Analyzing time-dynamic vowels: normalization in the current decade

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With the exception of van der Harst (2011), previous work comparing vowel-normalization methods for sociophonetic research has largely focused on steady-state vowels (e.g. Adank et al 2004). With modern sociophonetics nowadays resorting more to time-dynamic analyses rather than steady-state approaches, the present study revisits the issue of vowel normalization with an explicit consideration of temporal trajectories. We compared sixteen normalization methods implemented in Visible Vowels (Heeringa & Van de Velde 2018) and an unnormalized baseline, using van der Harst (2011)'s hand-corrected data of the Flemish-Dutch Teacher Corpus, which includes fifteen vowels (of which six may be phonologically diphthongal, but in practice all of these are temporally variable to some extent; van der Harst 2011). Using generalized additive models to model temporal trajectories, we compared the normalization methods' abilities to normalize anatomical variation, retain vowel distinctions and explain variation in the normalized F0-F3; similar criteria were also used by Adank et al (2004) and van der Harst (2011). We additionally investigated the extent to which by-speaker random effects could *supplement* or perhaps even *replace* the use of normalization. Our results partly reproduce the good results for Lobanov, Gerstman, and Nearey I found earlier. However, we observe that other methods, particularly Heeringa & Van de Velde II, come close to their performance but at much higher effect sizes. We also observe that random effects are not only useful for the unnormalized baseline, but provide a similar benefit also for the normalized data, showing that they are complementary to normalization. We interpret our findings in light of the way the different methods handle temporal dynamics.

References

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