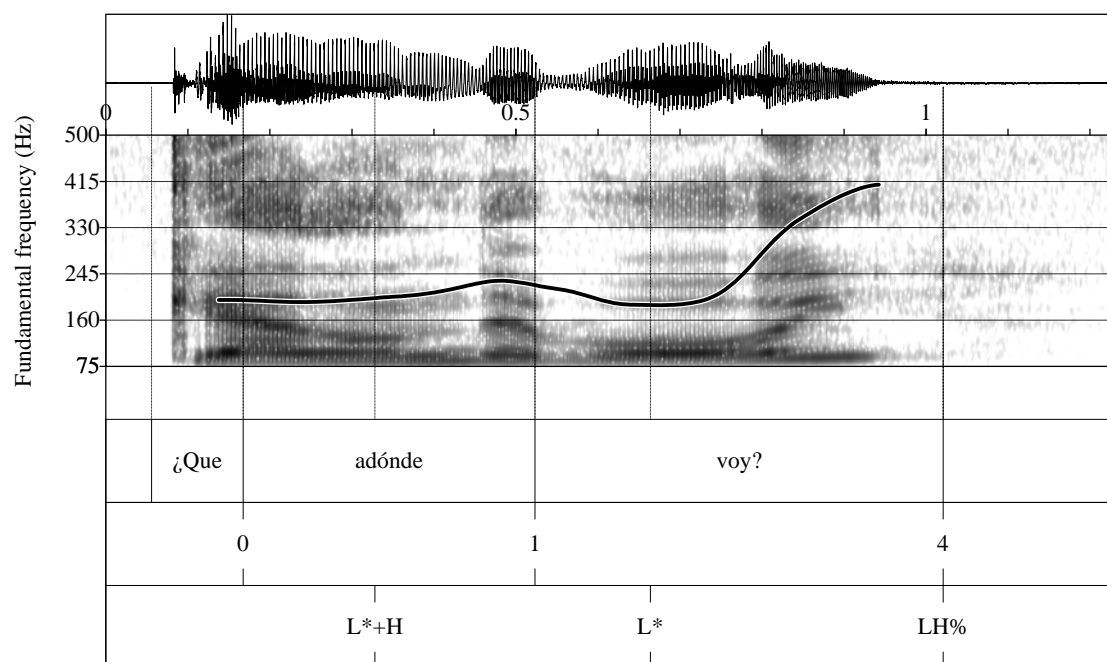
Figure 16: *Waveform, spectrogram and F0 trace for the echo wh- question ¿Que a<u>dón</u>de <u>voy</u>? 'You're asking me where I'm going?' produced with a L* LH% nuclear configuration.*
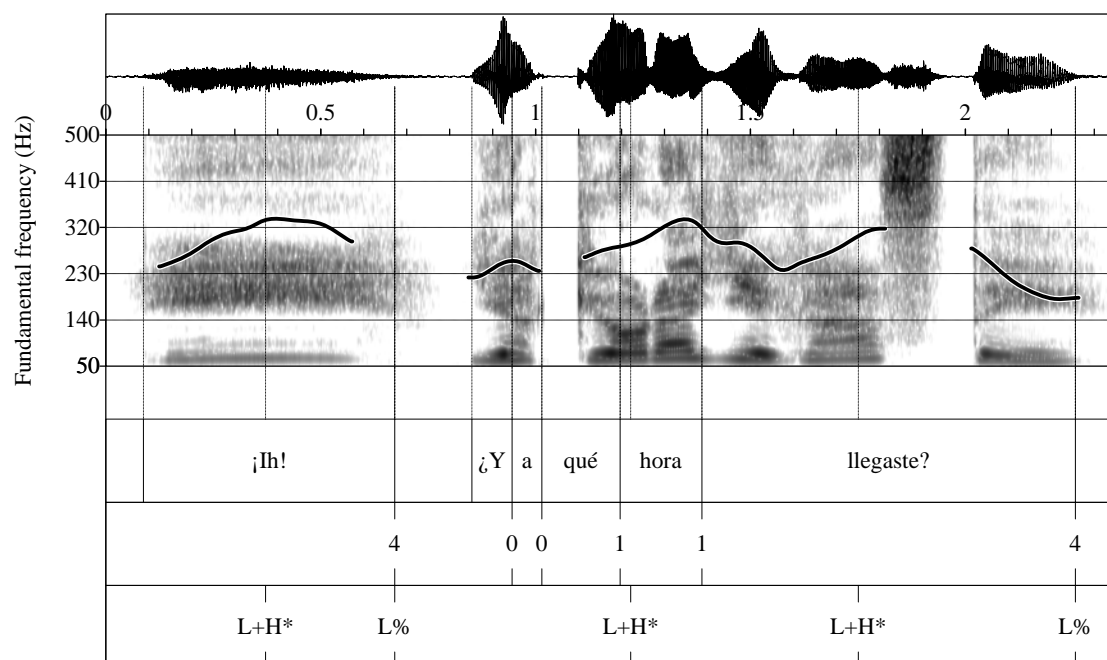

