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"WAS THAT A QUESTION?" PERCEPTION OF UTTERANCE-FINAL INTONATION AMONG L2 LEARNERS OF SPANISH

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This study examined the perception of final boundary tones among 55 English-speaking learners of Spanish at three proficiency levels and compared them with Spanish-English early bilinguals, Spanish monolinguals, and English monolinguals. Perception was tested using an imitation task, aimed at capturing categorical perception effects. The stimuli consisted of a resynthesized utterance where the final boundary tone was vertically displaced ten times in 10-Hz increments. Participants listened to and imitated each stimulus twice while being recorded. Each final boundary tone was manually marked and extracted for all utterances participants produced. A one-way ANOVA was run for each group. Significant differences in the perception of the ten stimuli were found in all groups. Post-hoc analyses showed that (1) no bimodal categorical perception emerged; (2) stimuli clustered from falling (declarative) to rising tones (questions); (3) overall, all participants perceived final boundary as Spanish monolinguals did; (4) a third pattern suggestive of a suspended tone emerged for bilingual speakers and learners with very high proficiency; and (5) very-high proficiency learners' perception resembled that of bilingual speakers. Results confirm the robustness and perceptual salience of utterance-final pitch—which aids perception from early stages of acquisition—as well as a positive role for proficiency in the perception of the target form.

INTRODUCTION

The field of second language (L2) pronunciation has paid little attention to how learners perceive pitch in the L2. Such research is essential to inform models of L2 pronunciation such as Flege's (1995) Speech Learning Model (SLM), where attunement in L2 perception is a prerequisite for development of L2 production. Even though some studies have examined the perception of prosody as it relates to lexical tones (e.g., Broselow, Hurtig, & Ringen, 1987), few have looked at how intonation in the L2 is perceived. In an attempt to further our knowledge in this area, this study investigated how English-speaking learners perceive final boundary tones in unmarked, non-emphatic declarative utterances in Spanish, an utterance type believed to pose some challenges for English speakers learning Spanish (e.g., Nibert, 2005, 2006). While speakers of both languages normally use falling intonation in these utterances, some varieties of English (including General American English) produce a rising contour—usually referred to as a high rising terminal (HRT)—where a falling one would be expected. This process of *uptalk* has been extensively studied in English, especially from dialectal and sociolinguistic perspectives (see Warren, 2016, for a comprehensive description of this topic).

To my knowledge, Nibert (2005, 2006) is the only study that has addressed the perception of intonation in Spanish as an L2. English-speaking learners of Spanish at three proficiency levels were tested on the effect of phrase accents (H- and L-) in Spanish to disambiguate utterances like [[*lilas*]$_{H-}$ [*y lirios amarillos*]$_{L-}$] ‘lilacs and yellow irises’, [[*lilas y lirios*]$_{H-}$ [*amarillos*]$_{L-}$] ‘yellow lilacs and yellow irises’, and [[*lilas y lirios amarillos*]$_{L-}$] where the lack of medial H- allows for either interpretation. Results showed a clear positive effect of proficiency level on the perception of this particular tone. The data suggested that there can be a “gradual development or restructuring of L2 interlanguage grammar toward a more restrictive and native-like state” (2006, p. 146).

