Variation in articulation causing instability in the phonetic realization of syllable structure

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Glide-like articulations in C_V environments present a tough analytical challenge, as they can realize no fewer than three different phonological structures (Pulleyblank 1983; Duanmu 2000). In present-day Mandarin Chinese, for example, a syllable such as /piŋ/ may be analysed as [pʰʲəŋ] with the glide treated as palatalization of the onset, [pʰjəŋ] with the glide treated as a segmental phoneme possibly making up a consonant cluster, or [pʰi̯əŋ] treated as part of the nucleus or as an onglide to the vowel. In this paper I address this using simultaneous acoustic and ultrasound data which can offer us a more precise description of the articulations which make up a syllable.

An extensive survey was carried out (30 subjects) from a variety of regions across China. Formant movement (and F2 slope of change), height, and duration were chosen as the main variables of investigation. Data was analysed using a novel adapted bi-polar co-ordinate system to generate accurate distance means between normalized splines (inspired by work by Stone et al 1983 and Zharkova & Hewlett 2009). Using this method for regions 3 and 4 (roughly equating to the hard palate), results showed both vowel lowering in [i], and more frontal articulations for the glide [j]. The acoustic results revealed gradience in steepness of the F2 slope (steeper for northerners (N), followed by central speakers (C), than for southerners (S)). Furthermore, a duration analysis for various syllable measures also revealed a significant duration increase when glides were present in the C_V environment (ANOVA ($F_{(1, 88)} = 11.42$, $p < .05$) + Pearson's at 95% (cor. 0.338, $t = 3.379$, $df = 88$, $p < .05$)). Finally, to understand more about categoricity and obligatoriness a Mixed effects with Bayesian parameter revealed a categorical distinction in glide realization between groups N and S, with gradience in glide realization observed in group C (LMER = est. 0.0016, std.err. 0.0005, $p < .05$)).

This paper reports that glide-like articulations in the C_V environment are subject to dialectal variation corresponding to a range of diachronic pathways. Additionally, a 'distinction enhancing' motivation for this variation can be understood from both the UTI and formant results: where tongue height was dependent on Mandarin variety. For example, [j] articulated higher in the vocal tract is more distinct from [i̯] (only undergoing lowering when preceded by a glide), than [i]. Finally, evidence from Old and Middle Chinese sources places this work in context by tracing back some of the observed changes, and helps us understand the complexities behind C_V glides.

References

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