

# PERCEPTION OF SPANISH DECLARATIVE QUESTIONS AND STATEMENTS BY L2 SPANISH SPEAKERS

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## ABSTRACT

The distinction between declarative questions and statements in Spanish is often found only in prosody. However, question contours vary from one Spanish variety to another. In Central Peninsular Spanish (PS) neutral questions tend to end with a rise while Argentinian Spanish (AS) shows a circumflex pattern. Here we investigate the perception of 20 L2 speakers whose L1 is American English identifying Spanish declarative questions with rising vs circumflex contours. The goal is to investigate the influence of primary and secondary cues to interrogation by comparing original and manipulated F0 contours. In general, all participants identified original sentences accurately. Contrary to our predictions, circumflex contours were more consistently perceived as questions than rising contours. We speculate that this may be due to the presence of secondary cues for interrogative contours.

**Key words:** intonation, perception, declarative sentences, L2 Spanish speakers

## 1. INTRODUCTION

Declarative questions are a type of yes/no interrogative sentences that are lexically and syntactically identical to declarative statements. For example, in Spanish: *¿Es frío?* (polar interrogative) and *Es frío* (declarative question). Not only do they have differences in their syntactic constructions but they also differ in pragmatics and usage. According to Gunlogson [7], the intonational contours that differentiate these two sentences may be language and dialect-specific, universal tendencies have been identified for the expression of interrogativity, such as questions having an overall higher pitch, and higher onset and final pitch than statements (Ohala [1]; Henriksen [2]; Gussenhoven [3]; Murphy [4]; Chen [5]; Grabe [6]).

In American English (AE) there are two types of yes/no questions: a) Is it cold? (polar interrogative), b) It is cold? (declarative question). Not only do they have differences in their syntactic constructions but they also differ in pragmatics and usage. According to Gunlogson [7], the intonational contours that differentiate these two sentences may be language and dialect-specific, universal tendencies have been identified for the expression of interrogativity, such as questions having an overall higher pitch, and higher onset and final pitch than statements (Ohala [1]; Henriksen [2]; Gussenhoven [3]; Murphy [4]; Chen [5]; Grabe [6]).

In Spanish declarative questions and statements are lexically and syntactically identical: a) *bebe agua*. *¿bebe agua?* -does he/she drink water? The listener must rely on prosody to differentiate questions from equivalent declarative statements, especially if the subject is left unexpressed (Face [8]; Henriksen [1]; Trimble [9]).

Moreover, the use of prosodic cues to mark interrogativity may vary across dialects. For instance, in the standard Spanish variety of Peninsular Spanish (PS) interrogativity is expressed by a rising boundary tone (H%) at the end of the interrogation and there is a fall (L%) in statements (Face [8]). Furthermore, it has been observed that the fundamental frequency (F0) of the first peak in questions is another cue that this variety of Spanish employs to distinguish the two types of sentences. According to Face [8], the final rise is the primary marker for interrogation, whereas the first peak is a secondary cue. Declarative questions start high at the beginning of the utterance, followed by a gradual descent and a rise at the end of the sentence (Navarro Tomás [10]). Additionally, if there is a pitch accent in sentence medial position, the rise of F0 is found in declaratives, but in questions it is not generally that consistent (Face [8]).

In Spanish from Buenos Aires, Argentina (AS), there is a height difference of F0 between declarative statements and questions. However, unlike PS, questions in AS have a circumflex contour with a falling boundary tone (HL%) at the end of the utterance [Prieto et al. [11]].

In order to identify the primary and secondary cues to interrogation in Spanish, Face [8] explored the perception of interrogative sentences by L1 speakers using both original and manipulated sentences of their native dialect. The results showed that the primary cue for native speakers is found in the last part, in the boundary tone, of the utterance.

Regarding the perception of Spanish intonation by L2 speakers, Uchida et al. [12] explored the acquisition of intonation by L2 speakers is still an understudied topic within the field of Second Language Acquisition (SLA). Nevertheless, there are studies that are worth mentioning that have investigated the production of declarative statements and questions in bilinguals (Zarate-Solis [15]) and L2 speakers (Gabriel et al. [14]; Sanchez [12]; Trimble [9]; Yuan et al. [15], Brandl et al. [16], Henriksen, et al. [17], Zarate-Solis [18], Mijanguez

Seijas [19]); and there are also studies on perception of bilinguals (Nibert [20]; Sanchez [12]; Timble [9]; Casillas et al. [21]).