Though they examined L2s other than Spanish, two important studies investigated how final boundary tones are perceived by L2 learners. In Cruz–Ferreira (1987), 30 English speakers learning Portuguese and 30 Portuguese speakers learning English heard 60 pairs of sentences that differed in their intonational pattern (e.g., *Didn’t John en`joy it* vs. *Didn’t John enˏjoy it*) and were asked if the sentences were the same or different while also matching the sentence to glosses. Cruz–Ferreira found that learners used at least three interpretive strategies when resolving the task. The *transfer* strategy was used when the L1 and L2 had similar intonation structures and hence the L1 meaning was assigned to the L2. The *pitch height* strategy stated that L2 learners identified L2 tones correctly when they broadly belonged to a certain category (for example, rise vs. fall). Finally, the *lexico-syntactic* strategy occurred when learners assigned the less marked interpretation to the sentences based only on their lexical or grammatical pattern. In another study on perception, Grabe, Rosner, García–Albea, and Zhou (2003) conducted two experiments aimed at testing the perception of falling and rising final intonation in English among adult speakers of Spanish and Chinese. Participants heard a pair of stimuli (the phrase *Melanie Maloney*) that differed only in the final pitch movement (rising or falling) and rated the stimuli as same or different. The second experiment was similar but used only contour movements without any speech. As predicted, all three groups made a clear distinction between falling and rising contours in both speech and non-speech stimuli. The authors attributed this to a purported universal (that is, non-language specific) auditory mechanism used in the perception of pitch (Bolinger, 1978; Cruttenden, 1981).

In view of the different intonational pattern in declarative utterances in English and Spanish, and given our limited knowledge on how utterance-final intonation in Spanish is perceived by L2 learners, the following research questions were posed:

(1) How do English-speaking learners of Spanish at different proficiency levels perceive the final boundary tone of Spanish declarative utterances?
(2) How does their performance compare to that of monolingual native speakers of Spanish, monolingual native speakers of English, and early Spanish-English bilinguals?

METHODOLOGY

Participants

Initial recruitment was conducted from third-semester and sixth semester Spanish classes at two universities in the U.S. In addition, students pursuing a Master’s or Ph.D. in Spanish at one of the universities were also recruited. After initial recruitment, participants’ proficiency was measured with the Spanish Elicited Imitation Task (EIT) test (Ortega, 2000), which is argued to be a reliable and valid tool to measure L2 oral proficiency (see Bowden, 2016, for discussion). For the sake of space, details about administration and scoring are omitted here, but they followed the same procedures described in Bowden (2016) and Ortega (2000). Final proficiency was hence operationalized based on two criteria: previous experience and scores on the EIT. From a possible range of scores between 0 and 120, the means for the three groups were the following: 57.96 (*SD* = 12.24) for the third-semester group, 93.33 (*SD* = 11.65) for the sixth-semester group, and 116.40 (*SD* = 3.78) for the group of graduate students. In order to maintain homogeneity in each group, outliers (two standard deviations above or below the group mean) were eliminated from the study. For this and other exclusion criteria (e.g., not completing all parts of the study or having extended stays in Spanish-speaking countries), 15 participants were excluded from the original pool, resulting in a total of 55 learners grouped into three levels: intermediate proficiency (IP, *n* = 17), comprised of third-semester Spanish students with EIT scores in the 42–82 range, high proficiency (HP, *n* = 20), comprised of sixth-semester students with EIT scores in the 83–107 range, and very high proficiency (VHP, *n* = 18), comprised of graduate students with EIT scores in the 109–120 range.

In addition, L2 speakers were compared with three groups: Spanish native speakers (SNS, *n* = 17), English (monolingual) native speakers (ENS, *n* = 17), and English-Spanish bilingual speakers (BS, *n* = 16). SNS speakers were from various Spanish dialects in order to represent the variety of dialects to which learners in this study had likely been exposed: Southern Cone (*n* = 4), Andean (*n* = 4), Mexican (*n* = 3), Central American (*n* = 3), and Peninsular (*n* = 3). ENS participants were recruited from undergraduate classes at the same university. They were all monolingual native speakers of American English. The BS group was comprised of heritage speakers, that is, early bilinguals who were raised in families that speak a minority language. The inclusion of this group attempted to expand the comparison beyond typical monolingual norms (Ortega, 2009) and reflect the bilingual nature of interlanguage development. In pronunciation, recent studies have also suggested that bilingual speakers are appropriate comparison subjects for L2 learners (e.g., Sakai, 2018).

