Current Approaches to Spanish and Portuguese Second Language Phonology
February 4th – 6th, 2010

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An eye on the present and a look to the future in Spanish and Portuguese L2 phonology research

Mary L. Zampini
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This talk will survey some of the primary trends and recent contributions in L2 Spanish and Portuguese phonological acquisition research and will discuss how this work relates to particular theoretical constructs and paradigms in the field. This will then be used as a springboard for an examination of those areas that have not received sufficient attention in the literature and will suggest potential avenues for future research. In addition to acoustic, segmental, and suprasegmental aspects of L2 Spanish and Portuguese, issues of comprehensibility, the role of technology in L2 pronunciation research, methodological concerns, teacher education, and implications for the L2 classroom will be addressed. In this way, it is hoped that this talk will provide input for the development of new research endeavors and generate broader discussion on a vision for the future in Spanish and Portuguese L2 phonology research.
The purpose of this study is to determine the effects of using technology outside the classroom to improve abilities in the second language learner's L2 phonological system. It is hypothesized that by completing speech perception exercises using technology and by completing short in-class production exercises, the second language learner will be able to improve his/her L2 phonological abilities without having to commit much class time to pronunciation training. Furthermore, results from perceptual treatments may support Skill Acquisition Theory (DeKeyser 1997, Robbins 1992, Towell & Hawkins 1994), one of the many current theories of second language acquisition.

This paper consists of an experiment which is a follow-up to pilot study carried out by Botero (2009). The current study (Experiment 2) consists of 40 participants, all students of Spanish 110 (Intermediate Spanish Conversation, at Pennsylvania State University). They were divided into three groups; those who received explicit training, perceptual input and metalinguistic explanation (1), those who received explicit training and metalinguistic explanation (2), and a control group (3). At the beginning of the semester participants completed a 'pre-treatment' word naming task. This assessed their Spanish pronunciation and served as the baseline against which the effect of the training exercises that they received throughout the semester were measured. During the course of the semester participants in both studies completed weekly exercises in Spanish perception via the internet (using ANGEL, the online course management system at Penn State). The groups in Experiment 2 received short periods of explicit instruction (one per week in class, for eight weeks). At the end of the semester the students returned to complete the 'post-treatment' word-naming and associated tasks. All ‘pre-treatments’ and ‘post-treatments’ were digitally recorded and phonetic analysis was done using Praat Software.

Preliminary data from both studies show that the groups receiving both explicit training and perceptual input not only improved the ability to discriminate between L1 and L2 sounds (results which follow the trend of Skill Acquisition Theory), they also improve production of L2 phones (specifically decreased velarization of coda laterals). However, perceptual input alone, via ‘at-home’ treatments does seem to play a role in improvement of Spanish L2 phonology as seen in Experiment 1.
References
On the (in)stability of an L2 Spanish phonological system exposed to L3 Portuguese phonology: How L3 development can shed light on L2 acquisition theory

Jennifer Cabrelli and Jason Rothman
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Viewing the critical/sensitive period for phonology in absolute terms, the fact that some L2 learners seem to attain a native-like phonological system under particular empirical measurements (e.g., Birdsong and Molis 2001) leaves unexplained the fact that most do not. To test how native-like these systems are, one can experimentally examine the extent to which they are equally resilient/permeable to cross-linguistic interference from an L3 as native phonological systems. Accordingly, we offer the Phonological Permeability Hypothesis (PPH), which states that pre- and post-pubescent phonological acquisition is fundamentally different, and this maturationally conditioned difference can be evidenced via experimentally measured differences in cross-linguistic permeability (regressive interference) between native and non-native phonological systems when an L3/Ln is acquired. If the L1 and L2 systems are learned/acquired differently and therefore different in their mental constitutions, it is expected that the additive system (L2) would be subject to more rapid and pervasive cross-linguistic interference from the L3 on an adult-acquired L2 as opposed to an early-acquired language (L1 or L2) as proficiency in the L3 increases. If accessibility to phonological principles and features differs between adult successive bilinguals and simultaneous bilinguals at the time of acquisition, their phonological systems would be different, even if they appear indistinguishable on the surface.

To verify or falsify the PPH, it is useful to test and then compare and contrast two groups of L3 learners: the first group composed of native English speakers that acquired Spanish as an L2 after the offset of a critical/sensitive period and the second group comprised of simultaneous Spanish/English bilinguals. As this is an ongoing project, we present a complete methodology for a longitudinal study in which both groups are in the initial state of acquisition of Brazilian Portuguese (BP). While BP is typologically related to Spanish, there are many phonological phenomena that exist in one language but not the other that can be analyzed at different levels of the phonological hierarchy. It is logical to assume that, should stability of a phonological system be defined in part as robust resistance to the influence of a novel system at one level, it should be so at all levels of the phonological hierarchy. Testing all levels will be accomplished by analyzing phenomena substantiated in BP and not in Spanish, such as phonemic nasality, resyllabification of illegal codas and vowel neutralization, and phenomena that are present in Spanish and not in BP, such as spirantization and coda deletion. Combining psycholinguistic perception tasks, word and sentence level target production tasks and elicited spontaneous production procedures that target the phenomena under investigation, monthly data collection sessions testing both languages (Spanish and BP) are necessary to know at what point any regressive interference becomes apparent, if at all, for each group, enabling a timeline of the L3 phonological acquisition process to be constructed for both groups.

As schematized in Figures 1 and 2, we predict that the influence of Spanish will be noted immediately between both groups, and as the BP generalizations are acquired, influence of Spanish will diminish quickly for the additive group (group 1) since it was acquired post-pubescently. Conversely, the PPH predicts that Spanish’s influence will persist considerably longer for the simultaneous group (group 2). The differences do not end there; while group 1 is predicted to evidence quick and pervasive interference from BP in their L2 Spanish, group 2 is hypothesized not to have any significant influence from BP interfere with the phonological system of Spanish (in the case there are effects they are predicted to be minimal and to surface towards the end of the year long study), since Spanish for them is a native system. Based on limited pilot results, we also expect that the acquisition of BP phonological generalizations for group 2 will quantitatively lag behind that of group 1 for reasons of a stronger influence from Spanish given its native status.

