Formant dynamics and word accents in type 2A Swedish

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Abstract

Background and objectives

Recent acoustic descriptions of the Swedish vowel inventory have shown that dynamic spectral cues help distinguish vowel categories (Persson, 2025). The inherent dynamics of both long and short vowels, combining with Swedish word accents, can give a look into the interplay between fundamental frequency (f_0) and formant dynamics. Recently, Standard Mandarin tones have been shown to affect the degree of diphthongization in closing diphthongs (Li & Al-Tamimi, 2024). The aim of the study is to investigate the relationship between f_0 and formant dynamics. The study also looks at temporal aspects of vowels according to the classifications of Peeters (1991).

Materials and methods

Recordings of L1 Swedish speakers with a dialect of the 2A-type have been used as the material for this study. A pilot study with two participants was conducted, comparing two reading tasks. Including these, 13 participants have been recorded in the LARM-studio of Lund University Humanities Lab so far. The participants read aloud a short story containing pairs of two-syllable words with differing word accents, where the first syllable contained the target vowel. In order to minimalize the effects of preaspiration and different formant transitions, the target vowels were followed by /n/ in most words. Because of lexical constraints, some were followed by /l/ and two were followed by /m/. The recordings were analysed in praat.

Results

Strong diphthongization can be seen in /eː/ in every simplex word. The initial steady-state of /eː/ may have formant values of around F1≈400 Hz, F2≈2200 Hz, F3≈2600 Hz. The offglide of /eː/ may have "target" formant values of around F1≈600 Hz, F2≈1500 Hz, F3≈2500 Hz. When /eː/ was found in a compound word, realizations with no diphthongization were found (F1≈450 Hz, F2≈2000 Hz, F3≈2500 Hz). Other long vowels featured slight diphthongization. The F1 of /oː/ rose near the end of the vowel, and the close vowels featured some semivowel offglides. Markedly, /uː/ and /ʉː/ exhibited reinsertion of the vowel after an offglide semivowel, e.g. [uwŭ]. Formants move further in words with accent II, and the formant movement might coincide with a fall in f_0. The short vowels displayed both less dynamic formants and less dynamic pitch.

Discussion

Preliminarily, what has been described by Persson (2025) and others is corroborated by this data. The formant values of diphthongized /eː/ differing from monophthong /eː/ is interesting. In accordance with Li & Al-Tamimi (2024), this data could imply that the degree of formant movement is affected by the dynamics of f_0, where F1 and f_0 correlate negatively. On the other hand, why specifically /eː/ features the most dynamic formants cannot be explained purely by this. The classification of /eː/ as a bipartite diphthong (steady-state/offglide) may be an accurate phonetic description. Other vowels featuring diphthongization do not have clear offglide components, temporally.

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