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Second Language Acquisition of the Spanish Tap and Trill in a Contact Learning Environment

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ABSTRACT

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The purpose of this thesis is to study whether target-like articulation of the Spanish tap [ɾ] and trill [r] is achieved by second language learners who have lived in a Spanish-speaking environment for an extensive period of time. The subjects of this study were students at Brigham Young University (BYU) who had spent 18 months to two years in a Spanish-speaking country. Most of the subjects had little to no previous Spanish instruction, but rather learned the language primarily through their contact with native speakers while abroad. In addition to whether or not subjects achieved target-like pronunciation of these two Spanish sounds, this study sought to observe whether or not certain linguistic factors (e.g., neighboring sounds, syllable stress, etc.) and extra-linguistic factors (e.g., previous Spanish instruction, instructors who were native speakers of Spanish, articulation in formal or informal speech, etc.) had influence on their articulation.

The results of this study reveal that the subjects were generally successful in articulating the Spanish rhotic sounds. The majority of the subjects pronounced the rhotics in a target-like manner over 80% of the time. Furthermore, while previous studies have claimed that the transfer of the American English approximant [ɹ] is the most common error when acquiring the Spanish tap and trill, the current study suggests that the most common error of L2 speakers who have lived abroad is developmental: the production of the tap [ɾ] in place of the trill /r/. Lastly, it reveals, through the results of a variable rule analysis, that the two most significant factors in accurate tap and trill articulation are its phonetic context and whether or not the participants had received adequate Spanish instruction prior to having lived abroad.

Keywords: second language acquisition, Spanish, tap, trill, rhotic, contact learning environment

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Chapter 1

Introduction

Statement of the Problem

Face (2006) has noted that "the amount of work on the second language acquisition of Spanish phonology is relatively small in comparison to other areas of Spanish second language acquisition" (p. 47). Though the ability to communicate through the application of grammar and the construction of correct syntax is obviously important, the ability to articulate the sounds of the language in speech is no less vital. Failure to produce only one sound correctly in a specific context will commonly reveal that a speaker's first language (L1) is not Spanish. Awareness of this may cause second language (L2) learners of Spanish to feel hesitant to speak in the target language for they feel that they may be judged for their non-native accent. Furthermore just one incorrect sound in a specific context may cause a speaker to be misunderstood or create an awkward situation, especially if a mispronounced sound gives rise to a taboo word. Thus, when it comes to comprehensive language acquisition it is essential for the learner to understand the phonological system of the second language—in contrast with the first language—especially how it relates with meaning, and to carefully utilize the sounds within.

The American English [ɹ] *vs. The Spanish* [r] *and* [ɾ]

One commonly noted difference between the phonological systems of Spanish and North American English is that of the distinct "*r*" sounds. The American English [ɹ] is usually an alveolar approximant. At the end of a syllable it is often formed with retroflection [ɻ], or the backward curling of the apex towards the roof of the mouth without making an occlusion. In the current study, the term *approximant* along with its phonetic symbol [ɹ] will be used to represent

both the syllable-initial approximant and syllable-final retroflex [ɻ]. Figure 1.1 illustrates that the [ɹ], as an approximant, is realized without a complete occlusion—a characteristic which makes it resemble the neighboring vowel [ɪ] in that it produces a continuous sound wave.

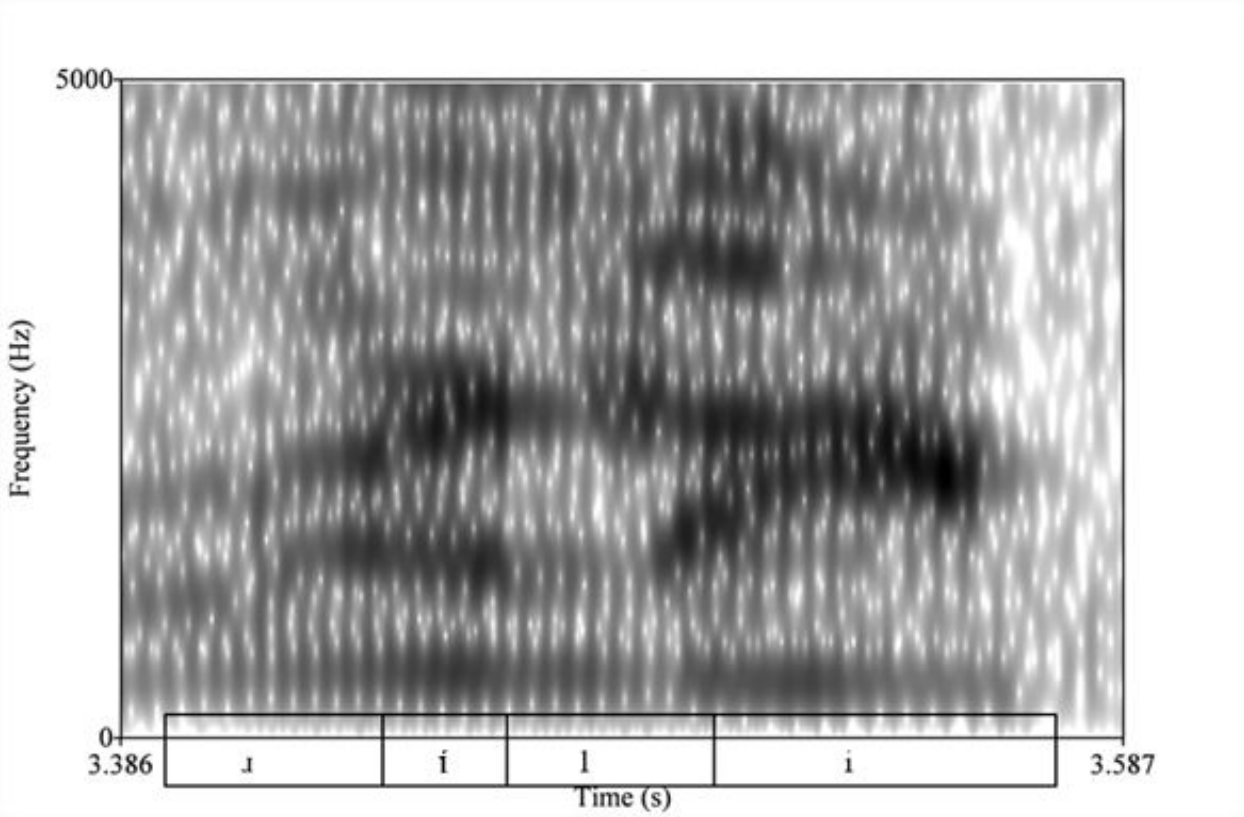

Figure 1.1 Spectrogram of approximant in *really*

The sound of the American English approximant varies greatly from those of the two common rhotics in Spanish: the tap [ɾ] and the trill [r]. The Spanish tap is articulated with a "single rapid contact of the [apex] of the tongue against the alveolar ridge", whereas the trill is formed with "several such rapid contacts, generally two or three" (Hualde, 2005, p. 181). As seen in figures 1.2 and 1.3, the Spanish tap is recognized in a spectrogram as a brief voiced stop while the trill consists of a series of voiced stops.

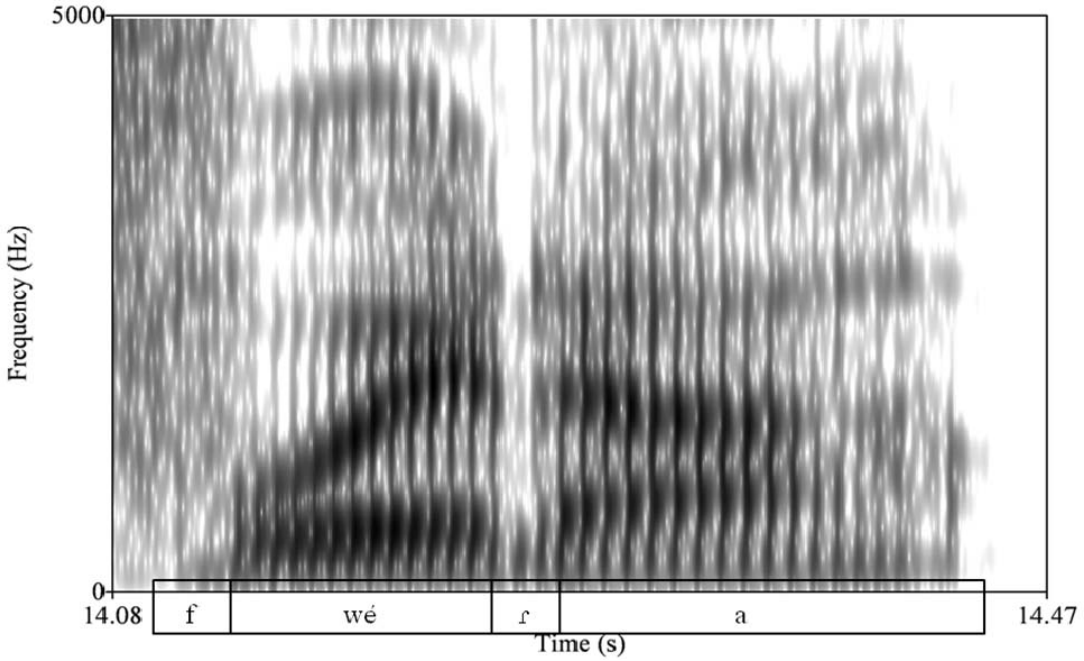

Figure 1.2 Spectrogram of tap in *fuera*

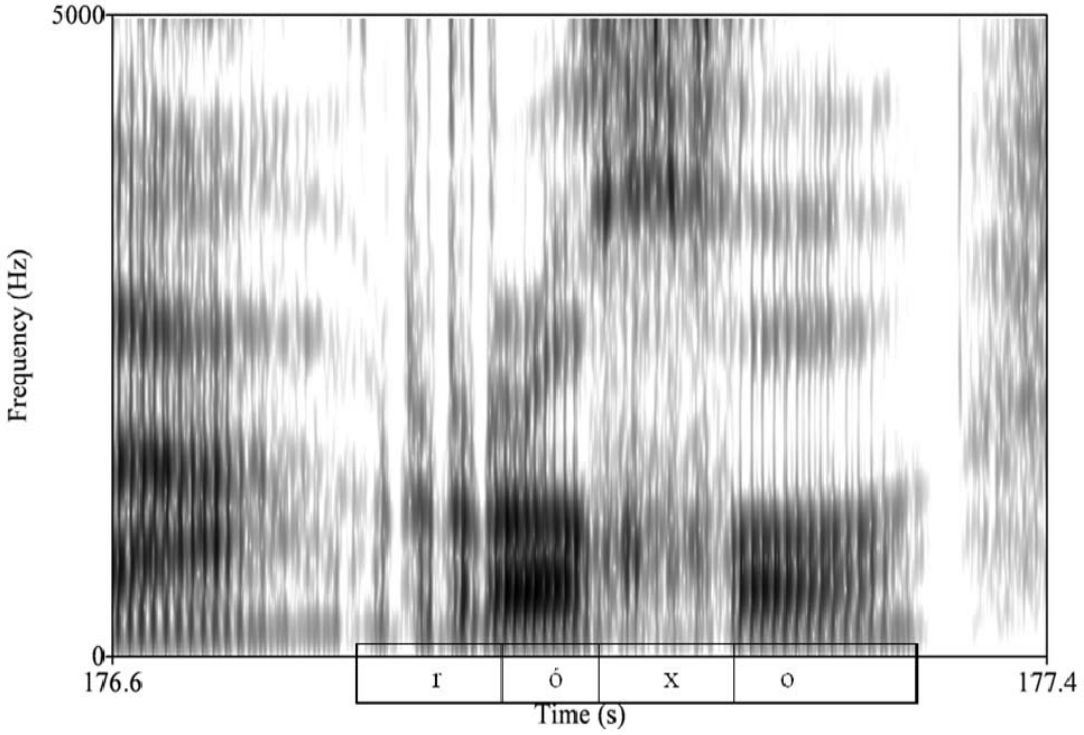

Figure 1.3 Spectrogram of trill in *rojo*

Errors Made by L2 Speakers in Articulation of Tap & Trill

Linguists and non-linguists alike have been quick to recognize the difficulty North American English speakers have when pronouncing the Spanish tap and trill. While intending to articulate these sounds they may make *transfer errors*—or incorrectly transfer "similar patterns," or sounds, "already acquired" in their native phonological system to a new learning situation where such patterns are not recognized (Major, 2001, p. 30). For example, Lado (1956) noted that many English speakers used the English approximant in place of the Spanish trill and tap, "leading to a loss of contrast between minimal pairs like *pero* and *perro*" (p. 28). Transfer errors of this type commonly occur when learners are in their beginning stages of L2 acquisition, when their perception of foreign sounds is based solely on the sounds they are already familiar with. Thus, an English learner of Spanish, when pronouncing *pero* "but", may use the English [ɹ] because the speaker recognizes the word as having an orthographic {r} and employs the speaker's own idea of that sound (Major, 2001).

