

Chapter 13

Prosodic correlates of mirative and new information focus in Spanish wh-in-situ questions

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This paper examines the prosodic correlates of focus in two types of wh-in-situ questions in Spanish: information-seeking (INF), and echo-surprise (SUR). We hypothesize that they will have different intonational properties since the former are associated with new-information focus, while the latter are compatible with mirative focus since they express unexpectedness and surprise (Badan & Crocco 2019). A total of 280 sentences from a contextualized elicitation task were analyzed in Praat following SpToBI conventions. Results show that INF and SUR have similar melodic contours, involving a rise through the first pre-nuclear accent, declination, and a steep final rise on the wh-phrase. However, SUR questions have a higher nuclear peak and larger focal tonal range than INF questions. Our results show clear scaling differences in the nuclear configuration consistent with a difference between new-information and mirative focus, which can be phonologically analyzed as nuclear upstep in SUR (L+;H*), unlike in INF (L+H*).

1 Introduction

This study compares the prosodic correlates of focus in two types of Spanish wh-in-situ questions: Information-seeking (INF), and echo-surprise (SUR). While the main strategy to formulate a wh-question in Spanish involves wh-fronting (1a), wh-in-situ questions are also possible in some dialects, such as in North-Central Peninsular Spanish (1b) (Jiménez 1997, Uribe-Etxebarria 2002, Etxepare & Uribe-Etxebarria 2005, Reglero 2007, Reglero & Ticio 2013, among others).



- (1) a. ¿**Qué** llevó Rosalía?
what wear.PST.3SG Rosalía
'What did Rosalía wear?'
b. ¿Rosalía llevó **qué**?

The pragmatic meanings of *wh*-in-situ questions in Spanish are varied. A sentence such as (1b) can be interpreted as an information-seeking (INF) question eliciting information in a neutral way (Reglero 2007, Reglero & Ticio 2013). Alternatively, (1b) can be interpreted as an echo question, i.e., a question requesting repetition of information (echo-repetition, henceforth REP) or conveying surprise (echo-surprise, henceforth SUR) (Chernova 2013, 2017, Reglero & Ticio 2013). Regardless of the pragmatic reading, the in-situ *wh*-element carries the main focus of the question (Horvath 1986, Rochemont 1986, Tuller 1992, Zubizarreta 1998, Escandell Vidal 1999).

In this study, we follow Reglero (2007) and Reglero & Ticio (2013) in considering INF questions as having new information focus; and we argue, based on Badan & Crocco (2019), that SUR questions in Spanish have mirative focus, which conveys counter-expectational value. Spanish INF and SUR questions display some syntactic differences, including differences in word order. In addition, impressionistic reports and a previous small-scale study suggest some intonational differences as well (González & Reglero 2018). In the present study, we investigate the prosodic characteristics of INF and SUR within a larger set of speakers, and connect these differences to focus, taking into consideration relevant studies from other Romance languages.

Our study is framed within the Auto-Segmental (AM) model of intonation (Pierrehumbert 1980, Pierrehumbert & Beckman 1988, Ladd 2008), which views intonation as the anchoring of High (H) and Low (L) tones to metrically strong syllables and edges of phonological domains. We follow the conventions of the Spanish ToBI prosodic annotation system (Beckman et al. 2002, Estebas-Vilaplana & Prieto 2010, Prieto & Roseano 2010, Hualde & Prieto 2015). Stressed syllables bear pitch accents, indicated with *. The pitch accent on the last main stress of an utterance is the nuclear pitch; other stressed syllables bear prenuclear accents (unless deaccented). Edges of phonological domains bear boundary tones. In Spanish, boundary tones occur at the end of full intonational phrases (IPs) and intermediate phrases (ips); these are indicated with % and -, respectively (Aguilar et al. 2009). Figure 1 below provides an example of prosodic annotation for a statement with narrow focus on the direct object. The final IP boundary is low (L%); the intermediate ip shows a steep rise (HH-). All pitch accents are rising; but while the nuclear peak is aligned with the stressed syllable (L+H*), prenuclear peaks are delayed, i.e., aligned with the post-tonic syllable (L+>H*).

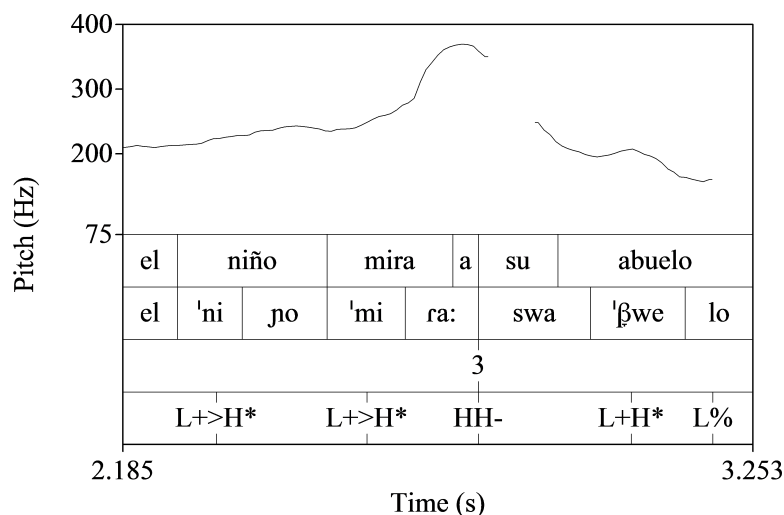


Figure 1: Example of Spanish ToBI annotation. Participant 15. *El niño mira a su abuelo* 'The child looks at his grandfather' (narrow focus)

The rest of this paper is organized as follows. §2 contextualizes the study in connection to focus and reviews its main syntactic and prosodic characteristics. §3 introduces the methodology of the study. §4 presents the results, and §5 is the discussion. Concluding remarks are provided in §6.

