

DOES IMMERSION MODALITY AFFECT ACQUISITION OF THE SPANISH TRILL?

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ABSTRACT

This paper analyzes the production of the Spanish trill by immersion students. It analyzes the impact of different immersion modalities on the acquisition of the production of the Spanish trill.

Keywords: trill, L2A, immersion, immersion modality, acoustics, acquisition

1. INTRODUCTION

The acquisition of Spanish as a second language has been studied with an incredible diversity of approaches, points of focus, and demographics of participants. Phoneticians have analyzed the way in which L2 learners and bilinguals acquire such linguistic aspects as Spanish phonetic categories, pronunciation, stress, pitch, and perception. This paper aims to investigate a growing subfield in the world of bilingualism: immersion. More specifically, at-home immersion school programs, and how different modes of immersion shape the way in which L2 Spanish learners acquire the language. Immersion schools give students the chance to live and learn in the target language for up to their entire school day, in some programs reaching upwards of seven hours a day. The expectation for students of these programs is that they emerge from them able to communicate and interact in the target language. With the variety of immersion types and the limited number of immersion programs, however, I think that an important question to ask is what kind of immersion works, and to what degree. To that end, this paper is investigating how different modalities of immersion affect the acquisition of Spanish pronunciation, with a focus on a specific production.

2. BACKGROUND

An important factor influencing language acquisition in an immersion program is the modality or type of immersion. The most common types of immersion are full (entire curriculum in the L2) and partial

(up to half of the curriculum in the L2) [1]. Additionally, there are forms of immersion in which learners start fully immersed, and have their L1 language arts introduced around 2nd or 3rd grade depending on the district, and gradually use more and more of the L1 until around 5th grade where it becomes a partial immersion setup, with 50% of the curriculum in the L1 and 50% in the L2 [1]. These programs are designed with the intent to emulate L1 acquisition to the end that the students can engage in meaningful communication in the L2 [2], though naturally different acquisition environments mean differing results as far as student performance and proficiency when graduating from the programs [3]. While previous studies [4]etc. have found that students in full immersion programs tend to perform as well as and often better than their monolingual peers learning in fully English curriculum [5] in subjects such as math, science, and language arts, what remains to be proven is which modality of immersion is better at teaching L2 learners to communicate in and produce the L2.

2.1. Communication

Communication in and production of the L2 can come in many forms. What is of particular importance and interest to this study is Spanish pronunciation by L2 learners. One of the greatest challenges in acquiring additional languages is the development of speech patterns that resemble those of native speakers of the target language [6]. Past research has found that there are many possible factors influencing the acquisition of Spanish pronunciation. Lenneberg [7] popularized the critical period hypothesis (CPH), which posits that “the complete mastery of a language is no longer possible if the onset of learning occurs after the end of some period in life during which human beings retain a full language-learning capacity” [6]. This inability to completely acquire languages after the critical period is typically attributed to loss of neural plasticity as the brain matures. Another theory that attempts

to explain the acquisition process of additional languages is Flege's Speech Learning Model (SLM) [8], which explains the development of phonetic categories in language learners. Per the SLM, learners' phonetic categories for their L1 and their L2 reside in the same cognitive space, which allows for interaction between them when acquiring and producing either language. This interaction can result in distinct categories for stark phonetic productions, as well as overlap and mixing in cases when phonetic structures are similar between languages [8]. While these theories and more aim to explain how acquisition of pronunciation can occur within the individual, few studies investigate how the context of acquisition can impact phonetic production.

2.2. Context of learning

Previous studies investigating context-of-learning [9], [10], [11] have focused on study abroad (SA) vs at-home (AH) learning. They investigated L2 learners of Spanish in 4 to 8-week SA sessions in countries like Mexico and Spain and assessed the degree to which context-of-learning affected nativelike pronunciation of consonantal segments in Spanish [11]. They found that production of word-initial stops and word-final laterals improved over the duration of the SA, and that voiced fricatives showed little to no improvement, which they attributed to the generative approach's idea that fricatives are more marked, and therefore more difficult to acquire [11]). This past research leaves a gap in our understanding of the effectiveness of context-of-learning, leaving out conventional AH vs AH immersion, and most prominently within-immersion contexts such as full vs partial immersion. This pilot study aims to begin to fill that gap by getting preliminary data supporting the idea that there is a difference in performance between full and partial immersion when it comes to L2 learner acquisition of Spanish pronunciation. Moving forward, a full-scale study investigating this will be necessary

