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Fabian Santiago, Elisabeth Delais-Roussarie

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Chapter 12

The Acquisition of Question Intonation by Mexican Spanish Learners of French

Fabián Santiago and Elisabeth Delais-Roussarie

1 **Abstract** In this chapter, we analyze the final tunes and prosodic structures
 2 observed in yes/no and wh-questions in French as an L2 produced by Mexican
 3 Spanish learners. Our study consists in a cross-comparison of information-seeking
 4 interrogative utterances recorded in French and Mexican Spanish in various set-
 5 tings and produced by 15 Mexican learners of French (L2), 10 French speakers,
 6 and 10 Mexican speakers. Analyses of the data show some differences between
 7 native and nonnative productions: (i) an overuse of rising tunes is observed in the
 8 learners' productions in all question types; in addition, an extra-rising contour is
 9 frequently used; and (ii) the internal prosodic structure in the long sentences is
 10 generally not marked by tonal cues (e.g., a pitch accent) in the learners' produc-
 11 tions. These patterns could be partly viewed as resulting from an L1 transfer in the
 12 case of yes/no questions, since similar prosodic patterns were found in the Spanish
 13 native speakers' productions. However, this hypothesis is not confirmed by the
 14 analysis of wh-questions: native speakers have a tendency to use a large variety
 15 of final tunes whereas learners use almost only rising contours, in particular, the
 16 extra-rising one. These results could lead to consider that L1 transfer in the acqui-
 17 sition of L2 prosody does not account for all learners' prosodic patterns. Alternate
 18 hypotheses may be put forward to account for the realizations observed: (i) a pro-
 19 sodic simplification, or (ii) the idea that a rise may be used to express some sort of
 20 linguistic insecurity.

21 12.1 Introduction

22 Among research on L2 acquisition, the studies dedicated to the acquisition of L2
 23 phonological systems concentrate mostly on segmental phonology. Even if recent
 24 studies in the last decade have focused on the acquisition of prosody in an L2, and

E. Delais-Roussarie (✉) · F. Santiago
 UMR 7110-LLF, Université Paris-Diderot, Paris, France
 e-mail: rotinet@hotmail.com

E. Delais-Roussarie (✉)
 e-mail: elisabeth.roussarie@wanadoo.fr

25 more precisely on intonation, research on acquisition of L2 prosody is still under-
26 represented (see, among others, Jilka 2000; Mennen 1999). In the studies on L2
27 intonation, it has often been argued that differences between the L1 and the L2
28 prosodic system constrain the acquisition process and may lead to interferences
29 between the L1 and the L2 (Mennen 2007; Rasier and Hiligsman 2007; Jilka 2000
30 among others). In several studies focusing on L2 prosody, transfer from the L1 to
31 the L2 is considered as an important factor to account for learners' productions/
32 competence, so that many prosodic errors observed in learners' productions are at-
33 tributed to their mother tongue (Horgues 2010; Cortés 2004; Ueyama and Jun 1998
34 among others, and also for a review, Mennen 1999; Van Els and de Bot 1987).

AQ1

AQ2

35 According to Mennen (2006), prosodic transfer could occur at both the pho-
36 nological and the phonetic level. Transfer at the phonological level results from
37 differences in the metrical structure or the tonal inventory. These differences may
38 be observed in the distribution of the stressed syllables, in the form of a contour
39 and in the meaning it conveys. Cases of such phonological transfer are to be found
40 when nonnative speakers use rises whereas native speakers would rather use falls,
41 or vice versa. One example showing a phonological transfer is presented in the
42 study by Ramírez and Romero (2005). They examined the intonational contour used
43 by Spanish speakers in L2 English tag questions, and found that nonnative speakers
44 realized rising contours when tag questions were used to confirm an information
45 given in the utterance (e.g., *It's cold today, isn't it?*), whereas native speakers would
46 usually use a falling one in this context. The authors argue that the overuse of rising
47 intonation patterns in tag questions might be related to their L1: tag questions are
48 lexicalized and performed with rising contours in Spanish.

49 Transfer occurs at the phonetic level when an identical phonological form/unit
50 differs in the way it is phonetically implemented in both languages. Differences in
51 the pitch span and the pitch range observed in the productions of Chinese learners
52 of Spanish (Cortés 2004) and English learners of German (Mennen et al. 2012) can
53 be attributed to the L1 of the speakers. Differences in the temporal alignment of the
54 rises in prenuclear pitch accents as realized by Modern Greek speakers of L2 Dutch
55 can also be attributed to the L1 and considered as a transfer at the phonetic level
56 (Mennen 2004).

57 Despite differences concerning the level at which the transfer occurs, all these
58 studies clearly show that L1 transfer (or interferences) is an important factor to
59 account for certain prosodic features observed in learners' productions. However,
60 not all prosodic errors observed in the learners' productions can be clearly related
61 to their native language. It so happens that prosodic forms observed in learners'
62 interlanguage are not observed in their first language, nor in the target language.
63 Among this type of phenomena, we may mention errors in the distribution of pitch
64 accents, or mistakes in the form and/or the phonetic implementation of intonational
65 events (Jilka 2007). In fact, similarities in both phonological and phonetic levels
66 between the L1 and the L2 do not always guarantee that the L2 prosodic structure
67 observed in learners' speech will sound "native like." It could happen that similar
68 phonetic implementations associated with identical tonal elements in both L1 and
69 L2 languages are not observed in the learners' productions. For instance, cases of

70 over-generalizations have to be observed in the use of final rising boundary tones
71 at the end of interrogative sentences. In many cases, even if certain question types
72 are usually realized with a falling contour (e.g., wh-questions) in both the L1 and
73 the L2, L2 learners have a tendency to produce them with a rising boundary tone
AQ3 (Horgues 2010; MacDonald 2011; Pytlyk 2008; among others).¹

75 The overuse of rising contours for all question types may be related to a specific
76 order in the acquisition of prosodic features: some rising forms, which appear at early
77 learning stages and decrease gradually with L2 exposure, may express linguistic
78 insecurity from the L2 speakers (Horgues 2010). The occurrence of these contours
79 may also be related to the activation of some intonational universals, which relate
80 rising tunes with the expression of some sort of interrogativity (Gussenhoven 2004;
AQ4 Gussenhoven and Chen 2000). Since this universal meaning (nongrammatical or
82 language independent) should be shared by all speakers, it could be argued that it
83 is activated by speakers when they start learning and speaking a foreign language.

84 From some of the studies just mentioned, it appears that L1 transfer is an impor-
85 tant factor to explain certain patterns observed in nonnative intonation. However,
86 the results obtained do not explain why some aspects of L1 prosody are transferred
87 to the L2, whereas some others are not, and why, in many cases, L1 transfer cannot
88 explain the prosodic errors of learners.

89 This study contributes to clarify these issues. By exploring the intonation of
90 questions in L2 French, we will show that calling for transfer has to be clearly justi-
91 fied. For this purpose, we carried out a study focusing on the acquisition of intona-
92 tion in French yes/no and wh-questions produced by Mexican Spanish learners. The
93 goal of our study is twofold: (i) analyzing the final tunes and the prosodic structure
94 observed in information-seeking yes/no and wh-questions in L2 French produced
95 by Mexican Spanish learners, and (ii) evaluating which characteristics of L2 French
96 intonation can be clearly derived from the observation of the data. Our results sug-
97 gest that transfer could partly explain what has been observed in yes/no questions,
98 but cannot be invoked in the case of wh-questions.

99 This chapter is organized as follows: in Sect. 12.2, the protocol used to gather and
100 annotate the data on which our study is based is presented. Section 12.3 concentrates
101 on the intonation of yes/no questions in both native and nonnative speech. In this
102 study, focus has been given to the form of the final tune and to the phrasing observed
103 in the two languages under investigation. Section 12.4 is devoted to the analysis of
104 wh-questions in L2 French, and more specifically the form of their final tune.

¹ In the same line, Celce-Murcia et al. (1996) mention that students of L2 English have a tendency to overuse a rising pitch at the end of yes–no questions. This remark is not supported by empirical data; however, this affirmation shows what is probably very often seen in L2 classrooms and is not reported in the literature.

105 12.2 Data and Methodology

106 In research on the acquisition of L2 prosody, different approaches may be used to
107 collect and analyze the data. Acoustic data, for instance, may be gathered by means
108 of an experimental procedure or may be extracted from larger corpora. Experimen-
109 tal approaches to collect the data have the advantage of allowing the control of vari-
110 ous elements that may come into play in the production process and to focus on the
111 targeted structures, but the gathered data may not always be a good sample of the
112 learner's proficiency. Corpus-based approaches, by contrast, may allow the gather-
113 ing of more natural data, but it is not possible to control the different parameters that
114 may come into play and to focus on a specific number of grammatical structures.
115 In this study, a corpus-based approach was used. The analysis presented is based
116 on 573 information-seeking questions that were extracted from a learner corpus.
117 The procedures used to collect the corpus data, to annotate them, and to achieve
118 the prosodic analysis of the extracted questions are presented in the three following
119 subsections.

120 12.2.1 Data Collection Protocol

121 As just mentioned above, the questions used for this study were extracted from a
122 larger corpus, whose data sets were gathered by adapting the COREIL corpus pro-
123 tocol (Delais-Roussarie and Yoo 2011). The latter has been designed in such a way
124 as to allow (i) the description of the prosodic characteristics of the learners' produc-
125 tions, (ii) the evaluation of the role of the L1 in the L2 acquisition process without
126 making any strong presupposition on the weight of transfer, and (iii) the conduct of
127 a contrastive analysis of the oral productions in L1 and L2 with a comparable set
128 of data.

129 In order to gather representative data sets to measure learners' competence and
130 performance at the prosodic level, (i) we recorded a relatively important number
131 of speakers in both their L1 and L2; and (ii) we opted for the use of a wide range
132 of elicitation tasks. To our mind, the diversification of the tasks allows a more de-
133 tailed picture of the learners' performance, as the latter may differ from one task to
134 another.

