Intonation of English polar interrogatives by River Plate Spanish speakers

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Resumen
Este estudio tuvo como objetivo investigar la selección y realización fonética de patrones de entonación del inglés L2 en interrogativas absolutas por parte de hablantes de español del Río de la Plata que habían recibido instrucción explícita. Los participantes se estaban formando para ser profesores de inglés como lengua extranjera en un Instituto de Formación Docente de la ciudad de Buenos Aires. Veinte hablantes desarrollaron una tarea consistente en adivinar un ítem mediante interrogativas absolutas (sí-no). Un análisis acústico de los contornos entonativos producidos mostró que los participantes utilizaron acentos ascendentes bajos, acentos ascendentes altos, acentos de suspensión y acentos descendentes-ascendentes. Los resultados mostraron que el acento ascendente bajo, precedido por un segmento pre-nuclear alto, tuvo una frecuencia relativamente baja, aunque durante el periodo de instrucción, los participantes lo habían practicado como patrón por defecto para las interrogativas absolutas. El acento ascendente alto y el acento de suspensión, que no les habían sido enseñados como marcadores de interrogatividad por defecto, ocurrieron con mayor frecuencia. La hipótesis es que los participantes pueden haber intentado producir acentos ascendentes altos, pero éstos emergieron como acentos de suspensión. Los contornos nucleares relativamente planos podrían haber sido el resultado de la transferencia de rango tonal de la L1, un error fonético. Los acentos ascendentes altos pueden haber sido originados por una transferencia fonética parcial, al aplicar una de las dos realizaciones fonéticas del acento interrogativo español del Río de la Plata. Se concluyó que el acento ascendente bajo era difícil de adquirir, y que esto debería abordarse en la práctica docente, así como la distinción entre errores fonológicos y fonéticos en la entonación del inglés como L2.

Palabras clave: entonación, interrogativas, transferencia L1, interlengua.

Abstract
This study was aimed at investigating the choice and phonetic realisation of L2 English intonation patterns in polar interrogatives by River Plate Spanish speakers who had previously received explicit instruction. Participants were training to become teachers of English as a foreign language in a Teacher Training College in the city of Buenos Aires. Twenty speakers carried out a task consisting in guessing an item by means of (yes-no) interrogatives. An acoustic analysis of the pitch contours produced revealed that the participants exploited low rising accents, high rising accents, level accents and falling-rising accents. The results showed

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that the low rising accent, which was always preceded by a high-pitched pre-nuclear segment, did not occur frequently, although during their instruction period participants had practised it as the default pattern for yes-no questions. Conversely, the high rising accent and the level accent, which had not been presented as default markers of interrogativity, occurred most frequently. It is hypothesised that the level accents may have been intended as high rising, and that the relatively flat nuclear contours resulted from L1 pitch range transfer, a phonetic error. High rising accents may have stemmed from partial phonetic transfer, with one of two phonetic realisations of the River Plate Spanish interrogative accent being transferred onto English. It was concluded that the low rising accent pattern was difficult to acquire, and that this should be addressed in teaching practice as well as the distinction between phonological and phonetic errors in L2 English intonation.

***Keywords*:** *intonation, interrogatives, L1 transfer, interlanguage.*

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Introduction

Intonation, the linguistic use of pitch changes in speech, comprises three systems: *tonality*, the division of speech into prosodic units or intonation phrases (henceforth, IPs); *tonicity*, which governs the distribution of accents, particularly the nucleus or nuclear accent; and *tone*, which refers to those linguistically significant obtrusions in pitch located on the tonic or nuclear syllable and extending on to the end of the IP (Tench, 1996). The term nuclear tone is also known as final or *nuclear pitch accent*, and in this study, the latter term will be used.

In English, nuclear pitch accents are exploited to create different meanings. From a transactional point of view, falling tones mark information as new, whereas rising and falling-rising accents signal that the propositional content of the intonation phrase is assumed to be part of the common ground between speaker and hearer. At the interactional level, falling tones signal separation or divergence; non-falling tones (rises and fall-rises) express that both participants are at one, or share the same worldview, with respect to the content of a given intonation phrase (Brazil, 1997).

In L2 English[1] intonation learning, learners face a number of challenges. Their learning task includes noticing and learning the L2 intonation forms and their mappings to different functions. Since intonation comprises two components, the phonetic and the phonological, in production tasks, learner errors may surface at one or both of these levels. Phonological errors are manifested in failure to select the appropriate intonation pattern for a given context; phonetic errors, on the other hand, give rise to forms which somehow deviate from the L2 target forms.

Both phonological and phonetic intonation errors are shaped by *interlanguage* processes. The term was coined by Selinker (1972) to refer to the learner's transitional knowledge of the L2. Two main forces shape interlanguage: interlingual and intralingual (cf. Ellis, 1994, 2015). Interlingual processes consist in the substitution of L1[2] forms for L2 forms; in other words, the transfer of L1 onto L2. Intralingual processes result in patterns which belong neither to the L1 nor in the L2. At the level of intonation, they may give rise to patterns which combine features of the L1 and the L2, or exhibit properties which cannot be found in either language (cf. Ioup, 1987). Prosodic universals (cf. Ohala, 1983, 1997; Gussenhoven & Chen, 2000) may also contribute towards the choice and realisation of intonation patterns.

1. The term L2 refers to second or foreign language; L2 English refers to English as a foreign language.
2. L1 refers to the first or native language.