In addition to presenting the predictions of the PPH couched within our methodology, we discuss its functional significance for adult SLA and L3 studies. While the methodology offered can only provide indirect evidence that native and so-called successful non-native phonological systems are or are not constituted in the same way, the presentation provides a novel and crucial, but so far lacking methodology to test so-called native-like L2 phonological systems and examine the extent to which they behave similarly as native systems under another language acquisition situation. This type of research joins similar research in the generative tradition that seeks to demonstrate how investigating the acquisition of an L3 informs key debates in L2 acquisition (e.g. Cabrelli et al. 2009; Iverson 2009; Leung 2007). The PPH innovates in that it is the first such proposal that takes such a position for adult phonological acquisition.


On the interference of English and Spanish in the acquisition of orthographic-phonological correspondences in L2 and L3 Brazilian Portuguese

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This study brings together three areas of language acquisition which have, as yet, not received a great deal of attention in the field: 1) the acquisition of Portuguese as a foreign language; 2) multilingualism (beyond L2); and 3) sound-symbol correspondences.

By comparing beginning learners with different L1 and L2 backgrounds, the study examines the acquisition of the phoneme /z/ in two orthographic contexts: <z> and intervocalic <s>. In considering these sound-symbol correspondence rules, the study addresses the role of the L1 and L2 in the acquisition of Brazilian Portuguese as an L3.

Fifty-two participants enrolled in 3 introductory classes of Brazilian Portuguese took part in this study, and formed four participant groups: native Spanish speakers, native English speakers fluent in Spanish, native English speakers not fluent in Spanish, and those with previous instruction in Portuguese. Three reading tasks were administered during the semester, at weeks 1, 8 and 15. Each task required that participants read a list of Portuguese words, consisting of Spanish-English-Portuguese cognates, non-cognates and nonce words. Results were analyzed for accuracy of pronunciation as well as evidence of L1 or L2 interference in the grapheme-phoneme correspondence.

Results suggest that the orthographic-phonological correspondence rules of participants’ L1 and L2 play an important part in L3 acquisition, as transfer from English and Spanish is evident in all three tests, for both graphemes. However, variability was observed even within participant groups, indicating that individual or other factors may also be at play.

Findings are discussed in terms of the sound-symbol correspondence systems for L1-L2-L3 learners and their implications for learnability and teachability of foreign language phonologies.
An Examination of the Acquisition of Synalepha by
L2 Spanish Speakers in a Study Abroad Context

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Within the field of L2 Spanish phonology, most of the previous literature has focused on segments, that is to say various phonemes, or learner phonetic realizations of the Spanish phones, instead of on the acquisition of suprasegmentals, as noted during the first CASPSLP conference by Dr. Holt (2008). The current study investigates the acquisition of synalepha in a study abroad context by 14 native English speakers enrolled in an intensive Spanish-language program in Zacatecas, Mexico. All 14 informants were from Central California and had taken at least two semesters of Spanish in a formal setting. They were recorded both upon arrival to Zacatecas and just before completion of the month-long program. The task was designed to elicit guided semi-spontaneous speech in which the instances of synalepha were found within the noun phrase in specific, pre-determined tokens while at the same time promoting a more natural production through the use of pictures. The vocoid sequence tokens were then analyzed with Praat utilizing features such as formant analysis and the duration of the vowel sequence to measure progress in the acquisition of synalepha. The absence of synalepha is most noticeably identified by the presence of an intervening pause, but it can also be identified by the insertion of creaky voice or a glottal stop between the vowels. Preliminary conclusions have revealed noticeable progress made on both accounts, though by some individuals more than others.

Selected reference
http://people.cas.sc.edu/deholt01/papers/research.htm#_CONFERENCE_PRESENTATIONS
Comparative studies between the phonological systems of English and Spanish establish a clear distinction in the syllabification and articulation of adjacent vowels. While Spanish displays a phonological contrast between diphthong and hiatus sequences allowing for adjacent vowels to be parsed as tautosyllabic (rising and falling) or heterosyllabic based on the vowel quality and the stress position, the English language lacks this contrast and allows falling diphthongs but not rising. Given the opposite phonological patterns described above, a situation of language transfer may be predicted for the articulation of adjacent vowels by Spanish learners, native speakers of English (Guitart 2004, Kempff 2006).

This experimental study addresses the acquisition of Spanish L2 phonology by adult English native speakers and has two different goals. First, we test the learners’ production of Spanish rising diphthongs and compare it with native speaker’s pronunciation in order to establish to which extent the identified differences in the two languages are represented in the learner’s interlanguage. Secondly, we evaluate the role of explicit instruction on the articulation and syllabification of the target sequences by exposing subjects to a sequence of instructional online sessions on the subject.

In order to provide evidence for phonological transfer and test the role of instruction we tested syllabification intuitions and recorded speech samples before and after participants have been exposed to explicit language instruction. A total of four participants’ groups were included in the analysis: English and Spanish native speakers (used as control groups), and beginner and advanced level Spanish students. The recorded speech samples were analyzed by taking two acoustic measurements: the vowel duration and the F1 and F2 frequency values.

The results confirm the prediction of L1 transfer but also provide positive evidence for the acquisition of L2 phonology patterns by adult learners. In the pre-instruction setting beginner learners displayed a significant difference in the articulation of the target sequences as compared to both, Spanish native speakers and advanced learners. After the instruction sections, however, the difference between beginners and other groups decreased significantly. Beginner learners have mastered several aspects of the explicit instruction, improving the production of tautosyllabic rising sequences. Advanced learners on the other hand also showed improvements in the production of these sounds after instruction, nonetheless in a much smaller scale, showing to have taken less advantage of the instruction sections, as compared with beginner learners. Overall, the results show that some learners can successfully accommodate their interlanguage into L2 parameters to acquire a more native-like pronunciation. The results also suggest that enhancement on the pronunciation of rising diphthongs can be achieved after several years of exposure to the language but it can be accelerated by explicit instruction on the subject.
Non-native articulations of vowels have been shown to contribute to a foreign accent (Elliot, 1997; Flege, 1997; Flege et al., 1999; Munro, 1993). In recent years, the number of studies to address acquisition of this sound class by second language (L2) learners of Spanish has increased. L2 learners at early stages of acquisition have been found to struggle to produce vowels in a native-like manner (Menke & Face, 2008), but learners at more advanced levels have been found to both perceive (Garcia de las Bayonas, 2004) and produce (Menke & Face, 2008) vowels in a way similar to that of native speakers. These few studies have looked at the acquisition of the Spanish vowel system by learners who began studying the language as adults; none have investigated Spanish vowel acquisition by child learners with early, extended exposure to Spanish. Given that previous work has suggested L2 study during childhood leads to greater accuracy in the articulation of L2 sounds (e.g., DeKeyser, 2000; Flege et al., 1999; Hojen & Flege, 2006; Munro et al., 1996; Scovel, 1969), this is an important population to consider in order to further our understanding of how Spanish vowels are acquired by L2 learners. This study sets out to address this gap by investigating immersion learners’ pronunciation of Spanish vowels, comparing the productions of native English-speaking learners to those of Spanish-English bilingual peers while considering development over (apparent) time.