135 As for the informants, we recorded 35 speakers divided into three groups: 15
136 Mexican Spanish learners of L2 French (FL2), 10 Parisian French Native Speakers
137 (FL1), and 10 Native Mexican Spanish Speakers (SL1). Concerning the FL2 speak-
138 ers, we controlled the age at which they started to learn French in order to avoid
139 the possible age effect on L2 prosody acquisition. We, thus, selected participants
140 who started studying French after 17 years of age. As for the level of proficiency,
141 two different levels in L2 French were taken into account in order to determine
142 whether a developmental path in L2 intonation acquisition could be observed. Two
143 proficiency levels according to the Common European Framework of Reference
144 for Languages (CEFRs) were, thus, considered: six university students positioned

Table 12.1 Participant's profile. SDs are into brackets

Group			Participants	Age span	Average age
FL2	Level	A2	6	18–34	23 (6)
		B1	9	21–55	27 (11)
FL1			10	18–55	35 (14)
SL1			10	23–38	30 (4)

145 at A2 level and nine students at B1 level participated in the study. All FL2 speak-
 146 ers were attending their French courses at the National Autonomous University of
 147 Mexico during the data collection procedure. Table 12.1 summarizes the profile of
 148 the various speakers.

149 All participants had to perform five distinct tasks, and FL1 and FL2 speakers
 150 were recorded in French, whereas SL1 speakers were recorded in Spanish. The five
 151 tasks were classified into three main groups. The first group includes two interac-
 152 tive oral production (IOP) tasks. In one of them, the speakers were interviewed
 153 (they were asked to talk about their projects, their experience in French courses,
 154 etc.), while, in the second, they had to perform a role-play, in which they asked
 155 questions to complete an enrolment form. The average number of words obtained
 156 per speakers for each IOP task was approximately 500 words for the learners and
 157 800 for the natives. The second group consisted of two monologue oral production
 158 (MOP) tasks. In the first one, speakers had to describe a painting, which was shown
 159 to them. In the second one, he had to tell a story from a picture that represented a
 160 group of people involved in an activity. The average number of words obtained
 161 in each MOP task consisted of approximately 500 words for the learners and 900
 162 words for the native speakers. The third group consisted in a reading task (RT), in
 163 which the speakers had to read short dialogues and several texts adapted from the
 164 EUROM 1 corpus (Chan et al. 1995). All participants were asked to read the texts
 165 and dialogues several times before the recording session. The average number of
 166 words obtained for all subjects in RT was approximately 510. All informants per-
 167 formed the tasks in the same order: IOP, MOP, and RT. The recordings took place in
 168 a quiet room and were done with an Edirol R09 digital recorder. The questions used
 169 in the current study were extracted from two types of tasks: IOP and RT.

170 **12.2.2 Linguistic Annotation and Classification of the Questions**

171 All the recorded data were first transcribed orthographically with CLAN (MacWhin-
 172 ney 2000), according to the TEI recommendations, in particular in the use of strong
 173 punctuation marks (full stop, question marks, etc.). In a grammatical tier added in
 174 CLAN, all questioning utterances were annotated in such a way as to differentiate
 175 information-seeking questions from confirmation seeking and echo questions. For
 176 this study, echo, imperative, and alternative questions were not taken into account.
 177 In addition, all the utterances presenting disfluencies were also disregarded.

Table 12.2 Classification of the information-seeking questions extracted from the corpus, according to the groups, the tasks performed (RT and IOP) and the morphosyntactic form

Morpho-syntax	Yes–no questions							Wh-questions				
	Declaratives			Pronominal subject–verb inversion		“est-ce que” insertion		<i>Fronted</i>			<i>In situ</i>	
Speakers’ group	FL1	FL2	EL1	FL1	FL2	FL1	FL2	FL1	FL2	EL1	FL1	FL2
RT	20	25	60	19	24	20	23	10	14	30	10	13
IOP	21	20	43	4	0	11	11	50	59	63	20	3
Subtotal	41	45	103	23	24	31	34	60	73	93	30	16
Total	301							272				

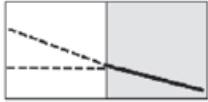
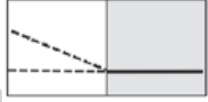
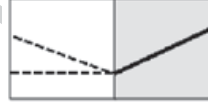
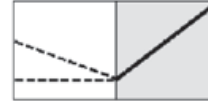
178 Among information-seeking questions, a distinction was made between yes–no
 179 questions and wh-questions. Moreover, each question type was subcategorized ac-
 180 cording to the morphosyntactic form of the utterance. Among the yes–no questions,
 181 three forms were defined (see Sect. 12.3.1 for more details), whereas two forms
 182 were distinguished among the wh-questions (see Sect. 12.4.1). The classification
 183 of the 573 information-seeking questions extracted from the RT and IOP tasks is
 184 summarized in Table 12.2.

185 **12.2.3 Prosodic Annotation**

186 The 573 utterances from the corpus were all annotated prosodically in order to al-
 187 low a comparison of the productions, regardless of their outcomes (native or nonna-
 188 tive speech). Focus was given to two distinct types of prosodic events in the encod-
 189 ing procedure: the form of the final tune (i.e., the pitch movement that goes from
 190 the last pitch accent to the boundary tone) occurring at the end of questions, and
 191 the segmentation into prosodic phrases. The transcription was represented on three
 192 distinct tiers in Praat: an orthographic tier, a syllabic tier, and a tonal tier.

193 To obtain for each utterance a prosodic annotation providing a symbolic encod-
 194 ing for a wide variety of linguistically relevant prosodic events, we had to face dif-
 195 ferent problems. Among the prosodic transcription systems (for a review see Delais-
 196 Roussarie and Post 2014), the most frequently used (IPA and ToBI) do not allow
 197 the encoding of data whose phonological system is not known. This comes from the
 198 fact that these two systems are phonological in nature, and rely for their encoding
 199 on existing phonological analyses. Other prosodic transcriptions, like INTSINT, are
 200 often thought in such a way as to encode a restricted set of prosodic events as tonal
 201 events, excluding other acoustic parameters that come into play in prosody-like
 202 durational cues. In order to overcome these problems, we decided (i) to proceed
 203 in two steps to assign to each utterance a prosodic transcription, and (ii) to use an
 204 automatic annotation tool, the Prosogram, which provides an automatic stylization

Table 12.3 Prosodic labeling of the final tunes observed in yes–no and wh-questions (dotted lines represent F0 trace observed in the penultimate syllable of the IP, and bold lines indicate the stylized final contour)

Label	Acoustic patterns	Stylization
L%	Falling movement that decreases of approx. 2 semitones from the penultimate syllable until the end of the IP-final syllable. It is perceived as a falling movement.	
0%	The F0 trace remains stable between the penultimate syllable and the IP-final syllable. The contour is then perceived as a low plateau.	
H%	Rising movement that starts at the onset of the IP-final syllable, spans for a maximum of 10 semitones, and does not reach the top of the speaker's range. The movement is perceived as rising.	
HH%	Extra-rising movement that starts at the onset of the IP-final syllable and continues in order to reach the top of the speaker's range, spanning more than 10 semitones. The movement is perceived as a very prominent rise.	

205 of the F0 curve according to perception thresholds (Mertens 2004, 2013). This styl-
 206 ization has the advantage of providing representations that are completely language
 207 independent, and of being usable for all types of data, even when the underlying
 208 intonational system is not known (as is the case here for FL2 speakers).

209 In a first step, a Prosogram was done for each utterance of the corpus. In a sec-
 210 ond one, a symbolic annotation was created that gave information in the form of
 211 the final tune and on the prosodic structure assigned to each utterance. To assign a
 212 label to final tunes, we relied on the stylization provided by the Prosogram, and on
 213 the perceptual analysis achieved by the authors so as to (i) identify the prominent
 214 syllables and (ii) evaluate the strength and sharpness of final movements. On the
 215 basis of a cross-comparison, four distinct labels were defined and used to encode
 216 the final tunes observed at the end of questions both in French and Spanish. They
 217 are shown in Table 12.3.

218 To provide a symbolic representation of the segmentation in prosodic words
 219 (henceforth PWDs), we compared a segmentation based on morphosyntactic rules
 220 to the prosodic realizations observed at the end of the predicted prosodic words. In
 221 French, a PWD, also called *Accentual Phrase* or *Groupe Accentuel*, consists in any
 222 lexical word and the related grammatical words on its left side (Jun and Fougeron
 2002; Post 2000; Di Cristo 1998; among others): a sentence such as *Vous prenez les*
 224 *réservations par téléphone?* may, thus, be divided into three PWDs, as shown in (1),
 225 square brackets indicating the expected PWD boundaries.

AQ5

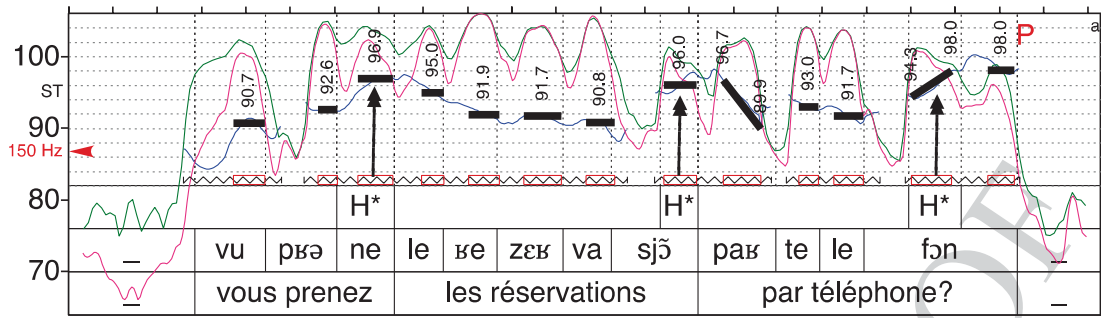


Fig. 12.1 F0 rising movements of 4, 5, and 7 semitones associated with the last syllable of the predicted PDWs *vous prenez*, *les réservations*, and *par téléphone*, respectively

- 226 (1) *Vous prenez les réservations par téléphone?*
 227 [Vous prenez]_{PWD} [les réservations]_{PWD} [par téléphone]_{PWD}
 228 ‘Do you make reservations by telephone?’

