Tracking changes in L2 articulation with longitudinal and native speaker comparisons

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In second language production research, the main focus is often on learners who have become relatively proficient in their L2. Training studies exist, but they also often target particularly difficult articulations for speakers who have been learning a language for some time (e.g. /r/ and /l/ in Japanese learners, Bradlow 2008). In this longitudinal study, we examine the early stages of language acquisition by focusing on English learners acquiring consonant clusters in Russian 1. Previous research has shown that non-learner English speakers have difficulty accurately producing obstruent clusters in syllable onsets (Davidson 2006). A main goal of this research is to examine changes in the articulatory coordination of consonant clusters over one year for beginning learners in a college Russian classroom.

Ultrasound data from two learners was collected at both the beginning of the academic year, before they had begun learning Russian, and again after two semesters. In addition, four native Russian speakers were also recorded with ultrasound producing the same utterances to provide a baseline comparison for what the learners should be acquiring. All speakers produced short phrases containing #CC, C#C, and #CəC sequences for three consonant combinations: /gd/, /kt/, and /tk/. An example for /gd/ is shown in (1). These sequences were chosen to compare two potential articulatory implementations (C#C and #CəC) that English speakers may substitute for the non-native #CC.

(1) C#C  #CC  #CəC
    [prɛb'eg  də'moj]  [xotj  gđə'mam]  [prəʃi'taʃ  gđə'voj]
    ‘the run home’  ‘at least to the houses’  ‘to read the annual’

To compare learners’ productions at two different time points and to compare them to native Russian speakers’ utterances, a global measure of similarity was implemented. First, tongue contours for several repetitions of all three sequences were extracted from the start of the silence of C1 to the end of the silence of C2 using EdgeTrak (Li et al. 2005). Next, the repetitions for each sequence type were averaged using the software program CAVITE (UMD Dental School). Finally, to determine whether the articulation of #CC is more similar to C#C or #CəC, both the mean difference in millimeters and the RMS difference along the length of the tongue curves for the averaged contours was calculated in CAVITE for the #CC~C#C, #CC~#CəC, and C#C~#CəC comparisons.

For the learners’ velar-initial sequences that have been analyzed to date, the articulation of #CC is most similar to #CəC at both time points for one participant. The other learner starts out with a #CC articulation that is more similar to C#C, but by the second time point, #CC is more similar to #CəC. For native Russian speakers who are the models for the L2 learners, #CC sequences are more similar to #CəC than to C#C. These results can be explained in terms of the syllabic position of the consonants: in #CəC and #CC, both consonants are in onset positions. An acoustic examination suggests that while learners may have begun to determine that #CC has more articulatory properties in common with #CəC than with C#C by the second time point, they have not yet completely eliminated the excrecent schwa commonly inserted by English speakers producing Russian consonant clusters.