A cross-sectional sample of students enrolled in a one-way (foreign language) Spanish immersion program in Texas participated in this study: 10 first graders, 9 third graders, 8 fifth graders, and 8 seventh graders. Subjects were recorded during a picture sorting task; such a task limited variation in the segmental context surrounding the vowels chosen for analysis, but at the same time elicited speech through a communicative, educational task familiar to students. The productions of 20 tokens of each vowel, for a total of 100 tokens per subject, were isolated and examined acoustically in order to measure first and second formant (F1 and F2) values. The tokens examined for each vowel were balanced for their occurrence in stressed and unstressed syllables.

Preliminary analysis of the vowel formant measurements shows a few trends. It is clear across vowels that there is a considerable range of pronunciations and a large amount of vowel reduction due to English influence. Learners in lower grades produce vowels in a way similar to that of native Spanish-speaking peers, but the Spanish vowel productions of fifth and seventh grade learners show differences from the vowels of their native Spanish counterparts. These issues will be explored further in this paper as will the effect of stress in order to provide a comprehensive analysis of the Spanish vowel productions of child L2 learners of Spanish.
References
Within research in Spanish SLA, studies on pronunciation are not uncommon, though they have mainly focused on segmental aspects (viz. studies by Elliot, Lord, Major and others). The present study targets the acquisition of the seldom-studied area of connected speech, to wit: synalepha and resyllabification:

Synalepha (V-V linking across words):
- El hombre retó a su hijita severamente.
- Enrique aguantó su enojo con decoro.

Resyllabification (C-V linking across words):
- A esa tabla le faltan los elementos que no son naturales.

Previous research by the author analyzed English-speaking advanced learners’ improvement during the course of three treatments (study abroad [4 week 6 credit immersion experience in Costa Rica]; explicit instruction [introductory course on phonetics/pronunciation]; other advanced language class without explicit instruction or practice in pronunciation), and addressed research questions regarding the different modes and types of exposure to Spanish and their effect on accurate pronunciation, the degree to which explicit instruction predicts improvement of pronunciation, and the relationship between fluency and accurate pronunciation.

While more careful styles of speech are thought to favor more accurate production, for connected speech phenomena, we might expect that increased speed would lead to better production of synalepha and final-consonant linking. However, previous results from other phases of this study suggest that this is not fully the case, and that there may be additional linguistic variables at play. For the current study, learners were given stimuli of 100 sentences that contained target combinations, and were recorded at the beginning and end of treatment, providing the baseline measure and final achievement.

Data analyses address the following research questions that test the hypothesis that otherwise phonologically-motivated linking will be inhibited by stronger prosodic and structural boundaries:

1. Do certain linguistic structures promote or inhibit linking phenomena? Specifically:
   a. Does vowel quality of the items/syllables linked affect rate of linking? (C-V, V-V)
   b. Does consonant quality of the items/syllables linked affect rate of linking? (C-V)
   c. Does word category (lexical/content vs. grammatical/function) of the items linked affect rate of linking? (C-V, V-V)
   d. Does morphological category (e.g., plural vs. verbal /–s/, stem-final or verbal /–n/, etc.) of the C or V of the items/syllables linked affect rate of linking? (C-V, V-V)
   e. Does syntactic phrasal structure of the items/syllables linked affect rate of linking? (C-V, V-V)
   f. Does prosodic stress of the items/syllables linked affect rate of linking? (C-V, V-V)

The results of this study contribute to the field of acquisition of Spanish phonology by English speakers, including both in classroom-based learning and full immersion settings, therefore providing further insight into the subtle contextual and linguistic factors that influence the degree of mastery of elements of nonnative phonology.
References
This study examined whether the structural position of a sound in a word affects L2 speech production. This was accomplished by answering the following research questions: a) Do L2 learners rely on phonotactic information in the process of L2 speech learning? and if so, b) Are similar or dissimilar distributional sound patterns more easily acquired by L2 learners?

The parameter for (dis)similarity was set around the notion of structural position in combination with L1 and L2 phonemic and allophonic inventories. It was hypothesized that segments coexistent in L1 and L2 with overlapping distribution in both languages will be the easiest to produce in L2 speech, whereas L2 learners will have the most difficulty producing a novel L2 contrast and maintaining it equally successfully in all structural positions in which it occurs in L2, with varying degrees of difficulty in between.

For this purpose the speech of 12 adult native speakers of English, with intermediate to intermediate-high proficiency in Spanish as L2, was analyzed. Data collection consisted of the subjects reading aloud in three sets of repetitions a list of stimuli, each one representative of a particular parameter of (dis)similarity. Perceptual, spectrographic and statistical analyses of the data were conducted.

The results show that the subjects were consistently more successful in producing the target sounds with overlapping distributional patterns in L1 and L2 than target sounds whose distribution differed in L1 and L2 as well as new L2 contrasts, thus confirming that classroom L2 learners do rely on phonotactic properties of sounds in the process of L2 speech learning and that overlapping and non-overlapping distributional patterns do have an effect on what is regarded by these learners to be similar to and different from their L1, and consequently, what is regarded as relatively more easy or more difficult to produce in L2 speech.