2.3. Acoustics and the Spanish trill

Many of the studies mentioned above assess Spanish pronunciation using voice onset time (VOT) as the measure, as it is easy and simple to measure and see differences between languages [12]. For a full overview of VOT and its applications and usefulness in evaluating L2 Spanish pronunciation, see studies including Flege [13], Amengual [14], and particularly Abramson and Whalen [15]. Though VOT is useful for investigating native-like pronunciation of voiceless and voiced stops, this study is

looking at the pronunciation of intervocalic rhotic when producing a trill, and thus a different measure is required. In order to analyze the pronunciation of the trill phoneme, two measures will be used: duration of the target sound, and number of occlusions during the trill [16].

Much research has been conducted on the acquisition of the pronunciation of Spanish vowels and consonants with many studies looking specifically at the intervocalic rhotic trill (for a full list of studies investigating intervocalic rhotic, see [6], which is the phonetic feature of interest in this study. In one previous study, Face [17] found that while L1 English learners of Spanish were "generally able to acquire native-like pronunciation of Spanish tap at a relatively early age in their development [17], they had significantly greater difficulties acquiring pronunciation of the Spanish trill. While they found evidence that as proficiency and language use increased so too did native-like pronunciation of the trill, they found that more advanced learners tended to still overgeneralize the tap in their production of Spanish rhotic categories. This study narrows the production tasks to the rhotic trill in an attempt to have any variation in production rise from the context in which the participants acquired Spanish, rather than differentiating between rhotic categories. In another previous study, Amengual [16] conducted an investigation on the acoustic correlates of the Spanish tap-trill contrast using heritage Spanish speakers and L2 learners as participants, as a factor of language dominance. In this study, Amengual found that Spanish-dominant heritage speakers (SDHS) produced more canonical trills with three or four occlusions, whereas both L2 learners and English-dominant heritage speakers (EDHS) produced trills with one or zero occlusions. This study proved not only that there is a significant effect of language dominance on production of taps and trills in Spanish, but also that within one group (heritage speakers) there can be a significant difference in production [16]. So the present study aims to investigate if there is a difference between immersion learners, and rather than dividing them by language dominance, I divided them by immersion modality.

3. RESEARCH QUESTIONS AND HYPOTHESES

For this project, I sought to answer three research questions. First, among a small group of L1 English speakers who participated in immersion programs, can different immersion modalities (partial, full) influence the way in which they acquire the

Spanish trill? And lastly, to what degree are the participants able to approximate the native pronunciation of the Spanish trill? Following previous research which has proven that immersion abroad is more effective than typical AH learning, I hypothesize that full immersion will be more effective than partial immersion in training L2 learners of Spanish to have native-like pronunciation of /r/. I also hypothesize that different immersion modalities will have a significant impact on acquisition of pronunciation and production in Spanish. I expect more time immersed in the language to result in better production values and more native-like trill duration and occlusions. With those hypotheses in mind, I expect that there will still be a noticeable difference between L2 learners and native speakers. As has been found previously [13] etc., age of acquisition is one of the most important factors when creating phonological categories, regardless of context of learning, and all of the participants started learning Spanish around five or six years of age.

4. PROCEDURE

4.1. Participants

Because this is a rather small pilot version of the study, there are only 5 participants. I had intended for there to be at least one more so I could have 2 of each participant group (full immersion, partial immersion, native speaker) but there were some issues getting data from a few participants. In the end, I have 2 participants who attended full immersion (FI) programs, 1 who attended a partial immersion (PI) program, and 2 native speakers. All of the participants from immersion programs are from the United States. The full immersion participants are both 25 years old, 1 male and 1 female. The partial immersion participant is a 27 year old male. The native speakers are 26 and 28 years old, both male, one from Spain and one from Chile.

4.2. Methods

This project consists of two tasks: a language use and socioeconomic status questionnaire, namely, the LEAP-Q [?] followed by a speech production task in the form of sentence reading. The LEAP-Q questionnaire was chosen for a number of reasons. Chief among them is its widespread use and recognition within the field of sociolinguistics, as well as linguistics as a whole. This allowed me to use it without having to make changes or to attempt to design my own questionnaire, which would have been too difficult for this project. Furthermore, the LEAP-Q

is a very comprehensive questionnaire covering social background, language use and dominance, education level, and more, which are all very useful points of information for me.