Figure 17: *Waveform, spectrogram and F0 trace for the counterexpectational wh- question ¡Ih! ¿Y a qué <u>ho</u>ra lle<u>gas</u>te? 'So what time did you arrive?' produced with a L+H* L% nuclear configuration.*
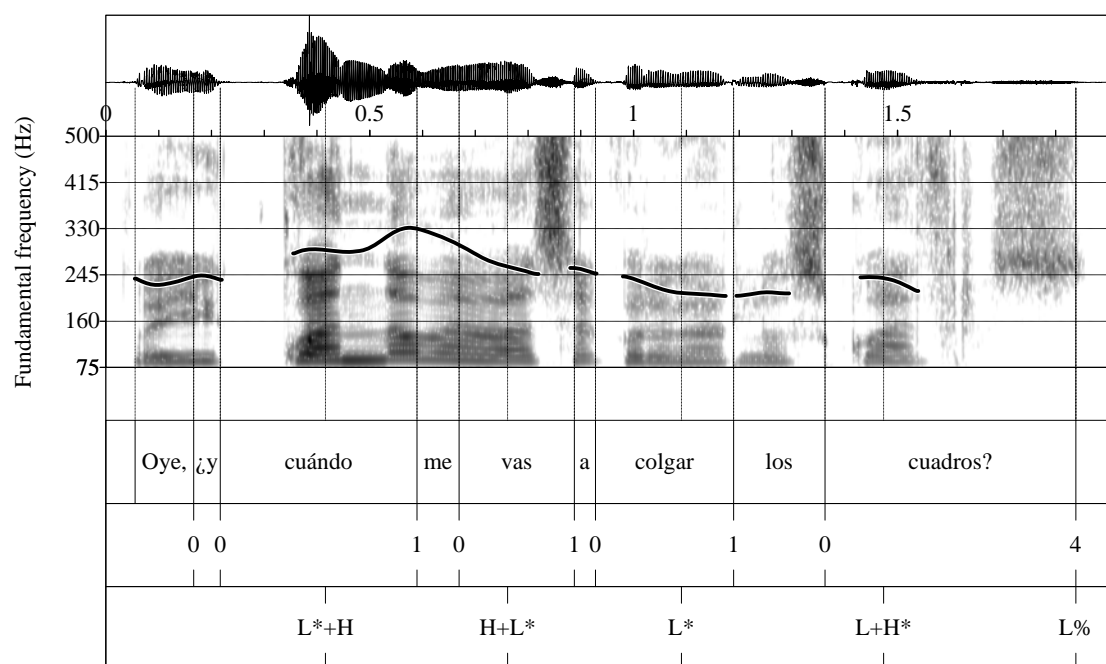
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Figure 18: *Waveform, spectrogram and F0 trace for the imperative wh- question* Oye, ¿y <u>cuán</u>do me <u>vas </u>a col<u>gar</u> los <u>cua</u>dros? *'Listen, so when are you going to hang up the paintings?' produced with a L+H* L% nuclear configuration.*
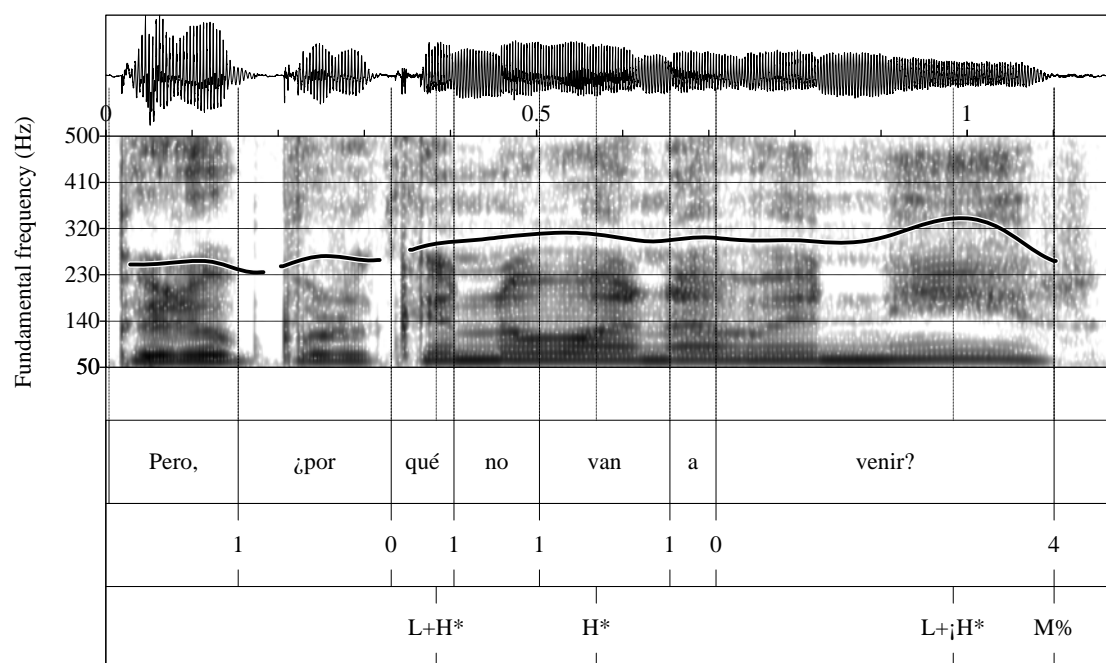