2 Properties of focus

2.1 Focus types

Focus, or the information center of a sentence (Chomsky 1971, 1976), is expressed cross-linguistically in one or more of three ways: prosodically, as in English; morphologically, as in Japanese; and syntactically, as in Russian (Gutiérrez-Bravo 2008 and references therein). In Spanish, focus can be expressed prosodically and syntactically (Zubizarreta 1998, Face 2006, Chung 2012, among others).

Focus can be defined according to its size as broad or narrow, and according to its meaning as new information (or presentational), contrastive, or mirative (DeLancey 1997, Ladd 2008, Gussenhoven 2008). Under broad focus, the entire sentence is focused; this occurs when the whole sentence provides non-presupposed, new information, as shown in (2). On the other hand, under narrow focus only

one sentential element is focused (3). The question in (3a) expresses the presupposition that Adriana bought something (this is the old, given information, or the sentence topic) but the value of the *wh*-word is unknown. The direct object in (3b) has narrow focus, and supplies the value for the variable bound by the *wh*-word.

- (2) a. ¿Qué pasó?
 what happen.PST.3SG
 ‘What happened?’
 b. [_{FOCUS} Adriana compró un libro.]
 Adriana buy.PST.3SG a book
 ‘Adriana bought a book.’
- (3) a. ¿Qué compró Adriana?
 what buy.PST.3SG Adriana
 ‘What did Adriana buy?’
 b. Adriana compró [_{FOCUS} un libro].
 Adriana buy.PST.3SG a book
 ‘Adriana bought a book.’

Regarding meaning, new information focus corresponds to the non-presupposed part of the sentence (Zubizarreta 1998, Chomsky 1971, 1976, Jackendoff 1972), while contrastive focus negates the value assigned to a specific variable and provides a different value for it (Zubizarreta 1998). On the other hand, mirative focus conveys surprise from unexpected information, has counter-expectational value, and transmits expressive and emotive attitude (Machuca Ayuso & Ríos 2017, DeLancey 1997, 2001, 2012, Dickinson 2000, Cruschina 2012, Gili Fivela et al. 2015, Jiménez-Fernández 2015b,a, Bianchi et al. 2016, Badan & Crocco 2019, Belletti & Rizzi 2017). The syntactic and prosodic characteristics of these focus types are reviewed next.

2.2 Syntactic properties

In Spanish, new information focus needs to appear as the rightmost element in the linear string to receive nuclear stress, i.e., to be assigned the main sentence prominence (Zubizarreta 1998, Gutiérrez-Bravo 2008, López 2009). Using the question-answer test, (4b) is ungrammatical as an answer to (4a) because the new information focus *un libro* ‘a book’ does not appear sentence-finally. In contrast, (4c,4d) constitute valid answers since the focus appears in the rightmost

position (note that in (4d), the pause – indicated with # – effectively makes *un libro* ‘a book’ rightmost in the linear string).¹

- (4) a. ¿Qué compró Adriana en la librería?
 what buy.PST.3SG Adriana in the bookstore
 ‘What did Adriana buy at the bookstore?’
 b. * Adriana compró [_{FOCUS} un libro] en la librería.
 Adriana buy.PST.3SG a book in the bookstore
 ‘Adriana bought a book at the bookstore.’
 c. Adriana compró en la librería [_{FOCUS} un libro].
 Adriana buy.PST.3SG in the bookstore a book
 ‘Adriana bought a book at the bookstore.’
 d. Adriana compró [_{FOCUS} un libro] # en la librería.
 Adriana buy.PST.3SG a book in the bookstore
 ‘Adriana bought a book at the bookstore.’

Contrastive focus differs from new information focus in regards to word order; any element in the sentence can be contrastively focused, regardless of sentence position (Zubizarreta 1998). One contextualized example is given in (5).²

- (5) Contrastive statement
 a. ¿Qué compró Adriana?
 what buy.PST.3SG Adriana
 ‘What did Adriana buy?’
 b. Adriana compró [_{FOCUS} un LIBRO] en la librería (no una
 Adriana buy.PST.3SG a book at the bookstore not a
 revista).
 magazine
 ‘Adriana bought a BOOK at the bookstore (not a magazine).’

¹We follow Zubizarreta’s (1998) original intuitions here, but see Ortega-Santos (2016) for a review of current experimental work that shows dialectal variation in the judgments (for example, in Argentinian Spanish, Mexican Spanish or Southern Iberian Spanish). As discussed by Jiménez-Fernández (2015b), Southern Peninsular Spanish has a specific position in the left periphery for new information focus in contrast to Standard Spanish (this includes speakers from Northern Spain and Madrid).

²Here and throughout, capitalization is used to indicate elements with contrastive or mirative focus.

Jiménez-Fernández (2015a) points to syntactic differences between contrastive and mirative focus (in the context of focus fronting). While contrastive focus can occur in an embedded sentence as a complement of a verb of saying (6), mirative focus is disallowed in this context (7) (this property was originally discussed by Cruschina (2012) for Italian):³

(6) Contrastive statement

- a. Juan va diciendo que ha vendido la John go-PRES.3SG say.GER that have-PRES.3SG sell.PTCP the moto. (Jiménez-Fernández 2015a: 53) motorbike
'John goes saying that he has sold the motorbike.'
- b. No, no. María dice que el coche ha vendido, no no no Mary say.PRES.3SG that the car have.PRES.3SG sell.PTCP not la moto. (Jiménez-Fernández 2015a: 53) the motorbike
'No, no. Mary says that he has sold the car, not the mortorbike.'

- (7) [??] ¡¡No me lo puedo creer!! ¡¡Va diciendo por ahí
not CL it can.PRES.1SG believe.INFT go.PRES.3SG say.GER by there
que DOS BOTELLAS DE VODKA nos habíamos bebido en la
that two bottles of vodka CL have.PST.1PL drink.PTCP in the
fiesta!! (Jiménez-Fernández 2015a: 53)
party
'I can't believe it! He goes saying everywhere that we had drunk TWO
BOTTLES OF VODKA at the party!!'

