Non-native Articulatory Variability in English Phonological Rule Application: Evidence from Korean and Indian Learners

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Spoken words naturally exhibit variability in the acoustic and articulatory dimensions, and so do realizations of language-specific phonological rules [1, 2, 3]. While numerous studies have investigated and documented L1 and L2 speakers' cues to differentiate sound categories in their native and non-native languages, it calls for further investigation how various groups of learners, e.g., whether or not they are EFL (English as a Foreign Language) or ESL (English as a Second Language) learners, acquire and produce phonological rules in their target languages. This study examines how Korean EFL speakers and Indian ESL learners apply three different phonological rules in English (the target language) – palatalization, place assimilation, and word-final coronal deletion – to their production of coronal consonants, and compares articulatory variability produced by two groups using ultrasound imaging. The three research questions that are addressed in this study are: (1) Do EFL and ESL speakers exhibit phonological variation? (2) Do the spectrum of phonological variation differ in their magnitude according to individual rules? (3) Do EFL speakers show different patterns of phonological variation from ESL speakers?

Ultrasound tongue contours from four Korean EFL and eight Indian ESL speakers show that both groups of learners produce a wide range of phonological variation in their target language. Both EFL and ESL speakers produced palatalized and non-palatalized variants in the palatalization context (Figure 1), and speakers from both groups tended to produce non-palatalized variants more often than palatalized ones (EFL: 74% non-palatalized & 26% palatalized; ESL: 80% non-palatalized & 20% palatalized). Both groups' preference for non-palatalized variants in the palatalization context might have been resulted by the way palatalization rules in learners' native languages are applied, in which palatalization is optional in the colloquial register in Tamil [4], and obligatorily applied across morpheme boundaries in Korean [5].

In their production of place assimilation rules, both EFL and ESL speakers yielded three major variants: assimilated, non-assimilated and hyperarticulated variants (Figure 2). Contrary to the gestural patterns in the palatalization context, the assimilated variants were dominant in both groups, with a noticeable inter-group difference (EFL 38% vs. ESL 31%). Patterns of assimilation also exhibited variability across places, in which coronal-to-velar assimilation resulted in more variation than coronal-to-labial assimilation.

Word-final /t/ deletion rules, as shown in their gestural patterns of place assimilation rules, were realized by both groups in three variants: deletion, no deletion, and hyperarticulation (Figure 3). Their production of deletion rules also yielded inter-group variation, in which no deletion was dominant in the EFL group, and deletion in the ESL group. As reported in their production of place assimilation, both EFL and ESL speakers exhibited variation across different places. Hyperarticulation was favoured before a velar stop, e.g., *must cap*, than before a labial stop, e.g., *must pad*.