Figure 19: *Waveform, spectrogram and F0 trace for the invitation wh- question* Pero, ¿por <u>qué</u> no <u>van</u> a ve<u>nir</u>? *'Why aren't you going to come?' produced with a L+¡H* M% nuclear configuration.*

3.3. Imperatives: commands and requests

Although imperative utterances are understood as directive speech acts in which the speaker seeks to induce the listener to do something, speakers can use different degrees of strength to express their objective, with utterances ranging from strong commands to gentle requests where the speaker uses a soft cajoling intonation. In Mexican Spanish, both commands and requests are produced with circumflex patterns, but they employ different types of boundary tones (see also Orozco 2008, 2010). While in commands the falling movement triggered by the low boundary tone starts during the accented syllable, requests are produced using a bitonal HL% boundary tone, where the high tone is still associated with the posttonic syllable.

3.3.1. Commands

As in other Spanish dialects (see Ortiz et al. this volume for Chilean Spanish, for example), the nuclear configuration used to express commands is L+H* L% (sometimes produced with an emphatic upstepped accent). This is exemplified in figure 20 with the utterance *¡Ven aquí ahorita mismo!* 'Come here right now!'. Similar pitch contours are found in Castilian Spanish (Estebas-Vilaplana and Prieto this volume), Chilean Spanish (Ortiz et al. this volume) and Venezuelan Andean Spanish (Astruc et al. this volume).

3.3.2. Requests

Requests communicate a softer illocutionary strength than commands and are commonly produced with a L+H* HL% tonal configuration. This is illustrated in figure 21 with the insistent request *¡Ay, ya! Vamos al cine, [no seas payaso]* 'Come on, [don't be an idiot,] let's go to the cinema!' The circumflex movement can appear at the end of both the intermediate (L+H* HL-) and intonational phrase boundaries (L+H* HL%). In this pitch configuration, the high tone at the end of the stressed syllable *ci-* is kept high during the onset of the posttonic syllable *-ne* and then the pitch falls till the end of the intermediate phrase. This pattern is similar to the pitch contours found in Argentinian Spanish (Gabriel et al. this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume) and Chilean Spanish (Ortiz et al. this volume).

