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LRC 530

Research Proposal

Acquiring Voicing Contrasts in English and Spanish:

Pedagogical Implications of Language Software Use in the Classroom

1. Introduction

One of the important questions concerning second language (L2) learners and bilinguals' speech production is how they realize a variety of language-specific phonetic segments. Sounds of speech are characterized by a number of different acoustic cues in the speech signal that differentiate one language from another. Two acoustic cues – voice onset time (VOT) and voiceless closure intervals – and their interaction during speech production in various languages are of a particular importance. They discriminate the production and perception of the Spanish and English stop consonants that may result in significant difficulties in language acquisition and learning for L2 Spanish learners and Spanish-English bilinguals.

2. Background

In articulation of stop consonants, an obstruction with the articulators (e.g., the lips, the teeth, the tongue) creates a stop for the airflow through the mouth. Then, there is a brisk release of obstruction that is followed by the onset of vocal fold vibration. Thus, there are two crucial aspects of stop consonant articulation that require close attention in language acquisition and learning: closure interval (the amount of time between the obstruction of the airflow and its

subsequent release) and voice onset time (VOT) (the time between the release of the obstruction – the release burst – and the onset of vocal fold vibration).

Both English and Spanish contain stop consonants: voiceless /p, t, k/ and voiced /b, d, g/. In spite of their apparent phonological similarity in both languages, these stop consonants are produced differently in English and Spanish.

3. Research on VOTs and voiceless closure intervals in English and Spanish

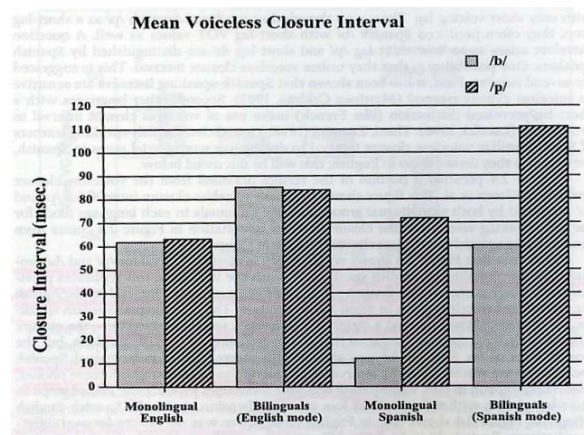
In English, voiceless /p, t, k/ are produced with VOTs that are typically longer than 30-35 msec. (Zampini & Green, 2001). Thus, they are called *long-lag* voiceless stops. On the other hand, English voiced consonants /b, d, g/ are articulated with VOTs shorter than 35 msec. and are called *short-lag* stops (Lisker & Abramson, 1964).

In Spanish, voiceless /p, t, k/ are articulated with VOTs less than 35 msec. In contrast to their English counterparts, they are short-lag. Moreover, when voiced /b, d, g/ are produced in Spanish, vocal fold vibration precedes the stop release so that they are called *prevoiced* (Lisker & Abrahamson, 1964; Castaneda Vicente, 1986). Thus, even though English and Spanish stop consonants have similar phonological classification (voiceless and voiced), they differ at the phonetic level.

Another distinctive feature in the articulation of English and Spanish stop consonants is the duration of the voiceless closure interval before the stop's release. Speakers of English do not demonstrate any difference between voiceless and voiced stop consonants in word-initial positions in speech; they produce the /p, b/, /t, d/, and /k, g/ pairs with the same closure duration (Crystal & House, 1988). In Spanish, Martinez Celdran (1993) in his experiments on sound perception found that closure intervals alone help speakers of Spanish to differentiate stop

consonants in their respective pairs. Green, Zampini, and Clarke (1998) found that Spanish-English bilinguals rely on closure intervals in their perception of word-initial /p/ and /b/ since voiceless /p/ in Spanish is produced with significantly longer closure intervals than voiced /b/.

Green et al. (1997) examined the voiceless closure intervals produced by Spanish-English bilinguals and compared the findings to the results of the voiceless closure interval research on Spanish and English monolinguals.



(Adopted from Green, Zampini, & Magloire (1997))

They found a significant difference in voiceless closure interval production times among English monolinguals, Spanish monolinguals, and Spanish-English bilinguals for both English and Spanish modes. Spanish-English bilinguals in the English mode show closure interval production patterns that are similar to those of English monolinguals with the closure interval difference of 20 msec. longer than those of English monolingual subjects. On the other hand, Spanish-English bilinguals in the Spanish mode show voiceless closure interval patterns similar to those of Spanish monolinguals but with significant difference in production between /b/ and /p/.

