

Perceptual vs. acoustic similarity in L3: The relationship between Norwegian vowel assimilation patterns and the Euclidean distances

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This study investigates the relationship between the L3 Norwegian vowel assimilation to L1 Polish vowel categories and the acoustic distance between Norwegian and Polish vowels by examining Euclidean distance and lip rounding as explanatory factors in the observed patterns of cross-linguistic similarity.

So far studies concentrated on L2: perceptual assimilation (Best & Tyler 2007, Tyler et al. 2014), and the relationship between vowel perception and their acoustic parameters (Strange et al. 2003, Escudero et al. 2012). In the present contribution we aim to explore L3 perceptual and acoustic similarity operationalized as the Euclidean distance. The hypotheses are: (1) the smaller the Euclidean distance between two vowels, the higher the likelihood of assimilating a given Norwegian vowel to a Polish category; (2) lip rounding and duration differences may influence the assimilation patterns.

15 subjects (L1 Polish, L2 English and L3 Norwegian, mean age 21) assimilated 16 Norwegian vowels in /dVd/ context to six Polish vowel categories and rated their goodness of fit on a 7-point Likert scale. We examined the relationship between assimilation rates of Norwegian vowels to each Polish category, and the Euclidean distance between the reference vowels for Polish (Weckwerth and Balas 2019) and the Norwegian vowels presented in the perception experiment.

To analyze the data, we fitted a linear model to predict Assimilation Rating as a function of Euclidean Distance and Roundedness (of the marked front and central vowels) – both turned out to be inversely proportional. The Norwegian vowels were, as hypothesized and as reported in L2 studies, assimilated to the nearest Polish categories as determined by the Euclidean distance. We observed more variation in the case of high front rounded vowels /y(:)/, and back rounded vowels /u:, ʊ/, and uncategorized assimilation types in the case of mid central rounded vowels /ø(:)/, with similar Euclidean distances to many Polish categories, but no single counterpart.

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