3.4. Vocatives

As is well known, vocatives are used to call to someone, commonly out of sight, by trying to catch his or her attention. The 'spoken chant' or 'stylised vocative chant' typically consists of a high tone associated with the stressed syllable followed by a mid tone associated with the posttonic syllables. This final sustained mid tone is widely used in vocatives in languages like English (Ladd 1978), Dutch (Gussenhoven 1993), French (Fagyal 1997), Portuguese (Frota in press) and Catalan (Prieto in press), and it is also found in Mexican Spanish. However, as expected, within this utterance type different contours can be used to convey subtle differences in meaning. The following three cases are instances of the same utterance, namely the proper name *Marina*, used as a vocative. This vocative is produced with a L+H* or a L* pitch accent and followed by one of two types of boundary tones, namely M% or HL%, depending on the intended meaning. The last syllable is clearly lengthened. These contours are described below.
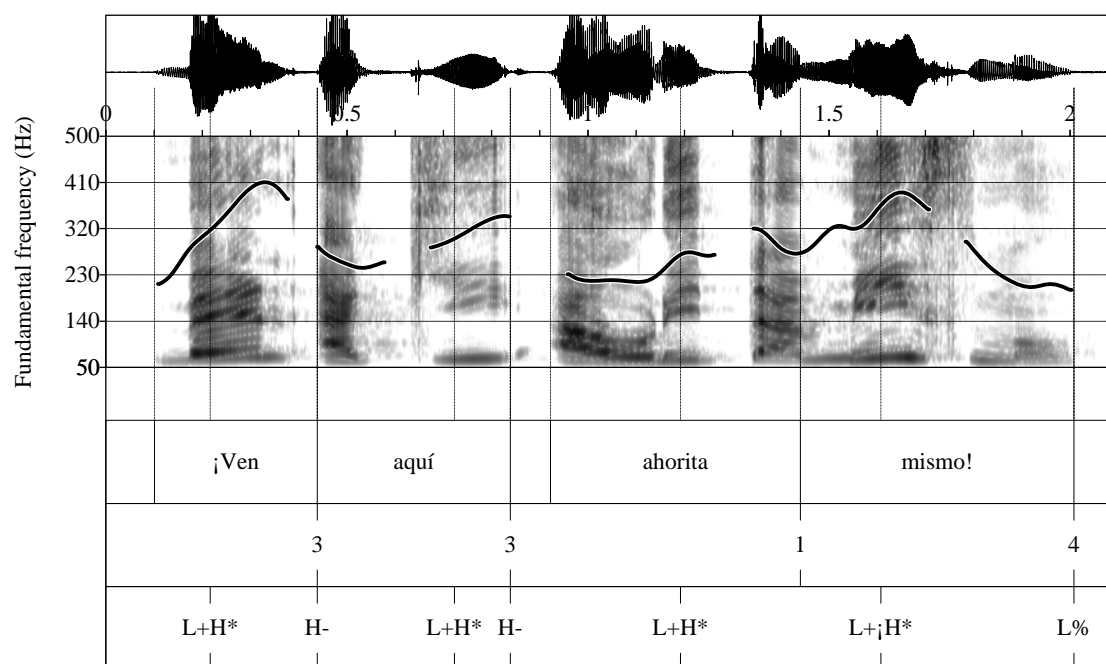
Figure 20: *Waveform, spectrogram and F0 trace for the command* ¡Ven aquí ahorita mismo! *'Come here right now!' produced with a L+¡H* L% nuclear configuration.*
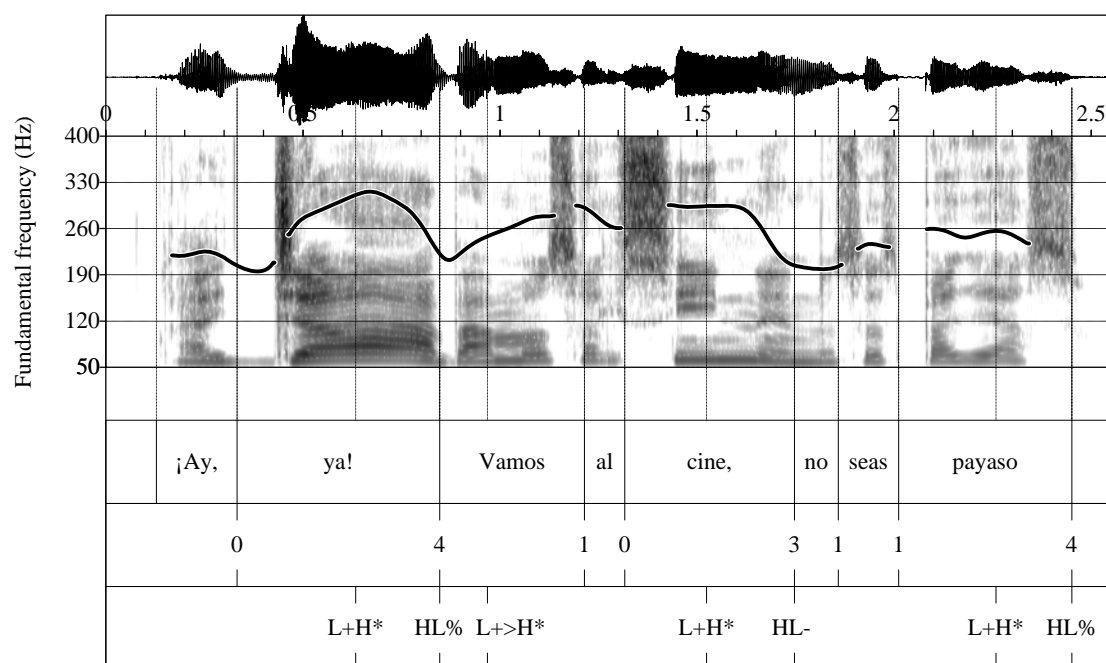