Additionally, various factors that impede usage of information provided by distributional patterns of sounds were discovered. Those factors are persistence of L1 phonological rules, reliance on L1 orthography, familiarity with L2 lexical items, the functional load of the target sounds in a particular structural position, the propensity of certain structural positions to be acquired earlier and the relative inherent articulatory complexity of the sounds being acquired.
Recent work in the field of second language acquisition of Spanish phonology has considered the acquisition of not only categorical sounds or segments by L2 learners of Spanish but also the acquisition of phonological processes, or contextual variation. In particular, the acquisition of spirantization of the Spanish voiced stops /b, d, g/ in intervocalic position by L2 learners has been investigated (i.e., Face & Menke 2009, Gonzalez-Bueno 1995, Zampini 1994). However, research on the acquisition of other phonological processes by L2 learners of Spanish is lacking. The objective of this study is to examine the L2 acquisition of another phonological process in Spanish – that of sibilant voice assimilation – by taking a close look at the linguistic factors that may correlate with the presence of sibilant voicing in advanced L2 learner production.

In Spanish, syllable-final /s/ may undergo regressive voice assimilation, assimilating in voice to the following consonant (Hualde 2005, Quilis 1993). Voicing of /s/ may occur before any voiced consonant, both word-internally as well as across word boundaries (Hualde 2005):

1. mismo [miz.mo]
2. los barcos [loz.βar.kos]

Spanish voicing of /s/ appears to be gradient and variable rather than categorical and complete. The factors related to the occurrence and degree of voicing of syllable-final consonants in Spanish are not yet quite clear, although there have been suggested variables such as regional norms (Quilis 1993, Hammond 2001) and speech rate or discourse style (Torreblanca 1978, Whitely 2002).

In a previous study of sibilant voice assimilation by a group of advanced L2 learners of Spanish, Schmidt (2008) found evidence of sibilant voicing in the speech of L2 learners, native speakers of English, enrolled in an undergraduate 4th-year Spanish topics course. While five of the fourteen learners in the class produced no examples of voicing of /s/ before a voiced consonant in the contextualized picture description task, the remaining nine learners did produce one or more tokens of the voiced sibilant in the appropriate context. Although it was determined through this previous work that some advanced L2 learners do realize sibilant voicing, the linguistic factors corresponding to this process for the learners still remain unclear.

The present study aims to determine the linguistic factors that relate to the occurrence of sibilant voicing by advanced L2 learners of Spanish. The tokens of /s/ preceding a voiced consonant produced by the advanced learners in a contextualized picture description task were analyzed according to the degree of voicing of the sibilant and several linguistic variables. The linguistic variables that are considered here include: 1) total duration of the sibilant, 2) duration of voiced frication, 3) duration of voiceless frication, 4) presence of pause between the sibilant and the following voiced consonant, and 5) position of the sibilant within the word.

Results point to several linguistic variables examined here that relate to the occurrence of voicing of /s/ in the voicing context for these advanced learners of Spanish. The role of the duration of the sibilant, continuous speech (lack of pause), and word position are discussed with respect to the occurrence of sibilant voicing. Implications are then made for the acquisition of assimilation processes by second language learners.
References


Previous research in laboratory settings (Bradlow et al. 1997, 1999; Jameison and Rvachew 1992; Rvachew 1994) suggests that improvement in the perception of new or difficult speech sounds can lead to improvement in the production of those sounds. This study investigates the extension of these findings to the second language (L2) classroom by comparing the impact of two assignments on 28 Spanish students’ improvement in pronunciation of the vowels /e/ and /o/ over the course of a semester. Focus was given to these vowels because most previous research has neglected to study in depth students’ improvement of these vowels in the classroom, despite their difficulty for English-speaking learners of Spanish. The students were from two sections of a lower-intermediate Spanish conversation course. Both sections were taught identically, except that a production-based pronunciation assignment was used in one section while a perception-based pronunciation assignment was used in the other. Improvement was measured via a pre-test and post-test that required students to produce these vowels in isolated words.

Students that received the production-based assignment constituted the production group (N=15), and those receiving the perception-based assignment formed the perception group (N=13). Both groups were given weekly instruction on differences in Spanish and English sounds that have been identified in past studies as difficult for English learners of Spanish. The assignment for the control group required students to submit five recordings of themselves reading a dialogue, and students received feedback each time from the instructor on their pronunciation. The experimental group was given five recordings of different native English speakers speaking Spanish and was asked to evaluate the speakers’ pronunciation. All native English speakers were unknown to the experimental group. For both assignments, students focused on the sounds that had been covered in class to that point.

To analyze participants’ improvement of the mid vowels, a technique of quantifying diphthongization was used. From participants’ productions on the pre- and post-tests, the first (F1) and second (F2) formants were measured throughout the production of each critical mid vowel, and the change in F1, as well as the change in F2-F1, was calculated. Diphthongization of the /o/ vowel was measured by the drop in F1, while the diphthongization of the /e/ vowel was measured primarily by the increase in F2-F1, and secondarily by the drop in F1. Improvement in production of the mid vowels was indicated by a reduction in these changes in F1 and F2-F1. This technique allows for a more in depth analysis of improvement than would be obtained from labeling each vowel as a diphthong or monophthong.

Data show a significant improvement in the diphthongization of both /o/ and /e/ for the experimental group. Moreover, no significant improvement is found for either vowel in the control group. This finding suggests that assignments that target the perception of L2 speech sounds should be considered when targeting pronunciation improvement in L2 curricula. Moreover, the technique of diphthong quantification used in this study revealed that participants in the experimental group continued to diphthongize the mid vowels even though they did so significantly less. This finding suggests that L2 students do not improve their mid vowel productions by advancing from diphthongs to monophthongs, but rather that they gradually reduce their diphthongization. The implications of these findings for L2 pedagogy and future research in second language acquisition will be discussed.
References
The question of ultimate attainment in L2 acquisition as it relates to the Critical Period Hypothesis (CPH) is well researched and debated in all cognitive approaches to SLA (see, e.g., Long 2005, Rothman 2008, Singleton 2005). Less contentious is the applicability of the CPH in the domain of L2 phonology (Long 1990, Scovel 1988). However, beyond the observable differences between L1 and L2 phonological acquisition embodied in the non-native accent of adult L2 learners, one must critically ask what it means to have a non-native phonological system and what is and is not possible to acquire in non-native phonology. If the phonological domain truly suffers from a critical period, this means that (at least some) new phonemes, suprasegmental phenomena and phonotactic constraints uninstantiated (or different) in the L1 should remain unacquirable (or resistant to modification) in the L2. Thus, the observation that L2 phonological systems are inevitably conditioned to be different from the target representation is amendable to empirical experimentation.