As mentioned in §1, in-situ wh-elements carry the main focus of a question (Horvath 1986, Rochemont 1986, Tuller 1992, Zubizarreta 1998, Escandell Vidal 1999). Reglero (2007) and Reglero & Ticio (2013) argue that wh-phrases in INF questions have new information focus⁴ since they elicit non-presupposed information (i.e., the value of the wh-word is unknown; see (3), (4)), and can also

³For a discussion on verb adjacency and its interaction with contrastive and mirative focus, see Jiménez-Fernández (2015a).

⁴See Uribe-Etxebarria (2002) for a proposal in which in situ wh-questions in Spanish have contrastive focus. This is primarily based on a more restricted interpretation of wh-in-situ in Spanish (at least according to Jiménez's (1997) intuition). Uribe-Etxebarria provides additional examples and a syntactic analysis that relates the interpretative properties of wh-in-situ in Spanish to their syntactic derivation.

appear in out-of-the-blue contexts. One example is given in (8), where the question is introduced by *dime una cosa* ‘tell me something’, a phrase eliciting new information.⁵ In addition, the *in situ wh*-phrase needs to appear finally (8b – 8d) (see (4) above).

- (8) a. Dime una cosa: ¿Rosalía llevó qué?
 tell.IMP-CL.DAT.1SG one thing Rosalía wear.PST.3SG what
 ‘Tell me something: What did Rosalía wear?’
 b. ¿Tú le diste el libro a quién?
 you CL.DAT.3SG give.PST.2SG the book to who
 ‘Who did you give the book to?’
 c. ?? ¿Tú le diste a quién el libro?
 d. ¿Tú le diste a quién # el libro?

For SUR questions, Reglero & Ticio (2013) have argued that the *wh*-phrase has contrastive focus⁶ since the echo *wh*-phrase does not need to appear finally (9) (see (5) above). In addition, SUR requires heavy contextualization, unlike INF (10).

- (9) ¿Rosalía llevó QUÉ ayer?
 Rosalía wear.PST.3SG what yesterday
 ‘Rosalía wore WHAT yesterday?’

- (10) Speaker 1:
 Adela fue a visitar a Aristóteles.
 Adela go.PST.3SG to visit.INFT DOM Aristotle
 ‘Adela went to visit Aristotle’
 Speaker 2:
 ¡No me lo puedo creer!: ¿Adela fue a
 NEG CL.1SG CL.ACC.3SG can.1SG believe.INFT Adela go.PST.3SG to
 visitar a QUIÉN?
 visit.INFT DOM who
 ‘I can’t believe it! Adela went to visit WHO?’

⁵This test is attributed to Ignacio Bosque (p. c.) (Reglero & Ticio 2013). See also González & Reglero (2018, 2020).

⁶Their claim applies to REP echo questions as well.

However, recent work on Italian argues that SUR in this language is associated with Mirative Focus (MirF) (Crocco & Badan 2016, Badan et al. 2017, Badan & Crocco 2019). MirF is a type of focalization involving surprise and unexpectedness. For Italian in-situ questions, MirF and INF have different syntactic properties: the most obvious one is that INF needs to be fronted, unlike SUR (5a,5b).⁷ Unlike INF, the *wh*-phrase in Italian SUR is D-linked to a previous discourse. Both types of questions also show prosodic differences, as discussed in the following section.

- (11) a. Dove vendono le mandorle? (Badan & Crocco 2019: 47)
 where sell.PRS.3PL the almonds
 ‘Where do they sell the almonds?’
 b. Le vendono DOVE le
 CL.OBJ.3PL sell.PRS.3PL where the
 mandorle? (Badan & Crocco 2019: 47)
 almonds
 ‘They sell (them) where the almonds?’

2.3 Prosodic properties

Prosodically, focused constituents tend to stand out over topics. As in many languages, in Spanish, focused elements can constitute separate intonational units (Gutiérrez-Bravo 2008). A high intermediate boundary tone (H- or HH-) can occur between the old (topic) and new information (focus) (Hualde 2014: 268–270; Hualde & Prieto 2015: 369). In addition, non-focal elements tend to have reduced pitch range (see for example De la Mota 1997, Face 2002a).

The realization of both prenuclear (non-final) and nuclear accents tends to differ in broad and narrow focus statements. In Madrid Spanish, pre-nuclear accents tend to have a higher pitch under narrow focus and/or be aligned with the stressed syllable, unlike under broad focus, where the peak tends to be displaced to the post-tonic (Face 2001). Stressed syllables are also longer under narrow focus in this dialect (Face 2000). In Castilian Spanish, nuclear accents tend to have a low pitch accent (L*) under broad focus, and rising (L+H*) under narrow focus

⁷See Badan & Crocco (2019) for additional differences in embedded contexts (related to question availability and scope). They propose overt movement of the *wh*-phrase to a low focus position (MirF) in echo questions.

(Estebas-Vilaplana & Prieto 2010). However, in Spanish contact varieties, including in contact with Basque, prenuclear accents tend to have earlier peaks under broad focus, as well (Elordieta 2003, O'Rourke 2012).

There are also prosodic differences between contrastive and new information focus. The former is characterized by higher pitch, expanded pitch range and/or earlier pitch alignment compared to the latter, at least in statements. In addition, an intermediate high or low boundary (H-, L-) can follow the contrastively focused constituent (De la Mota 1997, Face 2002a,b). Contrastive focus shows longer duration than new information focus sententially, in the focal constituent, and in its stressed syllable (Chung 2012). However, sentence-finally elements in narrow focus appear to have similar pitch height and show early peak alignment, unlike in statements with broad focus, where late alignment is more frequent (Domínguez 2004).

As mentioned in the previous section, *wh-in-situ* elements in Spanish are focused and are assigned nuclear stress since they are located at the end of the intonational phrase. The rest of the sentence is the topic since the information is presupposed. Impressionistic reports on the prosody of INF questions mention falling intonation and extra or “marked” stress (Escandell Vidal 1999: 63; Uribe-Etxebarria 2002, Reglero & Ticio 2013). On the other hand, in *situ-echo* questions, particularly those conveying surprise, reportedly display (falling)-rising or sharp/strong intonation and have marked stress on the *wh*-phrase (Contreras 1999, Pope 1976, Escandell Vidal 1999, Sobin 2010, Chernova 2013, 2017).