229 Concerning the prosodic labeling, a PWD word was considered as intonationally
 230 marked when its last metrically strong syllable was associated with a pitch move-
 231 ment of more than two semitones. The syllable was, thus, encoded with the tonal
 232 label H*, since it is pitch accented. Figure 12.1 illustrates how the segmentation in
 233 prosodic words was derived from the Prosogram stylization for sentence (1).

234 Similarly, in Spanish, the prosodic phrasing was analyzed at the level of the
 235 prosodic word. This prosodic unit is defined by the presence of a lexical accent
 236 realized tonally (Prieto 2006; Sosa 1999 among others), that is “pitch accented.”
 237 For the analysis of the data, we identified in all the sentences the position of the
 238 lexically stressed syllables in content words and we checked whether they carried
 239 an accent. As an example, a sentence like “¿Se pueden hacer reservaciones por
 240 teléfono?” is divided into four PWDs on the basis of the presence of lexical accents
 241 as shown in (2):

- 242 (2) ¿Se pueden hacer reservaciones por teléfono?
 243 [¿Se pueden]_{PWD} [hacer]_{PWD} [reservaciones]_{PWD} [por teléfono?]_{PWD}
 244 [se.ˈpwe.den]_{PWD} [a.ˈser]_{PWD} [re.se.ˈβa.ˈsjo.nes]_{PWD} [por.te.ˈle.fo.no]_{PWD} change to: [se.ˈpwe.ðen]
 245 ‘Can we make reservations by telephone?’

246 To encode the realization of a pitch accent, we adapted the notation suggested by
 247 de la Mota et al. (2010) by using the symbols H* and L*, which are associated with
 248 accented syllables. Figure 12.2 illustrates the labeling of PWDs derived from the
 249 Prosogram for this utterance.

250 12.3 Information-Seeking Yes–No Questions

251 Information-seeking yes–no questions consist of questions whose answer can be
 252 *yes* or *no*. In these interrogatives, the entire proposition is specifically questioned.
 253 As far as intonation is concerned, it is often said in the literature that rising tunes are
 254 associated with questioning utterances, whereas falling tunes are used in assertions

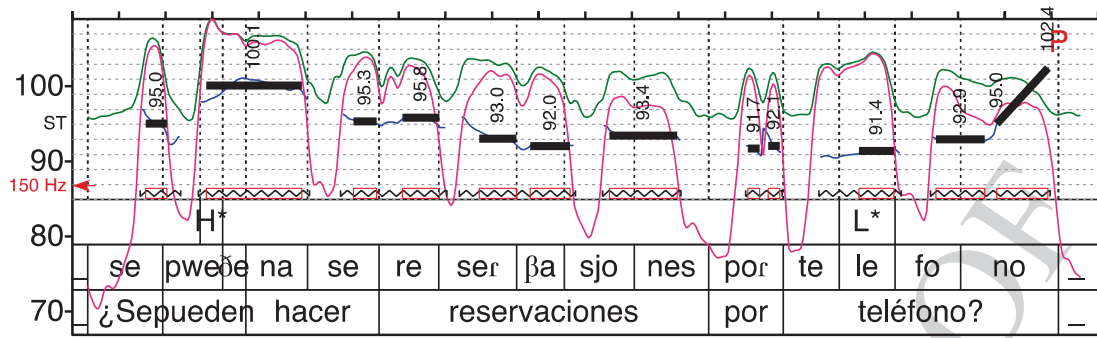


Fig. 12.2 F0 movements associated with lexical accents of the two predicted PWDs: a rising pitch of five semitones for *se pueden* (H^*) and a falling pitch for *teléfono* (L^*)

255 (see, among others, Chen and Gussenhoven 2000).² However, there is no one-to-one
 256 relation between the sentence modality and the form of the final tune. **In fact**, in
 257 many languages, among which we may mention French, rising tunes are not always
 258 observed, in particular, when the modality of the utterance is expressed by other lin-
 259 guistic elements. **In fact**, in many varieties of Spanish, like in Buenos Aires, Argenti-
 260 na, information-seeking yes–no questions exhibit final falling tunes, rather than ris-
 261 ing ones (Gabriel et al. 2010). In addition, it so happens that, for pragmatic reasons, a
 262 final rising contour is observed in assertions whereas a falling or a rising–falling one
 263 could be associated with yes–no questions (see, for instance, Delais-Roussarie et al.
 264 to appear, for the use of a rising–falling contour to sound more polite).

265 After presenting the morphosyntactic and prosodic features associated with in-
 266 formation-seeking yes–no questions in French and Spanish, we will explain in this
 267 section how the 301 utterances extracted from the corpus were realized. The analy-
 268 sis consisted in comparing two aspects of the intonational patterns observed across
 269 groups: the form of the tonal contour at the end of yes–no questions (or final tune)
 270 and the marking of the segmentation in prosodic words by the presence of rising
 271 pitch accents (H^*). The results will allow us to evaluate to that extent the produc-
 272 tions of the learners are influenced by their L1 (Spanish).

273 **12.3.1 Syntactic and Prosodic Characteristics of Information-**
 274 **Seeking Yes–No Questions**

275 **12.3.1.1 Yes–No Questions in French**

276 Three distinct morphosyntactic constructions may be used in French to build up a
 277 yes–no question (cf. Di Cristo to appear; Martin 2009; Beyssade et al. 2007, among
 278 others): (i) declarative structures similar to the one observed in assertive sentences

² Some studies on the intonation of questions have argued that the form of the intonational contours is not associated with the modality of the utterance, but express the attitude of the speaker towards the propositional content of the sentence or towards his interlocutor (Beyssade et al. 2007; Gunlogson 2001; Bartels 1999).

Style: Two "In fact" are to close. Maybe we must to supress the first "In fact" ?

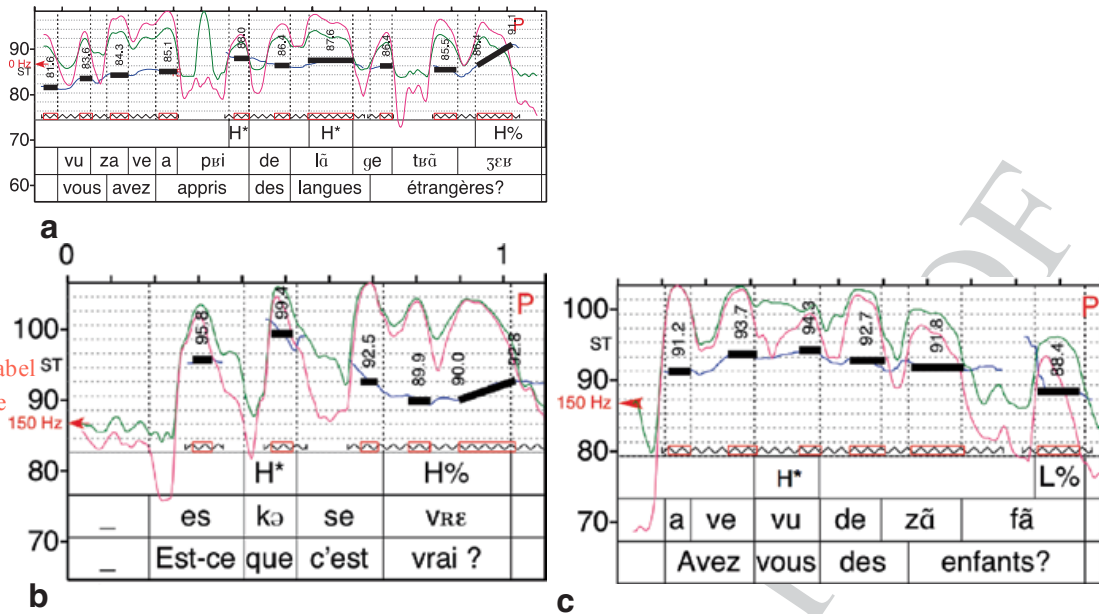


Fig. 12.3 Stylized F0 curves illustrating the different tunes observed at the end of information-seeking yes–no questions in French

279 can be used as shown in (3a). In this case, no lexical or morphosyntactic element indicates the modality of the sentence; (ii) subject–object inversion may be used in interrogative sentences, be the subject nominal as in (3b) or pronominal as in (3c); and (iii) an interrogative particle *est-ce que* can be inserted in sentence initial position, the rest of the sentence having the same syntactic structure as in assertions (3d). In spoken French, the constructions (3a), (3c), and (3d) are the more frequently observed. In our data, no question was built up with the structure exemplified in (3b).

- 286 (3) a. Vous avez appris des langues étrangères?
 287 'Did you learn any foreign language?'
 288 b. Pierre est-il venu?
 289 'Did Pierre come?'
 290 c. Avez-vous des enfants?
 291 'Do you have children?'
 292 d. Est-ce que c'est vrai?
 293 'Is that true?'