This study analysed the interlanguage intonation forms employed by River Plate Spanish speakers in polar (or yes-no) interrogatives in English. The aim was to investigate interrogative patterns employed when asking questions in a spontaneous speech task. The focus was placed both on the phonetic realisation and on the appropriateness of nuclear pitch accents selected. Therefore, the ToBI labelling system was used for the description and analysis of intonation contours produced.

Theoretical framework

Intonation forms: configurations versus levels

The phenomenon of intonation has been described from different views which assume different primitives. The British School views nuclear tones as made up of pitch movements or configurations; the American School, on the other hand, regards intonation as a string of pitch levels, high and low. Yet, in an analysis of oral production, the researcher must deal with phonetic output and measurable acoustic events in order to arrive at the intended phonological representation in the speaker's mind. Therefore, in this section there follows a presentation of two different views of the nature of intonation and some of their correspondences.

The intonation notation system used by most British school descriptions (Kingdon, 1958; Halliday, 1967; Crystal, 1969; O'Connor and Arnold, 1973) consists of marks or number intervals representing falling pitch, rising pitch, falling-rising pitch, and other combinations of pitch direction, each label representing a phonological category. Thus, the primitives of intonation are conceived as *configurations* or contours. The labels used by the British school for nuclear tones are iconic; the exact mapping of the phonetic level onto the phonological is not specified. In the British school, the correspondence between the phonetic level (as reflected in the fundamental frequency of vibration of the vocal folds, known as F0) and the phonological level is a many-to-one mapping; a given phonological description will represent a number of F0 contours. The many-to-one F0 phonology mapping is in line with the traditional impressionistic approach to intonational phonology, which describes a wide range of utterances with a small inventory of symbols.

On the other hand, the American School (Pike, 1945) and the tone sequence model developed in the autosegmental-metrical approach (AM) (Pierrehumbert, 1980; Beckman and Pierrehumbert, 1986) adopt a *levels* approach, i.e., the term *tone* is used to refer to a unit of analysis smaller than the British school nuclear tone. In the AM approach, the term *tone* refers to target F0 levels which are claimed to be underlying phonological primitives, the tonal targets in deep structure. These tones are consistently aligned with particular positions in the segmental string. The overall F0 contour is generated through interpolation between these target levels. In this approach, the equivalent to the British school nuclear tone is the nuclear pitch accent, which is made up of a starred tone, associated with the lexical stress, a phrase tone and a boundary tone.

The most important principle of the AM model consists in the separation of the intonational phenomenon into two levels: the phonological representation of the contour and its phonetic implementation. By considering intonation as consisting of a phonological and a phonetic component, the model makes it possible to analyse different types of errors in foreign language learners.

The under-specification of the phonetic form can present problems when it comes to identifying and quantifying the phonetic events in intralingual forms in L2 learners. Although the tone primitives in the AM model are also underspecified, the fact that a nuclear contour can be described as a sequence of tonal events allows for a more precise description of phonetic implementations. Therefore, the AM model, and the ToBI labelling system derived from it, were chosen for the instrumental analysis in this study.

The British nuclear tone contours can be labelled in terms of AM tonal sequences. ToBI labelling allows for the description of some differences which are unspecified in the British system. Table 1 shows some correspondences. The starred tone indicates the tone associated with the nuclear syllable. Only the nuclear pitch accents relevant for this study are listed.

Table 1

Nuclear tone/ Nuclear pitch accent labellings in the configurations approach and the AM approach

Configurations (contours) O'Connor and Arnold (1973) Nuclear tones	Tone sequences (levels) Pierrehumbert (1980), Ladd (2006), ToBI (Ayers and Beckman, 1997). Nuclear pitch accents
(High/ Mid) Fall (HF)	H*L-L%
Low Fall (LF)	L*L-L% or H+L*L-L%
Low Rise (LR)	L*L-H%
High Rise (HR)	H*H-H%
Level (L)	H*H-L%
Fall-Rise (FR)	H*L-H% or L+H*L-H%

Form-function mappings

A given intonation pattern may serve different illocutionary functions, while a certain illocutionary function may be marked with different intonation patterns. This many-to-one mapping allows for different modes of questioning. In English, polar questions may be marked with H*L-L%, L*H-H% and H*L-H%, with the bitonal L+H* nuclear pitch accent as an intensifying variant. Depending on the choice of form, the speech act will signal different communicative intents. The nuclear form considered the default by traditional approaches is the low rising accent L*H-H%. This nuclear pitch accent is part of the *Low Bounce* tune described by O'Connor & Arnold's attitudinal-grammatical account (1973). The authors claim that "more Yes-No questions… are said with the Low Bounce than with any other tone group" (op. cit., p. 46) and that it is "by far the most common way of asking yes-no questions; it should be regarded as the normal way" (op. cit., p. 64). The authors, however, fail to support their claims by providing field research or empirical data; therefore, their claim that the Low Bounce is the default intonation for polar questions remains within the realm of the native speaker's intuitive knowledge. This allegedly default intonation pattern, of which the ToBI representation is H* L* L-H%, makes the speaker sound "genuinely interested" in the interlocutor's answer. The Low Bounce being perceived as the default intonation for Yes-No questions does not preclude the occurrence of other tone groups in this sentence type. According to the authors, the Low Drop, of which the ToBI equivalent is H*L*L-L%, turns a polar interrogative into a "serious suggestion" or a "matter for urgent discussion"; so does the High Drop (H*H*L-L%), although the high key makes the suggestion sound "lighter and less serious". Yes-No questions with the Take-off (L*L*L-H%) are said to express disapproval and scepticism. The High Bounce (H*H*H-H%) is used in echo questions and in short, elliptical yes-no questions used to keep the conversation going (*Have you? Did he*?) (op. cit., p. 77).

