Perception of non-native contrast: Consonant length and L1 English listeners

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Languages like Finnish, Italian, and Japanese maintain a contrast for consonant length that can be difficult for English speakers to learn, as it is not a native phonemic contrast. Research has shown that English speakers are sensitive to length (Pickett & Decker, 1960) but do not maintain a phonemic contrast (Hayes, 2002). The current study focuses on English speakers' ability to discriminate and identify a non-native consonant length contrast. Given that learners can eventually acquire a contrast (MacKain, 1981), we investigate three questions: (1) What is the initial state of length perception in naive listeners? (2) Do listeners treat length differently for different consonants? (3) Can minimal instruction about consonant length contrast boost perception in naive listeners?

To investigate these questions, three groups of listeners performed a speeded AX discrimination task and a speeded forced-choice identification task on non-words (e.g., /hupo/ - /huppo/) produced by a native Finnish speaker which were manipulated for intervocalic consonant length. The first group are L1 English listeners who were informed they would hear words in an unknown L2 (No-instruction), while the second group was informed they would hear words from Finnish which can distinguish words based solely on consonant length (Instruction). A third group of native Finnish speakers served as controls (Native).

In the speeded AX discrimination task the contrast between the word pairs ranged from 0% of average singleton/geminate contrast (i.e., consonants of same duration) to 200% of average singleton/geminate contrast (i.e., twice the normal contrast) in 50% steps generating a 6-step continuum. This task required listeners to use a primarily phonetic strategy for determining if the stimulus pair was the same or different. Logistic mixed-effects regression models of the responses reveal that native speakers respond well above chance beginning at the natural phonological contrast, as expected. English speakers (in both groups) respond to increasing contrast duration in a more phonetic fashion; however, the instructed group does significantly better at detecting the contrast (Fig. 1, left). Additionally, if we subdivide the English speakers receiving no-instruction into groups with no-proficiency and proficiency in an L2, the subjects that are proficient in an L2 have a perceptual advantage in hearing the contrast (Fig. 1, right).

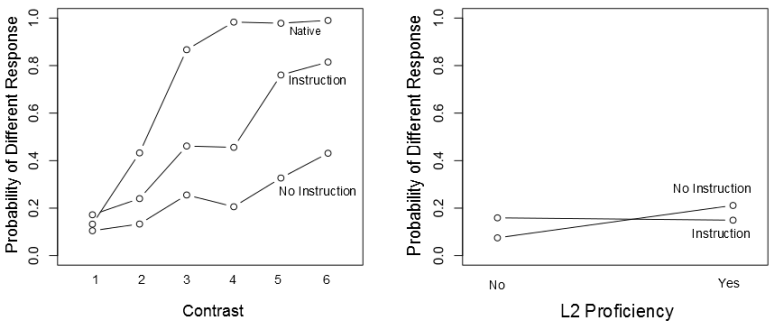

Figure 1 – Partial effects of Discrimination Task models. Left panel: Interaction of Contrast by Group. Right panel: Interaction of L2 Proficiency by English-speaking groups.

In the speeded forced-choice identification task the consonant length of the stimuli ranged from 75% of an average singleton to 200% of an average geminate in 25% steps generating a 10-step continuum. It required listeners to use a more phonological strategy for determining if the intervocalic consonant was either short or long. Logistic mixed-effects regression models of the responses reveal that native speakers respond well above chance beginning at the natural length distinction, as expected. English speakers (in both groups) do not show evidence of a boundary; however, the instructed group does significantly better at detecting the consonant length (Fig. 2, left). Analysis revealed significant differences in perceptibility between consonants among the English speakers, though these differences were mitigated for the instructed group in the direction of native speaker performance (Fig. 2, middle). Again, proficiency in an L2 aids English speakers in the detection of consonant length (Fig. 2, right).

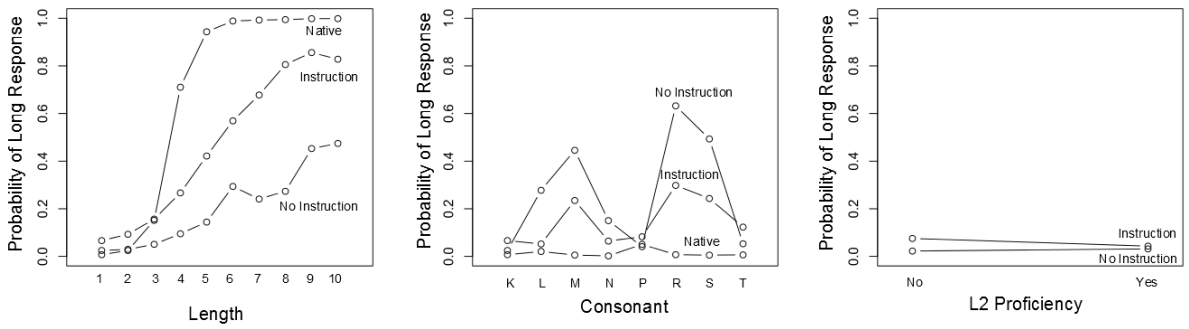

Figure 2 – Partial effects of Identification Task models. Left panel: Interaction of Length by Group. Middle panel: Interaction of Consonant by Group. Right panel: Interaction of L2 Proficiency by English-speaking groups.

The results of this study lend support for a phonetic level of processing which is intermediate to non-linguistic acoustic processing and phonemic processing at which the phonetic cue of duration begins to take on meaning. The results also indicate that previous experience and attention help novice listeners in processing novel contrasts. Therefore, the formation of phonemic distinctions in a second language may be facilitated by the experience and attention and supplemented by auditory-perceptual training of the contrast.

References

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