

Effects of Spanish L1 on phonetic and phonemic perception of English /b/ and /v/

Bridget J. Smith and Amber Torelli

The Ohio State University

Spanish includes the graphemes “v” and “b”, but the phoneme /v/ does not exist in Spanish the way it does in English. Instead both graphemes are represented by the underlying phoneme /b/, with the voiced bilabial stop [b], voiced bilabial fricative [β], and the bilabial approximant [β] as allophonic realizations. In word-initial position both “v” and “b” are pronounced [b]. In English, /b/ and /v/ are contrastive, being represented orthographically by “b” and “v” respectively. Additionally, /b/ has different degrees of voicing in the two languages: in English, /b/ often exhibits short-lag VOT, while in Spanish, it is usually pre-voiced (negative VOT). In order to investigate whether Spanish-English bilinguals’ Spanish phonology interferes with their English phonology, Spanish-English bilinguals’ and English monolinguals’ perception of English words and non-words containing word-initial /b/ and /v/ was compared during an eye-tracking experiment. In this word search task, participants heard English words and non-words pronounced over headphones and had to search for the appropriate word or non-word on the screen, using the mouse to select which form they thought they heard. Responses to words and non-words beginning with /v/ and /f/ were used for comparison, which are distinctive in both languages. For the purpose of this experiment, we allowed the participants to self-define bilingualism as meaning fluency in both languages, though not necessarily native fluency in English. Spanish was considered to be the first language of these participants because it was the language spoken at home during their early years, regardless of whether English was also spoken at home and in the surrounding communities.

The results in Figure 1 show worse discrimination of /b/ and /v/ for Spanish bilinguals, in that the accuracy in differentiating between the target *b*- and the competitor *v*- words for Spanish bilinguals (65.3%) is lower than that for English monolinguals (74.2%); although, the task was also surprisingly difficult for English speakers. Spanish bilinguals also performed worse when *v*- words and non-words were presented with *b*- words and non-words as competitors (84.9% accuracy compared to 95.6% for English monolinguals). In comparison, Spanish bilinguals performed as well, if not better, than English speakers on *v*- words and non-words when *f*- words and non-words were used as competitors. Additionally, the time-course of activation revealed by eye-tracking results show delayed activation and reduced confidence in the Spanish bilinguals for *b*- and *v*- words and non-words (Figures 2 and 3), as determined by greater proportion of looks to *v*- and *b*- competitors, respectively, while they performed about the same as English speakers on *f*- words and non-words with *v*- competitors (Figure 4). Even though the Spanish bilinguals had been living in the U.S. for years, using English on a daily basis, they showed definite evidence of interference from their Spanish phonology when perceiving English words with contrastive /b/ and /v/. These results support the hypothesis that second language acquisition involves the mapping of L2 phonemes onto the existing L1 phonological space, and that the two phonological systems may remain linked for a very long time, if indeed they can ever be separated. Age of acquisition and length of time using the L2 may play some role in the ability to distinguish word-initial /b/ and /v/. The surprising difficulty encountered by native English speakers in distinguishing /b/ from /v/ and /f/ from /v/ is explored using acoustic analysis of the stimuli produced by native English speakers, and may be due to the variability of /f/ and /v/ in English, including variability of voicing and frication.

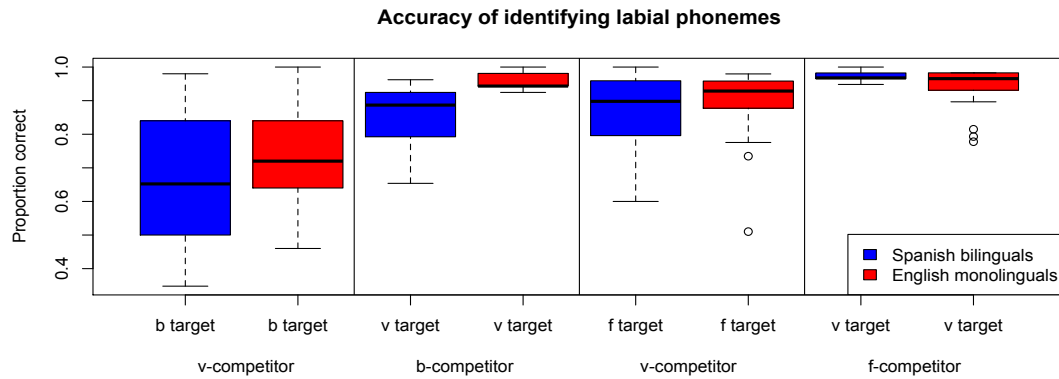


Figure 1: Accuracy rates in identifying /b/, /v/, or /f/ initial words and non-words.