O'Connor & Arnold list the *Switchback*, a tone group consisting of a high falling head and a falling-rising accent (H* H*L-H%) which, when used in Yes- No questions, is said to convey astonishment. Other possible uses of the fall- rise nuclear tone in polar interrogatives proposed by the authors do not express questionhood; they may convey surprise, interest, or concern, or may mark a contradiction as mild or polite (op. cit. p. 72). It can be safely said, then, that O'Connor and Arnold do not view the falling rising pitch accent as a marker of questionhood, especially in polar interrogatives. Wells (2006), a disciple of O'Connor's, follows the line by stating that the mid fall-rise is not used with questions (Wells, op.cit., p. 221), although he lists the high fall-rise as a marker

of echo questions. Interestingly, in a footnote (op. cit. p. 245), Wells points out that the use of a fall-rise for questions is a rather new development in the English language. Indeed, this form-function mapping is very frequent in Brazil's work (1997). According to Brazil, syntax does not determine a speaker's choice of nuclear pitch accent. In other words, form does not override illocutionary function. The speaker makes intonation choices according to his/her communicative intention. Therefore, a polar interrogative is not tied to any specific intonation pattern, and can bear any nuclear pitch accent. If the speaker's speech act is that of checking an assumption, s/he may choose either a falling-rising accent or a rising accent (in Brazil's terms, a *referring tone*, either *r* or *r+*, respectively), since, at a transactional level, both accents mark information as shared or previously negotiated between speaker and listener. The tendency to use falling-rising accents (H*L-H%) to mark checking questions in modern standard British English (in either interrogative or declarative form) has also been noted by Lindsey (2017), who argues that the use of the low-rising L* L- H% form proposed by O'Connor and Arnold and Wells for polar questions has fallen into disuse, or at least has ceased to be the default form for performing asking speech acts.

Brazil (op. cit., pp.106-107) mentions a type of interaction where the communicative values of proclaiming and referring tones in questions evidence a gradation of information status that goes from a state of zero convergence with the interlocutor to a state of convergence that allows the formulation of a hypothesis to be confirmed. Such interaction is featured in *Twenty questions* (also known as *Animal, vegetable or mineral*), a formerly popular game in television programmes in the USA and Great Britain, where participants must guess, by means of polar interrogatives, an object the host has in mind. The dynamics of this game elicits two types of questions. At the beginning of the game, when the participants do not yet have enough clues to formulate a hypothesis, they resort to finding-out questions to guess the answers, but since wh- questions are not allowed, they frame their questions as polar interrogatives and select an H*L-L% nuclear accent (Brazil's *p* tone) to mark the questions as finding-out: *Does it fly*? *Is it big?* By using this nuclear accent, speakers signal that they do not have enough evidence to make any assumptions, and expect new information to be provided. However, once the respondent has answered several questions, the range of uncertainty begins to narrow down, giving rise to an increase in the number of possible hypotheses, so that at a certain point, speakers switch back to referring tones: *Does it crawl? Does it live in water? Is it in your body?* The marking of the checking question as an act of reference can be done by means of H*L-H% (falling-rising accent) or L*H-H% (rising accent). In this way, the questioners signal that they are formulating hypotheses based on the answers to previous questions, and that they expect confirmation that their hypotheses are correct. If their hypotheses are not confirmed by the respondent, a third stage in the game develops: information questions, i.e. polar questions with falling tones, begin to predominate since having failed to check their assumptions by means of checking questions, the questioners return to the stage where they assume no basis on which to make assumptions: *Is it an elephant? Does it bite?*

Brazil's observations regarding the behaviour of questioners in *Twenty Questions* are relevant to the present study, where a similar game was used in order to tap into the participants' interlanguage mental representations of intonational phonological categories, forms and form-function mappings. A further focus of interest involved the ways in which the learners' phonological categories were phonetically implemented in production.

Previous research on the production of L2 English intonation

During the past years, there has been a growing interest in the study of L2 intonation production. Many L2 English intonation researchers have attributed the use of non-native intonation forms in the L2 to L1 transfer (Wennerstrom, 1994; Ueyama, 2000; Ramírez Verdugo, 2002; Mennen, 1998,

2004, 2008; Ortega & Llebaria, 2014, among others). Studies on L2 production of intonation often focus on non-native forms produced by learners of English (Jilka, 2000; Mennen, 2008), such as incorrect placement of prominence, replacement of rises with falls and vice versa, a narrower pitch range than that used by English speakers, and differences in final pitch rises (too low; too high; overshooting).

Similar findings were reported by Jilka (2007) in an investigation of the contribution of intonation to the perception of foreign accent in German speakers of American English and American English speakers of German. He concluded that most markers of foreignness stemmed from the transfer of L1 intonation features onto the L2. However, many of the features transferred were phonetic rather than phonological. One of these features was pitch range: when the German participants produced English intonation, contours were not as wide as those in the native participants'. Jilka's data set also showed that many intonation errors committed by L2 learners cannot be attributable to the influence of their native languages. He pointed out that the interpretation of error sources is difficult, as performance might reflect the combined effect of more than one type of transfer. His participants' limited repertoire of intonation patterns evince the presence of simplification processes at work. He also acknowledged the influence of other factors, such as cognitive load, which would place too high demands on learners' cognitive systems.