Figure 21: *Waveform, spectrogram and F0 trace for the request* ¡Ay, ya! Vamos al cine, no seas payaso *'Come on, don't be an idiot, let's go to the cinema!' produced with a L+H* HL- nuclear configuration.*

When demanding attention gently and softly to someone who is not necessarily out of sight or far away it is common to use a contour which is usually called 'vocative chant'. This tentative call is used when entering a house and calling. In this case, after a rise, the peak is located right at the onset of the postonic syllable, which is followed by a pitch level that is sustained until the end of the utterance. This is exemplified in figure 22 with the vocative *¡Mar<u>i</u>na!*

The nuclear configuration L+H* M% has also been attested for vocatives in other Spanish varieties like Argentinian Spanish (Gabriel et al. this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume), Castilian Spanish (Estebas-Vilaplana and Prieto this volume), Chilean Spanish (Ortiz et al. this volume), Ecuadorian Andean Spanish (O'Rourke this volume), Puerto Rican Spanish (Armstrong this volume) and Venezuelan Andean Spanish (Astruc et al. this volume).

Vocatives are also used when trying to get the attention of someone who will probably have difficulty hearing us because of distance or who has not answered a first call. In Mexican Spanish, the nuclear rising pitch accent of these sorts of insistent calling vocatives starts with the accented syllable, rises fast, ends in a high plateau which spreads across the posttonic lengthened syllable and finally sinks downward at the very end to a low level. This L+H* HL% contour is exemplified in figure 23.

The pattern L+H* HL% found in Mexican Spanish is similar to the one attested in Argentinian Spanish (Gabriel et al. this volume), Canarian Sapnish (Cabrera Abreu and Vizcaíno Ortega this volume), Castilian Spanish (Estebas-Vilaplana and Prieto this volume), Cantabrian Spanish (López-Bobo and Cuevas-Alonso this volume), Domincan Spanish (Willis this volumen), Puerto Rican Spanish (Armstrong this volume) and Venezuelan Andean Spanish (Astruc et al. this volume).

Vocatives can also be used as insistent requests or recriminations, with a nuance of admonition, in situations where a soft call would be inappropriate. Such recriminating vocatives in Mexican Spanish are related to a L* HL% tonal configuration. The pitch rises gradually to a high level which is achieved late, during the last vowel. Then there is a final fall to the speaker's minimum range. Figure 24 shows this contour in the sequence *¡Mar<u>i</u>na!*

Finally, request vocatives can also be produced with a L+H* L% nuclear configuration with other associated meanings, such as admonition. Although the nuclear pitch accent is the same as in other vocative types, the low, long, flat ending might conceivably be responsible for the admonitory content. This utterance type is shown in figure 25.