Perception task

Perception of final boundary tone was examined through an imitation task, which has been shown to be an effective method to investigate categorical perception (CP) effects in intonation (Dilley & Brown, 2007; Gussenhoven, 1999, 2004). In this task, participants usually listen to one stimulus at a time from a continuum and are asked to reproduce it out loud. If there is a categorical distinction, participants will not reproduce the entire continuum they hear and utterances tend to group in a bimodal distribution. The underlying principle and possible outcomes resemble those of discrimination and identification tasks, but the imitation task offers the advantage that no preexisting categories are required (as in an identification task) and only one stimulus is heard at a time (compared to at least two, as in a discrimination task), thus posing fewer challenges for memory retention (Gussenhoven, 2006). For intonation, Pierrehumbert and Steele (1989) were among the first to use this task and it has been employed to investigate pitch alignment (e.g., Pierrehumbert & Steele, 1989; Redi, 2003) and pitch height (e.g., Dilley, 2005; Dilley & Brown, 2007).

The declarative sentence *La nena lloraba* 'The girl was crying' was used as the source utterance to create the stimuli. This sentence was selected for its simple lexical composition, thus posing few challenges for L2 speakers. Additionally, the following phonotactic and segmental features were taken into consideration when choosing the sentence: (1) all consonants are voiced, which is an important requirement to obtain an uninterrupted pitch track, (2) only mid and low vowels (that is, [e, o, a]) are used (high vowels may produce undesired pitch alterations by raising the larynx, Gussenhoven, 2004), (3) syllables have a CV structure (no consonant clusters and no codas) in order to minimize potential difficulties for L2 speakers while also maximizing sonority necessary for pitch detection, and (4) content words are stressed on the penultimate syllable, which is the unmarked stress pattern in Spanish for words ending in a vowel.

The sentence was recorded by a native speaker of western Argentinian Spanish using a high-sensitivity microphone attached to a personal computer and the acoustic software Praat (version 5.1.25) at a sampling rate of 44 kHz. The file was resynthesized using the *pitch-synchronous overlap-add* (PSOLA) method included in Praat. This technique allows for stylization of the pitch track by reducing it to critical pitch points while keeping the overall curve shape. The resulting contour was inspected acoustically and auditorily before manipulation in order to check it was naturally-sounding. Relevant pitch points were reduced to the initial (InP) and final (FiP) points of the last intonational move. Height (117 Hz) and timing (middle point of [a] in syllable *ra*) of InP were kept as in source utterance. FiP was anchored at the last regular glottal pulse detected in the spectrogram, therefore excluding visible and audible creaky phonation at the end of the utterance. Finally, FiP was moved upwards seven times and downwards twice, in 10-Hz increments, creating 10 stimuli spanning over 90 Hz (See Figure 1), downsampled to 22 kHz and saved individually as WAV sound files. Two native speakers of Spanish listened to the resulting stimuli and judged them as naturally-sounding (that is, potentially produced by a human as opposed to digitally created).

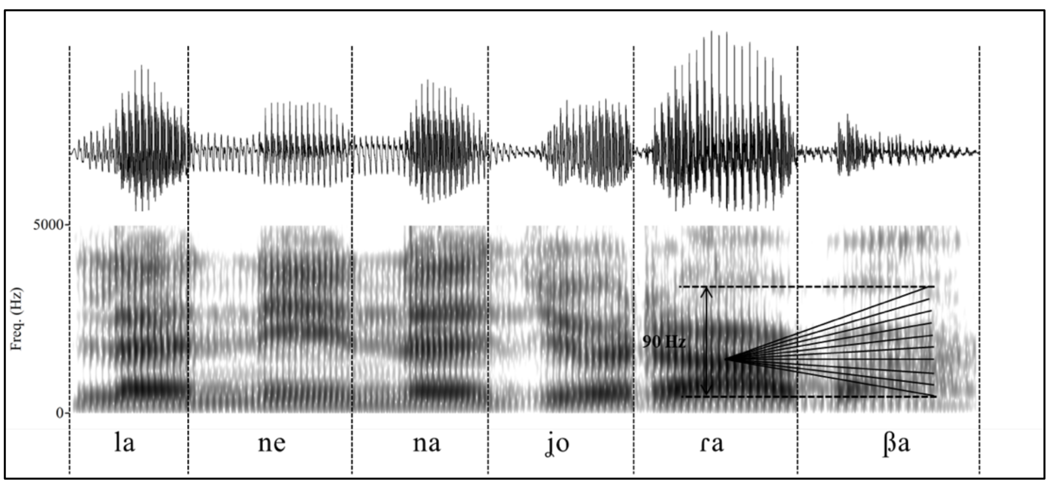

Figure 1. Schematic representation of resynthesized stimuli used in perception task.