Following Brown (1998), who claims that novel L2 phonemic representations are unacquirable if the necessary phonological feature(s) is/are not used contrastively in the L1, the present study (a) offers an account of the acquisition of the velar nasal /ŋ/ by L2 learners of English/L1 Spanish, and goes beyond this by (b) examining the interaction of English nasals /m/, /n/ and /ŋ/ with the L2 learners’ constraint hierarchy, following an Optimality Theoretic (OT) (McCarthy and Prince 1993, Prince and Smolensky 1993) conception of phonology. Brown’s approach predicts success in the L2 acquisition of the English velar nasal /ŋ/ given that all necessary contrastive features – [voice, nasal, dorsal] – are available via L1 transfer.

However, simply acquiring the novel velar nasal phoneme is insufficient. The L2 speaker must also allow nasal contrast in the coda via constraint reranking (Hancin-Bhatt 2000, and Hancin-Bhatt and Bhatt 1997). In Spanish (disregarding assimilation contexts), word-final coda nasals neutralize to the unmarked coronal place of articulation (Piñeros 2007). Piñeros argues that the markedness constraint PLACE HIERARCHY outranks the input-output faithfulness constraint MAX(Place). We will argue that the L1 Spanish speaker must rerank the dominant PLACE HIERARCHY constraint below MAX(Place) such that faithfulness dominates markedness, thus allowing coda nasal contrasts to surface. The question then becomes: can phonological constraints be reranked on the basis of target input? Does a critical period for phonology predict that such would be impossible? A strict interpretation of the CPH implies just that.

To test this prediction, we report on two tasks from a four-part study of advanced L1 speakers of Spanish acquiring L2 English. Results from picture identification and production tasks indicate that both acquisition of /ŋ/ and subsequent constraint reranking in the phonological domain (at least for this particular phenomenon) are possible. We will discuss what the results imply for L2 phonological acquisition theories and for the consequences of the application of the CPH to the domain of L2 phonology, arguing that the same mechanisms provided by Universal Grammar that guide L1 acquisition remain accessible in L2 acquisition, even if the implementation of such mechanisms results in an outcome for the L2 that diverges in certain respects from the L1, as will be shown by the results from task 4 (production).

(1) Part 2, picture identification: sample token

The participant sees pictures of swim (A) and swing (B)
The participant hears the word swim [swɪm]
The participant circles swim (A)
(2) Part 4, elicited production: sample token

The participant is asked to read the grammatical sample (adapted from Hancin-Bhatt 2000 and Hancin-Bhatt and Bhatt 1997).

a. *Him phone in the kitchen rang.  
   case error  
b. His phone in the kitchen rang.

The participant is expected to read (2b), producing [.æŋ].

(3) a. Average correct out of 6 on task 2  
b. L2 Production: 66 utterances/condition

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<tr>
<th></th>
<th>m ~ n</th>
<th>m ~ ƞ</th>
<th>n ~ ƞ</th>
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<tr>
<td>Native</td>
<td>5.6</td>
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</tr>
<tr>
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<td>5.27</td>
<td>5.73</td>
<td>5.45</td>
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<tr>
<th>Produced as</th>
<th>Correct nasal</th>
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<tr>
<td>[m]</td>
<td>94% 0% 0%</td>
</tr>
<tr>
<td>[n]</td>
<td>6% 100% 8%</td>
</tr>
<tr>
<td>[ƞ]</td>
<td>0% 0% 86%</td>
</tr>
<tr>
<td>[ŋk]/[ŋɡ]</td>
<td>0% 0% 6%</td>
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References
In Spanish, many lexical items exist that contain sequences of two adjacent vocoids (camión, tienda). In general, the two vocoids are diphthongized if the first is high and not identical to the second, as in the examples cited above, which are accepted as having 2 syllables. However, exceptions to this rule exist in which the vocoids are realized in hiatus, as in ‘cliente’ and ‘rioja’, which in Peninsular Spanish are more likely to be realized with 3, rather than 2, syllables each. Hualde (2005) indicates that factors that contribute to this exceptionality include whether the sequence is the first vocoid sequence in the word, presence of a morphological boundary between the two vocoids, and the quality of the second vocoid. Recent experimental work (Scarpace and Kilpatrick 2009) has at least partially confirmed this generalization, showing that perception of the vocoid sequence as a diphthong or two full vowels is predictable based on complexity of the syllable margins (simple vs. complex onset, presence vs. absence of coda) and quality of the second vocoid (a, e, o, u), with forms with [e] being most likely and forms with [a] least likely to be perceived as a diphthong.

For L2 speakers of Spanish, the perception of hiatus vs. diphthongs has not previously been investigated, but is relevant in light of recent work that indicates that the L1 phonotactic system may interfere in L2 perception (Altenberg 2005, Weber and Cutler 2006). Acquisition of exceptional hiatus by L2 Spanish speakers who are L1 speakers of English is complicated by phonotactic rules of English that potentially interfere with L2 perception. In English, sequences of glide~vowel following a consonant are only legal if the vowel is [u], as in ‘fume’ ([fjum]). Therefore, the phonotactic rules of English may lead L1 English~L2 Spanish speakers to perceive adjacent vocoids to be in hiatus except when the second vocoid is [u]. This is evidenced in production by L2 Spanish speakers, who often produce forms with vowels other than [u], such as ‘tienda’, with vowels in hiatus ([ti.en.da]) rather than with a diphthong ([tjen.da]).

Here, we present experimental evidence that indicates that native English speakers who are second language speakers of Spanish are sensitive to the perception of these sequences as diphthongs based on the quality of the second vocoid, but that perception is not based only on [u] vs. not [u], as the phonotactics of English would predict. Instead, the L2 Spanish speakers seem to be acquiring the same phonotactic restrictions exhibited by native speakers of Spanish. L2 learners were presented auditorily with real and nonce forms that varied in vocoid sequence (ia, ie, io, iu), and were asked to judge the number of syllables in each word. Results showed that the L2 speakers judged forms with [e] to be monosyllabic (having a diphthong) significantly more often than forms with [a] and [o], just as native speakers of Spanish did.