A preliminary investigation of *wh-in-situ* questions in four participants of North-Central Peninsular Spanish shows that INF have final rising intonation more often than SUR. The latter show an expanded sentential tonal range, and a substantially higher final High pitch compared to INF. On the other hand, the duration ratio of the *wh*-element (i.e. its duration relative to the sentence duration) is larger in INF than in SUR (González & Reglero 2018). These preliminary findings contradict the falling/falling-rising distinction previously reported for INF and SUR, but suggest that marked stress in INF is a perceptual result of increased duration of the *wh*-element, while sharp/strong intonation in SUR is related to expanded scaling and an elevated final pitch accent/boundary tone (for stress correlates in Spanish, see Ortega-Llebaria & Prieto 2007, 2011, Hualde 2014).

These preliminary results are also in line with other studies investigating intonational differences in pragmatic meaning for Spanish questions. For example, fronted *wh*-questions with a counter-expectational value have expanded pitch ranges compared to neutral questions. This difference usually goes hand in hand with a difference in boundary tone (Argentinian Spanish: Gabriel et al. 2010) or nuclear configuration (Peninsular Spanish: Estebas-Vilaplana & Prieto 2010;

Hualde & Prieto 2015: 374; Mexican Spanish: De la Mota et al. 2010; Venezuelan Spanish: Astruc et al. 2010).^{8 9} In addition, although Castilian Spanish echo questions tend to be realized with upstepped rising nuclear accents (L+_iH*), those with a counter-expectational value tend to have a sharp final rise (HH%) instead of a low boundary tone (L*) (Estebas-Vilaplana & Prieto 2010).¹⁰

Although earlier work considers that surprise echo questions have contrastive focus in Spanish, recent work on Italian suggests that mirative focus is involved since SUR questions have counter-expectational value (Badan & Crocco 2019). In addition to showing clear syntactic differences, SUR wh-in-situ questions in Italian are different prosodically from INF questions in several respects. First, the wh-phrase carries the main prominence of the sentence in SUR but not in INF contexts, where the main prominence falls on the verb. Second, the wh-phrase in SUR shows expanded scaling and has an upstepped rising pitch accent (L+_iH*); in comparison, INF questions have falling pitch accents, which are closely aligned with the verb. Finally, SUR questions have a high boundary tone after the wh-element and a clearly perceived disjuncture with the rest of the question. In contrast, in INF, the verb is followed by a low boundary tone, and a clear disjuncture is not typically perceived. Assuming that INF have new information focus and SUR mirative focus, we explore the intonational properties of both question types to elucidate the prosodic characteristics of both types of focus. We examine data from 14 speakers of North-Central Peninsular Spanish, where non-fronted wh-in-situ questions can have a new information reading, in addition to echo readings. Two specific hypotheses are investigated: First, if Spanish INF and SUR have different foci, they will have distinct prosodic properties. Second, if SUR have MirF, they will differ from INF in one or more of the following: (i) intonational contour, (ii) pitch range, and/or (iii) F0 (Crocco & Badan 2016, Huttenlauch et al. 2016, Badan et al. 2017, Machuca Ayuso & Ríos 2017, Badan & Crocco 2019, among others).

3 Methodology

3.1 Participants and data collection

Our participants are Spanish speakers from the Basque Country in northern Spain. Although bilingualism in Spanish and Basque is prevalent, and language

⁸In Ecuadorian Spanish, pitch range exclusively distinguishes between the two (Huttenlauch et al. 2016).

⁹A similar prosodic combination is also reported in Catalan and Italian (Gili Fivela et al. 2015, Prieto et al. 2015).

¹⁰In Brazilian Portuguese, neutral INF questions have falling intonation, while echo ones are rising (Kato 2019).

contact with Basque influences some prosodic characteristics of Spanish in this area (Elordieta & Romera 2020), the impact of language contact is considered to be minimal or non-existing for this study since Basque does not allow in-situ information or surprise echo questions (Etxepare & Ortiz de Urbina 2003, Reglero 2003).¹¹

Data was collected in Summer 2015 in Bilbao, Spain. Participants completed two tasks: a reading task, and a controlled elicitation task. Both were facilitated via a powerpoint that included visual and auditory stimuli to provide contextual information to engage participants in the task and prompt the relevant pragmatic reading. Both tasks were designed to control the context and therefore the pragmatic reading of the stimuli. The reading task is most similar to the methodology employed in other intonational studies of Spanish, including Prieto & Roseano (2010) and Rao (2013) and can be conceived of as involving “scripted speech”. The controlled elicitation task, which we focus on in this paper, did not include a written script for participants to read from, and was designed to provide a more naturalistic realization of the stimuli.

The completed experiment took approximately one hour per participant. A total of 22 Spanish participants took part in the experiment; all were paid for their participation. Participants had varied degrees of Spanish-Basque bilingualism. Before the tasks, all participants completed a consent form and the Bilingual Linguistic Profile (BLP; Birdsong et al. 2012) to obtain information on the language history, use proficiency, and attitudes towards Spanish and Basque. For this study, we report data from the elicitation data from 14 participants; all were 21–24 years old females from the province of Bizkaia.

Table 1 provides additional participant information. Positive BLP dominance scores indicate Spanish dominance; scores close to zero indicate balanced bilin-

¹¹Echo wh-questions in Basque are usually preverbal Etxepare & Ortiz de Urbina (2003), as shown in the example below:

- (i) a. Zugandik atera dira kontu zikin guzti horiek.
you.from come AUX stories dirty all those
‘All those dirty stories have come from you’
- b. Nigandik ZER atera dela?
me.from what come AUX.that
‘(That) what has come from me?’

Etxepare & Ortiz de Urbina (2003: 463) indicate that echo wh-questions with corrective/contrastive focus can appear finally with a preceding prosodic break; these are quite marked. Duguine & Irurtzun (2014) indicate that young Laubordin Basque speakers use an innovative strategy involving wh-in situ. None of the participants in our study come from this dialectal area.

gualism. Negative dominance scores indicate that participants are Basque dominant. Only three participants have negative dominance scores (P3, P7, P14); two of them are close to zero (P14, P7).