For example, Trimble [9] aimed to analyze the perception by L1 American English L2 Spanish speakers of declarative statements and questions, produced by a Castilian speaker, a Venezuelan speaker, and a proficient L2 Spanish speaker. The three speakers differed in the contours of the questions. The Castilian and the L2 speakers produced the question with a H% boundary tone, whereas the Venezuelan speaker sentences had a HL% boundary. The results showed only 44% of the Venezuelan interrogative utterances with the HL% boundary were perceived as question by the L2 speakers. This indicates that L2 speakers are sensitive to the boundary tones of the utterances when perceiving interrogation. Most of them agreed that H% signifies interrogation and L% finality, while there was less agreement in the meaning of HL%.

Here we aim to contribute to the field by examining the perception by L2 Spanish speakers of declarative questions and statements of PS and AS to better understand the acquisition of the intonation of Spanish as a second language across dialects. These two varieties were specifically chosen due to their differences in the acoustic contours in questions.

## 2. RESEARCH QUESTIONS AND HYPOTHESES

The study will address the following questions: Q1) How do L1 English L2 Spanish speakers interpret questions that do not end in a rise? Q2) Do listeners use both primary and secondary cues to interpret interrogative sentences? Q3) Do L1 and L2 Spanish speakers use the same cues?

L2 speakers should be able to identify correctly the Peninsular original statements and questions based on the universal cues and rising boundary tone. On the other hand, based on the results of Trimble [9] on the perception of the circumflex contour in questions, in interrogative sentences, we expect to observe variation when interpreting the Argentinian questions. Moreover, we expect that the main cue for questions to be the final boundary tone, even in the manipulated sentences, based on Face [8] and Trimble [9] for both L1 and L2 speakers.

## 3. METHODS

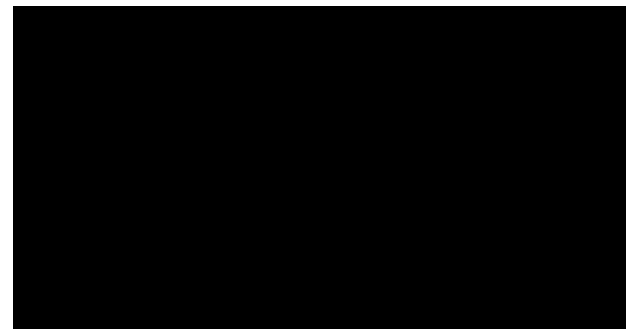
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In total, 41 individuals participated in our perception study: 13 Peninsular Spanish-speakers (control group for PS sentences), 14 Argentinian Spanish-speakers (control group for AS sentences),

and 20 L1 American English L2 Spanish-speakers. All L2 speakers had experience learning Spanish for over 5 years and their home language was English.

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Participants heard 27 sentences. 18 of them were produced by a female native speaker of Central Peninsular Spanish: 6 original declarative questions (PS-OQ) and their counterpart statements (PS-OS), and 12 manipulated sentences. In the case of AS, only questions were recorded by a male speaker, since the two varieties differ mainly in the contour of interrogative sentences. There were 9 utterances, 3 of which were original (AS-OQ) and 6 were manipulated (AS-MQ).



**Figure 1:** Manipulation from original statements. Pink line represents the rising boundary tone, the green baseline position and the black line represents the original contour.

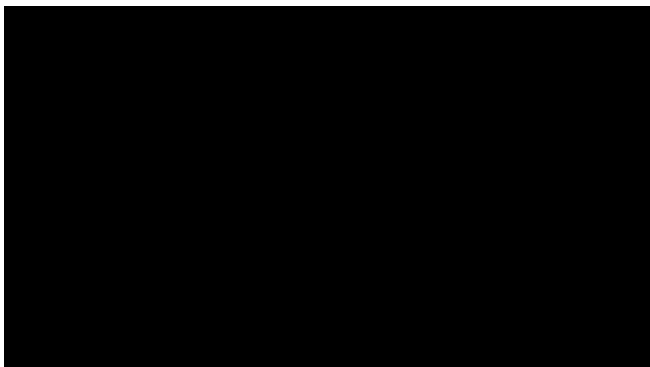
Manipulations were made using the program Praat [22]. AS and PS contours were manipulated separately and all the utterances were resynthesized.