Articulatory patterns reported in this study confirm that both EFL and ESL speakers produce a substantial amount of phonetic variability as native speakers would do. The way phonological rules are applied is inherently gradient rather than categorical. Both Korean EFL and Indian ESL speakers show that the extent of the spectrum of pronunciation variants differ by individual learners and phonological rules, and the likelihood of each phonological variant varies across phonological contexts.
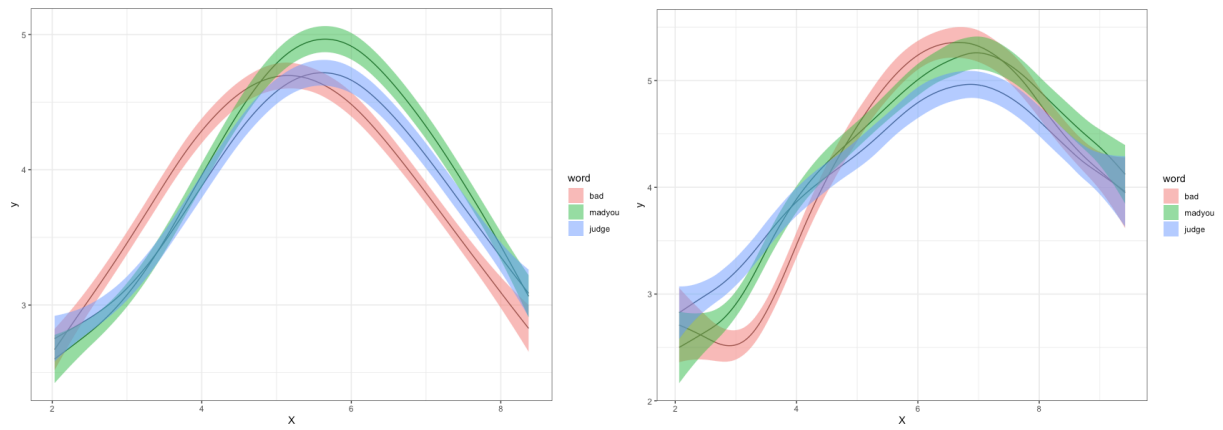
Fig.1 : Palatalization from EFL Speaker #1 (left) and ESL Speaker #1 (right)
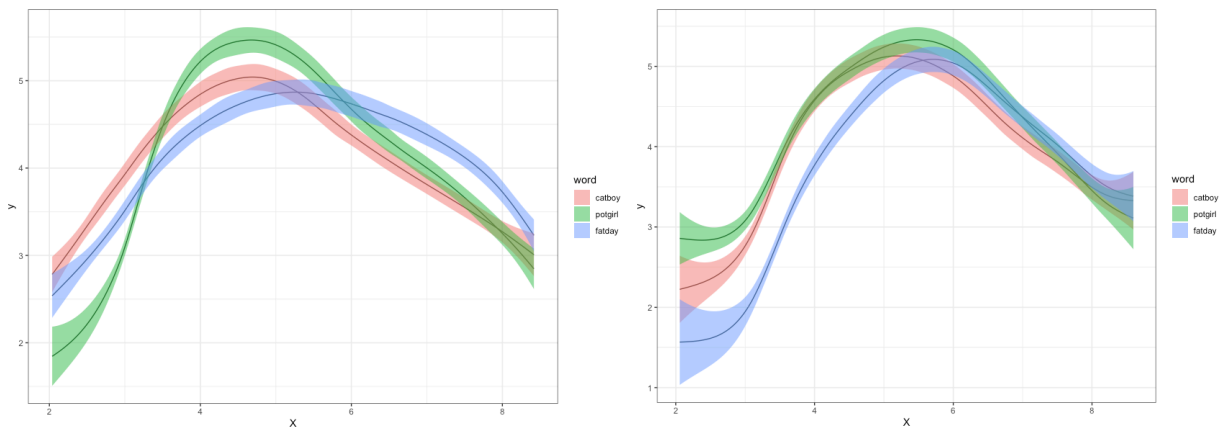

Fig.2 : Place Assimilation from EFL Speaker #2 (left) and ESL Speaker #8 (right)
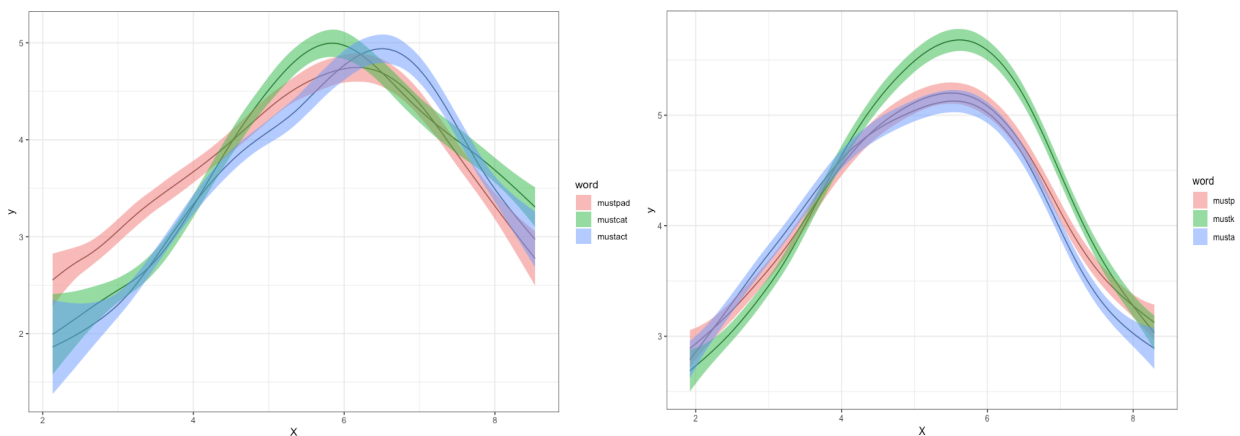

Fig.3 : Word-final /t/ Deletion from EFL Speaker #5 (left) and ESL Speaker #2 (right)

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