

The speaker discriminating power of within-speaker behaviour: a study based on vowel formants

Gea de Jong, Kirsty McDougall, Francis Nolan and Toby Hudson

Department of Linguistics, University of Cambridge, UK

gd288/kem37/fjn1/toh22@cam.ac.uk

Can patterns of diachronic sound change within a language variety be used to predict phonetic variability useful for distinguishing speakers? This paper extends our previous work on Standard Southern British English (SSBE) monophthongs investigating whether individuals differ more widely in their realisation of sounds undergoing change than stable sounds, presented at IAFPA 2006. F1 and F2 frequencies of vowels reported to be ‘changing’, /æ, ʊ, u:/ are compared with those vowels reported to be ‘stable’, /i:, ɑ:, ɔ:/ in hVd contexts. Read speech recordings of 50 male speakers aged 18-25 from the Dynamic Variability in Speech (DyViS) corpus are analysed (University of Cambridge: UK ESRC RES-000-23-1248).

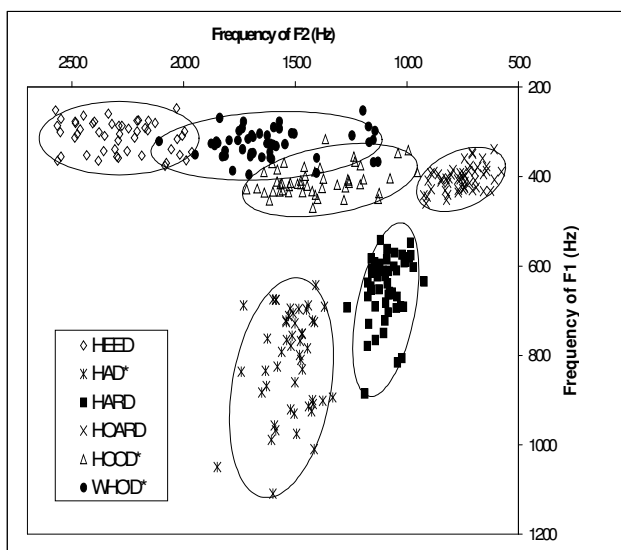


Figure 1. Mean F1 and F2 frequency values for 50 SSBE speakers for /i:, æ, ɑ:, ɔ:, ʊ, u:/. For each speaker, the mean consists of the formant values of 6 tokens per vowel.

For example, /ɔ:/ is tightly clustered, whereas a large F1 spread is found for /æ/ and a large F2 spread for /u:/. Figure 2 shows that one can expect quite a range when measuring the formants of a ‘changing’ vowel.

The present study looks in detail at the within-speaker variation exhibited by these vowels. While some individuals are very consistent in their realisations of particular vowels, others appear to exhibit a range of realisations, and the degree of this variability differs from vowel to vowel. Within-speaker behaviour will also be evaluated with respect to each individual’s vowel system as a whole and the findings discussed within a forensic context.

Results

The previous study confirmed the stability of /i:, ɑ:, ɔ:/ and the changing nature of /ʊ, u:, æ/. For both /u:/ (the vowel in WHO’D) and /ʊ/ (the vowel in HOOD) the frequency of F2 had increased considerably, indicative of more fronted pronunciations, while F1 remained unaffected. An increase in the frequency of F1 was observed for /æ/ (the vowel in HAD) indicating a more open articulation. The mean values of the frequencies of F1 and F2 of /i:, æ, ɑ:, ɔ:, ʊ, u:/ for each individual speaker are shown in Figure 1: the vowels displayed differ considerably from one another in the degree of between-speaker variation they exhibit.

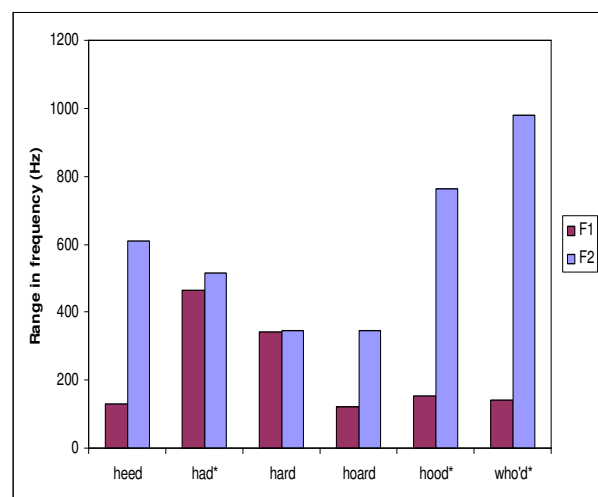


Figure 2. F1 and F2 formant frequency range for 50 SSBE speakers /i:, æ, ɑ:, ɔ:, ʊ, u:/. The range is calculated as the maximum minus the minimum value measured for all tokens across the group of speakers.