Effects of Task Language on English and Spanish Bilinguals' Speech Perception Study

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INTRODUCTION

Our research aimed to investigate the differences in language perception between English-Spanish bilinguals in an English versus Spanish language setting.

Many theories have been proposed to explain how language perception occurs, and one such theory posits the existence of two distinct phonetic systems that individuals switch between when speaking (Grosjean, 2001).There are slight yet prevalent differences between how bilinguals differ from monolinguals, one being exercising the tactic of frequently and almost automatically changing between languages (Grosjean, 2001).

One way to measure task switching is to look at perceptual differences when bilinguals are placed in a language setting for one of the two languages. For example, Gonzales et al. (2019) found that participants adjusted the boundary between /b/ and /p/ sounds based on the conceptual cues of the language they were told they were listening to (either English or Spanish). Similarly, Casillas and Simonet (2018) found that priming English or Spanish modes within the same session led early bilingual participants and proficient second-language learners, but not less proficient learners, to rapidly switch between language settings. Together, these findings show that processing relies on contextual linguistic information.

These findings support why it is worth investigating how English-Spanish bilinguals perceive speech given either English or Spanish instructions. The purpose of our study was to test how spoken in-person interactions and instructions could shift bilinguals' speech perception altogether along a voice onset time (VOT) continuum.

We did this specifically by manipulating voice onset times (VOTs) between stop consonants that exist in both English and Spanish, but with different distributions (see STIMULI section). The chosen stimuli also allowed us to investigate the Ganong effect (Ganong, 1980) across languages, because both ends were words in Spanish, but only one was a word in English.

METHODOLOGY

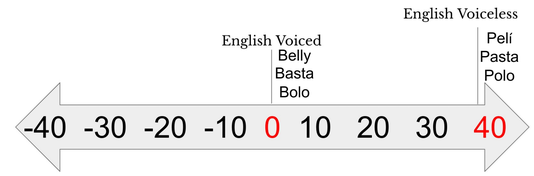
•**Participants**: Spanish-English bilinguals engaged in pre-experiment interactions, received instructions, and completed the experiment in either English (N=15) or Spanish (N=11). English-speaking monolinguals (N=11) completed the experiment in English.

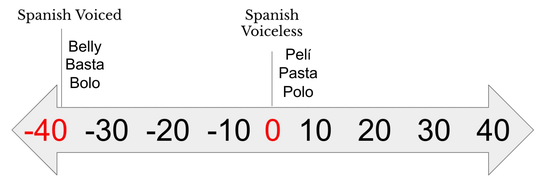
•**Procedure:** Participants were greeted by research assistants in either English or Spanish and engaged in small talk. Researchers gave a scripted explanation of the procedure and then participants completed a Qualtrics survey in the assigned language.

•**Design:** The design was between-subject and experienced in English or Spanish. It was administered via a Qualtrics survey where the participants listened to 36 unique stimuli 2-4 times each. On each trial, they were asked if the word started with a /b/ or /p/ sound.

STIMULI

We created audio stimuli by manipulating voiced onset times (VOTs) between -40ms and +40ms in 10ms increments. There were 3 different word pairs (belly/pelí, basta/pasta, bolo/polo) that were each played at 8 unique VOTs (-40ms, -30ms, -20ms, -10ms, 10ms, 20ms, 30ms, 40ms).

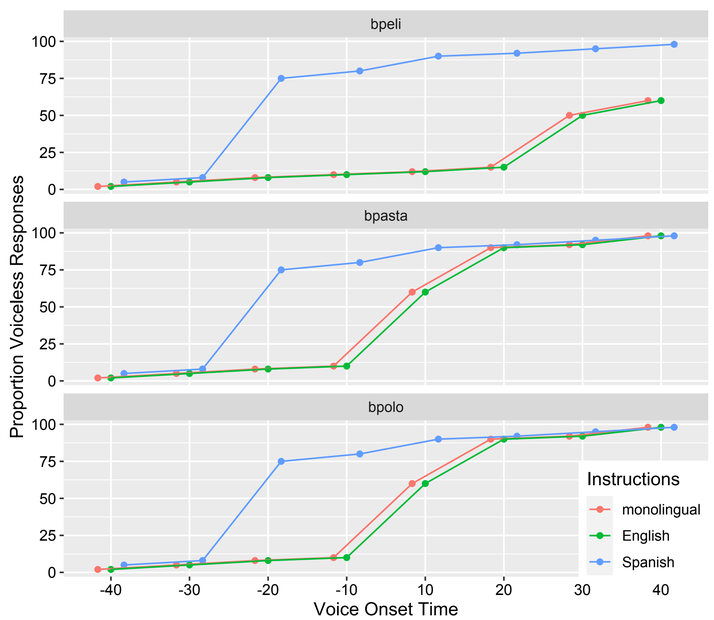




PREDICTED RESULTS

We predicted that participants who completed the experiment in Spanish would more readily report hearing /p/ at more negative VOTs because they were primed to perceive the negatively-shifted VOT continuum of the Spanish language.

For the belly/pelí word pair, monolinguals and bilinguals in the English group would more readily report hearing /b/ at more positive VOTs because they were primed to perceive the positively-shifted VOT continuum of the English language, whereas for the basta/pasta and bolo/polo word pairs, participants would report hearing /p/ at lower VOTs.

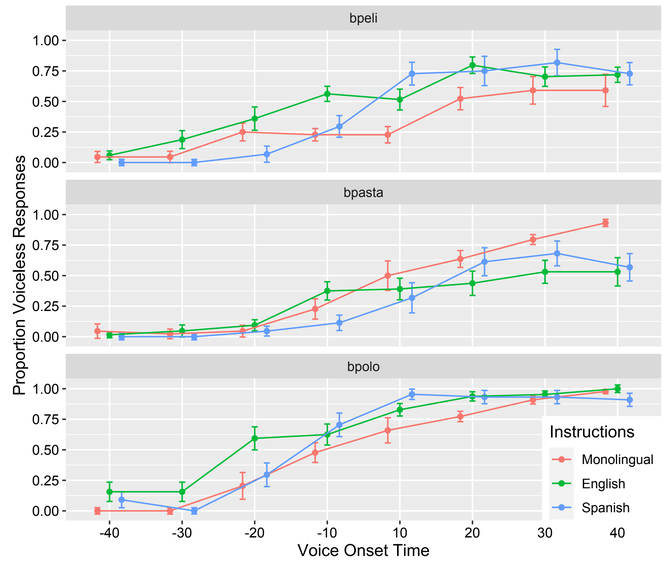


ACTUAL RESULTS

BELLY/PELÍ
- Bilinguals in the English group reported hearing voiceless /p/ at lower VOTs.
- Bilinguals in the Spanish group could more easily categorize voiced and voiceless sounds.
- Monolinguals did not report voiceless sounds until higher VOTs.

BASTA/PASTA
- Bilinguals in the English group reported hearing voiceless /p/ at lower VOTs.
- Bilinguals in the Spanish group did not report voiceless sounds until higher VOTs.
- Monolinguals had a gradual shift.

BOLO/POLO
- Bilinguals in the English group began reporting voiceless /p/ at more negative VOTs.
- Bilinguals in the Spanish group did not report voiceless /p/ until higher VOTs.
- Monolinguals had a gradual shift from voiced to voiceless.



CONCLUSIONS

The results show that there are significant differences in how bilinguals perceive speech based on task language setting. However, we know that language perception is not only a bottom-up process, but it is influenced by a multitude of top-down factors. We hope to continue the study using electroencephalogram (EEG) imaging to examine if participants are perceiving sounds differently or retroactively deciding the language of the word based on task language.

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