

On-going L1-based influence in the L2 acquisition of the phonology and phonetics of English word-final nasals

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Mastering word-final consonants involves the simultaneous acquisition of phonological contrasts and target-language patterns of coarticulation with following segments in connected speech. To date, research has primarily focused on the former learning problem (e.g., Broselow & Xu, 2004), with studies of coarticulation having investigated voicing assimilation (e.g., Cebrian, 2000; Simon, 2010). In both cases, researchers have overwhelmingly used auditory transcriptions or acoustic analysis. Given the complexity of acoustic models used to characterize nasal place articulation (Stevens, 1998), it is not surprising to see very few studies on the topic (Chan, 2007). Articulatory techniques, such as electropalatography (EPG), allow us to capture directly both nasal place contrasts and gradient coarticulatory processes. Thus, with the goal of increasing our general understanding of the acquisition of coda consonants, the present study investigates simultaneously the L2 acquisition of phonological place contrasts and coarticulation in English word-final nasals using EPG.

High intermediate/advanced L2 learners (3 each of L1 Japanese, Spanish, and French) as well as two English-speaking controls wearing custom-made Reading-style, 62-electrode EPG palates were tested on their L1 and L2 production of each language's word-final nasals via a carrier sentence reading task (e.g., *That's an awesome/common/charming pattern/sample/habit*); each carrier phrase was read 6 times, generating 24 tokens per speaker. Japanese, Spanish, and French differ (i) phonologically: whereas French, like English, allows syllable-final /m-n-ŋ/, nasal codas are more restricted in Spanish and Japanese (/n/ or /ŋ/ respectively pre-pausally/vocally; homorganicity with the following consonant elsewhere); and (ii) phonetically: like English, place assimilation with the following consonant is gradient in French but categorical in Japanese and Spanish. Based on typological similarity, French-speaking learners should be more target-like than their Japanese and Spanish counterparts.

Measurement of coarticulation was accomplished using the *Articulatory Assistant* software (Wrench, Gibbon, McNeill & Wood, 2002) to record, segment, and analyze the data. Whereas the phonological categorization of place contrasts was done auditorily, coarticulation was evaluated using standard articulatory measurements (Gibbon & Nicolaidis, 1999) to determine the relative location and degree of nasal constrictions. Learners' English productions paralleled those of their L1s both phonologically and phonetically with the exception of the Japanese speakers who had acquired the three-way English place contrast, although productions sometimes involved a following glottal stop or, less often, epenthetic vowel. In summary, with the exception of the Japanese learners' acquisition of the English phonological place contrasts, the results show strong L1 influence on both phonological and phonetic coda production even at more advanced stages.

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