The second task, the sentence reading and production task, was chosen because it is a straightforward and simple way to elicit the desired phonetic structures remotely, as the participants are in cities across the US while I am in New Jersey. They were sent a set of five stimulus sentences, each having the target word embedded within a sentence in order to elicit the most naturalistic pronunciation possible from the participants. Each target word contained the double /r/ trill, and there were no other trills within the stimuli. The participants recorded themselves saying the sentences out loud, one after the other, within one sound file.

The data were all segmented in Praat [?] before having the target phoneme's duration and number of occlusions measured. The analysis in Praat was conducted following Amengual [16]'s approach, by measuring the number of occlusions and the overall duration of the rhotic segment (in milliseconds, ms). An occlusion was determined to have occurred when lingual contact, a reduction in the amplitude of the waveform, a transition in F3 and F4 formant structure, and changes in intensity were observed. The actual analysis was done in R-studio. Duration and occlusion count averages were grouped by L1 (English or Spanish) and by immersion mode (full or partial) and plotted. Future work on this topic will conduct statistical analysis and model the effects being investigated.

5. RESULTS

Based on the analysis mentioned above, I was able to get a (very generalized) idea of how /r/ duration and number of occlusions differs both between immersion modalities and between native language speakers. Table 1 contains the descriptive statistical information for each participant. For all of the stimuli together, the full immersion participants had a mean number of occlusions of 1.2, the partial immersion participants had 0.4, and the native speakers had 2.125. The FI participants had a mean /r/ duration of 0.0551 seconds, the PI participants had 0.0416 seconds, and the native speakers had 0.0807 seconds. Figure 1 shows the distribution of duration and occlusion measurements for each participant, and Figure 2 shows the averages.

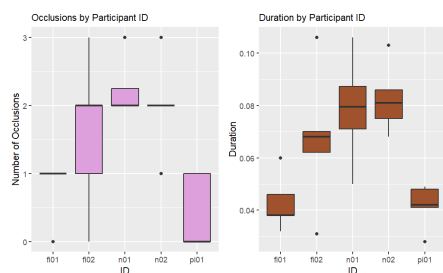


Figure 1: Distributions by duration and number of occlusions.

6. DISCUSSION AND CONCLUSIONS

I'm going to begin the discussion with a disclaimer: because the sample size for this project is so small, the results cannot and should not be taken as a generalization for all immersion learners, and will not be truly representative of the wider population of which a small sample were studied here. That being said, I think that the data found here make for a very interesting starting point for further investigation.

In this study, I sought to investigate whether immersion modality had an impact on the acquisition of the Spanish trill. And since the quality of the trill cannot really be evaluated here without comparing it to the productions of the native speaker participants, I will tie in my other research question here as well. That being evaluating the degree to which the L2 learner participants were able to produce a native-like trill. Looking back to figures 1 and 2, we can see that the full immersion (FI) participants had overall more occlusions and longer durations than the partial immersion (PI) participants. Furthermore, though neither FI participant ever quite reached the level of native-like production, they were consistently closer than the PI participant. From this, we can see that (for the very small sample size used here) L2 Spanish learners who attended a full immersion program had an advantage in trill production. I think that even with this very limited study, the results are interesting and show that this is a question worth further investigation. In the future, I would like to re-conduct this study with a participant pool of sufficient power to derive actual, informative results from the study. Additionally, for that study I would like to be better prepared for statistical analysis, at least to the point where I would be able to conduct an ANOVA or random effect model. I truly believe that, properly conducted, this will be a very interesting study with a lot of potential to improve the immersion education model.

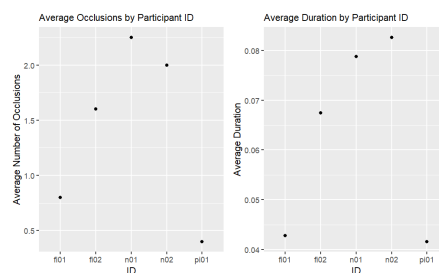


Figure 2: Mean durations and number of occlusions.

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