294 As far as intonation is concerned, the rising tune (H%) is considered as the most canonical form associated with information-seeking questions with a declarative morphosyntactic structure as shown in Fig. 12.3a (see Post 2000; Di Cristo 1998; Delattre 1966; among others). Note that nonrising tunes (falling and rising–falling) may also be used at the end of declarative questions, but this specific tonal form is rather associated with confirmation-seeking questions or echo questions (see, among others, Delais-Roussarie et al. to appear; Di Cristo to appear). When a morphosyntactic or a lexical marker indicates the modality of the utterance (subject–verb inversion or *est-ce que* particle, respectively), nonrising patterns such as falling ones (L or 0%) are relatively frequent, as shown in Fig. 12.3c), even though

304 a rise may also be observed (Fig. 12.3b). It has been argued that the form of the final
 305 tune is not as important when the sentence includes an interrogative marker (see,
 306 among others, Di Cristo *to appear*; Martin 1975a and b, Delattre 1966).

307 In French, interrogative sentences are phrased in prosodic words whose bound-
 308 ary is indicated by a rising pitch accent H* and a durational lengthening: the internal
 309 prosodic structures associated with yes–no questions do not differ from those ob-
 310 served in declarative utterances (see, among others, Di Cristo 1998). In Fig. 12.3a,
 311 for instance, the syllables [pɛi] and [lɑ̃] are accented and indicate that the sentence
 312 is segmented into three prosodic words:

313 (4) [Vous avez appris]_{PWD} [les langues]_{PWD} [étrangères]_{PWD}

314 In interrogative sentences in which the modality is expressed by scrambling (sub-
 315 ject–verb inversion) or by the particle *est-ce que*, the melodic peak is usually as-
 316 sociated with the enclitic pronoun or with the particle. In the first case, it is often
 317 realized as a rising pitch accent (see Fig. 12.3c: [vu] is associated with a rising pitch
 318 accent H*), whereas the peak takes the form of an initial rise H_i associated with [kə]
 319 as in Fig. 12.3b (see Delais-Roussarie et al. *to appear*).

320 12.3.1.2 Yes–No Questions in Spanish

321 Two morphosyntactic forms are found in yes–no questions when the subject of the
 322 sentence is nominal: either the subject precedes the verb displaying a declarative
 323 structure as in assertion (5a) or the subject and the verb can be inverted as shown
 AQ6 in (5b).³

- 325 (5) a. ¿Pedro trabaja?
 326 'Pedro works?'
 327 b. ¿Trabaja Pedro?
 328 'Does Pedro work?'

329 Among these forms, only the first one (5a) has been observed in the 103 informa-
 330 tion-seeking yes–no questions extracted from our corpus and used for this study.
 331 Examples are given in (6).

- 332 (6) a. ¿Practica algún deporte?
 333 'Do you practice any sport?'
 334 b. ¿Conoce esta avenida?
 335 'Do you know this avenue?'

336 The pronominal subjects in these interrogatives are represented by the phoneti-
 337 cally null pronoun *pro*⁴ and display a morphosyntactic structure similar to what is

³ For some authors (Escandell Vidal 1998), the form with subject–verb inversion shown in (5b) is considered as the unmarked structure for Spanish yes–no questions, whereas the form subject–verb in (5a) is the marked one. Other authors state that the choice of one form to the other depends on the information structure (Bosque and Gutiérrez-Rexach 2009). In the first case, focus is given to the predicate, whereas in the second case, informational focus is centered on the nominal subject.

⁴ Spanish is a pro-drop language that allows leaving the subject of a conjugated verb phonetically empty. For instance, in the utterance *Fui al cine* ('Went to the cinema'), the overt subject *Yo* ('I')

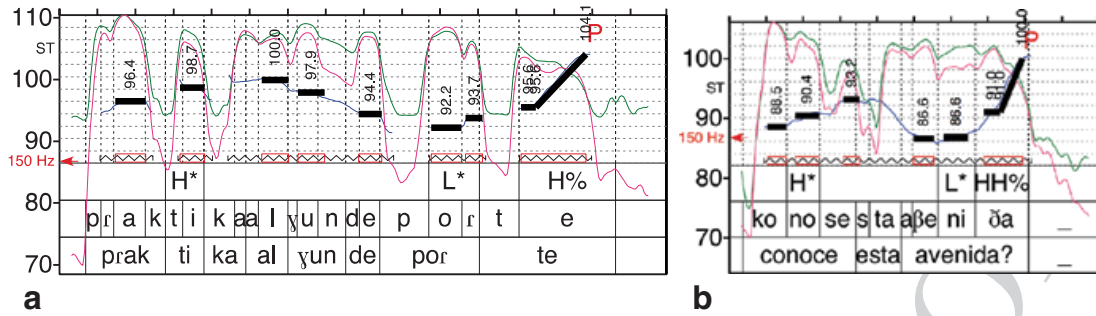


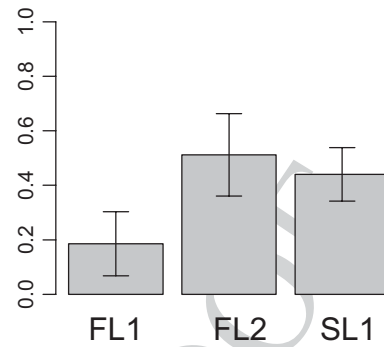
Fig. 12.4 Stylized F0 curves illustrating the two different rising tunes associated with yes–no questions in Mexican Spanish: the rising tune H% (a) and the extra-rising contour HH% (b)

338 observed in declarative clauses. In such utterances, intonation plays a crucial role,
 339 as it is the only linguistic element that indicates the modality of the utterance and
 340 allows distinguishing assertions from questions: a falling tune is associated with
 341 assertions, whereas a rising tonal configuration indicates questions. In the literature
 342 on intonation, it is reported that the tune canonically associated with information-
AQ7 343 seeking yes–no questions is the rising one (Estebas-Vilaplana and Prieto 2010; Face
 344 2007; Quilis 1993; among others). This rising tune, encoded H% in our study, is
 345 usually preceded by a fall caused by the low-pitch accent L* (or LH*) associated
 346 with the last accented syllable. An example of such a final intonational pattern is
 347 shown in Fig. 12.4a. It has been argued that the final rise may be sharper in the Mex-
 348 ican Spanish variety than in other Spanish varieties, reaching the top of the speakers’
AQ8 349 range (de la Mota et al. 2010; Ávila 2003; Sosa 1999). In our analysis, this rising
 350 form is labeled HH% and represents an extra-rising tune illustrated in Fig. 12.4b.

351 As for the internal prosodic structure, Castilian Spanish yes–no questions differ
 352 slightly from French ones. According to many authors (Face 2006; Quilis 1993, among
 353 others), speakers do not produce a pitch accent on medial stressed syllables, except in
 354 the initial and final words. These descriptions indicate that a rising pitch movement is
 355 realized on the first stressed syllable of the utterance, the F0 trace decreases until the
 356 penultimate syllable of the utterance (usually carrying a lexical stress and encoded as
 357 L*), and then rises on the final syllable. The analysis of the Mexican Spanish yes–no
 358 questions from our data set confirmed these observations. Figure 12.4a illustrates this
 359 fact: no pitch accent is realized between the initial pitch accent H* associated with
 360 the first accented syllable [‘ti] of the word *practica* and the final low tonal target L*
 361 associated with the last stressed syllable [‘por] of the word *deporte*, showing that
 362 no additional pitch accent is associated with the lexically stressed syllable in medial
 363 positions (*algún*). We interpret that the absence of F0 targets on the stressed syllables
 364 in medial position could be related to a kind of “internal dephrasing,” or at least, the
 365 internal phrasing in PWD is not as prosodically cued in Spanish as in French.

is generally dropped phonetically by the called null pronoun pro-effect since the subject is indicated in the verbal form fui. However, overt subjects are necessary in cases of focalizations as in the utterances ÉL fue al cine, no ella (“HE went to the cinema, not SHE”). As in assertions, this effect is mostly activated when the subject agreement (i.e., person and number) is expressed by the morphology of the conjugated verb.

Fig. 12.5 Proportions of HH% observed in declaratives yes–no questions across FL1, FL2, and SL1 groups



366 The analysis of the data focused on the final tunes and on the phrasing observed
 367 in information-seeking questions in both French and Spanish. Sections 12.3.2 and
 368 12.3.3 will present what was observed in our data, when comparing the productions
 369 of the learners to those of the natives.

370 **12.3.2 Final Tunes in Yes–No Question: Analysis and Results**

371 The final tunes occurring at the end of the 301 information-seeking questions ex-
 372 tracted from our corpus were analyzed in order to see whether the differences in
 373 the choice of the final tune across the fixed variables studied in this research were
 374 statistically significant. We used R and *lme4* (Bates et al. 2012) in order to construct
 375 linear mixed effect models (henceforth lme) that took into account the Contour/tune
 376 (H and HH%) and the predictor variables Group (FL1, FL2, SL1), Task (IOP, RT),
 377 Level (A2 or B1) and random intercepts and slopes for Subjects, for two categories
 378 of yes–no questions (declaratives and with a lexical or morphosyntactic marker) we
 379 tested individually.

380 From the result given by the use of these models, we consider significant differ-
 381 ences (expressed by z -scores and their corresponding p -values) between the contour
 382 and predictor variables. The contribution of each predictor variable was assessed
 383 using model reduction and likelihood ratio tests (χ^2): each predictor variable was in
 384 turn excluded from the full model producing a reduced version. This reduced ver-
 385 sion was then compared to the full model. It is only when the full model increased
 386 the log-likelihood of the data significantly (i.e., when the full model could give a
 387 better account for the data than the reduced model), that the predictor was consid-
 388 ered to have explanatory power.⁵

389 Concerning the category of yes–no questions displaying a declarative structure,
 390 only rising tunes (H and HH%) were observed in our data in both French and Span-
 391 ish, which corresponds to what could be expected from the description given in
 392 Sect. 12.3.2. Among the three groups of speakers taken into account, the main dif-
 393 ference is found on the proportion of HH vs. H%: the extra-rising contour mostly
 394 occurs in the productions of FL2 and SL1 groups, as illustrated in Fig. 12.5.

⁵ For convenience, we will not repeat the procedure to obtain the reduced model and will only present (χ^2) values capturing this assessment.