Table 1: Participant information: Procecence and BLP scores

ID	BLP Score	Spanish Score	Basque Score	Town
P15	168	199	31	Santurtxi
P11	155	190	35	Leioa
P9	123	209	86	Trapagaran
P22	85	161	76	Galdakao
P8	80	177	97	Bilbao
P1	76	201	125	Leioa
P5	51	182	131	Sopelana
P21	49	178	129	Barakaldo
P4	38	201	163	Sopelana
P20	26	180	154	Galdakao
P13	14	176	162	Sopelana
P14	−2	170	172	Arrankudiaga
P7	−5	188	193	Durango
P3	−40	159	199	Gorliz

The target sentences for the elicitation task involved fronted and in-situ wh-questions, statements, and yes-no questions. Here we focus on in-situ SUR and INF questions. Contextualized examples are provided below; note that all participants completed a short practice before the tasks, and that the context and prompt were presented aurally (not in written form).

(12) a. Context/Prompt:

Maite, Cristina, y Elena se han puesto a jugar al escondite con una amiga. Maite se ha escondido detrás de un árbol. Cristina detrás de un arbusto. Para preguntar por Elena una posibilidad sería decir: ¿y dónde se ha escondido Elena? ¿Cuál sería la otra manera de decirlo?

‘Maite, Cristina and Elena are playing hide-and-seek with a friend. Maite hid behind a tree. Cristina hid behind a bush. To ask about Elena, one possibility would be to say: And where did Elena hide? What would be another way to ask this question?’

- b. Expected target question:
 ¿(Y) Elena se ha escondido dónde?
 and Elena CL.REFL have.PRS.3SG hide.PTCP where
 ‘(And) where did Elena hide?’
- (13) a. SUR question:
Estás en la casa de una amiga y te enseña sus mascotas. Te dice: “El gato se llama Macacocogito.” Te sorprende muchísimo el extraño nombre de su gato. Hazle una pregunta para comprobar cómo se llama.
 ‘You are at your friends’ house, and she shows you her pets. She says: “My cat’s name is Macacocogito”. You are completely surprised by the cat’s unusual name. Ask your friend a question to double-check the cat’s name.’
- b. Expected target question:
 ¿El gato se llama CÓMO?
 the cat CL.REFL name.PRS.3SG how
 ‘The cat’s name is WHAT?’

3.2 Recording and coding

Recording was conducted via a Tascam DR-05 digital recorder with built-in omnidirectional microphones. Audio was recorded in 44,000 Hz in mono. 10 INF questions and 10 SUR questions were examined per participant for a total of 280 target sentences. Eight INF and six SUR questions had to be discarded because of waveform distortion and/or *wh*-fronting, leaving 266 sentences for the acoustic analysis.

Data was coded in Praat (Boersma & Weenik 2021) according to Spanish ToBI conventions (Aguilar et al. 2009, Face & Prieto 2007 *inter al.*). Both authors were involved in the acoustic analysis. Disagreements, which occurred in approximately 5% of the tokens, were resolved by consensus. The analysis focused on the following characteristics: (i) the overall melodic shape of the question, (ii) its nuclear configuration, (iii) the nuclear peak (in Hz.), and (iv) the focal tonal range (FTR), i.e., the difference between the lowest point at the beginning of the *wh*-phrase and its highest pitch. Pitch is reported in Hz and semitones (ST); the latter helps normalize the data and is more closely related to pitch perception. Specifically, a difference of 1.5 ST meets the perceptual threshold, i.e., it is considered to be perceivable by all speakers (T’hart 1981, Toledo 2000, Pamies-Bertrán et al. 2002). Paired two-tailed t-tests were conducted to establish whether these results are statistically significant.

Figure 2–5 below provide examples of melodic contours for INF and SUR. Figure 2 exemplifies the most frequent INF contour; it begins with an initial fall followed by a rise up to the first post-tonic syllable, which diphthongizes with the auxiliary verb to its right. Declination follows up to the beginning of the wh-question, realized with a steep final rise (L+H* HH%). The FTR is 183 Hz, equivalent to 10.7 ST.

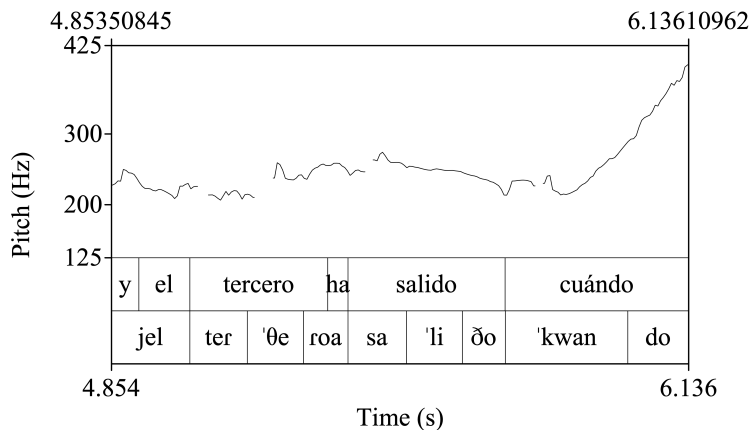


Figure 2: INF question. P21_12 ‘And when has the third one gone out?’

Figure 3 exemplifies an additional melodic pattern for INF, which starts with a slight initial fall up to the post-tonic syllable, followed by a slight rise on the verb *fue*. Declination ensues, and the wh-question shows a final rise-fall (L+H* L%). The FTR is 158 Hz, equivalent to 9.8 ST.

Figure 4 shows a third melodic pattern for INF in our data, involving a rise up to the wh-word, followed by a final fall-rise (H+L* LH%). The FTR is 89 Hz, equivalent to 7.4 ST.

