L1 influence on L2 assimilation: An EPG study of English /n/+stop sequences
Laura Colantoni, Alexei Kochetov & Jeffrey Steele (University of Toronto, al.kochetov@utoronto.ca)

Articulatory studies have shown crosslinguistic differences in across-word nasal place assimilation. The categorical versus gradient nature of assimilatory patterns is presumably phonologically conditioned: languages with larger nasal coda inventories show gradience; those with more restricted inventories display categorical patterns. In the case of L2 acquisition, previous articulatory studies have shown strong L1 influence (Solé, 1997; Davidson, 2005), particularly across word boundaries (Zsiga, 2003). The question arises as to whether L1 assimilatory processes are transferred independently of the L1 phonological inventory. English, with its 3-way labial-alveolar-velar nasal contrast and a preference for gradient and variable nasal-to-stop assimilation (e.g., Ellis & Hardcastle, 2002), allows for the study of the L2 acquisition of coda nasals by learners of typologically more/less similar languages, such as French, Japanese, and Spanish. French is more similar to English in assimilatory patterns (albeit less variable; Colantoni et al., 2016) but rather has a labial-alveolar-palatal distinction in codas. In contrast, Japanese and Spanish have only one nasal coda with categorical assimilation across words (Stephenson, 2004; Honorof, 1999). These typological differences allow us to test whether the L2 acquisition of coda contrasts blocks L1 coarticulatory patterns. On the assumption that L2 learners’ production is heavily influenced by their L1 phonological and phonetic systems, French speakers should be more target-like, given the greater similarity of word-final French and English nasals. Japanese and Spanish learners are expected to diverge from English speakers and transfer their categorical assimilation patterns.

To test this hypothesis, 11 participants (3 of each L1 plus 2 English controls) completed a carrier sentence reading task (That’s a ____ ) involving meaningful English sentences in which coda /n/ was followed by consonants including laryngeal /h/ (common habit; ’n0’ control condition), alveolar /t/ (common tactic; ’nt’), and velar /k/ (common caption; ’nk’), among other sequences. Wearing custom-made Reading-style, 62-electrode EPG palates, participants produced 9 repetitions of each utterance that were compared to earlier collected L1 data using comparable materials (1). The nasal interval was annotated and tongue-palate contact measurements were extracted one-third and two-thirds through the nasal interval: (i) Centre of Gravity of Contact (COG; Gibbon & Nicolaidis, 1999): higher values correspond to more anterior, alveolar articulations; (ii) overall contact difference (Qa(nterior)-Qp(osterior)) between the front and back 4 rows of electrodes: positive/negative values correspond to alveolar/velar constrictions respectively; near-zero values capture gestural overlap.

Figure 1 provides sample linguopalatal contact profiles. The target English pattern (a-i) involves an alveolar constriction in all 3 sequences, with strong velar gestural overlap in ’nk’ (i.e., [nj]); see (b-i)). The French speakers’ L1 and L2 productions (a-ii) were overall similar to the English target (a-i), with a comparable degree of alveolar-velar gestural overlap (b-ii). Japanese speakers’ realization of the single coda nasal (a-iii) shifted from the L1 uvular to the target L2 alveolar. The L1 and L2 realizations of the nasal before /k/, however, were different from the target, involving largely complete place assimilation. Spanish speakers (a-iv) realized the single coda nasal (before /h/) as velar, in contrast their L1 alveolar realization (before /a/; see (1c)). This is presumably due to assimilation to /h/ (realized as [x]) and consistent with L1 Spanish /n+x/ sequences. Complete nasal assimilation occurred before /k/ in both the L1 and L2, markedly different from the English target, but similar to Japanese. Figure 2 provides speaker-specific /n/ COG and Qa-Qp values in all 3 contexts one-third way through the nasal interval by L1/L2 (with asterisks indicating significant differences). Values at two-thirds of the interval were overall similar, but more velar-like for English and French speakers, reflecting considerable gestural overlap.

In summary, the results provide evidence that the L2 production of nasal+stop sequences is heavily influenced by the corresponding L1 patterns, as speakers’ L2 coarticulation clearly resembles that of their L1. While Japanese speakers showed some English-like realizations of single coda nasals, their L2 nasal-velar stop sequences were largely L1-like, as was the case for Spanish speakers, consistent with previous articulatory research on these languages as L1. This suggests that learners may acquire phonological coda contrasts before acquiring across-word assimilatory patterns. Overall, our results are consistent with previous studies that reveal that even advanced L2 learners transfer their L1 co-articulatory patterns, particularly across words (Zsiga, 2003). This, in turn, provides support for positionally-based acquisition models (Flege, 1995).

Figure 1. Linguopalatal contact profiles for the nasal interval for representative speakers, (left); black = 100% contact; white = 0% contact; examples of gestural overlap in /n+k/ clusters (right).

Figure 2. Mean COG (left) and Qa-Qp (right) at 1/3 of the nasal interval for non-English speakers.

Selected references