Toivanen (2003, 2004) analysed the pitch contours produced by Finnish learners of English and native speakers of English. She refuted the widespread view that L1 transfer predominates in Finnish English intonation. There are no rising intonation contours in Finnish so the rise is thought to be difficult for Finnish learners. However, Toivanen's study showed that this was not straightforward. On the one hand, she found that the native English speakers produced yes-no questions with rising tones less often than it would be expected from descriptions found in intonation manuals. Falling intonation, in fact, turned out to be more common than rising intonation. In the Finnish English data, falling accents were predominant in yes-no questions, but since these were quite common in the English yes-no questions, she came to the conclusion that the frequency of falling patterns produced by the Finnish participants could not be attributed to L1 transfer. The researcher concluded that the general distribution of nuclear pitch accents in her data set did not necessarily reveal important differences in the relationship between intonation and syntax between the native English set and the Finnish English set.

Research findings also show that the intonations of two given languages can differ at the phonological level, the phonetic level, or both. In L2 intonation acquisition, L1 and L2 may interact on either one or both levels. Mennen (2008), argues that L2 learners may first acquire phonological patterns of L2 intonation, whereas their correct phonetic implementation is acquired later. She cites studies by Mennen (2004) which showed that native speakers of Dutch who spoke Greek near-natively accurately produced Greek intonation categories but resorted to L1 phonetic detail to implement such categories. She concludes that further quantitative research comparing phonetic implementations in different languages is necessary to test the hypothesis that L2 intonation is first acquired at the phonological level.

Aims

This study aimed at analysing phonological choices and phonetic forms of L2 English intonation patterns in polar (yes-no) interrogative sentences by learners of English intonation in a spontaneous speech task. Participants were expected to produce L2 target-like nuclear pitch accents with a certain degree of success, and these forms were predicted to map onto the illocutionary function matching the context of situation, according to their previous training. They were also expected to resort to L1 transfer and intralingual forms to some degree.

Method

The spontaneous speech task consisted in a guessing game similar to *Twenty Questions*. A host thought of an item and participants had to guess what it was only by asking polar questions. Participants were instructed to ask twenty polar questions each throughout the session.

The choice of task resides in the fact that it is in spontaneous speech that the true state of interlanguage emerges. Other types of tasks, such as reading aloud, tend to promote the use of learnt forms which have not yet been internalised, especially when participants are given time to mentally rehearse the reading of the text. Moreover, reading tasks often promote the adoption of oblique orientation (Brazil, op. cit.), a reading mode which exploits only the *zero* (level) tone to mark syntactic non-completion, and the *p* tone to mark the end of the sentence, without taking into account the assessment of the area of convergence and the assignment of new and shared status to IPs. Hence the need to resort to a task which would elicit relatively free speech, although focused on the target structure.

Participants

Twenty subjects participated in the task. All of them were third year students at a Teacher Training College in Buenos Aires. They had already received explicit instruction in English intonation within the British school framework, mainly in O'Connor & Arnold's model (op.cit.), for seven months the previous year, with weekly lessons of approximately four hours each. Within that period, they had had intensive oral practice of all ten patterns included in this model, with a mean of one weekly hour devoted to the practice of the patterns. At the moment of testing, they had had one and a half months of practice, mainly in reading aloud narratives and poems, for two hours every week.

The participants' ages ranged from 22 to 44 years old (mean= 26.45; SD= 5.02). Eight of them had started learning English after age 8; seven of them after the age of 14, and only five had started at a mean age of six years old. All participants had been learning English for over 10 years at the time of the study. Their level of proficiency in English exhibited some degree of variety. Their overall proficiency levels ranged from B2 to C1 within the CEFR (Common European Framework of Reference).

The participants' weekly exposure to Spoken English outside the classroom ranged from 2 to 3 hours a week. Seven of them stated that they had a preference for American English, eight preferred British English and the remaining five stated they had no clear preference for either variant of English.

Results

Data processing and tabulation

The recordings obtained were edited using Audacity 3.0.4. Noise reduction was carried out by filtering out background noise. The audio files were resampled using Praat 6.1.53 speech analysis program (Boersma & Weenink, 2021) with sampling rates of 11 kHz, the standard value for female voices. The processing was also made with Praat. F0 trackings for each sample were calculated with a 75 kHz floor and a 600 kHz ceiling, and then fit to a semitone[3] scale.

F0 differentials wider than 2 semitones were analysed as dynamic (kinetic) accents, and narrower F0 differentials were analysed as level accents. The decision for the cut-off frequency

3. Accent pitch range is usually measured in logarithmic units such as semitones (1 octave= 12 semitones or st), which more closely represents auditory perception.

differential was made following House (1996), who provides empirical evidence showing that pitch differences smaller than three semitones usually do not play a role in speech communication.

The results showed a wide range of phonological choices and phonetic realisations. **Table 2** shows a taxonomy of the intonation patterns produced. The overall frequency of occurrence is based on all categories available in the output; the relative frequencies of non-falling accents were calculated with respect to the non-falling category as a whole.