SUR questions were realized similarly across participants. They involved an initial rise up to the first post-tonic syllable, declination up to wh-question, and a steep final rise (Figure 5). The nuclear configuration can be characterized as L+H* HH%, as in Figure 2. The FTR is 191 Hz (11.6 ST).

4 Results

4.1 Overall melodic contour

All SUR questions in our dataset show three intonational movements: (i) a rise through the first post-tonic syllable; (ii) declination (i.e., pitch lowering) up to

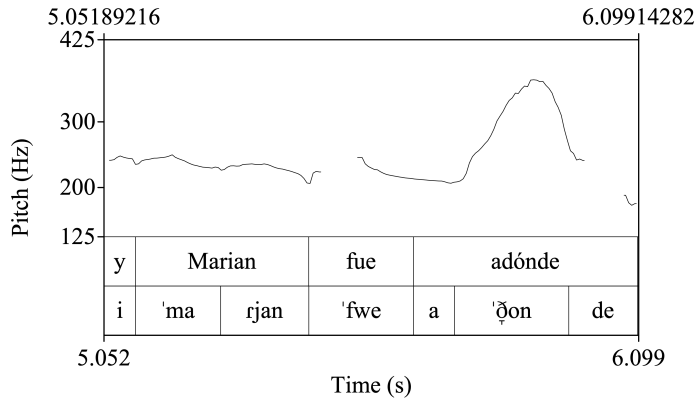


Figure 3: INF question. P15_4 ‘And where did Marian go?’

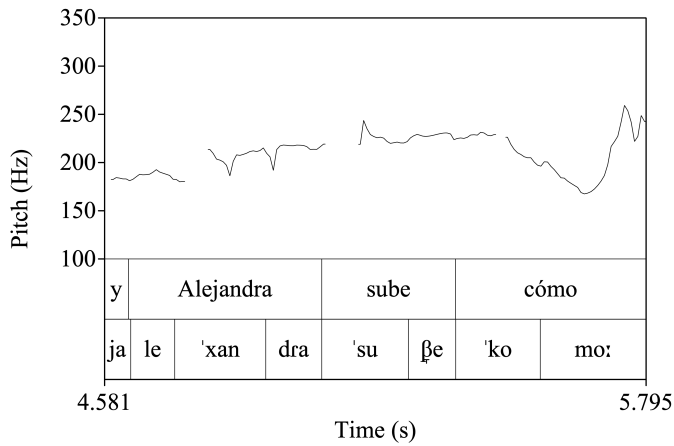


Figure 4: INF question. P18_13 ‘And how does Alejandra go up?’

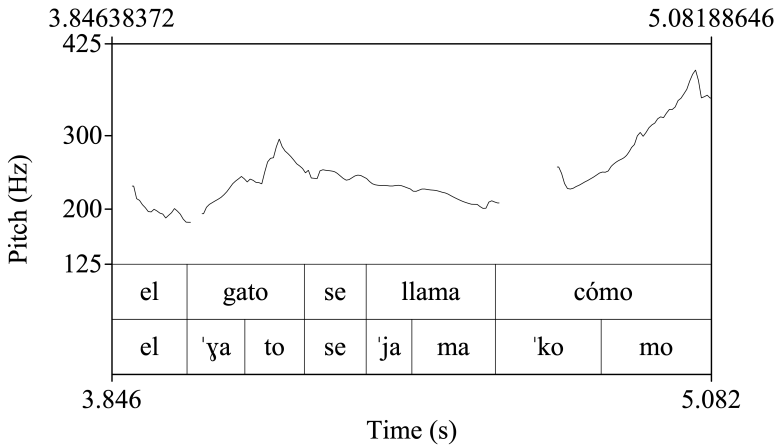


Figure 5: SUR question. P3_3 ‘The cat’s name is WHAT?’

the wh-phrase, and (iii) a steep final rise (Figure 5). For INF questions, a similar pattern occurs in 85% of cases, although an additional fall is usually present at the beginning (Figure 2). This fall occurs in cases where INF began with *y* ‘and’, a pragmatic strategy available in INF questions to establish a transition between the previous discourse and the wh-in-situ question (Jiménez 1997). Two additional melodic contours are attested for INF: one characterized by a final rise-fall (7.5%) (Figure 2), and another with an overall rise up to the beginning of the wh-phrase followed by a nuclear fall-rise (7.5%) (Figure 4). Most of these less frequent patterns are found in speakers 15 and 8, respectively.

4.2 Nuclear configuration

All SUR questions and most INF questions end in a high (HH%) boundary tone. The main exceptions are participant 15, showing a low boundary tone (L%) in 60% of INF, and participant 8, with a rising (LH%) boundary tone in 50% of INF questions. Low or rising boundary tones are also found sporadically in participants 3, 7 and 13.

The realization of the nuclear accent is more variable. Table 2 provides more information about the dominant nuclear configuration and its frequency per participant and type of question investigated. It can be observed that 10 of the participants analyzed (71%) show similar nuclear pitch accents in both INF and SUR: five of them have a rising nuclear pitch accent (L+H*), and five show a low nuclear pitch accent (L*).

The four remaining participants have different nuclear pitch accents in INF and SUR. Three of the participants (P7, 8, 13) have a low or falling pitch accent (H+L*) in INF questions, and a rising pitch accent in SUR questions. Participant 15 shows a preference for a rising pitch accent in INF (L+H*), and a low pitch accent (L*) in SUR. As stated above, this participant tends to realize low or rising boundary tones in INF questions.

Table 2: Nuclear configurations

ID	BLP Score	INF	%	SUR	%
P15	168	L+H* L%	60%	L* HH%	90%
P11	155	L* HH%	80%	L* HH%	60%
P9	123	L* HH%	60%	L* HH%	70%
P22	85	L+H* HH%	80%	L+H* HH%	89%
P8	80	H+L* HH%	50%	L+H* HH%	70%
		H+L* LH%	50%		
P1	76	L+H* HH%	100%	L+H* HH%	80%
P5	51	L+H* HH%	90%	L+H* HH%	100%
P21	49	L+H* HH%	100%	L+H* HH%	60%
P4	49	L* HH%	100%	L* HH%	100%
P20	38	L* HH%	55%	L* HH%	80%
P13	14	L* HH%	89%	L+H* HH%	100%
P14	-2	L+H* HH%	70%	L+H* HH%	100%
P7	-5	L* HH%	67%	L+H* HH%	100%
P3	-40	L* HH%	88%	L* HH%	70%

There is no apparent correlation with bilingualism; the patterns showed by Basque dominant speakers P3, P7 and P14 are variable and comparable to those attested in Spanish dominant participants.