It would be of interest to undertake perceptual tests in order to demonstrate that the abovementioned changes in the nuclear and boundary tone regions of the nuclear configuration lead to such meaning contrasts in vocatives.
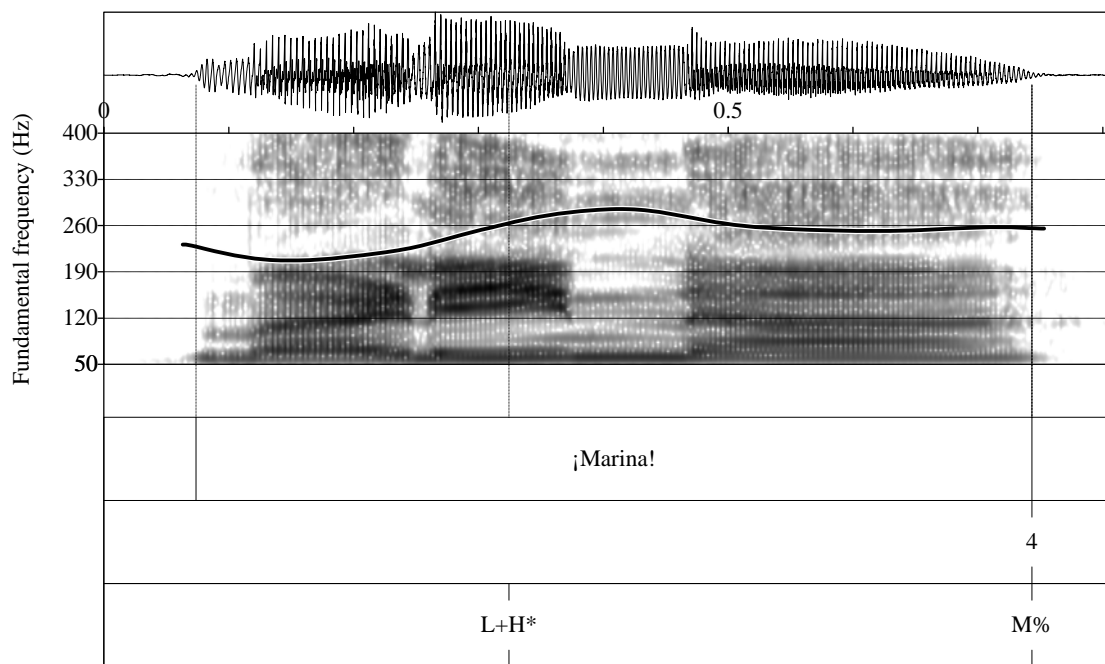
Figure 22: *Waveform, spectrogram and F0 trace for the tentative call* ¡Ma<u>ri</u>na! *produced with a L+H* M% nuclear configuration.*
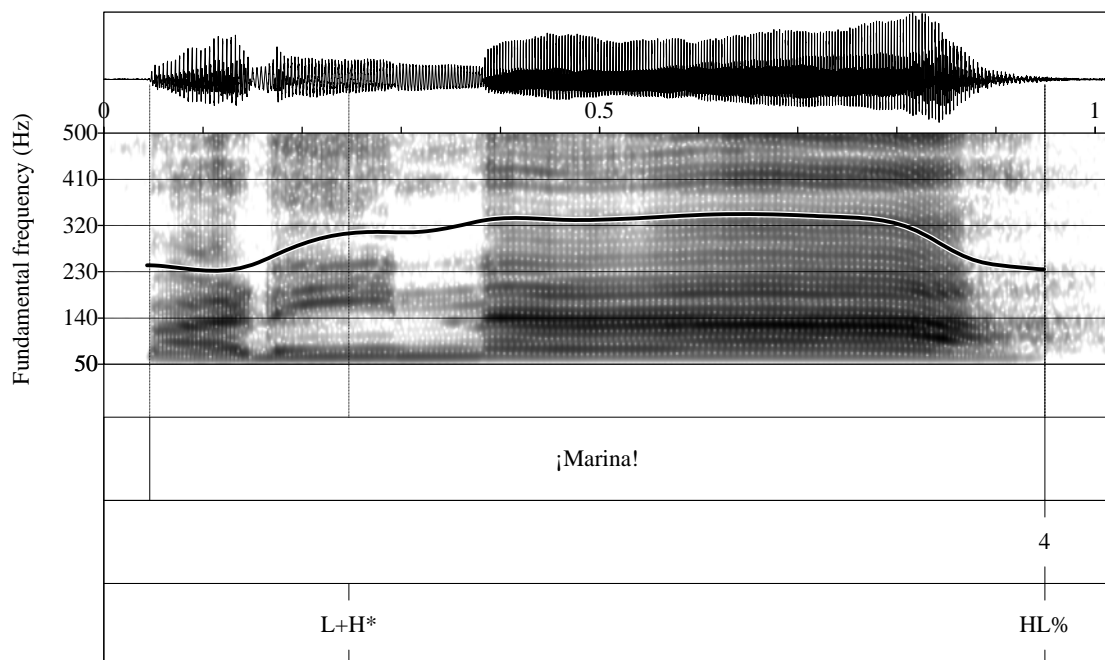