Procedure

Participants were presented with the ten stimuli twice, in two randomized blocks, resulting in 20 repetitions per participant. Participants were instructed to reproduce the utterance they heard as faithfully as possible. They were asked to focus on the pronunciation of the sentence and encouraged to imitate it within a comfortable pitch range. Participants first listened to a block of five practice utterances, which they could repeat until they felt comfortable with the task. For the trial blocks, participants had the possibility of saying the utterance again if they hesitated, paused, or considered that their output was not faithful to the stimulus they had heard. The stimuli were delivered over high-fidelity headphones and presented through E-prime software.

Recordings were made in a sound-proof room, with a high-sensitivity, head-mounted microphone attached to a personal computer and using Audacity (version 1.3.14), at a sampling rate of 32 kHz.

In order to collect information about the meaning participants assigned to the stimuli, upon completion of the task the researcher asked participants the following questions: (1) *Did the sentences sound the same or different to you?* (2) *If different, how so?* and (3) *In what contexts would you use the sentence(s) you heard?* During this interview, answers were audio-recorded and participants were debriefed on the nature of the stimuli and the goals of the study. Finally, participants completed a questionnaire aimed at collecting demographic information and data on previous language experience.

Analysis

After auditory and visual inspection of spectrograms and intonation curves of 2,100 utterances (20 utterances x 105 subjects), 555 (26.43% of the total) were removed from the analysis due to excessive creaky voice, hesitations, and uncommonly flat global pitch contours. Final creaky voicing, especially among male speakers, was the main reason for elimination. For this reason, two male speakers were removed altogether as more than 50% of their utterances contained creaky voice. In total, 1,545 utterances were analyzed (249 for IP group, 300 for HP, 276 for VHP, 252 for SNS, 231 for ENS, and 237 for BS). For these utterances, the final boundary tone was defined as the last non-spurious f_0 point in the pitch track generated by Praat (see Arvaniti & Ladd, 2009; Henriksen, 2014, for similar procedures). Extracted f_0 values were converted to equivalent rectangular bandwidth (ERB) units in order to normalize for differences among speakers, in particular between males and females. This normalization procedure describes more accurately the relationship between f_0 and perceived pitch and has been used increasingly in intonation research (e.g., Arvaniti & Ladd, 2009; Colantoni & Gurlekian, 2004; Simonet, 2009).

RESULTS

Boxplots (Figure 2) for each group present the descriptive statistics of the imitation task. The X axis represents the ten points in the stimuli, while the Y axis represents the normalized f_0 scaling of the final tone, expressed in ERB units.

In general terms, boxplots for perception of final boundary tones reveal that participants perceived increments in final f_0 in a gradient manner. That is, descriptive statistics do not suggest clear CP differences in the perception of boundary tone stimuli. A one-way ANOVA was run for each group in order to explore further potential CP effects in the data (Table 1). The 10 points in the stimuli served as the independent variable, and ERB units served as the dependent variable.

Results of the omnibus one-way ANOVA yielded significant difference in all six cases. Notice, however, the reduced effect sizes reported in η^2. This could be attributed to the rather small sample due to the elimination of 555 data points. Nonetheless, since all tests found significant differences between stimuli, a post-hoc analysis (Tukey’s) was run in order to determine the precise location of these differences. Results are presented graphically in Figure 3.