4.3 Nuclear high

Figure 6 shows the values of the nuclear High for all participants in INF and SUR. Eleven participants (79%) have a more elevated H in SUR. On average, the value of H in SUR contexts is +2.1 ST higher than in INF questions. This difference is above the perceptual threshold, suggesting that it is perceptually significant. Results from a paired two-tailed t-test indicate that this difference is statistically significant ($p = 0.0038$). The examination of individual differences shows that the

perceptual threshold is reached or surpassed in 8 of the participants. The remaining three participants do not follow this trend. Specifically, participants P9 and P11 have a more elevated nuclear High in INF contexts, while P5 shows a similar nuclear High in both pragmatic readings (Appendix A).

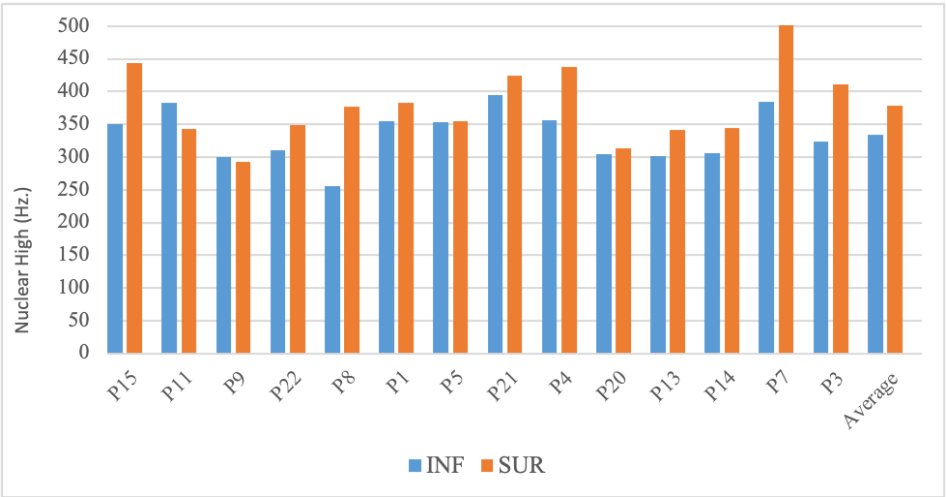


Figure 6: Nuclear High in INF and SUR questions

4.4 Focal tonal range

Figure 7 shows a box plot for the focal tonal range of INF and SUR questions for all participants pooled. It can be observed that the medians of INF and SUR are very different. On average, the FTR for SUR is +2.9 ST higher than for INF, well above the perceptual threshold. In addition, results from a paired two-tailed t-test indicate that this difference is statistically significant ($p < 0.001$). The examination of individual differences shows that this perceptual difference holds for 11 participants. For participant P9, this difference approaches the perceptual threshold (1.4 ST). Two participants do not follow this trend: P11, which has a higher FTR in INF, and P13, which has a similar FTR in both INF and SUR (Appendix B).

5 Discussion

The present study set out to investigate the prosodic characteristics of two types of pragmatically different wh-in-situ questions in Spanish: those requesting new

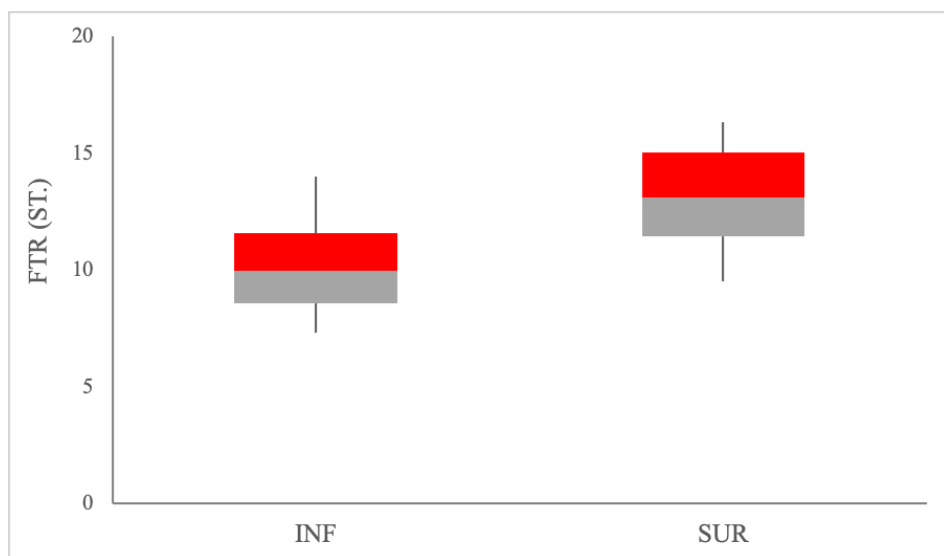


Figure 7: Focal Tonal Range in INF and SUR questions

information (INF), and those expressing surprise (SUR). Both share some syntactic similarities, since the *wh-in-situ* phrase is sentence-final. Our analysis reveals some prosodic similarities as well: the general melodic contour tends to be similar for both in most speakers, generally comprising an initial rise, medial declination, and a steep final rise on the *wh*-question. In addition, a high (HH*) final boundary tone tends to be present in both question types.