While these results indicate that L2 learners of Spanish are able to acquire phonotactic restrictions related to diphthongs and hiatus, the phonotactic grammar of English also appeared to interfere in the overall pattern of results. Forms with [u] were judged to be monosyllabic significantly more often than forms with other vowels. As judgment of a form as monosyllabic corresponds to perception of a diphthong, these results indicate that the L2 learners perceived a diphthong more often in environments where both the L1 and the L2 allowed diphthongs, and less often where the L1 disallowed them. Thus, the phonotactic grammar of the L2 Spanish speakers appears to be influenced by the phonotactics of both the L1 and the L2.
References


Perception of narrow focus by L2 learners of Spanish: A case of L1 prosodic transfer

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Narrow focus in Spanish can be realized both through syntactic dislocation as well as a change in prosodic prominence (Navarro Tomás, 1944). Prosodically, narrow focus in Spanish has been shown to correspond with an increase in pitch range as well as a leftward shift in the peak alignment (de la Mota, 1997; Face, 2002; Willis, 2003). Whereas the pitch accent is typically produced in the post-tonic syllable in broad focus (L^H in ToBI notation), it is realized within the tonic syllable in narrow focus contexts (L^H*). In English, broad focus contexts characterized by a pitch accent realized within the tonic syllable (H* or LH*), while narrow focus in is marked by an increase in pitch range, while the f0 peak alignment does not differ substantially from the broad focus realization (Hualde, 2005). Thus, although English and Spanish are similar in their use of pitch range as a marker of narrow focus, they differ in their use of peak alignment. Given the differences in prosodic systems, the current study investigates the perception of Spanish narrow focus intonation by L1 speakers of English.

To investigate the perception of narrow focus Spanish intonation by L1 speakers of English, a total of 20 subjects (10 L2 learners and 10 native speakers of Spanish) participated in a laboratory based identification task. L2 learners were drawn from intermediate Spanish courses at the University of Texas (years of Spanish instruction M=3.5). Stimuli consisted of auditory presentations of a broad focus utterance, with a manipulated f0 contour. The pitch range of the target constituent was manipulated along a 5-level continuum, ranging from 110Hz to 135Hz. F0 peak alignment was manipulated along a 5-step continuum, from early in the tonic to late in post-tonic syllable. The continua were crossed to create 25 unique stimuli (Figure 1). After a brief training, subjects listened to randomized repetitions of the stimuli (25 stimuli x 5 repetitions x 20 speakers= 2500) and were instructed to identify utterances that corrected a previously provided contextualizing question, thus signifying a narrow focus interpretation.

Preliminary results for native speakers of Spanish, drawn from a repeated measures ANOVA, indicate that both pitch range and peak alignment are perceptually salient cues for narrow focus (p<.05, p<.05). L2 learners of Spanish displayed sensitivity to pitch range (p=.020), showing no significant difference in performance from the native Spanish speakers (p=.937). However, contrasting with native speakers of Spanish, peak alignment did not serve as a reliable cue to narrow focus for L2 learners (p=.380), with post-tonic peak alignments being identified as narrow focus as often as tonic peak alignments (Figure 2).

These early results indicate that, in line with previous research on Spanish intonation production, native Spanish speakers use both pitch range and peak alignment as perceptual cues to narrow focus contexts. In contrast, L2 learners primarily use pitch range as a cue to narrow focus, while peak alignment plays a lesser or non-existent role. These findings seem to indicate L1 transfer at a prosodic level, with L2 learners relying on the prosodic systems of their L1. In addition to expanding the relatively unexplored field of L2 intonation perception, these findings have direct pedagogical implications.
Selected References


Figure 1- Intonation contour of the target constituent ‘luna’ taken from the utterance ‘Yo miro la luna de María.’ The horizontal solid lines represent the 5 different pitch range manipulations. The vertical dashed lines represent the 5 f0 peak alignment steps. The contour represented is the highest pitch range and the right most peak alignment, labeled 5E.

Figure 2- Perception of narrow focus by peak alignment. L2 learners are more likely to identify post-tonic peak alignments as narrow focus than native Spanish speakers.
Pitch accent and boundary tone usage:
The effects of a homestay program in León, Spain on L2 Spanish intonation
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The current paper adds to our understanding of the acquisition of intonation by quantifying the change in individual local tonal events over the course of a homestay study abroad program. Recent work regarding the acquisition of Spanish L2 intonation by English speakers (Henriksen, Geeslin, & Willis, in press) reports on the global intonation contour patterns and final boundary tones of three utterance types (wh-questions, yes/no questions, and declaratives), providing individual learner profiles that document the changes in contour types produced and the most frequent strategies employed at two points in time. Henriksen et al. analyze read speech produced in response to particular discourse contexts and find several changes in the L2 Spanish intonation patterns over the course of a 7-week study abroad program. For the declaratives, L2 speakers increased their use of tonal patterns with a prenuclear rising pitch accent and a Low final boundary tone, similar to native speakers. The yes/no questions were the most consistently produced with little variation between recordings; however, the use of a contour with a prenuclear rise increased by the second recording. The wh-questions were produced with least consistency. While this initial study improves our understanding of the overall patterns of global contour acquisition, several questions about the details of these patterns remain at the local or pitch accent and boundary tone level. The current study provides a more detailed account of the nature of local tonal change or modification over the course of the study abroad experience.

The current paper investigates pitch accent production (i.e., rising, falling or deaccented) and boundary tone production (i.e., rising or falling) following a recent line of inquiry in research on Spanish native speaker intonation (Face 2008; Prieto 2004; Willis 2007) by analyzing non-native speaker production for three sentence types: declarative, yes/no question, and wh-question. The tonal events were documented for each potential tonal target (prenuclear, nuclear, and boundaries). Our first research question examines the changes in tonal type usage for each utterance type produced by L2 learners of Spanish at two points in time. Our second research question investigates the changes in terms of tonal type substantiated in our learner data across time. Our informant group consists of 4 female English-speaking learners participating in an intensive home-stay program in León, Spain during summer 2007. We collected speech data through a computerized production task that elicited declarative, absolute interrogative, and pronominal interrogative utterances. The corpus included 96 target utterances in addition to 40 productions of distracter sentences. This task was administered once upon arrival to León and again at the end of the program. Each participant also completed a detailed background questionnaire, a proficiency test and a vocabulary test (to assess familiarity with words used in the task). Oral data were recorded into a SONY HI-MD MZ-RH1 minidisc recorder using a Shure WH20 head-mounted microphone. Sound files were analyzed with the acoustic analysis software PRAAT. For the acoustic analysis, the F0 contour of each target utterance was measured at several key points in the utterance. Specifically we calculated the initial tonal level (IT), the Low tone of the first pitch accent (L1), the High tone of the first pitch accent (H1), the Low tone of the second pitch accent (L2), the High tone of the second pitch accent (H2-only the declaratives), and the final tonal value of the utterance corresponding to the final boundary tone (FT). The tonal characterization for each potential location of a pitch accent or boundary tone is based on the general patterns of rise, fall, or no change. Initial findings indicate that in addition to the changes in global contour patterns previously reported (Henriksen et al., 2009), L2 learners of Spanish modify their local tonal behaviors over time.
Speech Rhythms of Hispanic Bilinguals in California

