

Articulatory characteristics of vowel length: Intrinsic vs extrinsic accounts

Sireemas Maspong

Institute for Phonetics and Speech Processing, LMU Munich

Length contrasts, primarily manifested through duration, have been widely analyzed in many phonological theories. Approaches to length contrasts can generally be classified into two main perspectives: internal and external accounts. Internal accounts consider length an inherent property of a segment, such as the presence of a [long] feature in feature theory. In contrast, external accounts interpret length as a difference in segmental organization. For example, in prosodic phonology, a short vowel results from a vowel associating with a single timing slot/mora, whereas a long vowel results from the same vowel associating with two timing slots/moras.

In this project, we investigate the articulatory characteristics of vowel length, with the primary goal of testing the predictions of internal and external approaches to vowel length contrast. Thai is chosen as a case study, as vowel length is contrastive for all monophthongs. Previous research has demonstrated acoustically and perceptually that duration serves as the primary cue for the length contrast.

We collected articulatory data from 19 native Thai speakers using Electromagnetic Articulography (EMA). Participants were instructed to produce *mVm* and *mVn* words containing short and long /i, u, u, a/ vowels with different speaking rates: fast, normal, slow. Tongue body, tongue dorsum, and jaw movements during vowel production, along with lip aperture during the production of onset and coda /m/ and tongue tip movement during coda /n/ production, were tracked and analyzed for their kinematic and timing properties.

The findings reveal that long vowels inherently have a longer plateau duration, a more extreme maximum movement position, and a larger amplitude than short vowels. The differences in all internal properties remain stable across speaking rates. Furthermore, vowel length also affects the coda consonants: codas following long vowels exhibit a shorter lag from consonant closure to release compared to those following short vowels. The vowel-to-coda lag also differs between short and long vowels, with long vowels having a longer VC lag than short vowels. Similarly, the differences in external properties remain stable across speaking rates.

The results suggest that vowel length cannot be captured by either internal or external accounts alone. The articulatory characteristics reveal that vowel length involves both an internal specification of the vowel and a difference in external organization.