Those who speak American English as their L1 may also commit *developmental errors* which are the same errors that Hispanic children experience "in L1 acquisition" of Spanish, utilizing perceptively similar—and often times simpler—sounds from the target phonological system in place of more complicated sounds (Major, 2001, p. 3). For example, Canfield (1940) recorded that, in the intervocalic position, first-year students of L2 Spanish occasionally replaced the difficult trill with the tap. Carballo and Mendoza (2000) observed that some children from Granada, Spain who were L1 learners of Spanish and had "trouble learning to make the trill," did likewise (p. 599).

In some cases L1 or L2 speakers may even make developmental errors in which they substitute a certain sound with a similar sound that is harder to articulate. Sacks (1962) observed

that many students, having developed the habit of trilling the tip of the tongue against the alveolar ridge, tended to overgeneralize and produce a trill instead of a tap (e.g., *perro* for *pero*).

In the following section ("Previous Studies") it is revealed that the most common error in the area of L2 articulation of the tap and trill was the transfer of the American English approximant.

Previous Studies

Much has been published on the contrasts of the English and Spanish "*r*" sounds and their significance in the L2 acquisition of the Spanish rhotics. These publications include the results of surveys made by Canfield (1940), Sacks (1962), Major (1986), Reeder (1998), and Face (2006). Canfield (1940) identified several contexts in which the tap and trill tended to be inaccurately pronounced for first-year students of Spanish. These contexts were as follows: a rhotic in word-final position (e.g., *señor*), a trill in word-initial position (e.g., *ruido*), both rhotics in intervocalic position, and also the tap before or after both voiced and voiceless dental consonants (e.g., *jardín*, *partes*, *ladran*, and *atroz*). All in all, he found that in most of the contexts, the majority of the students incorrectly transferred the American English approximant. For example, when observing the pronunciation of the intervocalic tap by his subjects, the rhotic was produced as the American English approximant [ɹ] by 60% (632/1052) of the participants. Moreover, 75% of the subjects transferred the approximant into Spanish when attempting to produce the word-initial trill, and, in word-final position, 72% of the subjects transferred it.

Sacks (1962) noted that the majority of 29 students of Spanish in his study had the tendency to replace the Spanish rhotics with the English approximant while reading two short poems and conversing spontaneously with other speakers. He did this without providing quantitative details nor by explaining which phonetic contexts had been observed.

Major (1986) focused on four beginning L2 students' ability to articulate correctly the Spanish rhotics after an intensive course of eight weeks in which pronunciation was a key topic and found that, even though the Spanish [ɾ] and American English [ɾ]—an allophone for /t/ and /d/ (e.g., *but<u>t</u>er*)—were similar, only three subjects were able to produce the intervocalic tap accurately by the end of the course (one in 79% of the cases, another in 73%, and the third in 57%) while the remaining subject continued to transfer the English [ɹ] in the context. When it came to the intervocalic trill, Major noted that—by the end of the course—one was able to produce it in 100% of the cases monitored in the final recording session while another achieved it in 71% of the cases. Nevertheless the remaining two subjects ended the course without acquiring the ability to produce the trill.

Reeder (1998) monitored the ability undergraduates, graduates, and professors of Spanish had to pronounce the intervocalic trill. He found that the more experience and interest one had speaking Spanish, the better they articulated the sounds. For example, graduate students and upper division undergraduates articulated the target-like trill in 37% of the cases in which it was pronounced while faculty members achieved it in 83% of the cases.

Face (2006) observed the pronunciation of the tap and trill by a similar group of subjects. Like Reeder (1998), he found that informants' experience and interest influenced pronunciation. In his study, the 20 advanced students monitored produced a target-like tap at least 50% of the time while 17 achieved the target-like trill at least 50% of the time. Face (2006) also made a special note that of the non-target productions of the tap produced by advanced students, 73% were due to the transferring of the American English approximant.

Purpose of Study

The purpose of this study is to observe and analyze the articulation of the tap and trill by students of BYU who are L1 speakers of American English and who have lived in a Spanish-speaking country for more than a year. I will pay particular attention to the pronunciation of the Spanish rhotics in the phonetic positions previously studied by Canfield (1940) and determine which type of error L2 speakers are more likely to make (i.e., transfer errors or developmental errors). I will also investigate the accuracy of the subjects' pronunciation of the Spanish rhotics in additional contexts (to be detailed in Chapter 2), including when they are found directly before or after other consonants—such as laterals and bilabials—as well as in words where more than one rhotic sound is articulated (e.g., *arrastraron*). Furthermore, the study will determine what other factors—if any—may impact the L2 acquisition of the tap and trill. The factors considered—which may be linguistic or extra-linguistic in nature—will be detailed in Chapter 2 as well.

Justification of the Problem

In contrast to the aforementioned studies conducted in the area of L2 acquisition of the Spanish rhotics, in which experience in a Spanish-speaking environment was not a factor, this study examines the pronunciation of L2 speakers who have lived more than a year in a Spanish-speaking country. Different studies have offered contrasting views regarding the part exposure to L2 plays in second language acquisition. Arteaga (2000) noted a link between comprehension—which is commonly achieved through receiving sufficient L2 input—and accurate speech production. However, Sparkman (1926), promoting the importance of phonological instruction, declared that "long years of residence in a foreign country will not ensure correct pronunciation" (p. 228).

Since none of the participants in this study had attended a Spanish phonetics or phonology course, which presumably would have assisted them in improving their pronunciation, and since the majority had not received much Spanish instruction prior to their living in a Spanish-speaking country, this investigation may indicate the influence that living in a Spanish-speaking community for an extended period of time has on the acquisition of one of the most notable difficulties English speakers have when learning Spanish pronunciation and whether or not these speakers are more likely to replace the Spanish rhotics with the American English approximant—like many speakers observed in the previous studies—or make developmental errors. Also, by examining the pronunciation of taps and trills in several phonetic contexts, the investigation may reveal to teachers and L2 students of Spanish which sound sequences including Spanish rhotics require more practice.

Moreover, the results of this study may indicate what other factors impact the target-like pronunciation of the Spanish rhotics. Such factors may be linguistic (e.g., syllable stress) or extra-linguistic (e.g., having had a native speaker as a Spanish teacher prior to living in the L2 environment).

Furthermore, the results of the investigation may reveal the influence words with a combination of taps and trills, as well as words with more than one tap, have over the pronunciation of the rhotics by a non-native speaker of Spanish. Including such words in the study could help determine whether or not the presence of two or more rhotics in one word influence a non-native speaker's pronunciation, possibly causing him or her to replace a tap with a trill or vice-versa, or to incorrectly replace them with an American English approximant. Having observed such phenomena while speaking with L2 speakers of Spanish, I hypothesized that placement of the rhotics in such words could play a role in incorrect articulation.

Delimitation of the Problem

This investigation is descriptive and was not conducted to help participants improve their pronunciation of the Spanish rhotics. It focuses on the way L2 speakers of Spanish who have lived in a Spanish-speaking country for more than a year pronounce the tap [ɾ] and the trill [r] in a variety of contexts in order to find out which are most difficult. In order to accomplish this, interviews were conducted among men and women who have served full-time missions for the Church of Jesus Christ of Latter-day Saints within the last two years. Furthermore, the participating subjects had not taken a course in Spanish phonology nor phonetics, and experience with the language before their missionary service was noted as well (i.e., high school Spanish courses, living abroad, residing with a native speaker of Spanish, etc.). I observed the role transfer errors play in the non-target-like pronunciation of the rhotics in comparison with developmental errors. Overall, many factors—both linguistic and extra-linguistic—were assessed in order to determine what—apart from living abroad—has the most influence on the target-like pronunciation of the Spanish tap and trill.

Research Questions

In summary, the five questions which will be researched in this study are the following:

(1) Are there contexts, other than those indicated by Canfield (1940), in which Spanish taps and trills may be difficult to pronounce—such as after alveolar consonants?

(2) Is it more difficult for L2 speakers of Spanish to pronounce the trill or tap when these appear in a word containing a combination of trill(s) and/or tap(s)—such as in *corrieron* or *barrera*?

(3) Do L2 speakers of Spanish who have lived in a Spanish-speaking environment for more than a year make the same pronunciation errors of the tap and trill as the students in previous studies?

(4) Are L2 speakers of Spanish more likely to produce transfer errors or developmental errors when articulating the tap and the trill after living in a Spanish-speaking environment for an extended period of time?

(5) What other factors—apart from having lived in a Spanish-speaking environment—condition the correct pronunciation of the tap and trill?

Chapter 2

Methodology

Participants

This study consisted of 20 participants—aged 21 and older—who were undergraduate students of BYU enrolled in one of various sections of a third-year Spanish grammar course. All 20 participants had returned from a mission for their church in a Spanish-speaking country within the last two years. The males had been abroad for two years while the females' missions had lasted 18 months. Prior to their missions, all participants had lived only in the United States. Twelve of the 20 participants had not received formal instruction in the Spanish language prior to their missionary service. Of the remaining eight participants, one had previously attended two junior high school Spanish classes, five had been enrolled in high school Spanish classes for more than one year (detailed further in Table 2.1), and the other two had taken first-year Spanish courses at the university level. It should also be noted that, prior to arriving in the Spanish-speaking country, all participants had eight weeks of Spanish instruction at a training center for missionaries. However, their understanding of the grammar—not pronunciation—was the prime focus during those eight weeks.

Language samples were gathered during the twelfth week of class of the Fall 2008 semester. Before participating in the study, all participants read and signed a consent form, and filled-out a brief survey in which they wrote information about themselves, including (a) their age, (b) their sex, (c) the country and region in which they served their mission, and (d) how many years of Spanish instruction they had received prior to the mission. Table 2.1 illustrates how informants responded. Informants shared other information apart from what is in the Table (e.g., if they had had any teachers who were native speakers of Spanish during their 8-week

language training prior to traveling to the mission location, etc.). This information will be addressed later in this Chapter.