Table 2

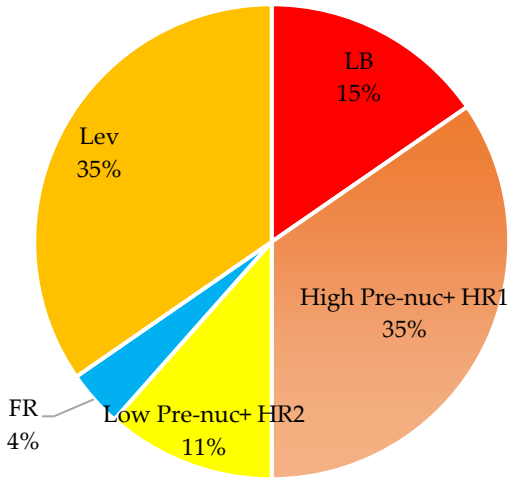
Categorisation and frequencies of intonation patterns produced.

Code	**Pattern**[i]	**Description**	**Frequency**[ii]	**Frequency**[iii]
LB	(H*) L*L-H%	High pitched pre-nuclear segment+ low rising nuclear accent (Low Bounce)	12.90	15.38
HR1	H* H-H%	High or mid pitched pre-nuclear syllables + high rising nuclear accent	29.03	34.6
HR2	(L*) H*H-H%	Low pre-nuclear segment+ high rising nuclear accent Pre-nuclear segment may contain low accents	9.68	11.54
FR	(H*) H*L-H%	An optional high tone followed by a falling-rising nuclear accent	3.23	3.85
Level	(L*) H*H-L%	A low pre-nuclear segment with optional low tone L* and a nuclear pitch range with a flat F0 contour (pitch span lower than 2 st)	29.03	34.62
F	H*L-L%	A high pre-nuclear segment followed by a mid-falling accent	9.68	--
Sp RF	L+^H*L-L%	The rising-falling nuclear accent with a delayed peak, used in Spanish polar interrogatives	7.74	--

[i] *Brackets mark optional elements*
[ii] *Overall frequencies*
[iii] *Frequencies relative to non-falling accents*

83.9% of the nuclear pitch accents found were non-falling. The overall frequency of rises was 51.61%. Rising accents totalled 61% of all non-falling accents. As for falling accents, they were distributed in English falling accents and Spanish accents L+^H*H-L%. **Figure 1** shows the distribution of variants within the rising accent category.

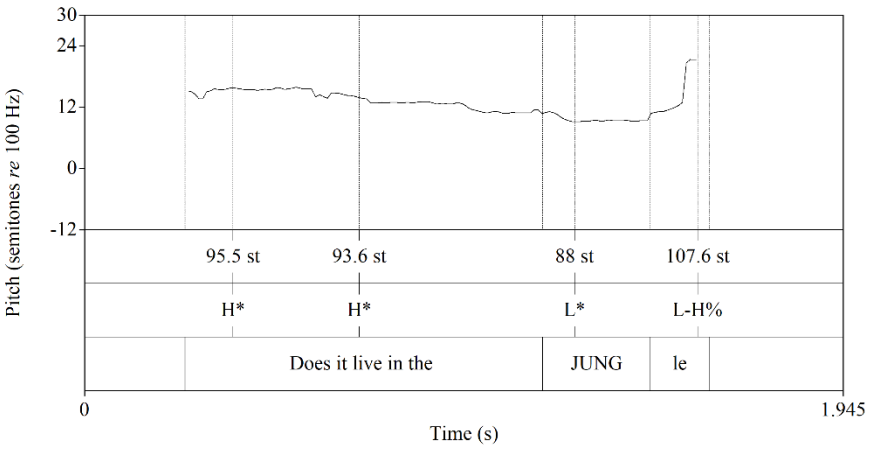
Figure 1. Distribution of non-falling accents (relative frequencies)



An analysis in Praat confirmed the perceived contours. **Figures 2-5** show examples of the most frequently occurring categories: HR1, Level, HR2, LB.

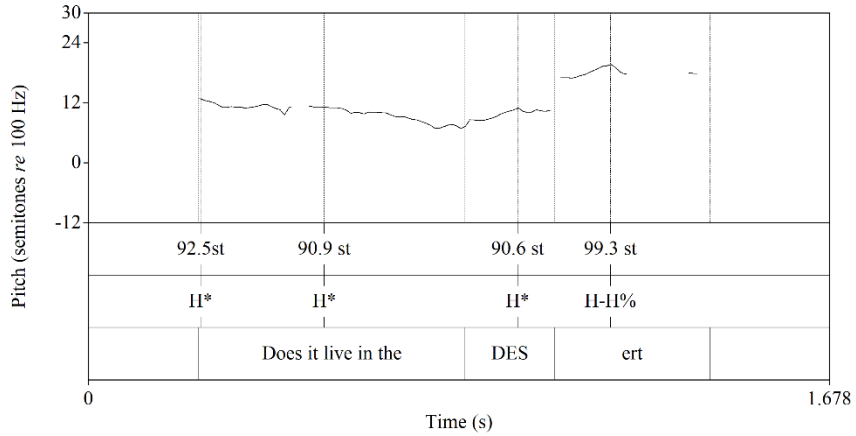
a) LB (Low Bounce). High pitched pre-nuclear segment + low rising nuclear accent L*L-H%

Figure 2. High pre-nuclear segment + low rising nuclear accent H* L* L–H% (LB)