Syntactically and pragmatically, INF and SUR also show some differences. INF are neutral and restricted to the rightmost position in the linear string, while SUR are counter-expectational and have a less restricted distribution. Prosodically, we find some differences as well: the nuclear High is significantly more elevated in SUR, and the focal tonal range is significantly expanded. A difference in FTR occurs in most participants, suggesting that this is the main prosodic cue distinguishing SUR from INF in this Spanish variety. We don't observe differences according to degree of Basque/Spanish bilingualism. This is expected since, although language contact impacts the realization of some prosodic features in both languages (see for example Elordieta 2003), the *wh-in-situ* questions investigated here for Spanish are not grammatical in Basque (Etxepare & Ortiz de Urbina 2003, Reglero 2003).

The intonational properties identified in this study for Spanish SUR are comparable to those reported for Italian SUR questions (Badan & Crocco 2019). At

first blush, unlike for Italian, the nuclear configurations of the *wh*-in-situ phrase in Spanish INF and SUR are similar, as in German, where the tonal contours of INF and SUR are reportedly the same (Repp & Rosin 2015). However, we argue that Spanish INF and SUR have distinct nuclear contours: INF is most frequently realized with a rising nuclear accent ($L+H^*$), while SUR involves upstepping ($L+iH^*$). The difference between these two tonal configurations is reportedly one of pitch range, as shown schematically in Figure 8. Upstepped rising nuclear accents are attested in Italian SUR (Badan & Crocco 2019) and in Spanish counter-expectational questions (Aguilar et al. 2009, Estebas-Vilaplana & Prieto 2010; Hualde & Prieto 2015: 374).

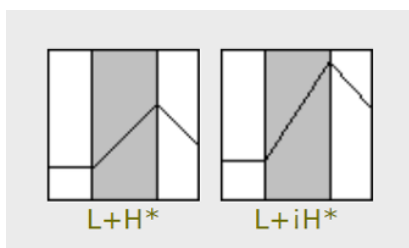


Figure 8: Rising vs. upstepped rising pitch accents (Aguilar et al. 2009)

The participants in our dataset have different degrees of Basque/Spanish bilingualism. We have not observed prosodic differences consistent with Spanish vs. Basque language dominance. Three participants (P5, P9, P13) show individual variation, with either an elevated nuclear peak or a higher FTR in SUR questions, but not both. Only P11 appears to be exceptional since she shows higher F0 and expanded FTR in INF than in SUR, unlike the rest of the participants. We leave open the possibility that low-statistical power and/or individual variation explains this different pattern.

6 Conclusion

This study has focused on the intonation of INF and SUR questions in Spanish. Results from an elicitation task in 14 female speakers from North-Central Peninsular Spanish show similarities in overall melodic contours and final boundary tones, but also differences in the height of the nuclear accent, the focal tonal range, and the nuclear pitch accent. We argue, following Badan & Crocco (2019) for Italian, that these differences are consistent with a difference between new information and mirative focus.

The analysis of intonation from the five male speakers remaining in our dataset and from the reading task will be relevant to further ascertain the patterns reported here and to inquire into possible gender differences in the intonation of *wh-in-situ* questions in Spanish. Future studies should investigate additional correlates of focus, including the presence of intermediate boundaries before the *wh*-element, *wh*-phrase duration and intensity, and the realization of pre-nuclear peaks (Chung 2012, Face 2001, 2002b, Gryllia et al. 2016 *inter alia*).

We also would like to note that the investigation of SUR questions in French would be of great interest to further elucidate the prosodic properties of MirF in Romance. Glasbergen-Plas et al. (2020) show that INF and repetition (REP) *in-situ* questions have similar tonal contours in French; however, REP *wh*-questions have extended pitch scaling and longer duration (cf. Déprez et al. 2013, Cheng & Rooryck 2000, Gryllia et al. 2016. Based on our current understanding of *in-situ* questions in Italian and Spanish, we consider it extremely likely that French SUR in French will have even wider scaling than REP, and/or might involve a different tonal contour compared to REP and INF.

Abbreviations

1	First person	IMP	Imperative
2	Second person	INF	Information-seeking
3	Third person	INFT	Infinitive
ACC	Accusative	L	Low
AM	Auto-Segmental (model)	MIRF	Mirative Focus
BLP	Bilingual Linguistics	NEG	Negation
	Profile	PL	Plural
CL	Clitic	PRS	Present
DAT	Dative	PST	Past
DOM	Differential object	PTCP	Participle
	marking	REP	Echo-repetition
FTR	Focal tonal range	SG	Singular
GER	Gerund	ST	Semitone
H	High	SUR	Echo-surprise

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Appendix A

Table 3: Nuclear High

ID	BLP score	INF	SUR	Difference	
				(Hz.)	(ST)
P15	168	350	444	94	4.1
P11	155	383	343	−40	−1.9
P9	123	300	293	−7	−0.4
P22	85	310	349	39	2.1
P8	80	255	377	122	6.8
P1	76	355	383	28	1.3
P5	51	354	355	1	0.05
P21	49	595	424	29	1.2
P4	49	356	437	81	3.6
P20	38	304	313	9	0.5
P13	14	302	341	39	2.1
P14	−2	306	344	38	2
P7	−5	384	504	120	4.7
P3	−40	323	411	88	4.2
Average		334 Hz	378 Hz	44 Hz	2.1 ST

Appendix B

Table 4: FTR

ID	BLP	INF		SUR		Difference
	score	(Hz.)	(ST)	(Hz.)	(ST)	(ST)
P15	168	156	10.2	259	15.4	5.2
P11	155	212	14	173	12.2	−1.7
P9	123	112	8.1	124	9.5	1.4
P22	85	126	9	175	12.1	3.1
P8	80	88	7.3	180	11.2	3.9
P1	76	172	11.5	234	16.3	4.8
P5	51	152	9.7	173	11.5	1.8
P21	49	189	11.2	234	13.9	2.7
P4	49	166	10.9	254	15	4.1
P20	38	150	11.8	182	15	3.2
P13	14	159	12.9	178	12.8	−0.1
P14	−2	110	7.7	147	9.7	2
P7	−5	153	8.8	272	13.4	4.6
P3	−40	127	8.7	232	14.4	5.7
Average		148 Hz	10.1 ST	200 Hz	13 ST	2.9ST

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