Informant	Age	Sex	Mission location	Prior instruction
1	21	M	Bahia Blanca, Argentina	6 years (MS/HS)
2	22	M	Piura, Peru	None
3	22	M	Guatemala City, Guatemala	None
4	24	F	Santiago, Chile	None
5	24	F	Santiago, Chile	2 years (Univ.)
6	22	M	Madrid, Spain	3 years (HS)
7	22	M	Oaxaca, Mexico	None
8	21	M	Asunción, Paraguay	2 years (Univ.)
9	22	M	Osorno, Chile	None
10	21	M	Barcelona, Spain	None
11	21	M	Montevideo, Uruguay	4 years (HS)
12	21	M	Guayaquil, Ecuador	2 years (HS)
13	21	M	Mérida, Mexico	None
14	22	M	San Salvador, El Salvador	None
15	21	M	Mendoza, Argentina	None
16	22	M	Buenos Aires, Argentina	None
17	21	M	San Salvador, El Salvador	None
18	22	M	Guayaquil, Ecuador	2 years (MS)
19	23	F	Santo Domingo, Dominican Republic	3 years (HS)
20	23	F	Antofagasta, Chile	None

Table 2.1 Informant background

The Interview

The investigation consisted of interviews in which the informants first read an incomplete narration (i.e., "Caperucita Roja" ["Little Red Riding Hood"]). The second stage consisted of a speaking portion in which informants answered a few questions pertaining to the content of the narration including one which asked them to explain—to the best of their knowledge—what happens at the end of the short story. This impromptu speaking portion was included in the interview since Elliott (1997) had noted that "as students focus on communicating meaning as opposed to pronunciation, more transfer errors emerge" (p. 102). The third stage consisted of a

word list which informants pronounced to the best of their ability. The concrete procedural assessment may be found in the appendices. Participants were told that the interview was part of a master's thesis study but not notified of its purpose. In order to ensure optimal quality, all recordings took place in a soundproof recording studio at BYU using the computer program Peak Pro 5.2 along with a Sennheiser MKH40 P48 microphone. Each interview was recorded digitally at a sample rate of 44.1 KHz.

Each individual response made by subjects during the second stage, particularly their spontaneous articulation of the Spanish rhotics, was observed, taking into consideration the phonetic context of each rhotic. The first and third stages of the interview (i.e., the narration and the word list) consisted of key words interspersed among distracter words so that participants would not recognize that their pronunciation of the Spanish rhotics was the focus of the investigation. The key words contained the Spanish rhotics in different contexts, including those previously observed by Canfield in his article "What Spanish Sounds Are Most Difficult for North Americans?" (1940). As indicated in Chapter 1, Canfield observed the pronunciation of the rhotics (1) in word-initial position, (2) in word-final position, (3) before a voiced dental consonant, (4) after a voiced dental consonant, (5) before an unvoiced dental consonant, (6) after an unvoiced dental consonant, and (7) in word-medial, intervocalic position. The current study observed these contexts, but also included more which contained the tap before and after certain consonants in order to see if these influenced articulation more than others. These contexts included (1) before the dental and other voiced stops (e.g., *barba*, *arde*, *amarga*), (2) after the dental and other voiced stops (e.g., *brincó*, *ladra*, *grama*), (3) before voiceless stops (e.g., *harpa*, *arte*, *arco*), (4) after voiceless stops (e.g., *prueba*, *trata*, *cruz*), (5) before the alveolar consonants /s/ and /l/ (e.g., *farsa*, *charla*), and (6) after an alveolar consonant in a separate syllable (e.g.,

Israel, *alrededor*)—a context in which only the trill is found (Hualde, Olarrea, and Escobar, 2001).

In order to determine whether or not subjects were accurately pronouncing a rhotic in a particular context, this study refers to the phonetic expectations stated in Hualde, Olarrea, and Escobar (2001) in which an {r} is to be articulated as a trill (1) when it is found at the beginning of a word and (2) when it is found after an [alveolar] consonant in the same word, but in a separate syllable (e.g., *honra*). According to the same Table, an {r} is to be articulated as a tap (1) when it is found after a consonant in the same syllable (e.g., *broma*), (2) when it is found before a consonant in the same word (e.g., *parte*), and (3) when it is found at the end of a word, preceding a word beginning with a vowel as in "mar azul" (Hualde, et. al, 2001, p.82). Still, regarding the placement of {r} before a consonant, I recognize that the use of the trill is accepted in certain dialects as well as in emphatic speech, though the use of the tap in such a context was much more common (Hualde, 2005, pp. 182-3). Altogether, the phonetic contexts and the rhotic sounds which are expected in each context may be observed in Table 2.2.

TAP
a. Word-final {r} when followed by vowel in another word (e.g., *caminar a mi casa*) b. Before voiced stop (e.g., *barba*, *cerdo*, *amarga*) c. After voiced stop (e.g., *bruto*, *ladrón*, *grosera*) d. Before voiceless stop (e.g., *zarpar*, *harto*, *parque*) e. After voiceless stop (e.g., *proteína*, *trampa*, *creo*) e. Before alveolar consonants /s/ & /l/ (e.g., *farsa*, *charlar*) f. Intervocalic tap (e.g., *cara*)
TRILL
a. Word-initial (e.g., *rollo*) b. After alveolar consonant in separate syllable (e.g., honra, alrededor) c. Intervocalic trill (e.g., *carro*)
POSSIBLE TAP OR TRILL
a. Word-final before pause b. Before consonant—possibly due to emphatic speech or the influence of certain dialectal varieties

Table 2.2—Rhotic sounds & corresponding contexts

Finally, another factor which could possibly condition the incorrect pronunciation of a tap or a trill was added: the presence of a rhotic in combination words. Such combination words contained either more than one tap (e.g., *tararear*, *secuestraron*) or a combination of a trill and tap(s) (e.g., *rastrearon*, *corrieron*, *arrastraron*, *barrera*).

Analyzing the Data

The data were recorded digitally as wave files. Pronunciation of key words from the narration and word list, and any words containing rhotic sounds in the second "spontaneous

response" stage of the interview were analyzed aurally by the author prior to being transcribed phonetically. A single apical-alveolar contact was deemed a tap while two or more in rapid succession were classified as a trill.

All target words were either categorized as target-like or not target-like. For the purpose of this study, target-like means that the rhotic in question was produced as a tap (1) after all consonants except for those whose point of articulation resides in the alveolar ridge (e.g., the alveolar sibilant [s], the alveolar nasal [n], and the lateral [l]) and (2) when acting as an intervocalic tap, indicated by the grapheme {r} in the written language. The rhotic in question was target-like when produced as a trill (1) in word-initial position, (2) after an alveolar consonant, and (3) when acting as an intervocalic trill, indicated by the grapheme {rr}. The word-final {r} was considered target-like when it was (1) pronounced as a tap when followed by another word beginning with a vowel and (2) pronounced as a tap or trill before a pause (i.e., when the word was read individually in the word list) or before a word in which the initial sound was a consonant. Also when the rhotic directly preceded a consonant inside the same word, both the tap and the trill were deemed target-like. Table 2.2 in the previous section illustrates which rhotic sounds are acceptable in the contexts listed.

The influence of regional dialects in the area of rhotic variation was also taken into consideration while reviewing the recordings and transcriptions of each interview. For example, the conversion of a rhotic into a lateral ("liquid neutralization" as in *puelta* instead of *puerta*) or into a vowel ("liquid gliding" as in *pueita*), would have been considered target-like if the participant had been in contact with native speakers from Andalusia or the Caribbean—particularly the Dominican Republic with respect to liquid gliding (Alba, 1992 & 2002; Lapesa, 1964). Other possibilities of target-like articulations may have included the devoicing and

aspiration of the trill as it occurs in the Caribbean, or the assibilation of the trill [ř]—or its conversion to a sibilant—which occurs in Central America, many Andean regions of South America, and Central Mexico (Quilis, 1992; Lipski, 1994; Verdugo, 2006, among others). Furthermore, if a subject—having lived in Andalusia, Extremadura, or in the Caribbean—had deleted the rhotic in syllable-final position, the articulation would be deemed target-like since such a phenomenon occurs among native Spanish speakers in these areas (Hualde, 2001; García Mouton, 1994).

Variable Rule Analysis

A logistic regression analysis of the results was made using Goldvarb X to reveal which contexts were least likely to yield accurate pronunciation by the subjects when it came to articulating the tap and the trill as well as what other factors, if any, helped or hindered the target-like pronunciation of the sounds. The logistic regression analysis conducted through Goldvarb determines which factors are statistically significant by assigning a weight to each factor. The application of the depended variable in this study is the native-like pronunciation of the Spanish rhotics. In order to interpret the results, weight values below 0.500 disfavor the application of the dependent variable while values above 0.500 favor its application. Values equal to 0.500 neither favor nor disfavor its application. Some factors considered were linguistic in nature (e.g., a rhotic's position in a stressed or unstressed syllable). Others were pieces of extra-linguistic information taken from the survey participants completed prior to the interview (e.g., Spanish instruction before the mission, mission location, etc.). All factors will be listed in the following section.

The factor groups used in the Goldvarb analysis were divided into two categories. The first consisted of the extra-linguistic factor groups whose values were given by each participant

in the survey prior to the interview—namely: (1) mission location—or location of stay abroad—(2) sex, (3) Spanish instruction before mission, (4) native speaker of Spanish as teacher at Missionary Training Center, (5) native speaker of Spanish as teacher after mission, and (6) speech style.

As it was hypothesized that the *mission location* factor may influence an informant's accent, the possibility that one region could be more likely to cause an L2 speaker to form a target-like tap, trill, or dialectal equivalent than another was to be considered. The sex of the informants was also a factor to consider. Biondi Assali (1992) noted this as she found that L1 speakers of Arabic living in Argentina who were female were more likely than men to acquire the Spanish [p]. The *prior instruction* factor was considered since some of the informants had studied Spanish in middle school, high school, and university. Since some linguists, like Sparkman (1926), view the acquisition of target-like sounds a result of having been instructed to pronounce the L2 sounds properly by teachers with correct pronunciation, these students may achieve a higher level of accuracy—as was the case in the previous studies reviewed in Chapter 1 (Canfield, 1940, among others). Also, whether they were specifically taught how to pronounce the rhotics or not, the fact that they had more experience listening to and utilizing Spanish than their counterparts may have given them more time to develop proper articulation. Likewise, experiencing the language as a speaker of L1 Spanish teaches it to them may have helped informants to articulate the tap and trill more correctly as they may have begun imitating the instructor in the early stages of L2 acquisition.

Lastly, when it comes to the *speech style* factor, I hypothesized that more transfer errors would occur when informants speak informally during the question and answer stage of the

interview since it is usually accepted that there is less accuracy of pronunciation in casual speech (Díaz-Campos, 2004; Zampini, 1994).

Table 2.3 reveals each of these factor groups along with the possible variables found within. Note that in the first factor group ("Mission Location"), there are two variables for South America—highland and lowland. "South America—Highland" refers to the interior regions of the continent in which certain rhotic phenomena (e.g., assibilation in Andean communities) may be more likely to occur. "South America—Lowland" represents lower and coastal regions in which there are other manifestations of the Spanish rhotics, including the neutralization of /l/ and /r/ in Llanos, Venezuela, etc. (Obediente, 1991).

I. Mission location
Caribbean
Mexico
South America--Highland
South America--Lowland
Spain

II. Sex
Male
Female

III. Spanish instruction before mission?
Yes
No

IV. Native speaker of Spanish as missionary teacher?
None
From Caribbean
From Central America
From Mexico
From South America
> 1 native speaker as teacher

V. Native speaker of Spanish as teacher after mission?
None
From Caribbean
From Central America
From Mexico
From South America
> 1 native speaker as teacher

VI. Speech style
Formal: Narration
Formal: Word list
Informal: Spontaneous response

Table 2.3 Extra-linguistic factors

The second category contained linguistic factor groups that could possibly impact the achievement of a target-like articulation of the rhotic in question: (1) rhotic found in a stressed syllable, (2) phonetic context, (3) position in a word with more than one rhotic if applicable, and (4) word type. Apart from the *phonetic context* factor, which had an impact in the studies mentioned in Chapter 1 (Canfield, 1940; Reeder, 1998, among others), I included the other factor groups for different reasons. For example, I hypothesized that a stressed syllable could have a positive effect on tap and trill accuracy since sounds in stressed syllables are more salient and also because many English speakers tend to hyperarticulate sounds in such conditions (De Jong, 1995).

