

EFFECTS OF PERCEPTUAL, COGNITIVE, AND SPEECH MOTOR SKILLS ON SPANISH PRONUNCIATION DEVELOPMENT

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INTRODUCTION

- Second language (L2) pronunciation outcomes are highly variable [1]. Some previous work has shown that this is partly due to individual skills differences such as working memory [2], perceptual acuity (PA) [3], and speech motor skill (SMS) [4].
- It is not yet clear what the relative contribution is of each skill area, given that no study has yet examined the role of all three skill areas in a single study.
- The goal of the present study is to determine how much variation each skill area is responsible for in L2 Spanish pronunciation.
- The study follows Florida State University (FSU) students enrolled in SPN1120. Participants are tested on their cognitive skills, SMS, and PA, and their progress in Spanish is tracked across time as they complete higher-level courses to examine whether these skill levels correlate with pronunciation development.
- We expect that students who demonstrate stronger performance in the areas tested will show greater proficiency in Spanish pronunciation than those who score lower.
- Through this research, we aim to better understand how these skills influence L2 acquisition and how this knowledge may help improve the teaching and learning of a second language.

OBJECTIVES

- Classify Spanish learners into learner types based on cognitive, perceptual, and speech motor skill levels.
- Investigate whether learner types differ in how their Spanish pronunciation develops over time.

METHODS

Participants: FSU students enrolled in SPN1120 who grew up speaking only English.

Tasks and Stimuli

- SMS tasks include rapid repetition of syllables (e.g., pa, pataka) and word sets (e.g. cop-top), and tongue twisters consisting of four words (e.g., dart book dock bait). Articulatory skill was determined based on the speed and accuracy of repetitions.
- PA tasks assess participants' ability to detect small differences in pitch, duration, and formants, as well as reproduce rhythms or melodies.
- Cognitive tasks:
 - Backward digit span working memory test – participants are presented with numbers, and they have to repeat them back in reverse order. Their score is based on the highest number of digits they could remember.
 - Lexical retrieval inhibitory control task – participants are presented with a list of words that they try to memorize. They are then presented with the first letter and category of a subset of the words; they have to type in the correct word. In the final part, they are presented with 50% of the initial words, and 50% new words. They identify what words they remembered.
- Spanish pronunciation: tracked through recordings from coursework at the beginning and end of SPN1120, SPN1121, and SPN2220. The tasks consist of a paragraph reading, a word reading list, and a short free speech task.

PRELIMINARY RESULTS

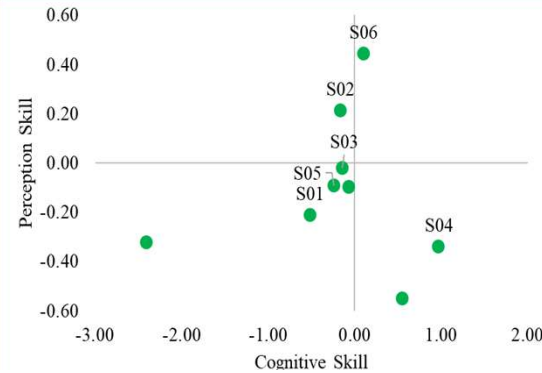


Figure 1. Perceptual and cognitive skill scores by participant.

DATA ANALYSIS

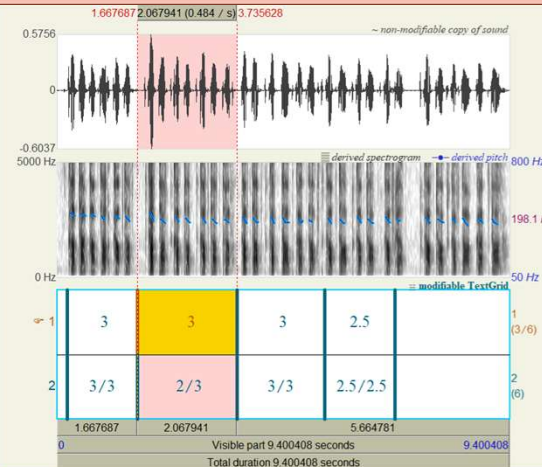


Figure 2. Analysis of cop-top production on Praat.

METHODS



Figure 3. Working memory task.

Recognition

lion

Y = Yes (studied) | N = No (new)

pod cab cord pub

Figure 4. Inhibitory control task.

Figure 5. SMS task.

DATA ANALYSIS

- Speech motor skill productions will be analyzed in Praat [5] to calculate speed and accuracy scores.
- Each skill score will be calculated as a z-score, in order to standardize performance across tasks with different units and ranges and make the resulting scores directly comparable across participants.
- All z-scores for each skill will then be averaged to establish each participant's cognitive, perceptual and speech motor skills (see Figure 1 for preliminary results).
- Pronunciation ability will be determined by Spanish speaking raters, who will listen to the audios and rate them for intelligibility, comprehensibility, fluency, and accentedness [6].
- Correlation scores and mixed effects linear regression models will be used to determine the extent to which each skill plays a role in the L2 Spanish development.

NEXT STEPS

- This is a multiyear project that is currently in the data collection stage. Participants are currently being tested to determine their relative skill levels.
- The Spanish pronunciation recordings are obtained at the beginning and end of the SPN1120 course, and learners will be followed through subsequent levels (SPN1121 and SPN2220).
- Expected results -> participants with better scores in cognitive, articulatory, and perception skills will display more rapid improvement over time.
- However, it is not clear which of the three skills is relatively more important.
- Participants will also undergo different types of pronunciation instruction. We will investigate whether certain learner types benefit more from different types of pronunciation instruction.

DISCUSSION

- Previous work has shown that language learners want pronunciation practice, but it is often largely absent in language teaching curriculums [1]. This research will be used to help determine whether personalized pronunciation instruction can be beneficial.
- The results from this multiyear project can be used to inform pronunciation instruction for Spanish courses.

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