Table 12.4 Linear mixed effects model analysis for tune (HH and H%), with the predictor variables Group (FL1, FL2, and SL1) in interaction with the Task (IOP and RT) in declarative yes–no questions

	Estimate	Standard error	z-value	Pr (> z)
Intercept	−0.7864	0.3046	−2.582	0.00982**
FL1 vs. FL2	−1.4047	0.4825	−2.911	0.00360**
FL2 vs. SL1	0.8904	0.4123	2.159	0.03082*
Task	0.4221	0.2318	1.821	0.06856.
FL1 vs. FL2 *Tâche	0.6059	0.3826	1.584	0.11326
FL2 vs. SL1*Tâche	−0.1344	0.3228	−0.416	0.67726

0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

395 In order to evaluate whether the occurrence of this form in the production of the
 396 Mexican Spanish learners of French comes from their L1 (Spanish), we set up an
 397 *lme* analysis with the predictor variables Group (FL1, FL2, and SL1) in interaction
 398 with the Task (IOP and RT). The results obtained from this model are reported in
 399 Table 12.4.

400 According to the results, all participants show a general tendency to prefer the
 401 rising form H% over the extra-rising one HH% (intercept $|z|$ value=2.582 and
 402 $p<0.01$). If we compare the proportion of HH% produced by FL1 speakers with
 403 those of FL2, we find significant differences: French natives produce less HH%
 404 than FL2 do ($|z|=2.582$ and $p<0.01$). In other words, in French declarative yes–
 405 no questions, FL1 speakers produce more H% than learners. If we compare the
 406 proportion of HH% produced by learners with that of the SL1 speakers, we find
 407 significant differences as well: the proportion of HH% is higher in learners’ oral
 408 productions than in native Spanish speakers’ ($|z|=2.159$ and $p<0.05$). An example
 409 of this extra-rising tune is given in Fig. 12.7a. Concerning the task effect, we found
 410 only marginal significant differences ($|z|=1.821$ and $p=0.069$). We can, thus, say
 411 that RTs only have a marginal effect on the choice of final tunes, and this effect is
 412 independent of the speakers’ languages. To sum up, it can be said that FL2 and SL1
 413 speakers prefer the extra-rising form HH% when producing a declarative yes–no
 414 question, whereas native French speakers use rather the rising tune H%. A likeli-
 415 hood ratio test found that these predictors were considered to have explanatory
 416 power ($\chi^2(4)=11.032$ and $p<0.05$).

417 As for the French information-seeking yes–no questions with a morphosyntactic
 418 or lexical marker, they were realized with a wide range of final tunes, which con-
 419 firmed what was said in Sect. 12.3.1. Figure 12.6a illustrates how the various forms
 420 are distributed in the two groups FL1 and FL2, and Fig. 12.6b shows the proportion
 421 of rising forms (H and HH%) used in the two French speaking groups FL1 and FL2.

422 By comparing the distribution of rising contours vs. falling ones between the two
 423 groups (Fig. 12.6b), it appears that nonnative speakers use almost only rising tunes,
 424 whereas native speakers display different final tunes. Regarding the proportion of

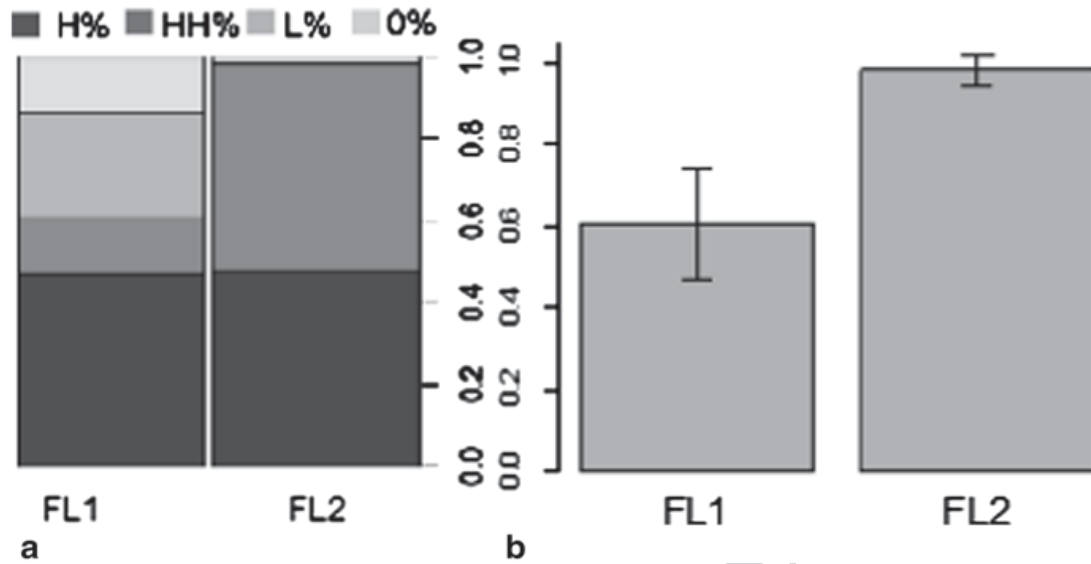


Fig. 12.6 Proportions of the four final tunes (a), and the rising contours grouping H and HH% (b) in French yes-no questions with a morphosyntactic marker produced by native speakers and learners

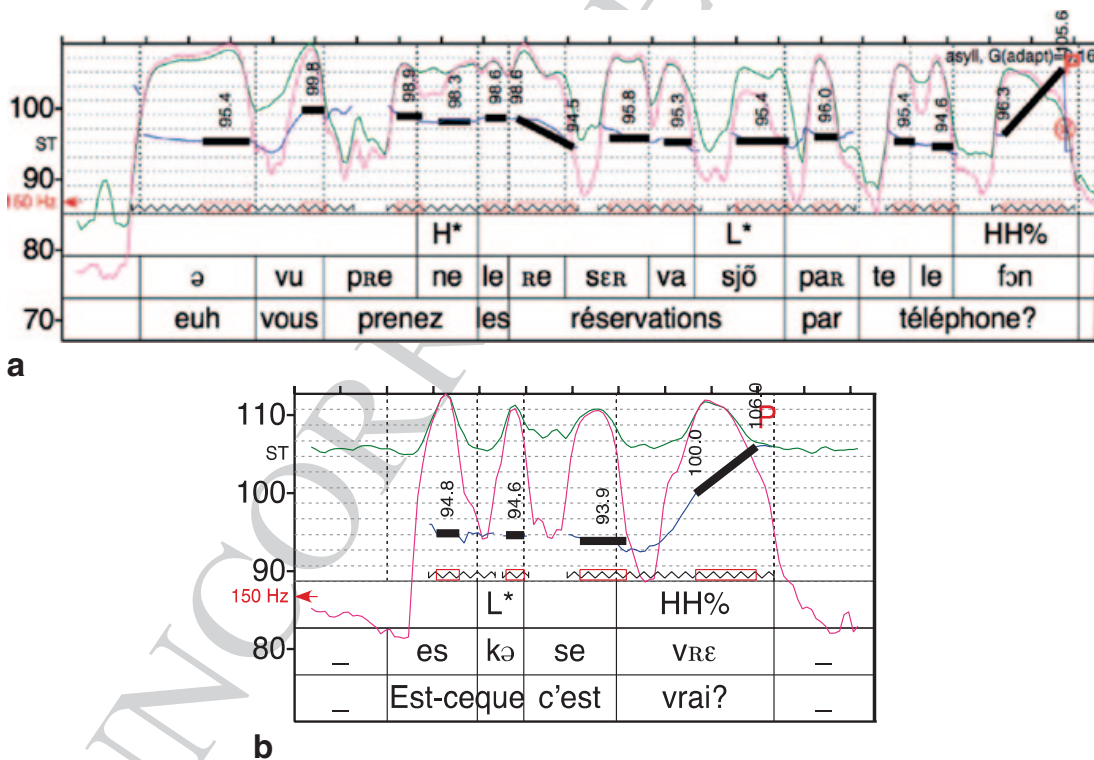


Fig. 12.7 Stylized F0 traces representing HH% contours associated with a declarative yes-no question and with a yes-no question with the *est-ce que* particle produced by two Mexican learners positioned at A2 level (b) and B1 level (a)

Table 12.5 Linear mixed effect model analysis for contours (rising (H and HH% grouped) vs. falling (L and 0%)) and variable predictors group (FL1 and FL2) in yes–no questions with an interrogative marker

	Estimate	Standard error	z-value	Pr (> z)
Intercept	2.448	0.644	3.801	0.000144***
FL1 vs. FL2	−1.948	0.644	−3.025	0.002489**

0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

425 the two different rises (H and HH%) across the groups, it appears that the HH%
 426 is by far the most frequently observed in FL2 oral productions. The results of an
 427 *lme* analysis for *Contour* (rising vs. falling) and the predictor variable *Group* (FL1
 428 and FL2) are reported in Table 12.5. In this model, the predictor variable *Task* was
 429 excluded since learners mostly produced this question type during the RT.

430 The statistical analysis shows that, in general, all speakers produce more rising
 431 contours than falling ones (intercept |z| value=3.801 and $p < 0.0001$). The propor-
 432 tion of rising contours vs. falling ones is different across groups: the proportion of
 433 falling contours used by FL1 speakers is significantly higher than in the case of FL2
 434 speakers (|z| value=3.025 and $p < 0.001$). The contribution of the predictor variable
 435 group confirmed this analysis ($\chi^2(1) = 17.33$ and $p < 0.001$). When comparing only
 436 H vs. HH% across the groups, we obtained significant differences as well: learners
 437 produced more extra-rising tunes than FL1 participants ($\chi^2(1) = 6.13$ and $p < .01$)

438 Concerning the effect of learners’ proficiency level in French on the choice of
 439 a rising contour (H vs. HH%) in information-seeking yes–no questions, regardless
 440 of the morphosyntactic structure, the statistical analysis does not confirm this hy-
 441 pothesis (|z| value=0.688 and $p = .489$). Nevertheless, it is important to note that the
 442 extra-rising contour appears mostly in utterances having a morphosyntactic struc-
 443 ture that does not appear in Spanish (with subject–verb inversion or with the *est-ce*
 444 *que* particle): 60 of the HH% contour occur in questions marked by an interrogative
 445 morpheme, and 40% in declarative questions.