As was noted in Chapter 1, I included two *word types*: a word type in which only one rhotic is found and another in which a combination of rhotics is found. It was hypothesized that combination words would trigger less accurate pronunciation. The *combination word details* factor group was included to see which rhotic in a combination word informants would be less likely to pronounce accurately. For example, based on impressionistic experience, I hypothesized that the first rhotic sound—especially in cases in which it was a trill as in *ba<u>rr</u>era* or *<u>R</u>oberto*—would be more likely to be pronounced incorrectly. Table 2.4 displays each of these linguistic factor groups along with their possible values.

I. Rhotic found in stressed syllable?
Yes
No

II. Phonetic context
Before voiced stop /b,d,g/
After voiced stop /b,d,g/
Before voiceless stop /p,t,k/
After voiceless stop /p,t,k/
Before alveolar consonants /s,l,n/
After alveolar consonants /s,l,n/
Word-initial
Word-final
Intervocalic tap
Intervocalic trill

III. Combination word details
Not applicable
1st {r} in word
2nd {r} in word
3rd {r} in word

IV. Word type
1 rhotic sound
Combination: tap & trill; more than 1 tap

Table 2.4 Linguistic factor groups for Goldvarb analysis

Chapter 3

Results

Introduction to Results

A total of 1700 tokens containing rhotic sounds was gathered from recordings, while 1655 were deemed suitable to be submitted into Goldvarb. Some of the words had to be omitted from the analysis. Such words included those in which there was a change in stress. For example, on one occasion a speaker changed the stress in *morirá* from the final to the penultimate syllable, as in [mo.ɾí.ɾa]. Since the influence stressed and unstressed syllables may have on the articulation of Spanish rhotics is a factor under investigation, I decided to remove any articulation with an unexpected stress in order to keep the data across speakers as uniform as possible. Other words not included in the analysis were those in which there was a change of the phonetic context in which the rhotic occurred. For example, one speaker, while reading the words *Caperucita Roja* ("Little Red Riding Hood"), pronounced the first word as [ka.peɾ.sí.ta] thus changing the intervocalic position of the rhotic to one preceding a sibilant.

Other criteria for dismissing words were cases in which speakers changed or deleted sound segments to the point where the word was quite different from the word they were expected to read aloud in the narration or word list stages of the interview. For example, one speaker articulated *corrieron*, a word containing a combination of a trill and a tap, as [ko.ɾjǒn] thus eliminating one of the key rhotic sounds. The same was the fate of a particular token of *secuestraron* in which a speaker did not articulate the tap found after the voiceless dental, thus

forming [se.kwes.tá.ɾon]. Though such tokens were not included in the variable rule analysis, they will be discussed in Chapter 4 in the section detailing the impact of combination words.

There were two separate occasions in which two participants articulated the trill as a dental consonant followed by a tap, as in *alrededor* [al.dɾe.ðe.ðóɾ] and *honra* [ón.dɾa]. These words were not omitted from the analysis, but the segments produced in place of the trill were deemed as not target-like.

Collectively, those who participated were able to achieve a target-like articulation of the Spanish tap and trill (or target-like allophones) in 90.6% of the cases. Articulation of the tap was extremely accurate. One hundred percent of the cases in which it followed the voiceless obstruents [p, t, k] were pronounced correctly while in other cases which required the articulation of the tap there was no less than 96% accuracy. Production of the trill was far less accurate with informants' achieving 56% accuracy. Two subjects were unable to pronounce a target-like trill in intervocalic position. Only eight subjects of the 20 monitored were able to achieve a target-like trill after an alveolar consonant while the rest were unable to do so.

Initial Results

The initial results revealed that all participants were able to form target-like articulations at least 80% of the time. Five of the 20 informants were able to form target-like articulations in more than 95% of their respective totals. Nevertheless, it should be noted that in most of the cases, subjects were expected to form the simpler tap and not the trill. Also, it was discovered that informants only used the American English approximant in 42 of the 1655 collected word cases—a mere 2.5% of all tokens. With regards to the speakers, there were seven who did not transfer the approximant at all. Of the other 13, five did it once, four did it twice, two did it 4

times, and—of the remaining two—one did it 8 times and the other did it 13 times. Table 3.1 illustrates each individual's percentage of target-like tokens, as well as of any transfer errors (i.e., the approximant [ɹ]), developmental errors (i.e., the tap [ɾ]in place of the trill [r] or vice versa), or other errors (e.g., deletions).

Subject ID	Overall Accuracy	Tap		Trill		Tap or Trill	
		Accuracy	Error type	Accuracy	Error type	Accuracy	Error type
6	97.7%	100%	N/A	100%	N/A	94%	100% other
5	97.5%	100%	N/A	83%	100% [ɾ]	100%	N/A
2	96.6%	98%	100% [r]	85%	100% [ɾ]	100%	N/A
1	95.2%	98%	100% [ɹ]	77%	100% [ɾ]	100%	N/A
4	94.9%	94%	50% [ɹ] 50% other	82%	100% [ɾ]	100%	N/A
19	94.0%	100%	N/A	83%	100% [ɾ]	90%	100% other
18	93.8%	97%	100% [r]	69%	75% [ɾ] 25% other	100%	N/A
16	92.9%	100%	N/A	58%	80% [ɾ] 20% [ɹ]	97%	100% [ɹ]
13	92.7%	92%	75% other 25% [r]	80%	33.3% [ɾ] 33.3% [ɹ]	100%	N/A
12	92.6%	100%	N/A	58%	100% [ɾ]	97%	100% [ɹ]
9	92.3%	100%	N/A	50%	100% [ɾ]	100%	N/A
7	89.3%	90%	50% [r] 50% [ɹ]	64%	100% [ɾ]	100%	N/A
15	89.2%	98%	100% [ɹ]	75%	66.7% [ɹ] 33.3% [ɾ]	84%	100% [ɹ]
3	88.7%	100%	N/A	27%	100% [ɾ]	100%	N/A
10	86.2%	98%	100% [ɹ]	17%	100% [ɾ]	97%	100% [ɹ]
11	84.8%	96%	50% [r] 50% [ɹ]	21%	100% [ɾ]	97%	100% [ɹ]
20	84.7%	100%	N/A	17%	90% [ɾ] 10% [ɹ]	90%	100% [ɹ]
14	84.6%	100%	N/A	25%	88% [ɾ] 11% [ɹ] 11% other	90%	100% [ɹ]
17	82.4%	100%	N/A	0%	100% [ɾ]	96%	100% [ɹ]
8	80.0%	97%	100% [ɹ]	50%	100% [ɹ]	69%	100% [ɹ]

Table 3.1 Percentage of target-like sounds by each individual subject

Further information presented in this section will be given in two divisions: namely, how target-like articulations of the Spanish rhotics related to (1) the extra-linguistic and (2) the linguistic factors discussed in the previous chapter.

Extra-Linguistic Factors

Some interesting extra-linguistic discoveries reveal that all subjects achieved target-like Spanish rhotics in more than 85% of the tokens—no matter where they had lived during their missionary service (see Table 3.2). The informant who had lived in the Dominican Republic was able to achieve accuracy in 78 of the 83 tokens (94%). The three informants who had been missionaries in Central America were able to articulate a combined 85.2% of target-like rhotics. The two informants who had lived in Mexico were accurate 91.1% of the time. The 11 subjects pertaining to the South America Lowland group were accurate 91.3% of the time while the one forming the Highland group was accurate 89.2% of the time. With regards to the two who had lived in Spain, they were accurate 92% of the time.

Mission location	Target-like	Not target-like
Caribbean (1 informant)	94% (78)	6% (5)
Central America (3)	85.2% (190)	14.8% (33)
Mexico (2)	91.1% (164)	8.9% (16)
South America--Lowland (11)	91.3% (833)	8.7% (79)
South America--Highland (1)	89.2% (74)	10.8% (9)
Spain (2)	92% (160)	8% (14)

Table 3.2 Accurate rhotics relating to informants' mission location

Regarding the role sex played in achieving target-like Spanish rhotics, Table 3.3 notes that, percentage-wise, the four female subjects were slightly more accurate in their target-like articulation than the 16 males.

Sex	Target-like	Not target-like
Male (n=16)	90.1% (1197)	9.9% (132)
Female (n=4)	92.6% (302)	7.4% (24)

Table 3.3 Accurate rhotics relating to informants' sex

Table 3.4 illustrates that subjects who had received Spanish instruction before the mission performed better than others.

Spanish instruction before mission?	Target-like	Not target-like
Yes (8 informants)	93.1% (536)	6.9% (40)
No (12 informants)	89.2% (963)	10.8% (116)

Table 3.4 Accurate rhotics relating to Spanish instruction before mission

Table 3.5 reveals that, whether or not they had been instructed by a native Spanish speaker prior to the mission, all participants were accurate at least 89.3% of the time. Still, those who had received instruction from more than one native speaker in the 8-week training prior to entering the mission location were able to achieve target-like articulations 96.5% of the time—more than any other group. Collectively, those who had at least one native teacher had a success rate of 91.9%—just a little more than those who had no native Spanish-speaking instructors.

Native speaker of Spanish as missionary teacher?	Target-like	Not target-like
None (12 informants)	89.6% (879)	10.4% (102)
From Caribbean (1)	94% (78)	6% (5)
From Central America (1)	89.2% (74)	10.8% (9)
From Mexico (1)	89.3% (75)	10.7% (9)
From South America (3)	90.1% (228)	9.9% (25)
> 1 native speaker as teacher (2)	96.5% (165)	3.5% (6)

Table 3.5 Accurate rhotics relating to native instructors prior to mission

Table 3.6 indicates that the participant who had more than one native speaker of Spanish as an instructor after the mission was more likely to produce accurate trills (97.5%). Also, interestingly, the five who had no native Spanish speaker as an instructor after the mission were

more accurate (92.2%) than the 15 who had at least one native speaker teaching them (90% collectively).

Native speaker of Spanish as teacher after mission?	Target-like	Not target-like
None (5 informants)	92.2% (392)	7.8% (33)
From Caribbean (3)	90.8% (226)	9.2% (23)
From Central America (0)	N/A	N/A
From Mexico (0)	N/A	N/A
From South America (4)	90.1% (308)	9.9% (34)
From Spain (7)	88.6% (495)	11.4% (64)
> 1 native speaker as teacher (1)	97.5% (78)	2.5% (2)

Table 3.6 Accurate rhotics relating to native instructors after mission

Overall, whether the speaker was speaking formally (e.g., pronouncing carefully while reading the narration or word list) or informally (e.g., answering the questions in the second stage) did not make a great difference. For example, in the narration, word list, and question stages, informants achieved target-like articulation in 92.2, 88.9, and 90.0 percent of the cases, respectively. However, when the three subcategories are taken into consideration (as Table 3.7 notes), it is obvious that there was far less accuracy with the trill in both of the formal stages of the interview as well as the spontaneous portion. When a trill was required, there was only 61% accuracy in the narration portion, 52.5% accuracy in the word list portion, and only 50% accuracy in the spontaneous speech portion (where there were only 12 tokens of a trill altogether). Nevertheless, when a tap was expected, or in contexts in which either a tap or trill was acceptable, there was at least 87.3% accuracy in all formats.