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This paper describes a study of the speech rhythms of Hispanic Bilinguals living in California, and is part of a wider study on speech rhythms in Romance languages. The participants in the study were born to Mexican parents living in the United States and provide an opportunity to study the effect of bilingualism on language, especially on pronunciation. This study specifically looks at language rhythm, addressing stress-timing versus syllable-timing as described in Pike’s pioneering work (1945). The instrumental analysis of the subjects’ natural speech spans both languages, Spanish and English, though the present paper focuses primarily on Spanish.

Language rhythm has been described as a continuum (Daurer 1987); at one extreme of the continuum one finds syllable-timed languages, while stress-timed languages are at the other extreme. Thus, certain languages, such as French and Spanish, seem to be syllable-timed (Ramus et al 1999), i.e. syllable duration is relatively equal within a phrase, while other languages, such as Dutch and English, are stress-timed, i.e. the duration of syllables within phrases varies according to the placement of stress. Meanwhile, other languages exist nearer the center of the continuum; for instance, Polish and Catalan demonstrate some phonological structures of stress-timed languages and other structures of syllable-timed languages (Daurer 1987). Because Spanish and English are said to exist near opposite ends of the continuum, a study of Spanish-English bilinguals was set up in order to examine the effect of bilingualism on language rhythm. The original hypothesis was that bilinguals would show a central tendency in rhythm, that is, that the Spanish of the bilinguals would tend to be more stress-timed, while their English would be more syllable-timed.

In order to carry out this study, 10 monolingual English speakers from California, 10 monolingual Spanish speakers from Mexico, and 10 bilingual Spanish-English speakers born and raised in California to Mexican parents were recorded speaking spontaneously. These recordings were then analyzed for vowel duration following the methodology introduced by Low and Grabe (1995), namely the Pairwise Variability Index (PVI). This methodology was widely followed in subsequent studies of speech rhythm, including several studies on prosodic variation by Carter (2005, 2006, 2007), which included studies of Spanish-English bilingual speakers from North Carolina. Furthermore, Low and Grabe (2001) compared the use of the PVI to Ramus et al’s differing methodology (1999) and concluded that the PVI is more accurate in classifying speech rhythm. The PVI is a pairwise equation that rates the variability of vowel duration in speech with outputs between 0 and 1, with scores nearer 0 representing a more syllable-timed language and scores nearer 1 representing a more stress-timed language. Thus, one can compare two or more languages’ rhythms relative to one another, as opposed to simply classifying them as either stress-timed or syllable-timed.

The original hypothesis was not supported by the data. Mexican speakers showed more variability in vowel duration than expected, while the Spanish of bilinguals seemed more syllable-timed than that of their monolingual Mexican counterparts. This is in agreement with recent research on rhythm (Grabe 2002, Benton et al. 2007), who find that rhythm seems to vary amongst speakers within the same language, and that genre and other factors also play a role, and that it is difficult to draw typological conclusions valid for a whole language when using spontaneous, natural data. There are, however, two implications of this study: one may be that Mexican Spanish is typologically different from California Spanish, but more importantly, it may be necessary to rethink our view of rhythm in bilingual speakers. A speaker’s dominant language may in fact display more variability in vowel duration solely because of the person’s command of that language (including the ability to use the dominant language in different registers and situations, which are generally curtailed in the ancillary language), and that while some varieties of Spanish are more syllable-timed than English, speaker variation is in fact an artifact of the speaker’s linguistic ability and command of the language.
Abbreviated References


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Acquisition of the Spanish Rhotics by L2 Learners

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Studies have shown that /ɹ/ is a socially marked feature and seen as being stereotypical of American speech by speakers of Spanish (Berkowitz, 1986; Dowd, 1984; Elliot, 1997; Zuengler, 1988). The use of English /ɹ/, as opposed to the Spanish alveolar trill or tap, is nonetheless typical for English speakers of Spanish (e.g. Elliot, 1997; Face, 2006; Major, 1986). Previous L2 studies have pointed to the difficulty native English speakers have in acquiring both Spanish rhotics. While accuracy in production increases for both sounds as proficiency level increases, taps tend to have higher rates of accuracy than trills (Face, 2006; Reeder, 1998). Production of the trill appears to vary widely by learner (Major, 1986), but even advanced majors and minors have been reported to only produce the trill in approximately one-fourth of the contexts (Face, 2006). Recent work has begun to describe the errors made by learners (Face, 2006; Kaiser, 2008; Major, 1986; Rose, 2008), but the stages of development for taps and trills are not yet clear. In addition, while the research to date supports the general notion that Spanish rhotics are acquired late by English learners of Spanish, it does not inform us of how close to native English-speaking L2 learners of Spanish are able to get with respect to these sounds. Finally, existing studies do not take into account the surrounding linguistic context.

This study sets out to address some of the gaps in the research related to the acquisition of Spanish rhotics by L2 learners. It looks at learners from a wider variety of levels – 4th semester, graduating Spanish majors, Ph.D. students of Spanish, and Spanish-speaking professionals who have studied Spanish for 25+ years – and considers the larger linguistic context and learner’s approximations to the native norm. Subjects at each of the above mentioned levels participated in this study by reading aloud an adapted, authentic Spanish-language short story. Rhotics were analyzed with a spectrogram using Praat acoustic software. Nineteen intervocalic tokens of trill r (9 word-initial and 10 word-medial), and twenty intervocalic tokens of tap r (10 word-medial and 10 word-final) were selected for analysis. Learner productions were coded as a tap, trill, assimilated variant, alveolar approximant, or other. All other productions were described so as to be able to more completely document the developmental process learners pass through in acquiring the Spanish rhotics.