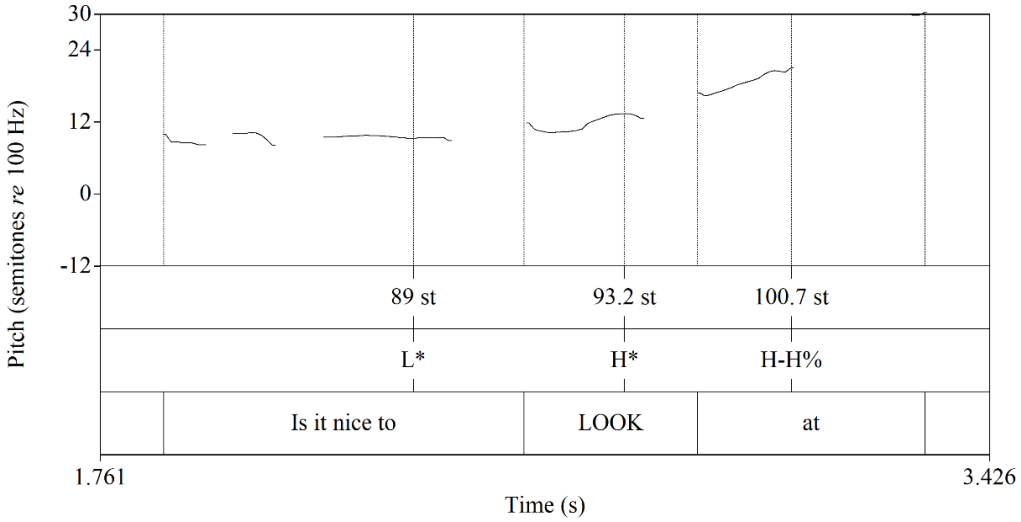
b) HR1: High pitched pre-nuclear syllables + high rising nuclear accent H*H-H%

Figure 3. High pre-nuclear segment + high rising nuclear accent (H*) H*H–H% (HR 1)



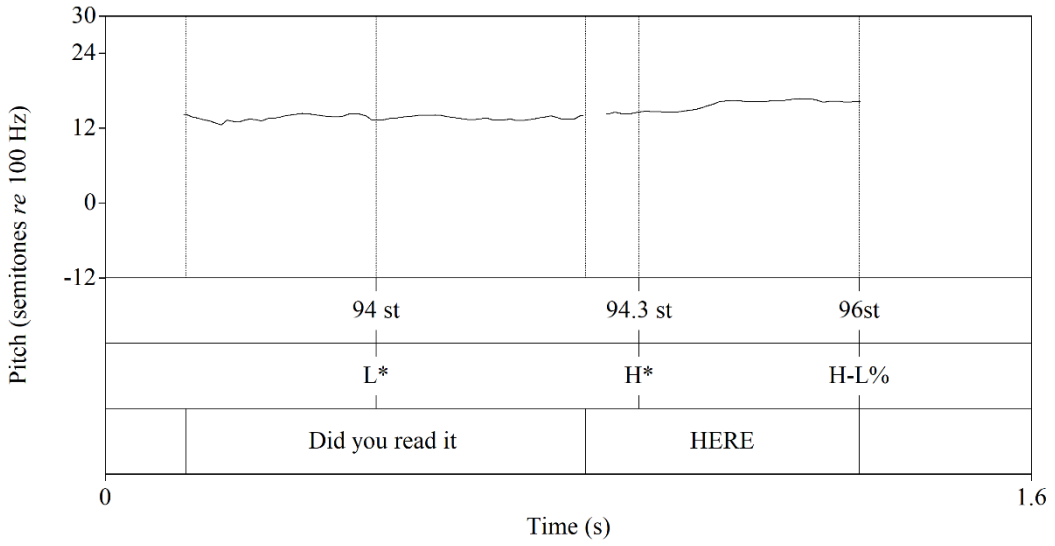
c) HR2: Low pre-nuclear segment + high rising nuclear accent; the pre-nuclear segment may contain low accent(s).

Figure 4. Low pre-nuclear segment + high rising nuclear accent (HR2)



d) Level: A level nuclear accent preceded by a low pre-nuclear segment L* H*H-L%[4]. The pitch span across the nuclear word is less than 2 semitones. This contour is perceived as a level tone, although the learner's intended nuclear pattern may have been a high rising accent.

Figure 5. Low pre-nuclear segment + level accent (L*) H*H-L%



Analysis

The group results show considerable inter-personal variability both in the choice of nuclear accents and in the phonetic realisation of patterns. Special labels had to be created in order to describe those patterns which emerged with a certain degree of frequency (as in Figs. 4 and 5, i.e. low pre-nuclear segments followed by a high rising nuclear accent or a level accent). The data manifests tension between two opposing forces shaping interlanguage processes: variability and simplification. Variability, the occurrence of more than one pattern from individual to individual, and within a given individual, is one of the most salient characteristics of learner language. In prosodic acquisition, in particular, given the lack of one-to-one mappings, it is expected that learners will employ different phonological categories to perform an illocutionary function and that they will produce a given phonological category with a number of different phonetic implementations. This is indeed one evident finding in the data.

Only two participants favoured an only phonetic form and phonological category to perform the questioning function, with the other half showing no clear preference. Only one participant showed a preference for low rising accents, and one participant produced only level accents. The rest of the participants varied in their choices, with low rises and level accents distributed relatively evenly (i.e. similar frequencies for each type of accent). Only a few cases showed clear groupings of 40%-60% favouring high rises and 60%-40% favouring level accents. This high degree of intra-personal variability also shows that most participants' interlanguage systems are in a meta-stable state.