Speech style: Tap	Target-like	Not target-like	Transferred approximant	Incorrect use of trill
Narration	98.3% (350)	1.7% (6)	50% of errors (3)	50% of errors (3)
Word list	99% (287)	1% (3)	33% (1)	66.6% (2)
Spontaneous	94.3% (149)	5.7% (9)	44.4% (4)	11.1% (1)

Speech style: Trill	Target-like	Not target-like	Transferred approximant	Incorrect use of tap
Narration	61% (72)	39% (46)	6.5% of errors (3)	91.3% of errors (42)
Word list	52.5% (62)	47.5% (56)	10.7% (6)	87.5% (49)
Spontaneous	50% (6)	50% (6)	0%	100% (6)

Speech style: Tap or trill	Target-like	Not target-like	Transferred approximant
Narration	97.3% (284)	2.7% of errors (8)	87.5% of errors (7)
Word list	94.6% (227)	5.4% (13)	92.3% (12)
Spontaneous	87.3% (62)	12.7% (9)	66.6% (6)

Table 3.7 Accuracy in formal and informal speech styles

Linguistic Factors

The linguistic factor category has been divided into three subcategories—based on Hualde et. al.'s (2001) descriptions provided in Chapter 2—in order to discuss more clearly the initial results: (1) contexts in which only a tap is expected, (2) contexts in which only a trill is expected, and (3) those in which either the tap or the trill are deemed target-like. Particularly, the first subcategory consists of intervocalic taps, taps found after a voiced consonant /b,d,g/, and taps found after a voiceless consonant /p,t,k/. The second subcategory consists of intervocalic trills, word-initial trills, and trills found after an alveolar consonant /l,n,s/. The third subcategory consists of either a tap or a trill found before a voiced consonant /b,d,g/, a voiceless consonant /p,t,k/, an alveolar consonant /s,l/, or a tap or trill in word-final position.

First and foremost, the phonetic contexts should be noted. When it came to the contexts in which a trill was the only target-like rhotic, there was 56.5% accuracy, whereas when the tap

was the only target-like sound there was 97.8% accuracy. Regarding the third subcategory—containing contexts in which the tap and trill were interchangeable—there was 95% accuracy. Table 3.8 illustrates the details with respect to each individual phonetic context. As it was noted before, there was 100% accuracy when it came to a tap appearing after a voiceless obstruent. Nevertheless, when it came to the trill after an alveolar consonant in a separate syllable, subjects were 25% accurate.

Phonetic context: Tap	Target-like	Not target-like	Transferred approximant	Incorrect use of trill
Intervocalic tap	96.3% (441)	3.7% (17)	41% of errors (7)	35% of errors (6)
After voiced consonant /b,d,g/	99.3% (144)	0.7% (1)	100% (1)	0%
After voiceless consonant /p,t,k/	100% (201)	0% (0)	0%	0%

Phonetic context: Trill	Target-like	Not target-like	Transferred approximant	Incorrect use of tap
Word-initial	49.4% (43)	50.6% (44)	11.3% of errors (5)	88.6% of errors (39)
Intervocalic trill	71.9% (87)	28.1% (34)	0%	100% (34)
After alveolar consonant	25% (10)	75% (30)	13.3% (4)	80% (24)

Phonetic context: Tap or trill	Target-like	Not target-like	Transferred approximant
Before voiced consonant /b,d,g/	98.4% (121)	1.6% (2)	100% of errors (2)
Before voiceless consonant /p,t,k/	95.3% (161)	4.7% (8)	100% (8)
Before alveolar consonant /s,l/	95.3% (143)	4.7% (7)	100% (7)
Word-final position	91.9% (148)	8.1% (13)	61.5% (8)

Table 3.8 Accuracy in phonetic contexts

Second, the relation of the three subcategories with syllable stress will be discussed. In all, Spanish taps and trills appearing in stressed syllables tended to be more accurately produced than those found in unstressed syllables (e.g., 94.1% to 86.6%). As noted in Table 3.9, it was

found that taps appearing in stressed syllables were target-like 99.4% of the time while those appearing in unstressed syllables were target-like 96.6% of the time. The results for the trills were similar since those appearing in stressed syllables were accurate 70.8% of the time while those in unstressed syllables were accurate only 45.8% of the time. With regards to the contexts in which a trill or a tap was accurate, when these were combined with a stressed syllable, 95.6% accuracy was achieved and when they were combined with an unstressed syllable, 93.5% accuracy was achieved.

Tap	Target-like	Not target-like	Transferred approximant	Incorrect use of trill
Stressed Syllable	99.4% (337)	0.6% (2)	50% of errors (1)	50% of errors (1)
Unstressed Syllable	96.6% (449)	3.4% (16)	43.7% (7)	31.2% (5)

Trill	Target-like	Not target-like	Transferred approximant	Incorrect use of tap
Stressed Syllable	70.8% (75)	29.2% (31)	0%	100% of errors (31)
Unstressed Syllable	45.8% (65)	54.2% (77)	11.6% (9)	85.7% (66)

Tap or trill	Target-like	Not target-like	Transferred approximant
Stressed Syllable	95.6% (416)	4.4% (19)	78.9% of errors (15)
Unstressed Syllable	93.5% (157)	6.5% (11)	90.9% (10)

Table 3.9 Accuracy in stressed and unstressed syllables

Altogether, words in which there was more than one tap or a combination of taps and trills (86.5% target-like) yielded less accurate pronunciation than those in which there was a single rhotic sound (93.2% target-like), especially when it came to the presence of an expected trill in a combination word (e.g., *ba<u>rr</u>era*). Intervocalic and word-initial trills in combination words formed a combined accuracy of 53.3%, while in combination words in which there were only taps or interchangeable taps and trills there was a much higher level of accuracy—as Table 3.10 illustrates.

Word type: Tap	Target-like	Not target-like	Transferred approximant	Incorrect use of trill
One rhotic (e.g., *cara*)	97.5% (475)	2.5% (12)	58.3% of errors (7)	83.3% of errors (1)
Combination (e.g., *tararea*)	98.1% (311)	1.9% (6)	16.6% (1)	83.4% (5)

Word type: Trill	Target-like	Not target-like	Transferred approximant	Incorrect use of tap
One rhotic (e.g., *carro*)	60.4% (67)	39.6% (44)	11.3% of errors (5)	86.3% of errors (38)
Combination (e.g., *barrera*)	53.3% (73)	46.7% (64)	6.2% (4)	92.1% (59)

Word type: Tap or trill	Target-like	Not target-like	Transferred approximant
One rhotic (e.g., *cargo*, *comer*)	97.1% (395)	2.9% (12)	91.6% (11)
Combination (e.g., *cargar*)	90.8% (178)	9.2% (18)	77.7% (14)

Table 3.10 Accuracy in single rhotic words vs. combination words

Variable Rule Analysis

The initial coding for the variable rule analysis included all factor groups—both linguistic and extra-linguistic—listed at the end of the previous Chapter. Nevertheless, in order to perform a logistic regression analysis and to obtain statistically significant findings, some factors and factor groups had to be omitted. For example, in the *phonetic context* factor group, the "after voiceless obstruent [p,t,k]" factor had to be removed since there was 100% accuracy. Because a logistic regression analysis explores variation, factors with no variation have to be excluded from the statistical analysis. Also, following a step-up/step-down binomial analysis—a variable rule analysis in which computations are done "one step at a time with different configurations of factor groups"—it was confirmed that some factor groups were not significant when it came to their influence on the articulation of the Spanish tap and trill (Tagliamonte, 2006, p. 266). One of these was the *combination word details* factor group. Four other factor groups deemed

statistically insignificant were “Mission Location,” “Sex,” “Native Speaker of Spanish as Missionary Teacher,” and “Native Speaker as Teacher After Mission.”

Following the prior removals, there was one remaining factor group from the extra-linguistic category (“Spanish Instruction Before Mission”) while four linguistic groups remained (“Stressed Syllable”, “Phonetic Context”, “Speech Style”, and “Word Type”). The step-up/step-down binomial analysis revealed that all five factor groups were statistically significant, ($p < 0.05$), yet when they were analyzed in Goldvarb’s one-step binomial run, there were too many errors to determine a truly statistically significant fit.

Most Significant Factors

After analyzing different combinations of the remaining statistically significant ($p < 0.05$) factor groups, it was determined that the pairing of the “Spanish Instruction Before Mission” and “Phonetic Context” factor groups was the most statistically significant fit (total Chi-square = 14.5441; $p < 0.05$ and the Chi-square/cell = 0.7869; $p < 0.05$). Also, it had the fewest number of errors (3) combined with the log likelihood closest to 0 (-247.0), which made it represent a better model. Table 3.11 illustrates the Goldvarb results for these two factor groups.

In the end, the first factor group found to be most statistically significant was “Phonetic Context.” All “Phonetic Context” variables except *intervocalic tap*, *intervocalic trill*, *word-initial trill*, *trill after alveolar consonant*, and *word-final rhotic* had been removed due to a lack of variation. Of the remaining context variables, the *intervocalic tap* and rhotics in *word-final position* received factor weights of 0.730 and 0.544, respectively. Each of these weights favors a target-like pronunciation. On the other hand, the three contexts in which only a trill was acceptable (*intervocalic trill*, *word-initial*, and *after alveolar consonant*) received factor weights of 0.238, 0.087, and 0.032, respectively. These weights disfavored target-like pronunciation.

The second factor group found to be statistically significant when it came to influencing the articulation of target-like (or not target-like) Spanish rhotics was "Spanish Instruction Before Mission." Those who had received Spanish instruction before becoming missionaries received a factor weight of 0.641 which favors target-like pronunciation. Those who had not received previous Spanish instruction received a factor weight of 0.415 which disfavors a target-like pronunciation. These results demonstrate what many have assumed: that more Spanish instruction is associated with better pronunciation.

Factor	**N**	**%**	**Pronunciation**	**Weight**	**Range**	**Interpretation**
Phonetic Context						
Intervocalic tap	418	96.30%	Target-like	0.73	0.698	Favors target-like pronunciation
	16	3.70%	Not target-like			
Word-final	140	92.10%	Target-like	0.544		Favors target-like pronunciation
	12	7.90%	Not target-like			
Intervocalic trill	87	75.70%	Target-like	0.238		Disfavors target-like pronunciation
	28	24.30%	Not target-like			
Word-initial trill	41	49.40%	Target-like	0.087		Disfavors target-likepronunciation
	42	50.60%	Not target-like			
After alveolar consonant	10	26.30%	Target-like	0.032		Disfavors target-like pronunciation
	28	73.70%	Not target-like			
Spanish Instruction Before Mission						
Yes	275	89.90%	Target-like	0.641	0.226	Favors target-like pronunciation
	31	10.10%	Not target-like			
No	421	81.60%	Target-like	0.415		Disfavors target-like pronunciation
	95	18.40%	Not target-like			

Table 3.11 – Goldvarb results for the distribution of target-like pronunciation for the factor groups found to be statistically significant

Chapter 4

Conclusions and Discussion

In this section the five research questions presented in Chapter 1 will be answered in accordance with the results presented in Chapter 4. The results from previous studies will be compared to those of the current study. Following this, suggestions for future research will be discussed.

Research Question 1: Are there contexts, other than those indicated in Canfield (1940), in which Spanish taps and trills may be difficult to pronounce—such as after alveolar consonants?

The first research question was aimed at determining phonetic contexts—apart from those previously observed—in which the Spanish tap and trill were difficult for L2 speakers to pronounce. As mentioned in Chapter 1, while other studies focused on only a few positions, mainly the intervocalic position for both rhotics, Canfield (1940) pinpointed several: *rd*, *dr*, *rt*, *tr*, intervocalic *r* and *rr*, initial *r*, and final *r*. Apart from the eight contexts studied by Canfield, the current study added a few more contexts. Altogether, the phonetic positions observed were the following: before voiced stop (i.e., [b, d, g]), after voiced stop (i.e., [b, d, g]), before voiceless stop (i.e., [p, t, k], after voiceless stop (i.e., [p, t, k]), before alveolar consonants [s] and [l], and after alveolar consonants [s, l, n]. In all of the additional contexts—except *after alveolar consonant*—the current informants were able to form accurate Spanish rhotics at least 95% of the time—including 98.4% accuracy for rhotics appearing before [b, d, g]. However, the current study has revealed that L2 Spanish speakers consistently pronounced the trill inaccurately when it appeared after the alveolar consonants [s, n, l] in a separate syllable (e.g., *Is<u>r</u>ael*, *ho<u>n</u>ra*, *a<u>l</u>rededor*). When it came to this context, there was only 25% accuracy.

