

## Examining phonological (in)stability to inform the L1 versus L2 debate

The present study investigates the extent to which early-acquired versus late-acquired (i.e., adult) phonological systems resist influence from a third language (L3). We test the hypothesis that adult-acquired phonological systems, even when evidencing native-like production and perception, are different from early-acquired systems with regards to the stability of the phonological system.

We examine L3 acquisition of Brazilian Portuguese (BP) and its effects on Spanish phonological systems that are acquired late (sequential L1 English/adult L2 Spanish,  $n=18$ ) versus early (sequential L1 Spanish/adult L2 English bilinguals,  $n=9$ ; heritage speaker English/Spanish bilinguals,  $n=16$ ). A study of Spanish and BP perception and production by L3 advanced BP learners investigated BP  $\rightarrow$  Spanish influence across BP development. To test the hypothesis, we investigated potential effects of L3 BP word-final vowel reduction on Spanish word-final vowels. BP unstressed syllables are less prominent than stressed syllables, evidenced by higher, shorter, less intense vowels than their stressed counterparts (Massini-Cagliari, 1992). However, in the varieties of Spanish tested here, word-final vowels do not undergo reduction similar to the reduction evidenced in BP (Example 1).

While there were no differences in control data from L1 BP speakers ( $n=15$ ) and L1 Spanish speakers ( $n=11$ ) in terms of intensity and duration, the data confirm that BP word-final vowels have a lower F1 (i.e., they are higher) and a higher F2 (i.e., they are more front) than Spanish word-final vowels (Figure 1). Thus, once L3 learners converge on the L3 BP target, we predicted that influence on the Spanish system could surface in the form of word-final Spanish vowels with a lowered F1 and/or increased F2.

We report findings from one production and one perception task. Participants completed the tasks in Spanish and BP on different days, and the order of language tested was counterbalanced. Stimuli across tasks and languages consisted of a set of phonotactically legal nonce CV.CV tokens (e.g., /male/, /tamo/) presented at the end of a carrier phrase. Production data came from a delayed repetition task in which learners heard the target stimulus at the end of a carrier phrase, followed by a distracter question that prompted the learner to repeat the first phrase. Production data were measured for F1-F0, F2-F1, duration, and intensity and submitted to statistical analysis using a Mixed Linear Model (MLM) with item and participants as random effects. Perception was examined via a timed forced-choice naturalness preference task, in which participants were given up to 3000ms to select between a token with a word-final reduced vowel (BP-like) and one with a fully-realized vowel (Spanish-like). Accuracy was analyzed via Logistic Binary Regression and reaction time (in ms) was analyzed using an MLM.

The L3 BP production and perception data indicate convergence on the L3 target by each of the experimental groups in that participants' data do not differ significantly from the BP control data (Figure 2). However, although the learners all had something available for transfer from BP to Spanish, no statistically significant differences were found when comparing the Spanish control data and the experimental groups' Spanish data (Figure 3). Although the data set does not support the hypothesis for differential stability in early- versus late-acquired systems, a closer look at individual data points to instability in some L2 Spanish speakers' production that is not evident in the early-acquired learners.

**References:**

Massini-Cagliari, G. (1992). *Acento e ritmo*. São Paulo: Contexto.

**Examples:**

(1) BP and Spanish word-final vowels

	<b>BP</b>	<b>Spanish</b>	
/a/ <i>casa</i>	[ 'ka.zɐ ]	[ 'ka.sa ]	'house'
/e/ <i>frase</i>	[ 'fra.zɪ ]	[ 'fra.se ]	'phrase'
/o/ <i>parto</i>	[ 'par.tu ]	[ 'par.to ]	'birth'

**Figures:**

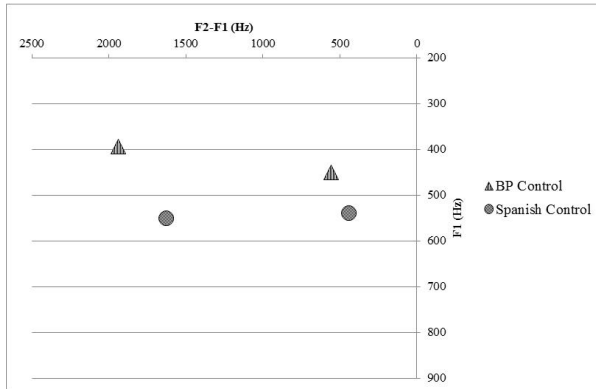


Figure 1. BP and Spanish /e/, /o/. BP vowels are higher (lower F1) and more fronted (higher F2).

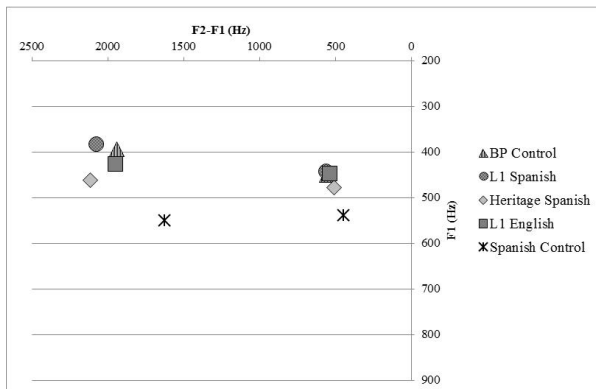


Figure 2. BP vowels produced by experimental groups and controls (no significant differences).

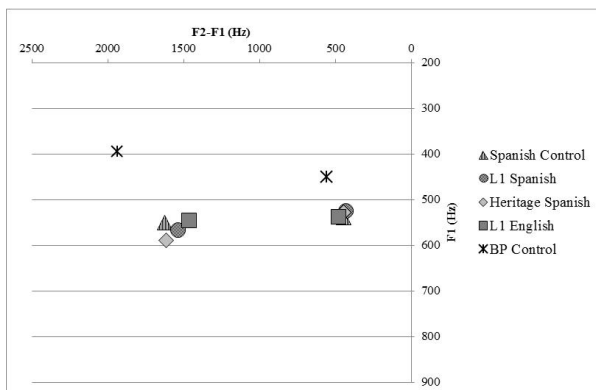


Figure 3. Spanish vowels produced by experimental groups and controls (no sig. differences).