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Re-assessing the role of vowel formant dynamics in speaker-dependent information

An important source of variation in speech originates from the speaker. Earlier research on speaker-dependent information in speech acoustics has investigated speaker information carried by different segments [e.g., 1,2], and by different speech styles [3,4]. This work has for instance shown that vowels tend to carry more speaker-dependent information than consonants. A recent study showed that a single segment within one speech style may vary in speaker-dependent information as a function of the word class it appears in: the vowel /a/ contained more speaker-dependent information when sampled from content than function words [5].

In this study on /a/, however, dynamic formant information did not aid speaker classification, whereas earlier studies of speaker-dependent vowel acoustics named it an important predictor [e.g., 6,7]. In contrast with the earlier work, (1) the /a/ study used spontaneous rather than lab speech, yielding contextual phonetic variation for the vowel /a/, and (2) the vowel /a/ is not inherently dynamic, whereas vowels in earlier work tended to be. Therefore, the present research was aimed at addressing the role of formant dynamics in speaker-dependent vowel acoustics, using a vowel that is often realized inherently dynamically. Also, the study sought to replicate the finding of differential speaker information by word class.

The vowel /e/ (often produced as [eⁱ]) was segmented from spontaneous telephone conversations, spoken by sixty Netherlandish, Standard Dutch, male speakers (~60 tokens/speaker). POS tags and right phonetic context were annotated. Various acoustic measurements were taken, including average and dynamic formant measurements. Preliminary results show that the linguistic-phonetic effects of context and word class are present (assessed through mixed-effects models), and that speaker classification improves when formant dynamics are added (assessed through linear discriminant analysis). This suggests that formant dynamics' contribution to speaker specificity varies by vowel.

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