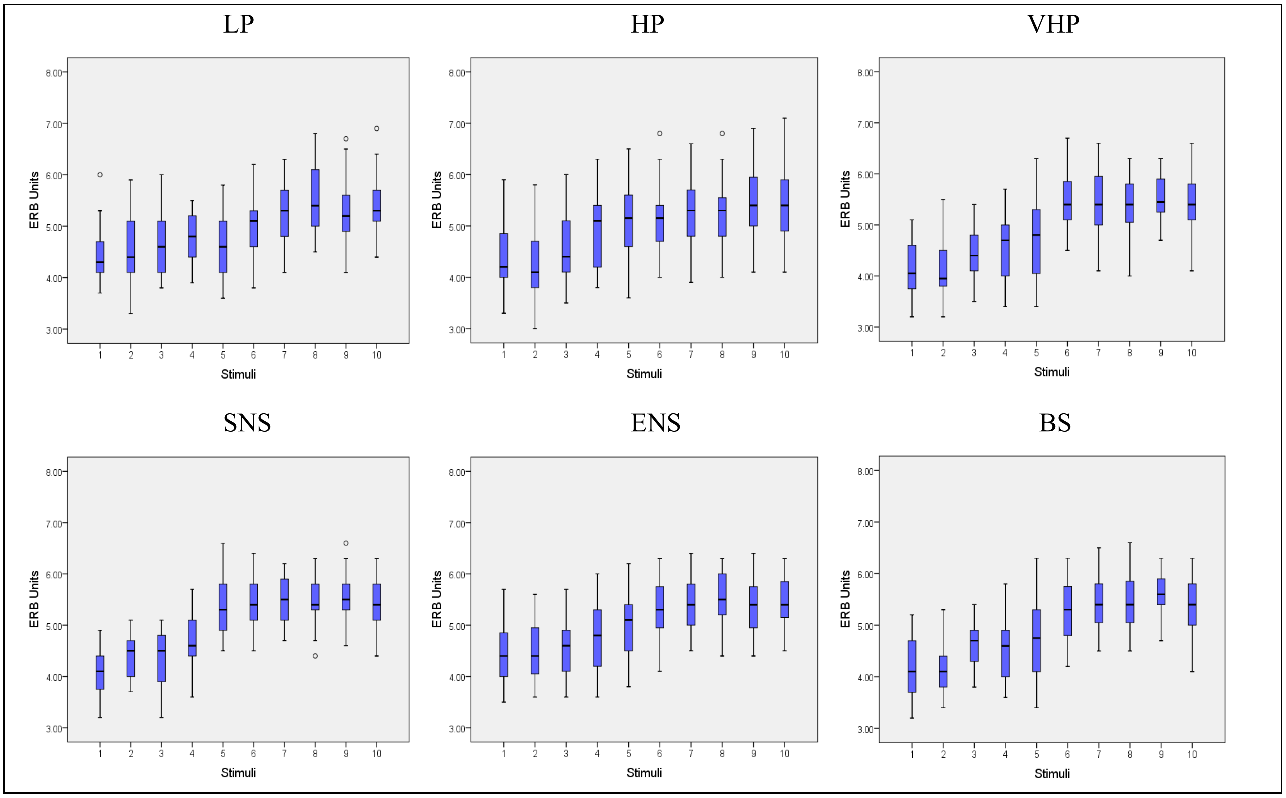

Figure 2. Boxplots with results in imitation task for all groups.

Table 1

One-way ANOVA for Results in Final Boundary Tone for All Groups

Group	*F*	*df*	Sig.	Partial η^2	Observed power
LP	11.09	9 - 239	.000	.29	1.00
HP	12.48	9 - 290	.000	.28	1.00
VHP	27.81	9 - 266	.000	.48	1.00
SNS	30.85	9 - 242	.000	.53	1.00
ENS	13.65	9 - 221	.000	.36	1.00
BS	23.34	9 - 227	.000	.48	1.00

The results of post-hoc comparisons revealed that no group achieved CP effects in the perception of the stimuli as traditionally defined, since all groups had more than two clusters and there was some degree of overlap among these clusters. Interestingly, however, if we are willing to consider the first two overlapping groups (blue and red in Figure 3) as one, the VHP, SNS, and BS groups did have one clear cut off point between stimuli 4 and 5 for SNS, and between stimuli 5 and 6 for VHP learners and BS. Otherwise, the stimuli for all groups were arranged from falling (non-emphatic declarative) to rising (questions), which corresponded to the declarative versus question interpretations, respectively, that the vast majority of participants reported in the debriefing interview.