From the statements produced by the Peninsular Spanish speaker, two other manipulated sentences were created (see Figure 1), changing the boundary tone to two positions, high (PS-MSH) and at the baseline (PS-MSB) of the utterance. The high boundary tone was created considering the high peak of the lexical stress of the first content word making the sentence have a raise at the end of the utterance. The baseline position, on the other hand was in the same height as the L\*, to ensure that there was no rising or falling boundary tone.

Similarly, from original questions two other sentences were created (see Figure 2). This time, since the questions already have a H% boundary tone, the manipulated sentences that were created had a falling tone (PS-MQL) or they ended in a baseline position (PS-MQB). In order to create the L% in the same way in all the stimuli, the height of L\* was taken into account as a reference and afterwards, the contour was lowered 40 Hz.

**Figure 2.** Manipulation from original questions.  
Pink: falling boundary tone; Green: baseline position;  
Black=the original contour.

The first manipulation of AS questions was done by deleting the peak of the HL% ending in M% (AS-MQB). The second manipulation was conducted in the same way as it was done in the Peninsular Spanish stimuli. First, the height of L\* was taken into account as a reference and afterwards, the boundary tone was lowered 40 Hz, creating a L% (AS-MQL). Pitch was lowered by 40 Hz for both speakers (PS and AS) to have the same tonal difference from the last lowest point before the start of the rise of the final boundary tone.



**Figure 3:** Manipulation from original questions. Pink: the contour after the circumflex was deleted; Green falling boundary; Black: the original contour.

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The study was conducted by using the online platform Qualtrics. The participants heard the stimuli, one at a time, and only once. After listening to each token, they were asked if the sentence was a question or not by pressing a button on the screen.

## 4. PREDICTIONS AND RESULTS

### 4.1. Perception of sentences from Peninsular Spanish

#### 4.1.1. Predictions

P1: *OQ as questions and OS as statements.* Questions end with a H% and statements in a L%. As these patterns align with the intonation patterns of the L2 *rctvle rcpwø" N3" \*CE)*, L2 listeners should accurately perceive original statements as statements and original questions as questions.

P2: *MQL as statements and MQH as questions.* L2 speakers will be guided by the manipulated boundary tone when interpreting the original statements that were manipulated to have a H% boundary tone and the manipulated questions with the L% tone. This may lead to the perception of manipulated statements as questions and manipulated questions as statements.

P3: *MQB as questions and MSB as statements.* In the absence of the primary cue, the prediction for questions and statements that end in the baseline is listeners will rely on a secondary cue and will perceive statements as statements and questions as questions.

#### 4.1.2. Results

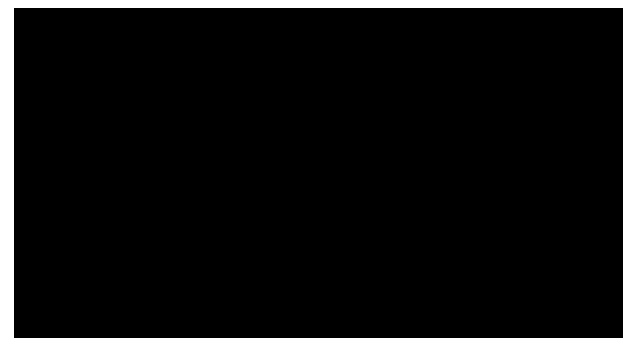
The results are shown in Figure 4. The performance of the L2 speakers was compared to the performance of the L1 speakers of PS.

P1: *OQ as questions and OS as statements.* This prediction was confirmed for original statements and to lesser extent for questions.

P2: P3: *MQL as statements and MQH as questions.* This prediction was confirmed for original statements and questions.

P3: *MQB as questions and MSB as statements.* This prediction was only partially confirmed for manipulated statements by the PS group. Only a few participants appear to have used other secondary cues as markers of interrogativity.

Lastly, we conducted t-tests using two-sample t-test for proportions to test whether L2 performed significantly different from the PS group in each sentence. For all the sentence types, except for OS, the p-value was smaller than .05. This shows that PS and L2 perceived PS intonation contours in different ways, including the original questions.



**Figure 4:** Perception of PS stimuli. Percentage of tokens identified as questions and statements.

6040' Rgtegr vkqp" qh' ugpgpegu" lt qo " Cti gpvkp p"  
Urcplkj 0'

#### 4.2.1. Predictions

P1: *Variation perceiving OQ*. Questions end in HL% boundary tone and since this is not part of the listeners L1, they will show variation in their responses.