Since the duration of closure intervals in Spanish voiceless stop consonants is a definitive, language-specific feature, it seems important to look into pedagogical implications of

the Green et al.'s (1997) findings and try to examine if these features can be acquired (or at least be approximated to native-like) through intensive language training and use of language pronunciation software in the classroom.

With regard to language learning and speech production, there is insufficient research on *acquisition* of native-like VOTs and closure intervals by L2 learners and bilinguals.

4. Research Questions

Research in acquisition of language-specific phonological features by early L2 learners, late L2 learners, and bilinguals has not been conducted sufficiently to answer some of the questions raised in the literature. Moreover, research is necessary to examine the role of technology use in the acquisition of L2 pronunciation. More specifically, it would be interesting to investigate if the use of language software in language instruction could help language learners in acquisition of language-specific phonological features, like closure intervals in stop consonants.

The suggested research questions are:

1. Is acquisition of native-like language-specific phonological features like closure intervals through classroom instruction feasible?
2. How close can language learners approximate their production of language-specific phonological features through targeted classroom instruction? How much time do they need to accomplish the task?
3. Can L2 pronunciation software facilitate the acquisition of language-specific phonological features in L2 language learners?

4. What are the benefits of L2 pronunciation software use in the classroom for late L2 learners?

5. Methods and participants

A total of 20-25 English-Spanish late L2 subjects (undergraduates, between the ages of 18-35) will participate in the longitudinal study on Spanish closure interval acquisition. The participants will be a part of two mandated Spanish 102 (Intermediate Spanish) classes for students majoring in Spanish or learning it for academic and business purposes. The proficiency in pronunciation at the beginning of the semester will be determined by a pre-test.

The pre-test will require the students to read texts in Spanish aloud. The texts will include voiceless stops in various in-text positions (beginning of the word, middle of the word, end of the word). The participants' reading will be recorded. The subsequent analysis of data will establish mean voiceless closure intervals for the control and the experimental groups.

The control group will then proceed learning Spanish with methods, approaches, textbooks, and classroom activities required by the Spanish Department. The students in the experimental group, however, besides following the same routine as the control group, will be required to work on their pronunciation with "A+ Spanish" pronunciation software for 30 minutes of every class (the Computer Assisted Language Learning mode, CALL).

The students in both groups will again be tested for their pronunciation proficiency with voiceless stops mid-semester and at the end of the semester. They will be required to read the same texts that have been used in the pre-test. Their reading will be recorded, and the duration of voiceless stop closure intervals will be analyzed.

6. Analysis of data and possible findings

The main research method employed in the study will be a mixed design with analysis of covariates ANCOVA. The data of words containing voiceless stops will be singled out and analyzed for mean closure interval durations (in msec.). The performance data will be analyzed for possible interactions among the beginning-of-the-semester, middle-of-the-semester, and the end-of-the-semester means of closure intervals durations and voiceless stop consonant in-word positions (beginning-of-words, middle-of-words, and end-of-words).

The predictions are that at the beginning of the semester, the participants will probably display voiceless closure interval patterns that will be close to those of their monolingual English patterns (Green et al., 1997). As the semester progresses, both groups will demonstrate improvement in their voiceless closure performance. The /p/ mean closure intervals will become longer and the /b/ mean closure intervals will become shorter in all in-word positions, moving in the direction of patterns displayed by native speakers of Spanish.

However, it is also expected that the experimental (CALL) group's means of closure intervals will be closer to those of monolingual Spanish as presented in Green et al.' (1997) study. The CALL group's voiceless stop closure interval duration data will resemble those of monolingual Spanish speakers' more than the control group's data.

7. Possible interpretation of findings

Students can acquire native-like language-specific phonological features like closure intervals through classroom instruction. With intensive, targeted exposure to pronunciation practices, intermediate-level L2 language learners can approximate their production of language-specific phonological features through classroom instruction. Multiple factors can aid in the

process. One of them is frequent L2 pronunciation software use in the classroom that can facilitate the acquisition of language-specific phonological features in L2 language learners and approximate their pronunciation to native-like.

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