Unlike previous studies which look at a limited group of subjects, this study examines a wider range of subjects and shows that this sound class does indeed improve over longer periods of time; nonetheless, even the most advanced do not produce target-like rhotics in all cases. Preliminary results indicate that target-like productions are more common word-externally than word-initially (for the trill) and word-finally (for the tap). There are also indications that even advanced L2 Spanish speakers lack target-like productions of trills, substituting instead a variety of complex sounds, apparently in order to distinguish the articulatorily more complex trill from the articulatorily simple tap. By tracking non-target productions across learner levels, from early learners to the most advanced, this study provides insight into the phonological development of L2 Spanish learners over a much broader range of abilities than has been considered in previous studies.
References


One important aspect of learning to communicate in a second language (L2) is understanding the phonology of the target language. First language (L1) phonological rules have an effect on the accuracy of learners’ L2 pronunciation. When these L1 phonological rules are adversely different from the target language rules, learners find difficulty in acquiring accurate L2 pronunciation skills particular to certain strings. One particular area of concern for L2 Spanish students whose L1 is English is the pronunciation of Spanish rhotics. Surprisingly, there have not been many studies focusing on the L2 acquisition of Spanish rhotics. Face (2006) investigated intervocalic rhotics among advanced L2 Spanish students whose L1 was English and noted the developmental trajectory of rhotic accuracy among his participants. However, he did not look at students in beginning stages of L2 development.

This study investigates L2 Spanish rhotic production in beginning learners. Specifically, this study addresses the possible effects of the maximally different ways to produce [ɹ] in English—retroflex and bunched on the acquisition of Spanish [ɾ] and [ɾ]. It also addresses the influence that a phonological rule involving [ɾ] in English has on the acquisition of the same phone in Spanish.

Results from a study involving students enrolled in beginning Spanish classes show that there is a slight facilitation (not statistically significantly) effect for learners that employ retroflex articulations in their English rhotics to produce rhotics in Spanish accurately compared to those learners that employ bunched articulations. Concerning the effect of an L1 phonological rule on the production of Spanish rhotics, results show that a significantly high percentage of accurately produced taps were in words that follow the same phonological rule that produces taps in English.

These results are interesting for two reasons. First, the correlation of similar stress patterns across languages and effective production of taps indicate that the subconscious phonological English tap rule interacts with Spanish utterances in a way that facilitates the similar phonetic effects. That participants more accurately produced taps in environments that they were accustomed to, shows L1 transfer of phonological rules. Second, that a phonological rule associated with /t/ and /d/ (both of which are also phonemes in Spanish) facilitates the production of taps only in environments that are similar to English provides evidence that these participants have not yet assigned the phone [ɾ] to the correct phoneme in Spanish. Although this process is underway, indicated by instances of accurate tap productions in environments unlike English, learners at beginning levels have not yet reallocated taps in their phonemic inventories.

This study has implications for interlanguage phonology theory and for English speaking students and teachers of L2 Spanish. This study has indicated that rhotics are emerging at the beginning levels of L2 Spanish. Therefore, teachers should inform students who are often frustrated about the difficulty of pronunciation of the normal developmental process of an L2 phonology involving rhotics.
References
Second language acquisition of the Spanish tap and trill in a contact-learning environment

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There are many factors that contribute to second language acquisition. Variables such as age of acquisition, type of instruction, learning styles, and time spent in the target culture are but a few among the numerous factors that influence the acquisition of a second language. While there are a few studies that have investigated the effects of study abroad on the acquisition of the Spanish phonological system by adult native English speakers (e.g. Diaz-Campos 2004 and 2006), the role of even longer experiences in Spanish speaking countries (i.e. more than one year) has been largely ignored. Work on the acquisition of the Spanish tap and trill by regular classroom students has consistently shown that these sounds, especially the trill, are difficult to master for English speaking learners. For example, Reeder (1998) found that his graduate students and upper division undergraduates articulated a target-like trill in 37% of the cases. Twenty of Face’s (2006) advanced students could produce a target-like tap at least 50% of the time while 17 achieved the target-like trill at least 50% of the time. In both of these studies the most common learner error was the production of the American English retroflex.

The purpose of the current study is to investigate the acquisition of the Spanish tap /ɾ/ and trill /ɾ/ by adult learners who have spent 18 to 24 months abroad in a Spanish speaking country. The participants in this study consisted of 20 adult learners of Spanish enrolled in various sections of a third-year Spanish grammar course. All of the participants had recently returned from a service-oriented stay in a Spanish-speaking country. In addition to whether or not subjects were able to accurately produce the tap and trill, this study also sought to discover whether or not certain factors (e.g. phonetic context, prior Spanish instruction, time spent with native Spanish-speaking companion, attitude, motivation, etc.) influenced whether or not a target-like pronunciation of the tap and trill is achieved.

In order to analyze the subjects’ production of the Spanish rhotics, three different speech types were analyzed. The first is read speech from an incomplete Spanish story that the participants were asked to read aloud. After the reading, participants discussed the story’s probable ending in a semi-spontaneous conversation with one of the researchers. Finally, subjects were asked to read a list of words with careful attention to pronunciation. The tasks were recorded digitally and production of the tap and trill was analyzed spectrographically using Praat. Finally, a logistic regression analysis, using GOLDVARB, was performed to explore the influence of linguistic and extra-linguistic factors in the acquisition of Spanish-like pronunciation of /ɾ/ and /ɾ/.

The participants of the current study were much more accurate in their production of the tap (96.3% target-like) and trill (71.9% target-like) than participants in previous studies. Factors that significantly contributed to target-like production include linguistic environment (the most problematic contexts are word initial and after an alveolar consonant) and prior Spanish instruction. While previous studies have shown that the American English retroflex [ɹ] is the most common error, in the current study the most common error was the production of the tap [ɾ] in place of the trill /ɾ/. These results are analyzed using Major’s (2001) OPM theory for SLA and contribute to our understanding of the acquisition of the Spanish rhotics by English speaking learners.