Group	1	2	3	4	5	6	7	8	9	10
LP	4.41	4.54	4.58	4.78	4.63	4.98	5.24	5.47	5.33	5.40
HP	4.40	4.24	4.48	4.95	5. 14	5.17	5.24	5.28	5.42	5.41
VHP	4.14	4.13	4.43	4. 55	4.74	5.56	5.48	5.39	5.54	5.49
SNS	4.11	4.38	4.36	4.74	5.40	5.43	5.51	5.52	5.56	5.47
ENS	4.44	4.48	4.54	4.78	5.02	5.31	5. 40	5.51	5.38	5.48
BS	4.14	4.20	4.63	4.54	4.74	5.27	5.50	5.50	5.60	5.37
	Stimuli for final boundary tone									

Figure 3. Results for post-hoc comparisons in final boundary tone stimuli.

Note. Scores represent mean ERB units produced for each stimulus, by group. Scores grouped in the same color indicate that means are statistically equal (Tukey’s test).

DISCUSSION AND CONCLUSION

The results for perception of boundary tone showed that all participants were able to perceive broad increments in pitch in an overall similar manner. The data from debriefing interviews also determined that that these differences in pitch have at least two interpretations: questions (for rising tones) or declaratives (for falling tones). Indeed, regardless of proficiency, participants perceived overall pitch height and excursions accurately, a perception process that Cruz–Ferreira (1987) noticed in L2 speakers and called *pitch height strategy*. In her opinion, learners “seem to be sensitive to the gross phonetic shape of the pattern” (p. 112), which is supported by scholars such as Cruttenden (1981) who assign the general universal meanings of *open statement* to rising contours and *closed statement* to falling ones. This rudimentary strategy may constitute the first phase in perceiving and shaping the L2 intonational system. This finding seems to contradict the initial hypothesis that this intonational pattern in Spanish would pose a challenge for English speakers. The current study appears to demonstrate that perception of Spanish boundary tone might be an aspect on interlanguage phonology that naturally develops from an early stage and approaches native-like processing at high proficiency levels. This can be achieved in an instructed setting and with minimal to no explicit pronunciation instruction, as was the case for participants in this study.[1]

The finding that even monolingual English speakers processed the stimuli in a broadly similar manner as other groups provides further evidence for the robustness of the perceptual strategy under investigation: it can be activated successfully even if the hearer does not possess familiarity with the L2. As reported in the background questionnaire, these speakers had negligible contact with spoken Spanish in their daily lives and had received no instruction in Spanish during high school. Yet, they perceived global falls and rises similarly to other participants in this study. It could be argued that they were processing the auditory stimuli not as Spanish intonation but merely as changes in pitch excursions. These results are in line with Grabe et al. (2003), where perception of final intonation was broadly the same for both speech and non-speech stimuli. The fact that the broad distinction between falls and rises in English is the same as in Spanish—and in many if not most other languages, as argued by Cruttenden (1981)—could have also aided monolingual participants in their perception of Spanish intonation.