Figure 23: *Waveform, spectrogram and F0 trace for the insistent calling vocative* ¡Ma<u>ri</u>na! *produced with a L+H* HL% nuclear configuration.*
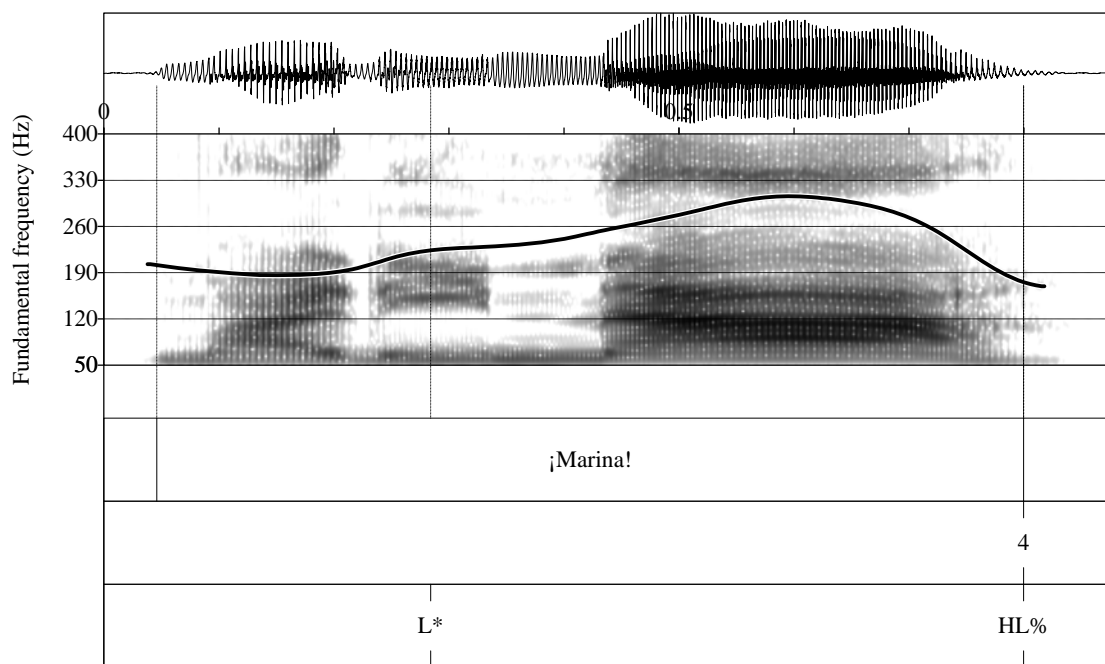
Figure 24: *Waveform, spectrogram and F0 trace for the recriminatory vocative* ¡Ma<u>ri</u>na! *produced with a L* HL% nuclear configuration.*
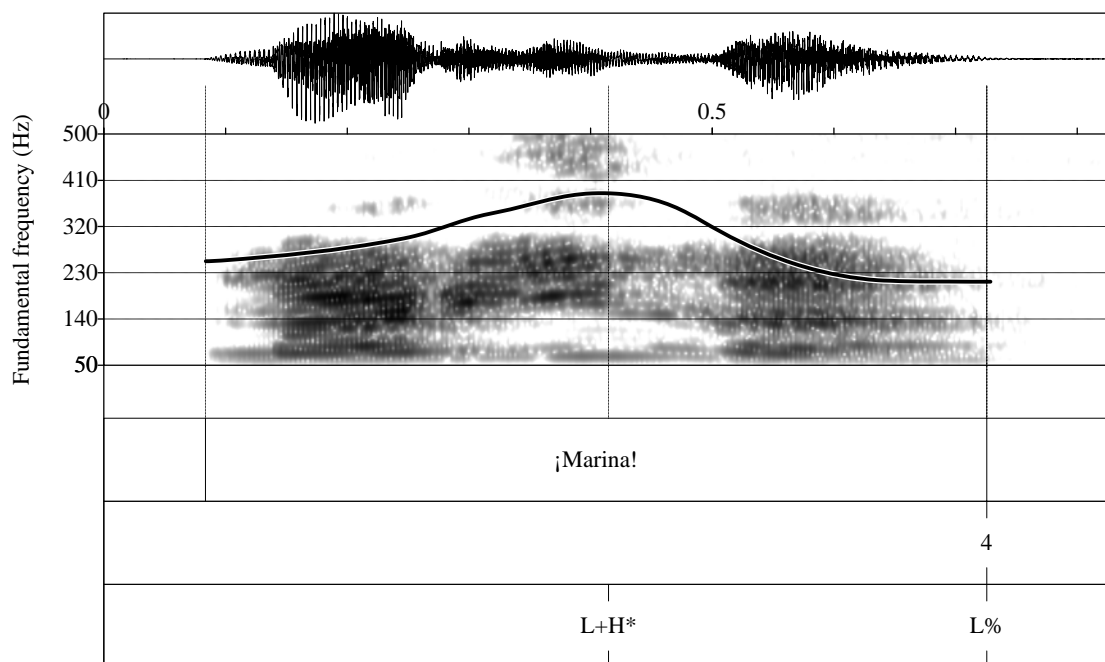