With respect to contexts previously observed in the literature, it was—in summary—more likely for the current subjects to accurately produce the intervocalic tap (96.3% accuracy) and a rhotic in word final position (91.9% accuracy). Nevertheless it was not as likely for the current subjects to accurately produce the intervocalic trill and the word-initial trill. In the first case, there was 71.9% accuracy while, in the latter, there was only 49.4% accuracy.

In conclusion, in answering the first research question, the current data reveal that there is at least one context, apart from those observed in previous studies, in which a trill is difficult to produce—*after an alveolar consonant in a separate syllable*.

Research Question 2: Is it more difficult for L2 speakers of Spanish to pronounce the trill or tap when these appear in a word containing a combination of trill(s) and/or tap(s)—such as in corrieron, barrera?

It was found that rhotics were less target-like in words containing multiple taps (e.g., *secuestraron*) or a combination of a trill and tap(s) (e.g., *rinoceronte*, *corrieron*) than words which contained a single rhotic sound. Of the 650 rhotic sounds appearing in combination words, 562 (86.5%) were accurate, whereas in the one-rhotic words, 937 (93.2%) of the 1005 sounds were target-like.

Trills—which were found in word-initial position or between vowels (and always expected as the first rhotic when present)—were the most difficult to pronounce in a combination word (53.3% target-like). When it came to inaccuracy, developmental errors were more common. Among the 64 non-target-like articulations of the trill in a combination word, 59 (92%) were formed as taps and 4 (6%) were formed as an approximant. This varies slightly from a trill in a single rhotic word, in which 86.3% of the inaccurate articulations are taps while 11% are formed as a transferred approximant.

Where taps were expected (e.g., after a voiced stop [b, d, g], after a voiceless stop [p, t, k], and in intervocalic position), there was 98.1% accuracy. Of the 2% which were not accurate, transfer errors were more common since 44% were formed as an American English approximant while 33% were formed as a trill.

One of the justifications for this study was the need to investigate potential for misunderstandings—or the phonetic distortion of a word to the point where it cannot be understood. This was especially the case when it came to combination words since they were the most common forms to be omitted from the variable rule analysis because some subjects formed a different series of sounds when articulating some of these words—an action which could have altered a listener's understanding of what was being said. Twelve combination word tokens were removed from the statistical analysis for this reason (e.g., *corrieron* pronounced as [koɾjón], etc.). The most difficult combination word for subjects to pronounce was *tararear*—which was articulated in many different ways, such as [taɾaɾéɾ], [taɾjáɾ], and [taɾeáɾa]. One reason it was articulated in so many ways was because it is not a common verb. In Davies' *Corpus del Español* website, the verb *tararear* was only found 16 times in a collection of more than 100 million words and many of the subjects in the current study admitted after reading it that they were not familiar with the word (information retrieved August 17, 2009). It had been hypothesized that the close contact between two intervocalic taps in the same word might cause mispronunciation of at least one of the taps (e.g., [muɾjéɾon] > *[muɾjéron]), but when it came to the articulation of a more familiar word containing two intervocalic taps—*morirá* (*morir* was found 12,619 times in Davies' corpus)—there was 100% accuracy (information retrieved August 17, 2009).

Research Question 3: Do L2 speakers of Spanish who have lived in a Spanish-speaking environment for more than a year make the same pronunciation errors of the tap and trill as the students in previous studies?

The third research question was formed in order to see if prolonged exposure to the target language—or having lived in a Spanish-speaking environment for 18 months to 2 years—would have a positive effect on the L2 acquisition of the Spanish tap and trill. As noted, in the studies listed in Chapter 1, subjects were mainly beginning students in their first or second year of Spanish instruction and had not had experience in a contact learning environment (Major, 1986; Canfield, 1940). A few studies monitored tap and trill pronunciation among upper-level students and faculty members (Face, 2006; Reeder, 1998). Whether or not the subjects had lived in a Spanish-speaking environment was not a factor in these studies.

The results given in the current study suggest that the subjects were much more likely than were the first-year L2 Spanish learners in Canfield (1940) to produce target-like Spanish rhotics in certain phonetic contexts. When observing the pronunciation of the intervocalic tap by his subjects, Canfield found that the rhotic was produced as the American English approximant [ɹ] by 60% (632/1052) of the participants. Interestingly, in the current study, the intervocalic tap was target-like in 96.3% (441/458) of the occasions in which it occurred. Only 7 (41%) of the 17 errors were formed as a approximant and 13 of the 20 informants never produced an intervocalic tap that was not target-like. Moreover, while 75% of the subjects in Canfield (1940) transferred the approximant into Spanish when attempting to produce the word-initial trill, it was only produced as an approximant in 5 (11.4%) out of 44 non target-like occurrences in the current study. Still, it should be noted that target-like production in this particular context was only achieved 49.4% of the time since the remaining 39 (88.6%) non target-like cases involved the

use of the tap instead of the trill. Canfield reported that, in word-final position, 72% of the subjects transferred the approximant while only 28% made a target-like tap or trill. In the current study, subjects transferred the approximant in only 8 (5%) of the 161 cases in which there was a word-final rhotic. Canfield noted that 53% of the first-year students produced the intervocalic trill as a tap while 29% produced it as a approximant. In the current study, the trill was articulated correctly 71.9% of the time and was never produced as a approximant. In Canfield's study, 78% replaced the tap following a voiced dental [d] with a approximant and 69% did the same when it followed a voiceless [t]. Subjects in the current study categorically produced the target-like variant after [d] and were accurate 91.5% of the time when it followed a [t]—with the approximant replacing the tap in 6 (100%) of the non target-like tokens.

When compared with the subjects of Major (1986), the current subjects yielded similar results—especially when it came to production of the intervocalic trill. As stated in Chapter 1, Major (1986) noted that, after an intensive course of eight weeks in which instruction in Spanish phonetics was a major focus, three of the four subjects were able to produce target-like intervocalic taps. One achieved it in 79% of the cases, another in 73%, and the third in 57%. In the current study, all subjects achieved at least 83% accuracy when pronouncing the intervocalic tap, with 11 achieving 100% accuracy and seven achieving at least 90% accuracy. When it came to the intervocalic trill, one subject in Major's study was 100% accurate and another could achieve it in 71% of the cases while the other two could not produce the trill. In the current study, eight of the 20 subjects were able to achieve 100% accuracy, four were able to achieve at least 80% accuracy, while the remaining eight could only make a target-like trill in fewer than 67% of the cases (including two who could not make any target-like intervocalic trills). While it should be reiterated that subjects in the current study, like those in Major (1986), underwent

eight weeks of Spanish instruction (prior to traveling to their prospective missions), their class time was mainly focused on the learning of Spanish grammar and not pronunciation.

In Face (2006), the 20 advanced L2 speakers were accurate in 78.7% of their intervocalic taps (as compared to 96.3% of the current study). Furthermore, he reported that of the non-target productions of the tap produced by advanced learners, 73% were due to transfer of the voiced alveolar approximant from American English. Their accuracy in the pronunciation of the intervocalic trill was much lower (26.6%, compared to the current study's 71.9%). Apart from Face, Reeder (1998) found that the graduate and upper division undergraduates of Spanish observed were only able to achieve target-like trills 37% of the time.

All in all, the initial results of the current study suggest that living in an L2 environment is an extremely important factor in improved pronunciation. As Arteaga (2000) noted, this may be due to a link between comprehension—which is commonly achieved through receiving sufficient L2 input—and accurate speech production. In regards to 'receiving sufficient L2 input', participants in this study spent all day communicating with native speakers in the Spanish language. While communicating with native speakers of Spanish, it is possible that many became accustomed to hearing the tap and trill, and, thus, were better able to imitate them in their own speech.

Research Question 4: Are L2 speakers of Spanish more likely to produce transfer errors or developmental errors when articulating the tap and the trill after living in a Spanish-speaking environment for an extended period of time?

In response to this fourth research question, subjects were more likely to commit developmental errors. Of the 156 errors made by the subjects, only 42 (27%) were transfer

errors (e.g., the American English approximant), whereas 109 (70%) could be classified as developmental (e.g., incorrectly-placed taps, trills, [dɾ] in place of trill, etc.).

Instead of replacing a Spanish rhotic with the American English approximant [ɹ], 62% of the errors occurred as a result of substituting the Spanish trill with another sound found in Spanish phonology—the Spanish tap. It should be mentioned that, though the tap is an allophone of the dental obstruents [d] and [t] in English (e.g., *better* [bɛ́ɾɹ]), its use in place of a trill is better considered a developmental error because (1) it is also found in the Spanish phonological system, (2) the replacement of the trill with it is something which native speakers may make while learning how to articulate the trill (Carballo et al., 2000), and (3) because it was never used as an allophone of the /t/ or /d/. There were also six cases in which the intervocalic tap was pronounced as a trill and, similar to the Spanish-English bilingual child observed by González-Bueno (2004), two subjects replaced the trill appearing after an alveolar consonant (e.g., *ho<u>nr</u>a*, *a<u>l</u>rededor*) with a dental obstruent followed by a tap [dɾ]—possibly because such a substitution may be an effort to "approximate the articulation of the trilled /r/ by reinforcing the simple tap with the help of an occlusive sound" (p. 916).

In conclusion, while subjects from previous studies—who had learned Spanish in a classroom—were more likely to transfer the American English approximant into L2 Spanish, the current subjects—who became fluent by living in a Spanish-speaking environment—were more likely to do what children learning Spanish as their L1 do when acquiring the tap and trill. With this, it can be inferred that adults living in a place where only the target language is spoken may

acquire the sounds of L2 in a process similar to the one children experience when acquiring sounds of an L1. Such a finding complements the conclusion that speakers who have exposed to an L2—and are better able to comprehend it—are more likely to acquire a more native-like accent (Arteaga, 2000). The current subjects were more likely than subjects in previous studies to discontinue the practice of relating L2 sounds to similar sounds in their native language and experience a process similar to first language acquisition.

Research Question 5: What other factors—apart from having lived in a Spanish-speaking environment—condition the correct pronunciation of the tap and trill?

Apart from the speakers' time being immersed in a Spanish-speaking environment, this study set out to determine other significant factors that condition their pronunciation of the tap and trill. According to the final variable rule analysis conducted in Goldvarb, two factors were considered the most statistically significant—one linguistic (*phonetic context*) and one extra-linguistic (*Spanish instruction before mission*).

Throughout this study, much emphasis has been placed on the possible role of phonetic context on the L2 articulation of the tap and trill. For example, two of the primary purposes of this study were (1) to find out how the current subjects compared with subjects from other studies in the articulation of the rhotics in certain positions within a string of sounds and (2) to discover what other phonetic contexts hinder the target-like production of the rhotics. As it was mentioned before, the current subjects were accurate (at least 91.9% of the time) when it came to contexts in which the tap was expected or the tap and trill were interchangeable, but had some difficulty with trill articulation—especially when it came after an alveolar consonant (25% target-like) and word-initially (49.4% target-like). The difference in percentages between the

target-like taps and the target-like trills reveals that the statistical significance of the 'phonetic context' group was based on the difficulty of the trill.