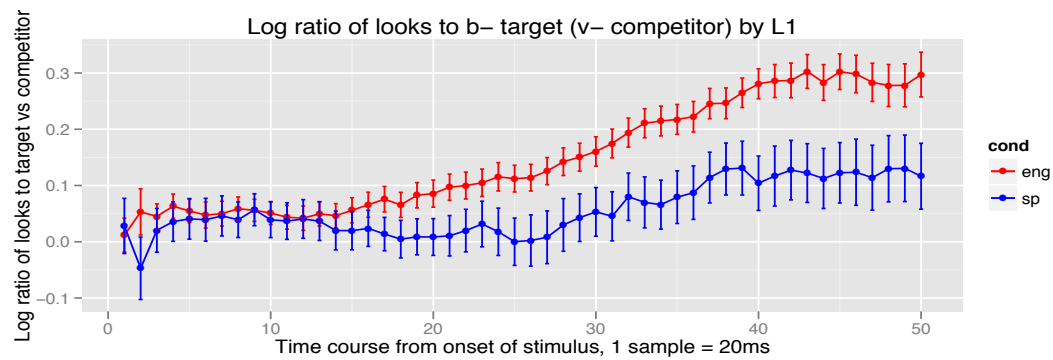


Figure 2: Log ratio of looks to *b*- target with *v*- competitor

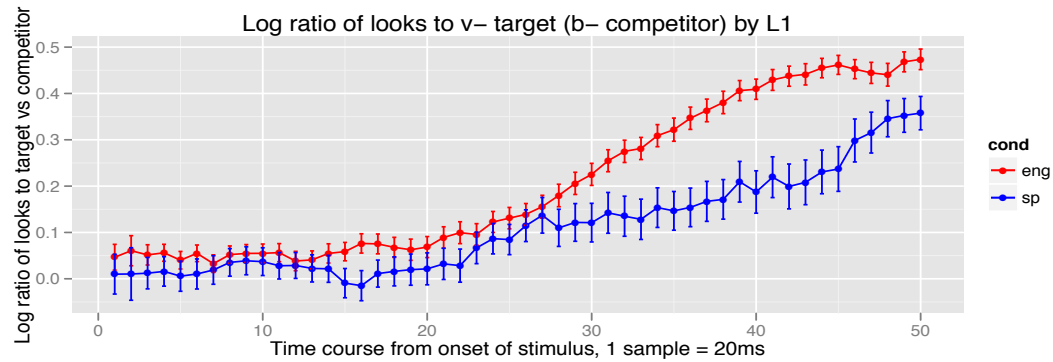


Figure 3: Log ratio of looks to *v*- target with *b*- competitor

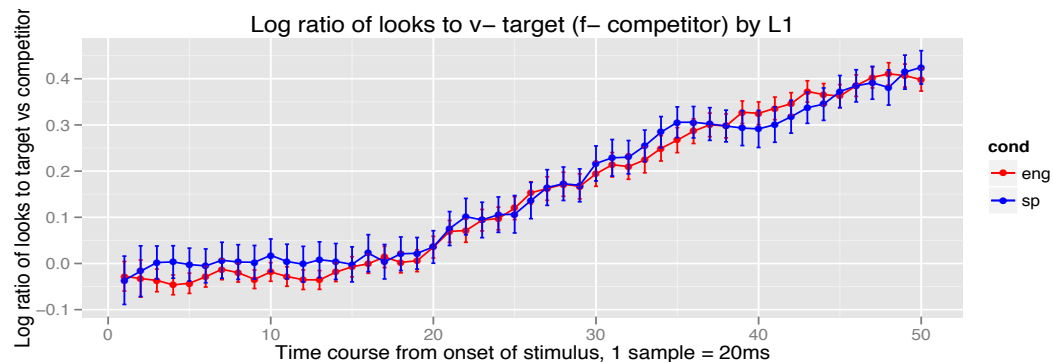


Figure 4: Log ratio of looks to *v*- target with *f*- competitor