446 As shown in Fig. 12.6b, rising tunes are by far the most frequently used by learn-
 447 ers in this question type, from which the extra-rising contour HH% is the most em-
 448 ployed (Fig. 12.6a). As for declarative yes–no questions, no significant task effect
 449 on the contour choice was observed across the two groups. Figure 12.7b shows an
 450 example of yes–no question with the *est-ce que* bearing an HH% contour at the end.

Change to: an exemple of one yes/no question with the particle est-ce que bearing a final HH% contour.

451 12.3.3 Prosodic Phrasing in Yes–No Questions: Analysis and 452 Results

Change to: 453 In order to analyze the prosodic structure of yes–no questions, we compared for
 yes/no 454 each utterance the phrasing observed with the one that is predicted according to the
 455 morphosyntactic alignment rules given in Sect. 12.2. The phrasing observed was
 456 derived from the distribution of the pitch accented syllables. In the 1995, yes–no

Wrong! Change to:
 In the 95 yes/no questions

Fig. 12.8 Proportions of PWDs prosodically realized with a pitch accent by task across the groups

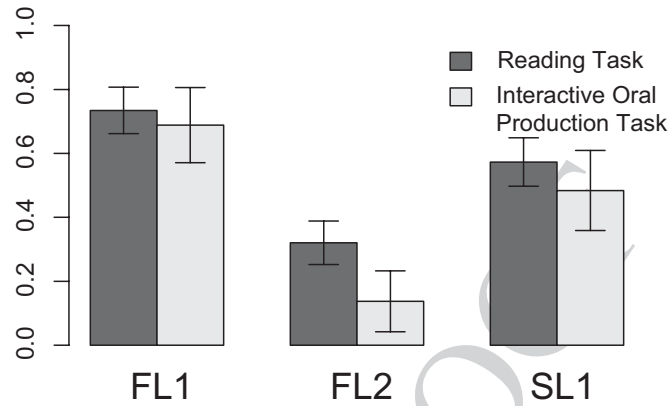


Table 12.6 Linear mixed effect model analysis for PWDs (pitch accented vs. not pitch accented), and predictor variables group (FL1, FL2, and SL1) interacting with the task (IOP and RT) in yes–no questions

	Estimate	Standard error	z-value	Pr (> z)
Intercept	-0.1095	0.1192	-0.919	0.3583
FL1 vs. FL2	1.0646	0.1639	6.495	8.31e-11***
FL2 vs SL1	-1.2800	0.1835	-6.975	3.06e-12***
Task effect	0.2874	0.1223	2.350	0.0188*
(FL1 vs. FL2)*Task	-0.1824	0.1687	-1.081	0.2796
(FL2 vs. SL1)*Task	0.2692	0.1871	1.439	0.1502

0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Change the second "realized" by "produced"

457 questions produced by the French natives (FL1), 157 out of 204 derived PWDs
 458 were prosodically realized (72%), i.e., realized with a pitch accent (the tonal move-
 459 ment consisting of a rise of 5 semitones in average). The analysis of the 103 yes–no
 460 questions produced by the Spanish learners of French (FL2) showed that a rise
 461 indicated by the high target H* was realized at the end of 65 PWDs across the 232
 462 predicted PWDs (28%). In the case of 103 questions produced by Spanish speakers,
 463 226 PWDs were expected and only 102 were realized with a pitch accent associated
 464 with the stressed syllable (55%). Figure 12.8 illustrates the proportion of PWDs
 465 realized with a pitch accent across the groups by distinguishing the tasks.

466 As shown in Fig. 12.8, a quite different picture emerges in the proportion of
 467 prosodic words realized with a pitch accent in native and nonnative productions.
 468 In order to evaluate whether the native speakers showed a significant difference in
 469 marking PWDs, we set up a linear effect model for PWDs (pitch accented and not
 470 pitch accented) with the variable predictors and Group (FL1, FL2, and SL1) inter-
 471 acting with the Task (RT vs. IOP), and random intercepts and slopes for subjects.
 472 The results obtained confirm that there are significant differences across the three
 473 groups (see Table 12.6).

Change to:
 In the case of the 103 questions

474 These results show that FL1 speakers produce more PWDs with a pitch accent
475 than learners ($|z|$ value=6.495 and $p < 0.0001$). From the analysis made, it appears
476 that learners have a tendency to realize PWDs as unaccented, whereas native French
477 speakers tend to mark them tonally. By comparing the group of Spanish speakers
478 (FL2 and SL1), the analysis indicates that Mexican learners associate fewer pitch
479 accents with the stressed syllable of PWDs when speaking in French than Spanish
480 speakers speaking in their L1 ($|z|$ value=6.975 and $p < 0.0001$). The second ques-
481 tion consisted in evaluating whether tasks had an effect on the tonal realization of
482 PWDs. As shown in Table 12.6, we found a considerable effect of the task on the
483 tonal realization of PWDs, but there was no interaction between the group and task
484 for marking the PWDs with a pitch accent. In other word, all speakers, regardless of
485 their L1, have a tendency to produce more pitch accents in RTs than in spontaneous
486 speech ($|z|$ value=2.350 and $p < 0.01$).

487 By comparing the model with fixed effects group and participants as random ef-
488 fects against one model without the effect in question, we found that predictors have
489 an explanatory power ($\chi^2(2) = 34.49$ and $p < 0.0001$).

490 Finally, we evaluated whether the proficiency level of the learners has an effect
491 on the way they phrase yes–no questions in PWDs, by realizing a pitch accent. An
492 analysis comparing the proportion of prosodically marked PWDs in the productions
493 of the two groups of learners was achieved. The results showed that, even if learn-
494 ers with a higher level of proficiency had a tendency to realize more PWDs with
495 a pitch accent than learners at a lower level, the differences did not reach signifi-
496 cance ($|z|$ value=0.980 and $p = .327$). As yes–no questions in Spanish were usually
497 deaccented, that is with no pitch accent associated with the stressed syllables, the
498 realization observed in the learners' data may be in part explained by some interfer-
499 ences with their L1.

500 **12.3.4 Summary and Discussion**

501 The analysis of the data showed that the yes–no questions produced by the Mexi-
502 can Spanish learners of French display some prosodic characteristics that are not
503 observed in French native speakers' productions. As for the final tune, learners
504 only use rising contours, whereas native speakers use a wide variety of contours
505 at the end of yes–no questions, in particular when the modality of the utterance
506 is expressed by lexical or morphosyntactic elements. In this latter case, nonrising
507 tonal contours (0 and L%) are very frequently observed in the FL1 group. In addi-
508 tion, among the rising forms, learners use an important proportion of extra-rising
509 contours in comparison to the other language groups. As for the internal prosodic
510 structure, the French native speakers often realized pitch accents to indicate the
511 right edge of PWDs (or APs). As a consequence, a high proportion of potential
512 PWDs derived from the morphosyntactic rules are actually realized prosodically.
513 By contrast, the learners of French do not often mark the right edge of PWDs by the
514 realization of a rising pitch accent H*. This difference in the realization of PWDs
515 in French questions confirms what was said in previous analyses (Vion and Colas

2006, 2002). The prosodic patterns observed in the learners' utterances are more similar to what is found in Spanish speakers' productions: in our data, the proportion of PWDs marked by the realization of a pitch accent is not as important as in French. The tonal patterns obtained in the Mexican Spanish data provide evidence for the idea that stressed syllables in sentence internal position are commonly deaccented in Spanish yes–no questions (*cf.* Face 2007, 2006). The observation of the data suggests that the segmentation in PWDs is not indicated by the same prosodic events in Spanish and French. In Spanish the internal prosodic structure is not signaled by pitch accents, because of a deaccenting process.

To sum up, the intonational patterns observed in the yes/no questions produced by the learners differ from what the FL1 speakers do. Two distinct points display clear differences between the two groups of speakers: (i) the choice of the final tonal contours, and more specifically the exclusive use of rising contours in the learners' productions, and (ii) the marking of the prosodic words (PWDs), which are almost never clearly indicated in the learners' utterances. This shows that FL2 learners may be influenced by their L1 in realizing yes–no questions in French: they, thus, use rising contours frequently, and, in particular, extra-rising ones (HH%), and they do not clearly indicate the segmentation in prosodic words by the occurrence of a pitch accent. On the basis of these points, it could be said that an L1 transfer comes into play.

12.4 Information-Seeking Wh-Questions

Information-seeking wh-questions are interrogative clauses that are used by speakers to ask for information on a specific part (or constituent) of the proposition. Such utterances are characterized by the presence of an interrogative marker (or wh-word) that indicates which part of the proposition is questioned. After describing the morphosyntactic and prosodic characteristics of information-seeking wh-questions in French and Spanish, we present in this section the results of our analysis which focus on the final tunes observed at the end of the 272 wh-questions extracted from our corpus. Note that we were not able to provide an analysis of the prosodic phrasing, since the extracted utterances did not contain more than two PWDs. The distribution of the contours observed in the 272 utterances and the analysis according to the shape of the tunes, the groups of speakers and the morphosyntactic forms of the sentences allow reconsidering the weight of the L1 transfer for explaining the prosodic patterns observed in learners' oral productions.