The trill has always been noted as a difficult sound for L1 speakers of English to acquire (Canfield, 1940; Lado, 1956, among others) and in this study it proved most difficult to articulate after an alveolar consonant. Since the trill is formed through a repetition of rapid alveolar stops (in which the apex of the tongue briefly touches the alveolar ridge), it is possible that it was the least target-like when found after the alveolar consonants [s, n, l] because such a combination is foreign to English—and even difficult for L1 speakers to acquire (Carballo and Mendoza, 2000). It is also possible that participants, having heard a trill following an alveolar consonant, tended to perceive it as a tap and, thus, imitated what they believed they were hearing. The same may have been the case for the word-initial trill. Orthography may have also influenced their pronunciation as well. Having observed many cases of a single {r} at the beginning of a word, informants may have assumed it was to be articulated as a tap. Nevertheless, it appears that syllable stress—or better yet the lack of it—may have played a part in non-target-like articulation of the word-initial trill. When the phonetic context was cross-tabulated with the syllable stress factor, it was revealed that 65% of word-initial trills appearing in stressed syllables were target-like, whereas only 43% were target-like when in unstressed syllables. Given this, it is possible to infer that L2 speakers are more likely to accurately produce the word-initial trill in *rojo* [ró.xo] than in *Roberto* [ro.βéɾ.to] because, in the stressed syllable, the trill is more salient—and thus more noticeable—by speakers and listeners. Moreover, De Jong (1995) noted that, in English, speakers are more likely to hyperarticulate sounds when they are found in stressed syllables. With this, it may be possible that the subjects, who are L1 speakers of English, reinforce the Spanish trill as well when it is the onset in a stressed syllable.

The finding that *Spanish instruction before mission* was the other of the two most significant factors in the study was somewhat surprising to the author. Though it was included as a factor, it was assumed that participation in a high school foreign language program had no major impact on pronunciation. This is because many schools only require students to take two classes and it was assumed that, in the classroom, the acquisition of Spanish pronunciation is not the priority. Furthermore, the initial results revealed that those who had received previous instruction were accurate 93.1% of the time while those without it were accurate 89.2%—not much of a difference. Nevertheless, when the *Spanish instruction* factor group was cross-tabulated with *phonetic context*, it was evident that the eight participants with previous instruction were more likely to form target-like rhotics in problematic scenarios. For example, Table 4.1 notes that 93% of their intervocalic trills were target-like, whereas those who had not received prior instruction were accurate 60% of the time. Participants with prior instruction formed more accurate word-initial trills (62%) than the rest (43%), as well as trills appearing after an alveolar consonant (43% vs. 15%). Furthermore, they were less likely to transfer a approximant into Spanish (36%) than those who had not received instruction (64%).

	Intervocalic trill	**Word-initial trill**	**After alveolar consonant**
Previous Spanish instruction	93% target-like	62% target-like	43% target-like
No Spanish instruction	60% target-like	43% target-like	15% target-like

Table 4.1 Relationship between previous Spanish instruction and accurate trills

The evidence provided in Table 4.1 suggests that instruction is a significant factor in L2 acquisition of a native like accent. Nevertheless, we should not dismiss the impact living in an L2 environment has on pronunciation. It seems likely that those with *more exposure* to the L2 perform better in the area of trill articulation. In other words, when in-class Spanish time is added to in-culture Spanish time, the result is better trill articulation.

Other Findings

Apart from the results which were sought to answer the research questions, the current study yielded other findings, including the influence dialectology had on participants and the role formal speech—in conjunction with informal speech—played in the articulation of the tap and trill.

Dialectal Influence

Special attention should be paid to a certain variant of the Spanish trill which was found in the analysis: assibilation. There were 18 occasions in which the assibilated trill [ř] replaced the more universal trill [r]: 13 (out of 161) in word-final position, 1 (out of 87) in word-initial, and 3 (out of 121) in intervocalic position, and in one occasion it was found before a voiceless velar. Of the six subjects who articulated the [ř], two had carried-out missionary service in the area east of Santiago, Chile, one in Piura, Peru, one in Mérida, Mexico, one in El Salvador, and one in Guatemala. One of the individuals who had lived in Chile assibilated the trill 5 times—3 times in word-final position and twice between vowels. The participant who had lived in Mérida produced 4 assibilated trills in word-final position. The participant who had lived in Piura, Peru assibilated 2 trills in word-final position and 1 in intervocalic position. The other individual who had lived in Chile assibilated 3 trills in word-final position. The participant who had lived in El Salvador assibilated 1 trill in word-initial position. The subject who had served in Guatemala assibilated 1 in word-final position and, in one case, before a voiceless velar [k], as in [pwéř.ko], which was also deemed target-like since, in some central regions of Guatemala, the tap may be articulated as a voiceless sibilant at the end of a syllable (Quesada Pacheco, 1996).

Apart from assibilation, there was one occasion in which a word-final {r} was deleted. The speaker who did this had lived in Santiago, Chile, where word-final deletion may be a variant among some native speakers when they speak informally (Rabanales, 1992).

Altogether, though these cases were few, they provide further evidence that L2 language contact, apart from classroom instruction, has an impact on a learner's acquisition of L2 sounds in that they not only acquire the Spanish rhotics used universally, but may also adopt local variants. Such phenomena reveal that the current subjects are exhibiting advanced stages of language acquisition—which is not mentioned in other studies.

Formal and Informal Speech

In this study, the overall use of a tap or trill in formal speech did not result in more target-like articulations as it may have been expected (Díaz-Campos, 2004; Elliott, 1997). Whether subjects were reading the narration (92.2%) or words in a word list (88.9%), the interview stages geared towards formal speech provided practically the same number of target-like articulations as the subjects' spontaneous responses to questions (90%).

As noted, the stage in which participants scored the lowest was where formal speech was triggered: the reading of the word list. Nevertheless, according to Major (2001), word lists may have more in common with spontaneous speech—and, therefore, cause more pronunciation errors—because "word lists do occur in natural speech, even in conversation" (p. 70). He provides some examples in which word lists may occur in natural speech, including when a speaker answers the question *What shall I pick up at the store?* Nevertheless, when it comes to word lists, Sparkman (1926) based mispronunciation on the correlation of an orthographic grapheme—for example {r}—with an L2 speaker of Spanish's transferring of the American

English approximant, for he noted that, when reading Spanish, L2 speakers "naturally give these same letters their old, or their English values" (p. 229).

In order to see if Sparkman's theory (1926) could be applied to the current study, I tabulated the number of times in which an American English approximant was transferred in the reading portions of the interview. All in all, the majority of mistakes involved the usage of a tap in place of a trill (70% of the errors in the narration section and 68% of those in the word list section). The approximant formed only 13 (21.6%) of the errors in the narration section and 19 (26.4%) of those in the word list section. Thus, in the area of formal speech, it was actually more natural for the current informants to make developmental errors than to give the grapheme {r} its English value. The results the spontaneous response portion of the interview yielded were similar to those in the word list section: 42 (26.9%) out of 156 errors were formed as the transferred approximant—a similar percentage. Thus, Major's (2001) conclusions are more in line with the current study's results than is Sparkman's theory (1926).

Indications for Future Research

Future investigation revolving around L2 production of the Spanish tap and trill may consider other sociolinguistic factors not monitored in this study. First, particular observation may be made as to whether or not close association with native speakers influences the pronunciation of the tap and trill. For example, full-time missionaries for the Church of Jesus Christ of Latter-day Saints, when serving in a foreign language environment, may have native speakers as "companions"—or other missionaries from whom they never separate during a determined period of time (usually for two or more months). The fact that a companion is with another missionary 24 hours a day may mean that, when the companion is a native speaker, the missionary has much more experience developing sounds from the L2. Apart from native

companions and the mission itself, L2 phonetic development may come as a result of post-mission association with native speakers.

Another factor that may be considered is the attitude a participant has towards the Spanish language and Hispanic cultures in general. According to Elliott (1995), the "attitude or concern for pronunciation accuracy" an L2 speaker has when communicating in a second language is "the most significant factor relating to accurate target language pronunciation" (p. 356). Also, Terrell (1989) pointed out that an L2 speaker must be "open to the target language and culture" in order to acquire proper pronunciation
(p. 208). Based on this, it may be beneficial to inquire into what a participant's attitude is toward Spanish. For example, does the speaker listen to the radio or watch Spanish television networks? Does the speaker read in Spanish or use it daily (e.g., at work, in restaurants, with friends, etc.)? It is very possible that factors concerning a speaker's attitude toward the language and culture are linked to target-like pronunciation.

Finally, more emphasis could be given to the instruction participants have received. For example, did their instructor concentrate on pronunciation? Answers to such questions could help determine why the *Spanish instruction before mission* factor group was considered one of the most significant factors in this study's Goldvarb analysis.

Conclusion

While some studies have sought to find connections between the amount of in-class Spanish learning and accurate L2 articulation of the Spanish tap [ɾ] and trill [r] (Canfield, 1940, among others), there has been relatively little research on the influence long-term residence in a Spanish speaking environment has on L2 speakers' pronunciation of the two rhotics. Studies on the acquisition of the Spanish tap and trill by regular classroom students have 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 contrast with the view that correct L2 articulation of the Spanish tap and trill is best acquired through explicit classroom instruction, this study has revealed that living in a Spanish-speaking country tends to have a positive impact on an L2 speaker's pronunciation. For example, the speakers observed were more likely to achieve accurate pronunciation than participants in previous studies who had had more in-class experience, but no experience in a Spanish-speaking country. Altogether, the current subjects were accurate 96.3% of the time in tap articulation and 56% of the time in trill articulation.

In addition to whether or not subjects were able to accurately produce the tap and trill after an extended stay in a Spanish-speaking country, this study also sought to discover whether or not certain linguistic and extra-linguistic factors influenced target-like pronunciation of the tap and trill. The results of the study reveal that two factors (apart from long-term residence) are statistically significant: (a) the rhotic's phonetic context and (b) Spanish instruction prior to living abroad. Those who, apart from living in a Spanish-speaking country, had received prior Spanish instruction were much more likely to make target-like pronunciations in the three most difficult phonetic contexts involving a Spanish rhotic (i.e., a trill in word-initial position, between vowels, and after an alveolar consonant in a separate syllable).

Lastly, while the most common learner error found in previous studies was the transfer of the American English approximant, the most common learner errors for those who have been

immersed in a Spanish-speaking environment involved the use of one Spanish sound in place of another. In fact, the incorrect transfer of the approximant formed little more than 2% of the collective errors. The correlation between these results and Major's (2001) Ontogeny & Phylogeny Model (OPM) reveals that residence in a target language environment positively affects L2 acquisition of phonology. If Major's (2001) OPM were applied to the second language acquisition of the "more-marked" trill, it would be proposed that most L1 speakers of English would pass through three stages of second language acquisition based on the type of errors made.

In the first stage, they would make transfer errors (e.g., using the approximant in place of the tap) because they rely solely on the phonological transfer from L1. In the second interlanguage stage, they would replace the trill with a sound from L1, L2, or "nonnative" sounds influenced by both the L1 and L2 sound systems and language universals (p. 116). This could be, perhaps, a rhotic sound similar to those found in other languages. Finally, L2 speakers would reach a point where only developmental errors would occur—that is to say that the non-target-like sounds would come from the L2 (e.g., the tap in place of the trill) and not the L1. It can be concluded that while in the previous studies, the subjects' quantity of transfer errors indicated that they tended to be in the first stage of the OPM, the current subjects—who had more exposure to the L2 while living in Spanish-speaking countries—were heading well past the interlanguage stage. Most of their errors involved the use of sounds from Spanish—a pattern similar to those seen in children acquiring Spanish as an L1 (Carballo and Mendoza, 2000). This reveals that immersion in a second language environment can cause L2 learners to acquire Spanish through a process similar to the one children experience as they acquire it as their first language.

Bibliography

Alba, O. (2002). *¿Cómo hablamos los dominicanos?* Santo Domingo: Impresora Soto Castillo, S.A., 18-20.

Alba, O. (1992). El español del Caribe: Unidad frente a diversidad dialectal. *Revista de Filología Española*, LXXII, Installments 3 & 4, 525-540.

Arteaga, D.L. (2000). Articulatory phonetics in the first-year Spanish classroom. *The Modern Language Journal*, 84 (3), 342.

Biondi Assali, Estela (1992). El uso de [p] en el habla española de los inmigrantes de origen árabe en la Argentina. *Hispanic Linguistics*, 5(1-2), 143-68; 143-68.