4. The boundary tone L% does not refer to *low* in absolute terms. In this accent, the symbol refers to a tone with a F0 scaling not higher than that of the preceding phrase tone H- (Ladd, 2006).

Simplification emerged mainly at the phonological level. Most participants seem to have constructed a representation by which polar questions, regardless of speaker knowledge or assumptions, must take non-falling tones. An overall inspection of the results shows that participants did not use falling and non-falling accents in the way described by Brazil (op. cit.) for the guessing game. Almost 84% of participants used only non-falling accents to ask questions, regardless of whether they asked at the beginning of the game (where finding out questions would be expected) or towards the end, when they had exhausted all possible leads. Very few participants evidenced their lack of clues as to a possible object which was to be guessed at. This shows that the falling- finding out and non-falling- checking form- function mappings are far from established in the participants' interlanguage systems.

The low rising nuclear accent was consistently preceded by a high- pitched pre-nuclear segment, i.e. O'Connor & Arnold's Low Bounce. This pattern seems to have been acquired in holographic form, i.e. as a fixed formula. Indeed, this process is in line with early acquisition processes, mainly overgeneralisation. However, this pattern did not occur very frequently, although it was part of the participants' conceptual knowledge. The fact that it was not as frequent as other rising patterns suggests that despite previous explicit instruction and intensive oral training, the group had not acquired it to a considerable degree. In other words, although participants had been trained to conceptualise this pattern as the default form for yes-no questions, it was the least bused of the rising contours. It may be concluded that the Low Bounce pattern is perhaps the most difficult for learners, and the last to be acquired, if it ever is.

Unlike low rising nuclear accents, the nuclear high rising accent showed variability in the type of pre-nuclear pattern preceding it. In most cases, the pre-nuclear segment was high or mid- pitched; in a few cases, produced by a small set of participants, the approach to the high rising nuclear accent was made from a low pitch, starting with a low pre-head and/or head and then stepping up to the onset of the nuclear accent. It may be the case that the latter phonetic implementation represents an earlier stage of acquisition while the former develops later on. The other accents, however, were consistently preceded by a unique pre-nuclear pattern. Out of the total non-falling accents produced, the two most preferred accents were the high rising accent preceded by a high onset accent (or high pre-nuclear segment) and the level accent. These seemingly different categories might in fact be the result of attempts to produce a single, simplified category, of which the pattern H* H*H-H% might be the underlying representation, as shall be explained further on.

Two hypotheses may be proposed for the preference of high rising accents for low rising accents. The high rising accent H*H-H% is usually not presented as the default for polar questions in intonation manuals; its use is usually associated with echo questions and repetition questions, which were not options in the guessing game. One possible account is universalist in nature. Gussenhoven (2004, op. cit.) posits that intonational meaning is based on three biologically determined codes, which are exploited in the phonetic implementation of utterances: the *frequency code*, the *effort code* and the *production code*. The production code concerns the use of high pitch and declination to mark the beginning and end of informational units respectively. The effort code associates increased breath effort with prominence and focus. The frequency code has special relevance to the analysis of questions. It was first formulated by Ohala (1983), and it relates the size of the larynx and the vocal folds to two levels of meaning: the signalling of informational status and the expression of power relationships. According to the frequency code, high pitches signal submission, uncertainty, non-assertion and interrogativity (Ohala, 1997).

In light of the universalist account, it could be hypothesised that the participants exploited their tacit knowledge of intonation universals when using high rising accents in polar interrogatives.

These universals are encoded in high tones (H*, H- and H%) and rising accents as phonological categories or underlying representations. It may also be the case that, as argued by Ohala (1983, op. cit; 1997, op. cit.) and Gussenhoven (2002, op. cit.), the association of high and rising pitches with questionhood status is a universal tendency, while the association of low rising pitches with interrogativity is not universal, and therefore marked. This might also explain why the H* H*L-H% contour, which is usually not associated with questionhood in traditional intonation instruction, did emerge during the question game, albeit not very frequently.

A further source of preference for the high rising accent may be extra-linguistic, namely, the influence of exposure to standard American English, which exploits H*H-H% as a marker of checking questions by default (Cruttenden, 2007). However, the demographic information collected from the participants showed that the amount of exposure to this variant was not much higher than exposure to the British variant; in several cases, participants who consistently produced high rises and level accents declared a preference for standard British English. Moreover, exposure to American English does not account for the reasons why the participants would so readily internalise the rising accent *only* in polar questions nor why the range of F0 excursion was rather narrow in comparison to the ranges exploited in English.

If phonetic features such as pitch range and peak alignment are transferable, it could be expected that the phonetic implementation of phonological categories may be subject to transfer processes as well. If this is so, it could be hypothesised that the frequent use of high rising contours in polar questions was the result of phonetic transfer, an interlingual error by which the phonetic implementation of a L1 phonological category is applied to the L2.