12.4.1 *Morphosyntactic and Prosodic Characteristics of Wh-Questions*

In French, a great variety of morphosyntactic forms can be observed in information-seeking wh-questions: (i) with the wh-word in sentence initial position followed by a subject–verb inversion as in (7a); (ii) with the wh-word followed by the particle

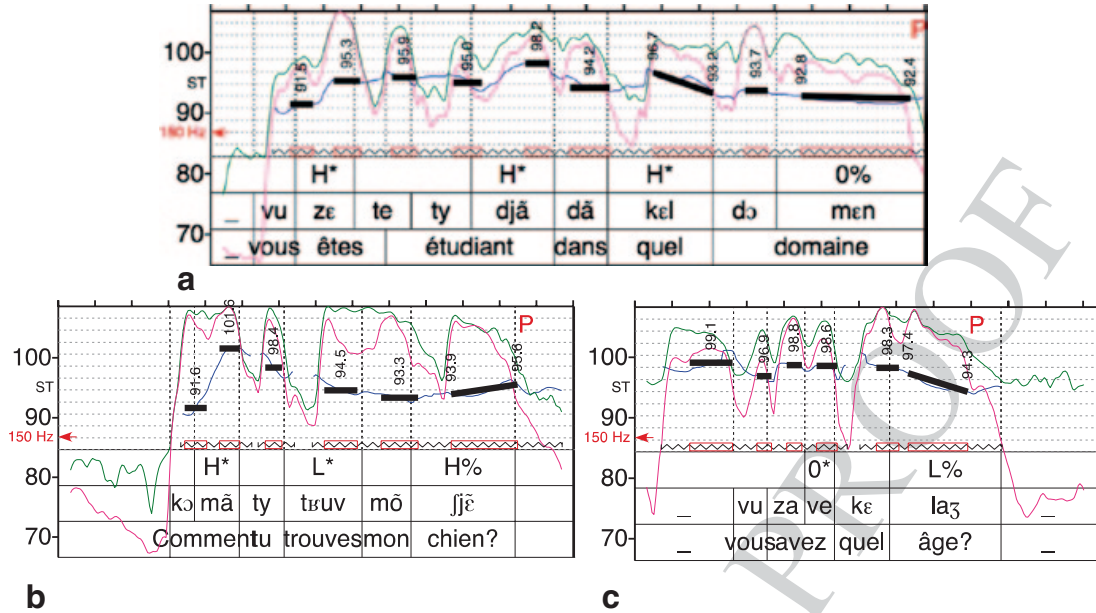


Fig. 12.9 In-situ and fronted wh-questions realized with three different final contours

554 *est-ce que* but without any subject–verb inversion as in (7b); and (iii) with the wh-
 555 word located in the position where the questioned constituent should occur as in
 556 (7c). In our data, only sentences of type (i) and type (iii) are present, the first one
 557 being called “fronted wh-questions,” and the other one “in situ wh-questions.”⁶

- 558 (7) a. Comment trouves-tu mon chien?⁷
 559 ‘How do you find my dog?’
 560 b. Quand est-ce que tu viens?
 561 ‘When are you coming?’
 562 c. Tu as donné ce livre à qui?
 563 ‘Who did you give that book to?’

564 As far as intonation is concerned, information-seeking wh-questions in French are
 565 described as ending with a falling tune or contour encoded here as L% (Di Cristo
 566 1998; Delattre 1966, among others). However, a wide range of final contours has
 567 been observed in this sentence type, regardless of the morphosyntactic forms used.
 568 Among the falling tunes, a phonetic distinction can be made between two types of
 569 forms: (i) a falling contour that occurs at the end of the utterance and that is com-
 570 parable to the falling tune observed in assertions (Fig. 12.9c); (ii) a falling pitch
 571 movement that occurs after the initial rise Hi on the wh-word, the final syllable be-
 572 ing associated with a low plateau which is encoded 0% (Fig. 12.9a). Speakers can
 573 also use rising tunes H%, as shown in Fig. 12.9b. Recent studies suggest that the
 574 rising contours observed at the end of wh-questions differ considerably from those

⁶ In situ wh-questions can be used in several contexts in French, and not only as echo-questions. Further research on that point is nevertheless necessary.

⁷ In colloquial French, it is possible to have the same structure without any subject–verb inversion: *comment tu trouves mon chien?*

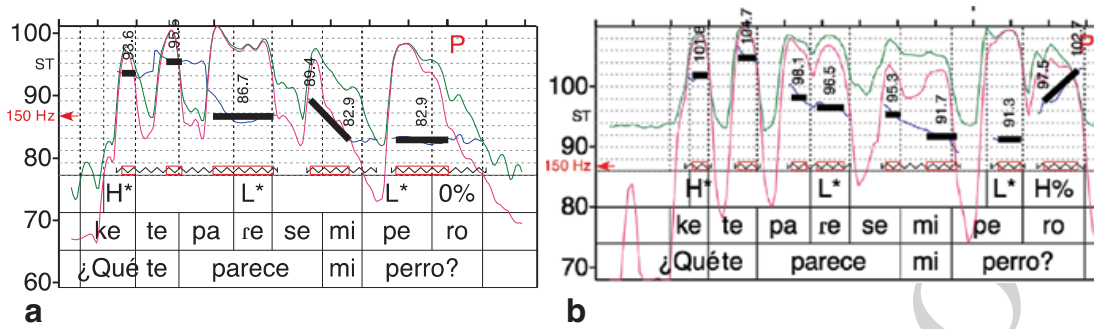


Fig. 12.10 Stylized F0 pitch tracks associated with two wh-questions in Mexican Spanish, one with a 0% final contour (a), and one with a H% rising tune (b)

575 realized at the end of yes–no questions: the rise is less sharp in wh-questions than in
 576 yes–no questions (Di Cristo to appear; Déprez et al. 2012).

577 With the exception of emphatic echo questions, information-seeking wh-ques-
 578 tions in Spanish are always characterized by a morphosyntactic form in which the
 579 wh-word is in sentence initial position as in (8), which contrasts with what was
 580 observed in French.

- 581 (8) ¿Qué te parece mi perro?
 582 'How do you find my dog?'

583 As shown in previous studies (de la Mota et al. 2010; Ávila 2003; Sosa 2003, 1999;
 584 Quilis 1993; among others), different tunes may occur at the end of wh-questions in
 585 Spanish: falling and rising ones. Nevertheless, the falling contour L% is considered
 586 in the literature as the most frequently used in all varieties of Spanish (cf. Quilis
 587 1993; Navarro Tomás 1944). In grammatical descriptions of Spanish intonation, it
 588 is often said that the melodic profile associated with information-seeking wh-ques-
 589 tions is relatively similar to that of assertions. It is claimed that Spanish speakers use
 590 a rising contour H% in wh-questions for pragmatic purposes, in particular, to sound
 591 more polite (Quilis 1993). In the 1993 wh-questions analyzed in this study, a wide
 592 array of final tunes has been observed. Figure 12.10 illustrates a nonrising contour
 593 0% (Fig. 12.10a) and a rising one H% (Fig. 12.10b) produced by two Mexican
 594 speakers for the question in (8).

595 **12.4.2 Final Tonal Contours in Wh-Questions: Analysis and**
 596 **Results**

597 The aim of the analysis on wh-questions was to see whether L2 speakers would use
 598 the HH% contour as in the case of yes–no questions, or would be influenced by
 599 their L1, and use other final tunes. As far as the data are concerned, it is important
 600 to note that the wh-questions extracted from the corpus consisted mostly of a wh-
 601 interrogative pronoun (*who, what, when, where, why, or which*), but in some cases,
 602 the questioned phrase consisted of a noun preceded by an interrogative adjective

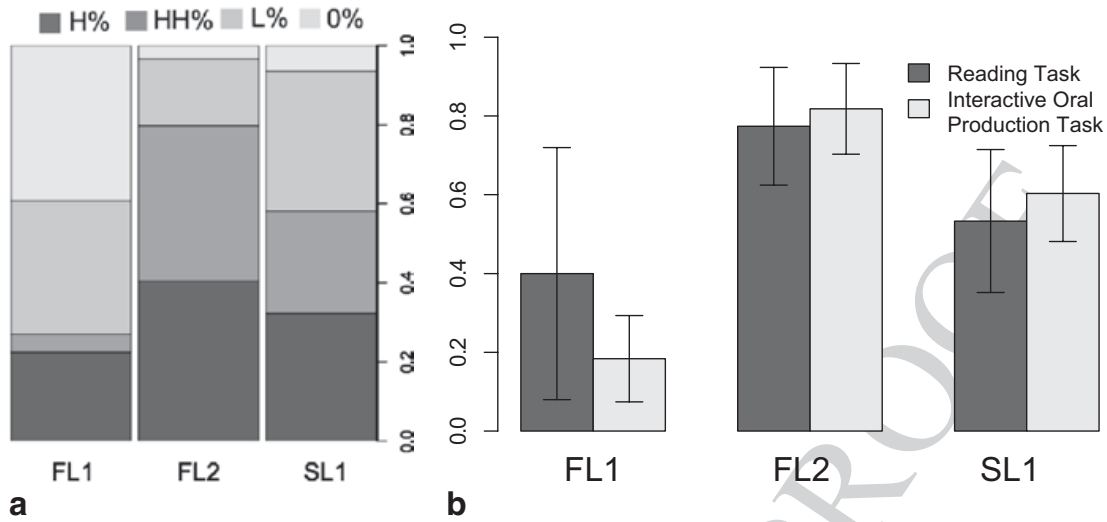


Fig. 12.11 Proportions of contours observed in wh-questions across the three groups (a), and proportions of rising contours (H and HH% grouped) used in the different tasks (b)

603 (e.g., *what profession, which course...*). Among the data from the FL2 speakers, in
 604 situ wh-questions were all extracted from the RT.