P2: *MQL as statements*. Manipulated questions ended in L% will be perceived as statements, since the primary cue is the boundary tone.

P3: *MQB as question*. L2 speakers will use secondary cues to perceive manipulated questions ended in M% as questions in the absence of the primary cue.

#### 4.2.2. Results

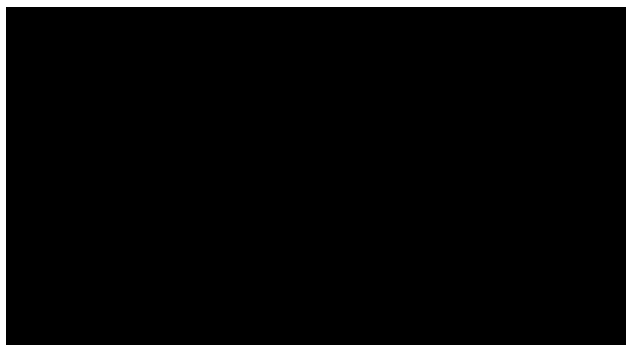
The results are shown in Figure 5. The performance of the L2 speakers was compared to the performance of the L1 speakers of AS.

P1: *Xctcvkqp"rgteglxpi"QS*. This prediction was not confirmed because L2 speakers interpreted the original Argentinian questions as questions.

P2: *OSN"cu"uxvgo gpv0* It was confirmed as L2 speakers were generally sensitive to the final L% boundary tone and perceived the manipulated questions as statements.

R3: *MQB as question*. The was confirmed. They identified the manipulated sentences as questions in the majority of cases.

Again, we conducted T-tests for group comparisons. All the p-values were larger than .05 Thus, we can say AS and L2 perceived AS intonation contours in similar ways.



**Figure 5:** Results of AS sentences. Percentage of tokens identified as questions.

## 5. DISCUSSION AND CONCLUSION

Overall, this study has shown that L2 speakers relied on universal tendencies to interrogation when perceiving the sentences. They perceived stimuli with a H% boundary tone as questions and stimuli with a final L% boundary tone as statements. Moreover,

final stimuli with a high tone on the last stressed syllable and a final circumflex were also perceived as questions even if in the rctvkr cpv0hative language this contour is not usually found in such contexts.

Regarding the first research question, original statements and questions from PS were perceived quite accurately. In the case of declarative questions, accuracy was somewhat lower, and their performance was significantly different from the control group, but the majority of participants perceived the unmanipulated interrogative sentences as questions. In the case of the perception of the Argentinian utterances, addressing the second research question, all the groups showed sensitivity to the presence of the circumflex contour and to the high tone at the end of the utterance. In fact, AS questions were perceived slightly more accurately than the PS questions and L2 speakers performed similarly to the control group. Therefore, we may conclude that the main cue to interrogation is the presence of a high tone at the end of utterance, regardless of the final low boundary tone.

Regarding the third research question, in general, L1 and L2 speakers of Spanish appeared to have relied on the same cues when interpreting the declarative sentences. Natural stimuli ending either in a high boundary tone or an upstepped circumflex tended to be interpreted as a questions and stimuli with a final falling contour were mostly interpreted as statements. Manipulation of the final contour resulted in more ambiguous stimuli.

This project has contributed to understanding how the intonation of the declarative questions and statements of Spanish differing solely in the prosody. It also showed how intonation is perceived by L2 speakers compared to L1 Spanish speakers. In order to create stimuli, two variants of Spanish were chosen: Argentinian and Peninsular.

The main difference between the two variants is in the boundary tone of the questions, H% for PS stimuli, and HL% tone for AS questions. Since the latter boundary tone is not usually found in American English, it can be challenging to acquire for L2 speakers, as was shown in Trimble [5]. However, this study showed different results, since L1 and L2 speakers interpreted HL% in a similar way.

Both the Venezuelan questions in Trimble [9] and our Argentinian questions end in HL%, but these two studies show different results. We surmise that the difference may be due to differences between Venezuelan and Argentinian interrogative circumflex contours. It is likely that the relative height of the last accentual peak before the final fall conditions perception of interrogativity for L1 English speakers. Alternatively, the relative height of the first peak in the sentence may also play a role (Face [19]).



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