

A CROSS-LINGUISTIC STUDY OF LIP POSITION IN VOWELS

Wendy Linker, Dept. of Linguistics, Phonetics Laboratory,
UCLA, Los Angeles, California 90024, USA

For most languages there is a correlation between rounding and backness of vowels, and the degree of lip opening is related to vowel height. For English, lip positions can be predicted from formants following the extraction of only one lip factor (Linker 1978). This factor represented a combination of lip protrusion and vertical lip opening. In languages with both front rounded and unrounded vowels we may hypothesize that different factors are needed to account for the variance in the data. 4 languages with such vowels were investigated (Swedish, Cantonese, French, Finnish) to see how vowel quality interacted with lip position. Two possibilities suggest themselves: (1) these languages conform to a universal relation between lip position and vowel quality, or (2) the relation between lip position and vowel quality is language specific, and the lip positions would differ significantly even if the vowel qualities were identical.

Simultaneous frontal and lateral photographs were taken of 8 male speakers of each of the 4 languages pronouncing words illustrating the vowels of their language. The session was recorded and the first 3 formants of the vowels were measured on spectrograms. The negatives were enlarged and traced. Exact distances for 24 lip measures were calculated. Harshman's PARAFAC procedure, a 3-mode factor analysis, was carried out separately for each language. To compare the languages within the factor space, a version of Canonical Correlation was used, which found a single space for the lip data of all 4 languages. The relation between formants and lip position could then be determined for each language and, since the factor space was identical, meaningful comparisons among the predicted lip spaces could be made by a 3-way Analysis of Variance. Since the lip spaces were predicted from formants, any significant differences are due solely to underlying differences in the use of lip position in these languages.

Reference

Linker, W. (1978): "Lip position and formant frequency in American English vowels", UCLA Working Papers in Phonetics 41, 20-25.