605 As expected from previous studies on French and Spanish intonation, native
 606 speakers in both Spanish and French use a wide array of tonal contours at the end of
 607 information-seeking wh-questions: rising contours, and mostly H%, and nonrising
 608 contours (0 and L%). Note however, that the proportion of rising contours vs. fall-
 609 ing ones differs between both groups (French and Spanish natives). This result is
 610 shown in Fig. 12.11a, which represents the proportion of the various final contours
 611 used by each language group. We calculated the proportion of rising and falling
 612 forms used by the three language groups for the two different tasks as well. These
 613 results are represented in Fig. 12.11b.

614 In order to evaluate whether significant differences in the distribution of the
 615 various tunes could be found across the three groups, we set up an *lme* for Contours
 616 (rising vs. falling), and predictable variables Group (FL1, FL2, and SL1) interacting
 617 with the Task (reading vs. spontaneous). Table 12.7 summarizes the results obtained
 618 with this model:

Table 12.7 Linear mixed effect model analysis for contour (rising (H and HH% grouped) vs. falling (L and 0%)) and the predictor variables group (FL1, FL2, and SL1) interacting with task (RT and IOP)

	Estimate	Standard error	z-value	Pr (> z)
Intercept	0.419227	0.268224	1.563	0.118059
FL1 vs. FL2	-1.237036	0.385435	-3.209	0.001330**
FL2 vs. SL1	1.376819	0.379319	3.630	0.000284***
Task	0.005952	0.179084	0.033	0.973487
(FL1 vs. FL2)*Task	0.568761	0.252392	2.253	0.024229*
(FL2 vs. SL1)*Task	-0.438486	0.272246	-1.611	0.107262

0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Change to:
 FL1 and SL1

619 As expected, we found a significant interaction between the groups and the dis-
620 tribution of the rising contours. By comparing the proportion of rising tunes, we
621 provide evidence that French natives produce fewer rising tunes than learners ($|z|$
622 value=3.209 and $p<0.001$). When comparing the proportion of rising tunes be-
623 tween Spanish learners of French and Spanish speakers in their native language,
624 we find significant differences as well: Spanish speakers produce fewer rising tunes
625 than learners ($|z|$ value=3.630 and $p<0.0001$). In other words, learners use by far
626 more rising contours in information-seeking wh-questions than French and Spanish
627 speakers do.

628 As for the task effect interacting with the group on the use of rising tunes, we ob-
629 served that French native speakers produced more rising contours in RT than in IOP
630 in comparison to learners ($|z|$ value=3.209 and $p<0.001$). However, by comparing
631 both Mexican Spanish speakers (FL2 and SL1), we did not find significant differ-
632 ences in the choice of contour and group interacting with the task ($|z|$ value=-1.611
633 and $p=0.107$). We found that the predictor group had an explanatory power for the
634 choice of either rising or falling contours ($\chi^2(1)=15.30$ and $p<0.0001$) in wh-ques-
635 tions. Furthermore, the proportion of HH% in learners' productions differs consid-
636 erably from what is observed for native speakers: 40% for FL2 learners vs. 4.5 and
637 25% for FL2 and SL1, respectively.

638 In order to evaluate whether the morphosyntactic form had an effect on the choice
639 made by the speakers, we carried out an analysis focusing on in situ wh-questions.
640 Because of the small number of wh-questions extracted from the IOP task, an *lme*
641 for contour (rising vs. falling), and Group (FL1 and FL2) was set up after excluding
642 the task effect for the subset of in situ wh-questions. The results showed the same
643 tendency as for the other question types: FL2 speakers produce more rising tunes
644 in RTs than FL1 do ($|z|$ value=0.0257 and $p<0.05$), and among the rising contours,
645 the extra-rising one HH% represents almost 60%, whereas it represents less than
646 5% in FL1 data. These results were confirmed by carrying out a likelihood ratio test
647 ($\chi^2(1)=4.86$ and $p<0.01$).

648 We also decided to evaluate whether the level of proficiency had an effect in the
649 choice of the contour in the case of FL2 learners. A last linear mixed effect model
650 was carried out. The results obtained after modeling the data with the variable pre-
651 dictor contour (rising, falling) and level as fixed effect (A2, B1) and participants
652 as random effects confirmed that learners positioned in lower levels produced
653 more rising contours than students having an advanced level: ($|z|$ value=1.741
654 and $P<0.05$). A likelihood ratio test confirmed this observation: ($\chi^2(1)=3.799$ and
655 $P<0.05$).

656 In addition, we found the same tendency as for the analysis of yes-no questions:
657 advanced students produce fewer HH% than beginners in questions having a mor-
658 phosyntactic structure that differs from the one used in their L1 (60% occurrences
659 of HH% were founded in in situ wh-questions vs. 36% in fronted wh-questions).
660 However, more data must be gathered in order to find significant differences be-
661 tween the proficiency level and the choice of the contour.

662 **12.4.3 Discussion of the Results**

663 The analysis of the wh-questions extracted from our corpus shows that the distri-
664 bution of the contours is not the same in French (FL1) and Spanish (SL1), even
665 though the form of the final tunes varies much more than in yes–no questions in
666 both languages. In French, the nonrising contours 0 and L% are the most frequently
667 used, regardless of the position of the interrogative expression (fronted or in situ).
668 Our results provide only nuanced support for Déprez et al.'s (2012) proposal and
669 confirm the fact that French speakers realize falling contours rather than rising ones
670 in wh-questions (Di Cristo 1998 to appear).

671 In Spanish, the proportion of nonrising (0 or L%) and rising (H or HH%) contours
672 used is almost similar. Note, however, that Spanish differs from French in the use of
673 the extra-rising contours HH%: they represent more than 20% of the tunes in Span-
674 ish vs. less than 5% in French. These realizations confirm what has been said in the
675 literature (de la Mota et al. 2010; Quilis 1993; Navarro Tomás, 1944 among others).

676 Learners' realizations differ from native speakers' realizations, both in French
677 and Spanish. Rising and extra-rising contours are far more common in learners' re-
678 alizations, occurring in more than 60% of the occurrences. Note, however, that the
679 proportion of HH% contours used is even more important in in situ wh-questions,
680 which is a structure unknown from the learners, as it does not exist in Spanish.

681 According to these results, an L1 transfer cannot be invoked to account for the
682 data for two reasons: (i) learners have a tendency to use systematically rising con-
683 tours in wh-questions, whereas falling contours are also used in their first language;
684 and (ii) the extra-rising contour HH% cannot be related to the learners' L1, since
685 this form is not as frequent in wh-questions.

686 The observations we made are in the same lines as what has been observed by
687 MacDonald (2011), Horgues (2010), Pytlyk (2008), and Celce-Murcia (1996): L2
688 learners associate H and HH% contours to questions, regardless of their morpho-
689 syntactic form and type. As far as perception is concerned, naïve speakers seem
690 to associate consistently rising tunes to questions when they listen to an unknown
691 L2 (see Gussenhoven and Chen 2000). In the light of these results, an analysis
692 in terms of L1 transfer has to be revised. Two hypotheses should be investigated:
693 (i) unmarked primitive tonal patterns, usually considered as universally associated
694 with the interrogative modality, could be stocked in the learner's nongrammatical
695 knowledge, and used at early stages in the acquisition; and (ii) the extra-rising tunes
696 could indicate a lack of linguistic security when speaking an L2.

697 **12.5 Conclusion**

698 The prosodic patterns observed in information-seeking yes–no questions in Spanish
699 and French differ in two ways: (i) a rising tonal contour is usually realized at the
700 end of information-seeking yes–no questions in Spanish, whereas a wide array of
701 contours may be observed in French; and (ii) the segmentation in PWDs is usually

702 indicated by the presence of a rising pitch accent H* in French, whereas phrasing in
 703 PWDs is not necessarily tonally marked in Spanish. These differences could explain
 704 in part what was observed in the learners' productions. They are indeed character-
 705 ized by a very high proportion of extra-rising final contours and by an absence of
 706 pitch accents in PWDs located in sentence internal position. Since these realizations
 707 share common features with the intonational patterns observed in information-seeking
 708 yes–no questions in Spanish, it can be argued that learners' realizations result
 709 from the activation of an L1 transfer.

710 However, by studying the intonational patterns in information-seeking wh-ques-
 711 tions, we showed that the use of rising contours, and more specifically extra-rising
 712 ones, cannot be considered as resulting from an L1 transfer. In this question type,
 713 nonrising contours are as frequent as rising ones in Spanish, whereas the learners do
 714 employ rising contours in most of the cases (80%). In addition, the extra-rising tune
 715 HH% is far more frequently used by the learners than by any native speaker, regard-
 716 less of the language. Note, however, that (i) learners positioned at the A2 level use
 717 this tune more often than more advanced learners, and (ii) this form is more frequent
 718 when the morphosyntactic structure obtained is not observed in the speaker's L1.

719 In any case, the results obtained in the analysis of wh-questions force us to con-
 720 sider factors other than L1 transfer to explain the use of extra-rising contours in in-
 721 terrogative utterances. Two distinct hypotheses may be formulated. The first expla-
 722 nation relies on the idea that rising tunes are considered as unmarked forms at very
 723 early stages of the L2 acquisition process, because of the universal association be-
 724 tween rising tune and interrogativity. In other words, by being language independent
 725 and universal forms, rising tonal patterns have a stronger effect on learners' prosodic
 726 competence. Another explanation that is forth exploring is to see whether the use
 727 of extra-rising forms could be related to linguistic insecurity. The fact that learners
 728 showed preference for this form when producing questions the syntactic structures
 729 of which differ from their L1 is an argument in favor of such an analysis: in our data,
 730 the learners do use a higher proportion of extra-rising contours HH% in yes–no
 731 questions with an interrogative marker and in in situ wh-questions, two forms that
 732 are not frequent in Spanish. Further research on this issue is necessary in order to
 733 evaluate what could motivate the occurrence of extra-rising tunes in L2 speech.

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Authors' first names are not referred with the same. See lines 739 (Ávila, S.) vs line 742 (Bartels, Christine).

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