The preference of high rising accents as markers of checking questions may have been the result of partial phonetic L1 transfer. In River Plate Spanish, polar questions tend to take the nuclear accent L+^H*H-L%. The River Plate interrogative accent contour is characterised by a delayed and raised F0 peak[5]; this is signalled by the diacritical mark ^ (Barjam, 2004). The F0 of the peak ^H* is aligned late within the nuclear syllable. This accent was seldom found as such in the data; L1 full transfer (i.e. phonological and phonetic) was almost negligible, which points to a stage of acquisition beyond the elementary level. However, transfer of this accent may have occurred at the phonetic level. The high rising contour may have stemmed from transfer of one of two possible surface realisations of the underlying representation of the Spanish nuclear accent. When there is post-nuclear material onto which the phrase accent and the boundary tone may anchor, as in the case of paroxytone and proparoxytone nuclear words, the phonetic output describes a rise-peak-fall pattern, as in *¿Se hace al HORno?* However, if there is no post-nuclear material, as is the case of nuclear oxytone words, the final fall associated to H-L% is truncated, i.e. not realised, as in *¿Es de algoDÓN?* It is hypothesised that this truncated realisation of the interrogative pattern of Spanish was transferred to English; transfer of the full rising-falling realisation could have been precluded by the participants' knowledge that this pattern, felt as typical of the River Plate Spanish variant, does not signal interrogativity in English.

A further likely case of phonetic transfer may be found in the level accents produced. This category included nuclear pitch accents which exhibited a pitch range lower than 2 semitones. As explained in the Results Section, this criterion was based on research which shows that differences smaller than 2 semitones are perceived as static tones, thus making the resulting F0 contour the equivalent of a monotone or level accent. This may have been the case of some of the participants:

5. The terms *delayed* and *raised* are used with respect to the equivalent declarative in a minimal pair.

they may have intended to use a high rising accent; however, the transfer of a narrow pitch range created the perception of a monotone.

The results of this study are in accordance with findings by Backman (1979), who analysed the English intonation produced by two speakers of Spanish and compared it to that of a native American English speaker. She found that the Spanish informants produced intonation contours which were clearly narrower than the native speaker's. There was also an effect of language experience: with increased residence in the US, the more advanced Spanish participant managed to shift from flat two-tone[6] pitch height range typical of Spanish into the three-tone range exploited by American English. On the other hand, the other participants, who had a lesser degree of proficiency and spent a shorter period of time in the US, transferred a narrow pitch range onto English intonation patterns.

Mennen (2008) claims that when German speakers produce English intonation, they may transfer their L1 range, and this produces what to English ears is a 'flat' intonation contour, thus reinforcing the stereotype that Germans, and speakers of similar languages such as Dutch, sound 'boring' or 'dogmatic' (also see Jilka, op. cit. who found the same type of transfer and the same effect). Celce-Murcia, Brinton & Goodwin (2010) have also found that some learners may transfer their L1 pitch range onto English, thus producing intonation contours which may be too narrow if the L1 range is narrower than that in English, and cite Spanish as one example. It may well be the case that the same type of transfer takes place in River Plate Spanish speakers of English. More research is needed in order to test this hypothesis.

Conclusions and implications for teaching

The data suggest that the participants have constructed an intonation system with the main characteristics ascribed to interlanguages: L1 transfer, simplification and overgeneralisation. The Low Bounce, the pattern to which the learners had been previously exposed to and had practised intensively as the default form for polar interrogatives, proved to be the most difficult to acquire. Considering its difficulty, and the fact that it is rather outdated, it is proposed that the Low Bounce H* L* L- H% should not be taught as the default form, and if it is, it should be taught later on rather than at early stages of acquisition. A pattern with a mid-rise[7] and a declining pre-nuclear- segment H* !H* L*L-LH%, with its gradual approach to the L* nuclear tone (i.e. the pitch anchored onto the nuclear syllable), may prove more productive and easier to acquire.

The fact that the high rising accent and the level accent predominated in the participant's choices raises the question of the role of explicit instruction. These accents had not been presented nor practised as typical markers of interrogativity during the instruction period. It seems that the acquisition of L2 English intonation has its own agenda, and that L1 intonation plays an important role in the shaping of prosodic interlanguage. Therefore, any gains in learning will be gradual and slow, and periods of instruction shorter than one academic year may not be enough for effective learning. Systematic research needs to be carried out in order to establish stages and processes in the development and direction of change in interlanguage intonation.

The results also lend support to the hypothesis that pitch range is transferable, and that, as suggested by Mennen (2008), in learning L2 intonation, the phonological level is acquired earlier than the phonetic level. It is probable that two types of L1 transfer played a role in the preference for these accents. A high rising contour was indeed a familiar pattern for the participants, since it is one

6. The term *tone* is used here in the AM and ToBI sense; in the British school the equivalent term is *pitch key*.
7. The term *mid* used here refers to the actual realisation of the low tonal target L*. It should be borne in mind that since there are only two levels, L and H, a pitch contour starting at a mid-pitch height will be labelled L* in this model.

of two surface realisations of the River Plate Spanish interrogative rising-falling accent typical of yes-no questions. Transfer of L1 pitch range, a phonetic error, could be the factor underlying the frequent production of level contours. In this case, what appeared to be a phonological error may have been in fact a phonetic error.

Intonational errors in L2 speech may not be what they seem in instrumental analysis; two F0 contours with slightly different shapes may be perceived as the same phonological category. Additionally, a phonological error may have different underlying causes, which may reside in either difficulty with the phonological structure of the L2 or with its phonetic realisation. It follows then that, for teaching purposes, it is essential to distinguish between the phonological and the phonetic level, so that the source of error can be interpreted and dealt with accordingly. This distinction can allow for more relevant pedagogical decisions as to the order and sequence of intonation patterns to be taught and practised, as well as the application of more effective teaching strategies.

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