Acoustic and perceptual evaluation of Japanese geminates produced by L2 learners

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Previous studies have well established that second language (L2) learners of Japanese have difficulty producing Japanese words with singletons and geminates accurately (e.g., Masuda and Hayes-Harb, 2005). However, less known is how this inaccurate production may relate to native listeners' judgments on degrees of foreign accent. The present talk will examine *accuracy* and *foreign accent* of L2 production with two related sets of data (Hirata, 2017; Hirata and Kato, 2015).

For the first set (Hirata, 2017), L2 learners' production of singleton and geminate stops, collected in two stages from the same learners, were acoustically and perceptually analyzed for their *accuracy*. For the acoustic analysis, ratios of the stop closure over the entire disyllabic words were examined, and accuracy of the L2 production was assessed using the boundary ratios provided by native speaker production. Results indicated that L2 production accuracy was lower for geminate than singleton words (49.2 vs. 96.8%). Native listeners also auditorily identified accuracy of the L2 production, showing a lower accuracy for geminates than singletons (23.6 vs. 43.5%).

For the second set (Hirata and Kato, 2015), we examined degrees of *foreign accent* in a short sentence including singleton and geminate stops produced by the same L2 learners. In particular, we were interested to identify roles of duration, fundamental frequency (f0), and intensity in signaling foreign accent. For this, we used a 'morphing' technique in which we swapped the values of these three acoustic parameters between L2 learners and native speakers, and had native Japanese listeners evaluate degrees of foreign accent in the original production and modified stimuli. In addition, native listeners evaluated *accuracy*, i.e., whether words were heard as the learners intended in original script reading. We found that: (1) the original L2 production with geminate stops was rated as more strongly foreign-accented than that with singleton stops; (2) correction of intensity had an ignorable effect on improvement of perceived foreign accent; (3) corrections of duration and f0, separately or together, improved the foreign accent rating towards the native level; (4) L2 learners who had inaccurate duration did not benefit from only correcting f0 in improving their foreign accent, while those who had inaccurate f0 benefitted from only correcting duration; and (5) when evaluating only "accurate" stimuli in terms of singleton and geminate production, native speakers still detected foreign accent.

In summary, the present L2 learners were less accurate and sounded less native-like in producing geminate than singleton words. Taken together, the results suggest that learners may need guidance not only towards 'accurate' production of singleton and geminate consonants but also towards 'natural/native-like' pronunciation without indicating foreign accent.

References:

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