Upon closer examination, however, there were differences between monolingual English speakers and the other groups. The results of the debriefing interview revealed that *question* and *statement* were the only two possible interpretations that intermediate proficiency, high proficiency, and English speakers assigned to boundary tone stimuli. However, a subset of participants in the groups of very high proficiency L2 speakers, bilingual speakers, and Spanish native speakers reported that certain utterances seemed to be 'unfinished' or 'as if the speaker wanted to say something else.' We could hypothesize that this third interpretation may be attributed to a level final tone, pragmatically interpreted as a suspension tone. This possibility appears to be corroborated in the perception data: these three groups actually perceived three distinct groups of stimuli (see Figure 3), where the middle group—represented in red and spanning stimuli 2–5—could be linked to this purported suspension tone. This is an appealing possibility and would suggest that, as proficiency in Spanish increases, perception of final tone is attuned to three basic utterance types: declarative, suspended, and interrogative. Authors such as Levis (1999) have also noticed the role of this third utterance-final pattern in interlanguage phonology. In regards to the English falling-rising contour he observed, Levis stated that because "one function of intonation in conversation is to communicate whether a speaker has finished a turn, falling-rising intonation is a key communicative resource for speakers" (p. 43).

It is also worth noticing that only the SNS, VHP, and BS groups—the groups with the highest proficiency in Spanish—achieved some level of categorical perception, even if not produced with the traditional bimodal distribution. More interestingly, the pattern of clustering for the VHP group was exactly the same as that of BS. These findings contribute to research that suggests high proficiency in a foreign language may result in native-like processing (see Bowden, Steinhauer, Sanz, & Ullman, 2013, for an example of syntactic processing). To my knowledge, this current study is the first to obtain such results for perception of L2 prosody.

[1] A set of questions in the background questionnaire addressed the type and amount of explicit pronunciation instruction participants had received. Even though most said they had received explicit explanations for Spanish segments known to be difficult for English speakers, none recalled ever being taught about or receiving feedback on aspects of Spanish intonation.

Finally, we need to consider the context where L2 speakers in this study learned Spanish. All participants started learning Spanish as teenagers in instructed settings. This type of instruction continued into college, where only some participants in the very-high proficiency group also had the opportunity of extended stays in a Spanish-speaking country. Given this general profile, it is safe to assume that the L2 input participants had received was not only limited in amount but also restricted to a combination of native and non-native sources (classmates and non-native instructors, for example). The background questionnaire revealed that in fact all L2 participants received substantial input from non-native speakers of Spanish yet showed significant development in their perception of L2 intonation. In other words, it appears to be possible for college-level students of Spanish to improve their perception of Spanish intonation *despite* limited access to native L2 input. These results underscore the beneficial role of instructed contexts in the development of certain aspects of L2 intonation.

LIMITATIONS

The imitation task employed in this study is a methodological compromise which, as discussed above, has been deemed an effective tool to examine perception of intonation, but the fact that it tests *perception* while relying on *production* remains problematic. Even though the selected utterance was simple and did not pose challenges for the speakers, all of whom had at least three semesters of instruction, some participants were simply poor imitators, as also noticed by Dilley (2010), and felt uncomfortable with the task. The elimination of 26% of the data points from the analysis may reflect participants' insecurity while performing the task. Future research should build upon findings in this study and triangulate results from an imitation task with data from different perception tasks. Additionally, the stimuli can be diversified to include, for instance, utterances of varying length and stress patterns.

ABOUT THE AUTHOR

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REFERENCES

Arvaniti, A., & Ladd, D. R. (2009). Greek wh-questions and the phonology of intonation. *Phonology, 26*(1), 43–74.

Bolinger, D. (1978). Intonation across languages. In J. P. Greenberg, C. A. Ferguson, & E. A. Moravcsik (Eds.), *Universals of human language. Volume 2: Phonology* (pp. 471–524). Stanford: Stanford University Press.

Bowden, H. (2016). Assessing second-language oral proficiency for research: The Spanish Elicited Imitation Task. *Studies in Second Language Acquisition, 38*(4), 647–675.

Bowden, H. W., Steinhauer, K., Sanz, C., & Ullman, M. T. (2013). Native-like brain processing of syntax can be attained by university foreign language learners. *Neuropsychologia, 51*(13), 2492–2511.