Figure 25: *Waveform, spectrogram and F0 trace for the admonitory vocative* ¡Ma<u>ri</u>na! *produced with a L+H* L% nuclear configuration.*

4. Conclusions

This chapter has presented a set of intonation contours that commonly occur in the variety of Mexican Spanish spoken in México DF. The description of the attested configurations represents a further contribution to the analysis of the intonation of this variety using semi-spontaneous elicited speech. Our analysis has shown that the intonational contrasts found in Mexican Spanish can be adequately described using the standard Sp_ToBI labelling conventions. Providing a unified account of Mexican Spanish intonation within the Sp_ToBI framework is useful beacuse it captures the relevant empirically observed patterns attested so far and allows for further comparison between Mexican Spanish intonation contours and the intonation contours produced in other Spanish varieties. The main findings can be summarized as follows.

Though circumflex configurations exist in other varieties of Spanish, as is the case of the very common L+H* L% contour, they have a wider pragmatic scope in this variety. In Mexican Spanish, 'circumflex' nuclear configurations are also used in broad focus statements and wh- questions, namely L+H* L%, L+H* HL%, L+H* M% and L+H* LM%. We understand that there is a 'prototypical circumflex configuration' that is realized through a series of tonal configurations which are related to several factors and which differ progressively from the prototype. Broad focus sentences, however, can also be produced with a L* L% contour, the common tonal pattern across dialects.
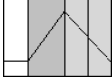
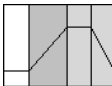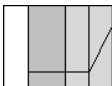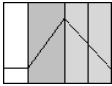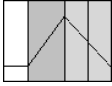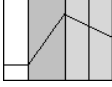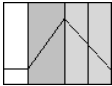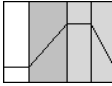Information-seeking yes-no questions in this variety are produced as L* LH%, with a long and very high final rise, and invitation yes-no questions as L* HH%. A similar alignment contrast has been described for Castilian Spanish, namely L* HH% versus L+H* HH% (see Escandell-Vidal 1996, 1999, Thorson et al. 2009, and Estebas-Vilaplana and Prieto this volume). This is a clear case of a specific dialect marking the contrast between utterance types through differences in alignment. Moreover, the same kind of contour can be implemented with different duration and pitch range to convey different meanings. This is the case with information-seeking, counterexpectational echo and confirmation yes-no questions, which are all produced with a L* LH% configuration. However, the final high target in counterexpectational echo yes-no questions is higher than in information-seeking yes-no questions, which in turn end higher than confirmation yes-no questions.

The contrast between a command and a request is expressed in Mexican Spanish through a different nuclear pitch configuration, namely L+H* L% for the expression of a command and L+H* HL% for the expression of a request, together with durational cues. In addition, a potential contrast was found in the nuclear pitch accent and height of boundary tones in vocatives, which might be linked to different m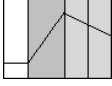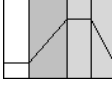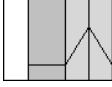eanings. It would be useful to undertake perceptual experiments to test the effects of tonal alignment and tonal scaling on the expression of different discourse meanings as well as to analyse in depth the variety of contrastive pitch configurations present in the dialect, and their respective pragmatic meanings.

Finally, a summary of all the main nuclear pitch configurations with their corresponding sentence types found is presented in table 3. These results provide ample reconfirmation that nuclear pitch contours can be used to convey a variety of meanings.

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

Statements		
Broad focus statements	L* L%	
	L+H* L%	
Biased statements		
Narrow focus statements	L+H* L%	
Contradiction statements	L* HL%	
Exclamative statements	L+H* L%	
Statements of the obvious	L+H* LM%	
Uncertainty statements	L+H* M%	
Questions		
Yes-no questions		
Information-seeking yes-no questions	L* LH%	
Biased yes-no questions		
Echo and counterexpectational yes-no questions	L* LH%	
Imperative yes-no questions	L* LH%	
Invitation yes-no questions	L* HH%	

Confirmation yes-no questions	L* H%	

Wh- questions

Information-seeking wh-questions	L+H* HL%	

Biased wh- question

Echo wh- questions	L* LH%	
Counterexpectational wh-questions	L+H* L%	
Imperative wh- questions	L+H* L%	
Invitation wh- questions	L+H* M%	

Imperatives: commands and requests

Commands	L+H* L%	
Requests	L+H* HL%	

Vocatives

Tentative calls	L+H* M%	
Insistent calls and vocatives used to call over a long distance	L+H* HL%	
Recriminatory vocatives	L* HL%	
Admonitory vocatives	L+H* L%	

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