

Intra-speaker variation in SSBE monophthong formant frequencies

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While a common assertion in phonetics courses is that speakers cannot produce a sound identically twice, relatively little is known about the extents of ‘unstructured’, iteration-to-iteration variation within speakers (Audibert & Fougeron 2022). This study investigates intra-speaker variation in F1–F2 centre frequencies for Standard Southern British English monophthongs. It builds on studies of American English vowel productions (e.g. Whalen, Chen, Tiede & Nam 2018) which suggest that individual speakers are highly consistent in their productions within and across recording sessions, but differences in typical variability can be discerned between speakers and between vowels.

The data come from a 16-speaker corpus of SSBE speech. Young adult female speakers performed a series of speech production tasks repeatedly, in 6 to 8 near-identical sessions over several months. Read productions of *bead*, *bid*, *bed*, *bird*, *bad*, *barred*, *bud*, *bod*, *board*, *good* and *booed* were extracted and subjected to formant analysis using *FastTrack* in *Praat*. Midpoint F1–F2 centre frequencies were normalised following Ferragne & Pellegrino (2010). Convex hulls were fitted to relevant groups of data points and area sizes taken as measures of variation in the F1–F2 vowel space (see Fig. 1). Analysis focuses on the research questions **(1)** What is the extent of intra-speaker variation in F1–F2 frequencies? **(2)** Does the extent of intra-speaker variation vary significantly between (a) vowels and (b) speakers?

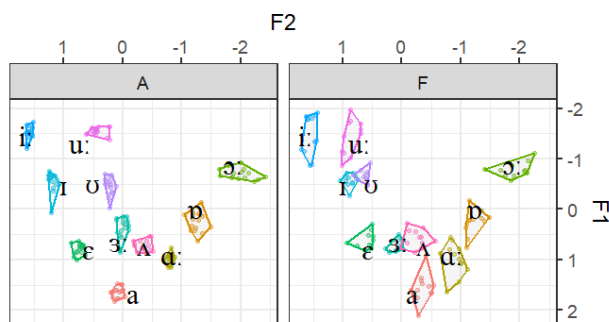


Fig. 1: Two speakers' F1–F2 measurements with convex hulls fitted by vowel

Preliminary results show evidence for significant differences in the extent of intra-speaker variation between vowels as well as between speakers. While these differences appear broadly in line with the findings of Whalen et al., their interpretation is complicated by covariates of formant frequencies. For example, correlations between f_0 and F1 suggest that extents of by-vowel and by-speaker variation may be affected by harmonic bias (Whalen, Chen, Shadle & Fullop 2022). Therefore, it remains unclear how much of the observed acoustic variation can be attributed to articulatory variation.

References

- Audibert & Fougeron 2022, Intra-speaker phonetic variation in read speech: Comparison with inter-speaker variability in a controlled population. *Proceedings of Interspeech*.
- Ferragne & Pellegrino 2010, Formant frequencies of vowels in 13 accents of the British Isles, *Journal of the International Phonetic Association*.
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