Broselow, E., Hurtig, R. R., & Ringen, C. (1987). The perception of second language prosody. In G. Ioup, & S. H. Weinberger (Eds.), *Interlanguage phonology: The acquisition of a second language sound system* (pp. 350–361). Cambridge, MA: Newbury House.

Colantoni, L., & Gurlekian, J. (2004). Convergence and intonation: Historical evidence from Buenos Aires. *Bilingualism: Language and Cognition, 7*(2), 107–119.

Cruttenden, A. (1981). Falls and rises: Meanings and universals. *Journal of Linguistics, 17*(1), 77–91.

Cruz–Ferreira, M. (1987). Non-native strategies for intonational meaning: An experimental study. In A. James & J. Leather, J. (Eds.), *Sound patterns in second language acquisition* (pp. 103–120). Dordrecht: Foris.

Dilley, L. C. (2005). *The phonetics and phonology of tonal systems* (Doctoral dissertation). Massachusetts Institute of Technology.

Dilley, L. C. (2010). Pitch range variation in English tonal contrasts: Continuous or categorical? *Phonetica, 67,* 63–81.

Dilley, L. C., & Brown, M. (2007). Effects of pitch range variation on f0 extrema in an imitation task. *Journal of Phonetics, 35,* 523–551.

Flege, J. E. (1995). Second language speech learning: Theory, findings, and problems. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-language research* (pp. 233–277). Baltimore: York Press.

Grabe, E., Roser, B. S., García–Albea, J. E., & Zhou, X. (2003). Perception of English intonation by English, Spanish, and Chinese listeners. *Language and Speech, 46,* 375–401.

Gussenhoven, C. (1999). Discreteness and gradience in intonational contrasts. *Language & Speech, 42*(2), 283–305.

Gussenhoven, C. (2004). *The phonology of tone and intonation*. New York: Cambridge University Press.

Gussenhoven, C. (2006). Experimental approaches to establishing discreteness in intonational contrasts. In S. Sudhoff et al. (Eds.), *Methods in empirical prosody research* (pp. 321–334). Berlin: Walter de Gruyter.

Henriksen, N. (2014). Initial peaks and final falls in the intonation of Manchego Spanish wh-questions. *Probus 26*(1), 83–133.

Levis, J. M. (1999). Intonation in theory and practice, revisited. *TESOL Quarterly, 33*(1), 37–63.

Nibert, H. (2005). The acquisition of the phrase accent by intermediate and advanced adult learners of Spanish as a second language. In D. Eddington (Ed.), *Selected Proceedings of the 6th Conference on the Acquisition of Spanish and Portuguese as First and Second Languages* (pp. 108–122). Somerville, MA: Cascadilla Proceedings Project.

Nibert, H. (2006). The acquisition of the phrase accent by beginning adult learners of Spanish as a second language. In M. Díaz–Campos (Ed.), *Selected Proceedings of the 2nd Laboratory Approaches to Spanish Phonetics and Phonology* (pp. 131–148) Somerville, MA: Cascadilla Proceedings Project.

Ortega, L. (2000). *Understanding syntactic complexity: The measurement of change in the syntax of instructed L2 Spanish learners* (Doctoral dissertation). University of Hawaii at Manoa.

Ortega, L. (2009). *Understanding second language acquisition*. London: Routledge.

Pierrehumbert, J., & Steele, S. (1989). Categories of tonal alignment in English. *Phonetica, 46,* 181–196.

Redi, L. (2003). Categorical effects in production of pitch contours in English. In *Proceedings of the 15th International Congress of the Phonetic Sciences* (pp. 2921–2924). Barcelona.

Sakai, M. (2018). Moving towards a bilingual baseline in second language phonetic research. *Journal of Second Language Pronunciation, 4*(1), 11–45.

Simonet, M. (2009) Nuclear pitch accents in Majorcan Catalan declaratives: Phonology, phonetics, diachrony. *Studies in Hispanic and Lusophone Linguistics, 2*, 77–115.

Warren, P. (2016). *Uptalk: The phenomenon of rising intonation.* Cambridge: Cambridge University Press.