Canfield, D.L. (1940). What Spanish sounds are most difficult for North Americans? *Hispania*, 23 (2), 154-57, 159

Caravedo, R. (1996). Perú. *Manual de dialectología hispánica (El español de América)*. Manuel Alvar (Dir.). Barcelona: Editorial Ariel, S.A., 159-160.

Carballo, G. and Mendoza, E. (2000). Acoustic characteristics of trill productions by groups of Spanish children. *Clinical Linguistics & Phonetics*, 14 (8), 599.

Coello Vila, C. (1996). Bolivia. *Manual de Dialectología Hispánica (El español de América)*. Manuel Alvar (Dir.). Barcelona: Editorial Ariel, S.A., 169-183.

Corpus del Español. (2007, December). Created by Mark Davies. *Frequency of "tararear" and "morir"*. Retrieved August 17, 2009, from http://www.corpusdelespanol.org/x.asp.

De Jong, K.J. (1995). The supraglottal articulation of prominence in English: Linguistic stress as localized hyperarticulation. *Journal of the Acoustical Society of America*, 97(1), 491-504.

Díaz-Campos. (2004) Context of learning in the acquisition of Spanish second language phonology. *Studies in Second Language Acquisition*, 26(2), 249-273.

Elliott, A.R. (1995). Field independence/dependence, hemispheric specialization, and attitude in relation to pronunciation accuracy in Spanish as a foreign language. *The Modern Language Journal*, 79(3), 356.

Elliott, A.R. (1997). On the teaching and acquisition of pronunciation within a communicative approach. *Hispania*, 80 (1), 102.

Face, T.L. (2006). Intervocalic rhotic pronunciation by adult learners of Spanish as a second language. In *Selected Proceedings of the 7th Conference on the Acquisition of Spanish and Portuguese as First and Second Languages*, ed. Carol A. Klee and Timothy L. Face. Somerville, MA: Cascadilla Proceedings Project, 47-58.

García Mouton, P. (1994). *Lenguas y dialectos de España*. Madrid: Arco/Libros.

González-Bueno, M. (2004). Articulatory difficulties in the acquisition of Spanish /r/ in a bilingual context. In Cohen, J., McAlister, K., Rolstad, K. & MacSwan, J. (Eds.) *ISB4*. Somerville, MA: Cascadilla Press, 916.

Hualde, J.I. (2005). *The Sounds of Spanish*. Cambridge, UK: Cambridge University Press, 181-183.

Hualde, J.I., Olarrea, A., and Escobar, A.M. (2001). *Introducción a la lingüística hispánica*. Cambridge, U.K.: Cambridge University Press, 82.

Lado, R. (1956). A comparison of the sound systems of English and Spanish. *Hispania*, 39 (1), 28.

Lapesa, R. (1964). El andaluz y el español de América. *Presente y futuro de la lengua española*, II. Madrid: OFINES, 173-182.

Lipski, J. (1994). *El español de América*. Madrid: Cátedra, 251-260.

Major, R.C. (2001). *Foreign Accent: The Ontogeny and Phylogeny of Second Language Phonology*. Mahwah, New Jersey: Lawrence Erlbaum Associates, 30, 47, 70, 116.

Major, R.C. (1986). The ontogeny model: evidence from L2 acquisition of Spanish *r*. Language Learning 36, 453-504.

Montes Giraldo, J.J. (1992). El español hablado en Colombia. *Historia y presente del español de América*. César Hernández Alonso (Coord.). Valladolid: Junta de Castilla y León, 525-526.

Moreno de Alba, J.G. (1992). El español hablado en México. *Historia y presente del español de América*. César Hernández Alonso (Coord.). Valladolid: Junta de Castilla y León, 627-647.

Obediente, E. (1991). *Fonética y fonología*. Mérida: Universidad de Los Andes, 168.

Quesada Pacheco, M.A. (1996). El español de América Central. *Manual de dialectología hispánica: El español de América*. Manuel Alvar (Dir.). Barcelona: Editorial Ariel, S.A., 105.

Quilis, A. (1992). Rasgos generales sobre la lengua española en el Ecuador. *Historia y presente del español de América*. César Hernández Alonso (Coord.). Valladolid: Junta de Castilla y León, 598.

Rabanales, A. (1992). El español de Chile: Situación actual. *Historia y presente del español de América*. César Hernández Alonso (Coord), Valladolid: Junta de Castilla y León.

Reeder, J.T. (1998). English speakers' acquisition of voiceless stops and trills in L2 Spanish. Texas Papers in Foreign Language Education 3, 101-118.

Sacks, N.P. (1962). A study in Spanish pronunciation errors. *Hispania*, 45 (2), 294.

Sparkman, C.F. (1926). The value of phonetics in teaching a foreign language. *The Modern Language Journal*, 10 (4), 228-9.

Tagliamonte, S.A. (2006) *Analyzing Sociolinguistic Variation*. New York: Cambridge University Press, 263, 265-266.

Terrell, T.D. (1989) Teaching Spanish pronunciation in a communicative approach. *American Spanish Pronunciation: Theoretical and Applied Perspectives*. Peter Bjarkman and Robert Hammond, eds. Washington, DC: Georgetown UP, 208.

Verdugo, L. (2006) Situación lingüística de Guatemala. *Estudios sociolingüísticos del español de España y América*. Ana M. Cestero Mancera, Isabel Molina Martos y Florentino Paredes García (Eds.) Madrid: Editorial Arco Libros, 195-201.

Zampini, M.L. (1994) The releationship between the production and perception of L2 Spanish stops. *Texas Papers in Foreign Language Education*, 3(3), 85-100.

Appendix A
INTERVIEW—NARRATION & QUESTIONS

Please read aloud the following paragraph and answer the questions below.

Érase una vez una niña llamada Caperucita Roja salió de su casa a caminar a la casa de su abuela. Antes de que se fuera, Marta—la sirvienta de su madre—le había dicho que no tardara mucho en llegar allá. Durante su viaje por el bosque Caperucita descubrió un trébol grande que se parecía a una cruz. Pensaba que sería el regalo perfecto para su abuela. Mientas volvía a su camino, Caperucita cantaba "Cielito lindo". Cuando se le olvidaba la letra, se ponía a tararear.

Por fin Caperucita Roja llegó a la casa de su abuela. Sin embargo, nada parecía normal. El ambiente olía a puerco podrido. Además las mascotas de su abuela—un perro y un gato persa—que antes habrían salido a saludarla no estaban.

—¿Corrieron a otra parte de la selva?—se preguntó. Caperucita decidió entrar a la casa.

Al pasar de un cuarto a otro, chirriaron todas las puertas dándole un susto y causando que se le estremeciera el torso (17). Todas las cosas alrededor estaban destrozadas, ¡incluyendo la posesión más preciada de su abuela: una preciosa harpa!

—¿Abuelita? ¿Abuelita?—gritó Caperucita.

No había respuesta.

—¡La secuestraron!—dijo en voz alta.

—No, mi'jita. Estoy aquí. Ven aquí a charlar.—dijo alguien en el cuarto de su abuela…

Answer the following questions…

1. ¿Por qué salió Caperucita Roja de su casa?
2. ¿Qué hacía Caperucita Roja cuando no sabía la letra de la canción?
3. ¿Cómo va a terminar este cuento? ¿Qué va a pasar?

Appendix B

INTERVIEW—WORD LIST

Please read the following words. Do your best to pronounce each one carefully.

1. todos
2. nuevomexicanos
3. rinoceronte
4. supongo
5. lugar
6. gorda
7. son
8. idea
9. ladrón
10. tuvo
11. nada
12. rojo
13. infarto
14. debía
15. atractivo
16. baboso
17. claro
18. borrosa
19. Guatemala
20. nave
21. yerba
22. también
23. carpeta
24. brincó
25. pronto
26. farsa
27. cebú
28. foca
29. barrera
30. garganta
31. ahorcar
32. globo
33. arrastraron
34. cesó
35. sagrada
36. lamentablemente
37. flecha
38. acróbata
39. dorso
40. vuelo
41. burlarse
42. cinco
43. morirá
44. rastrearon
45. labios
46. honra

Appendix C
INTERVIEW—NARRATION KEY

Key for examiner.

Érase (3) una vez una niña llamada **Caperucita (3) Roja (5)** salió de su casa a **caminar (4)** a la casa de su abuela. Antes de que se **fuera (3)**, **Marta (9)**—la **sirvienta (8)** de su **madre (1)**—le había dicho que no **tardara (8, 3)** mucho en **llegar (4)** allá. **Durante (3)** su viaje **por (4)** el bosque Caperucita **descubrió (1)** un **trébol (2) grande (1)** que se parecía a una **cruz (2)**. Pensaba que **sería (3)** el **regalo (5)** perfecto para su abuela. Mientras volvía a su camino, Caperucita cantaba "Cielito lindo". Cuando se le olvidaba la **letra (2)**, se ponía a **tararear (3, 11)**.

Por fin Caperucita Roja llegó a la casa de su abuela. Sin **embargo (8)**, nada parecía normal. El ambiente olía a **puerco (9) podrido (1)**. Además las mascotas de su abuela—un **perro (6)** y un gato **persa (10)**—que antes **habrían (1)** salido a saludarla no estaban.

—¿**Corrieron (3, 6)** a otra **parte (9)**?—se **preguntó (2)**. Caperucita decidió entrar a la casa.

Al pasar de un cuarto a otro, **chirriaron (3, 6)** todas las puertas dándole un susto y causando que se le estremeciera el **torso (10)**. Todas las cosas **alrededor (7)** estaban destrozadas, ¡incluyendo la posesión más preciada de su abuela: una preciosa **harpa (9)**!

—¿Abuelita? ¿Abuelita?—gritó Caperucita.

No había respuesta.

—¡La **secuestraron (2, 3)**!—dijo en voz alta.

—No, mi'jita. Estoy aquí. Ven aquí a **charlar (10)**.—dijo alguien en el cuarto de su abuela…

Appendix D

INTERVIEW—WORD KEY

Key for examiner.

Words (NOTE: Words in italics found in Reading Section; words with asterisk contain a combination of taps, trills, or both)

TAP.

1. After voiced stop [b,d,g]

brincó
descubrió
habrían
ladrón
madre
podrido
grande
sagrada

2. After voiceless stop [p,t,k]

preguntó
pronto
atractivo
trébol
letra
cruz
acróbata
*secuestraron**
rastrearon*
arrastraron*

3. Intervocalic tap

claro
Caperucita
llegara
érase
fuera
sería
durante
*tararear**
*secuestraron**
morirá*
rastrearon*
*corrieron**
barrera*
arrastraron*
*chirriaron**

4. Word-final {r} when followed by vowel

caminar
por
llegar

TRILL.

5. Word-initial {r}

rinoceronte*
rojo
roja
regalo

6. Intervocalic trill

perro
borrosa
*corrieron**
arrastraron*
barrera*
*chirriaron**

7. After alveolar consonant in separate syllable

honra
*alrededor**

TAP OR TRILL.

8. Before voiced stop [b,d,g]

yerba
sirvienta
gorda
*tardara**
garganta
embargo

9. Before voiceless stop [p,t,k]

harpa
carpeta
Marta
infarto
parte
puerco
ahorcar

10. Before alveolar consonants [s,l]

persa
torso
dorso
farsa
*charlar**
burlarse*

11. Word-final before pause/consonant

lugar
*tararear**

Appendix E
SURVEY FORM

Prior to participating in the interview, please fill out this form.

NAME:
AGE:
BIRTHPLACE:
MISSION:
YEARS SERVED:
Were any of your teachers at the Missionary Training Center native Spanish speakers? If so, where were they from?

_____
_____
_____
_____

Please list the places where you have lived apart from your birthplace and mission:

_____
_____
_____
_____
_____
_____
_____

Did you know Spanish before your mission? If so, where did you learn it?

_____

SPANISH COURSES TAKEN	YEAR	TEACHER (NATIVE SPEAKER?)
Ex. SPAN 105	*2008*	
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____