

ACOUSTICS2008/2009
The Effect of Vowel Duration on Formant Frequencies - Data from Hakka Chinese

Wai-Sum Lee and Eric Zee

Phonetics Lab, Dept. of Chinese, Translation and Linguistics, City University of Hong Kong, 83 Tat Chee Avenue, Kowloon Hong Kong, Hong Kong

In the target undershoot model, vowel duration is considered as the main determinant of vowel reduction, resulting in undershoot in formant frequencies relative to the "bull's-eye formant pattern" (Lindblom, 1963). The model predicts more schwa-like formant frequencies as vowel duration is shortened. In Hakka Chinese, vowel phonemes /i e a o u/ may be realized as long [i: e: a: o: u:] in the CV: syllables and short [i e a o u] in the CVS syllables (S = a stop consonant). Results of a formant frequency analysis of the long and short vowel sets in Hakka Chinese from 10 male and 10 female speakers show that (i) in all the short vowels there is a displacement of vowel formant frequencies away from the target frequencies associated with the long vowels; and (ii) relative to the target frequencies, F1F2 don't become more schwa-like for all the short vowels, with [u] being the only vowel that undergoes centralization in the F1F2 plane and with [i e o a] displaying a significant rise in F1, [i e] an insignificant decrease in F2, and [o] an insignificant increase in F2. It appears that the Hakka data do not support the target undershoot model.