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## The difficulty of producing and transcribing vowels

Nicole Whitworth, [n.whitworth@yorksj.ac.uk](mailto:n.whitworth@yorksj.ac.uk), York St John University

It has been claimed in the literature (Howard & Heselwood, 2013; Nelson et al., 2019) that learning to transcribe and produce vowels is particularly difficult. However, there is very little empirical evidence confirming this or explaining what makes learning vowels, such as the Cardinal Vowel (CV) system apparently more challenging. The current study reports students' perceived difficulty of producing and transcribing CVs (see also Whitworth, 2025) and compares it to the perceived difficulty of learning to produce and transcribe IPA consonants. Binary forced choice perceived difficulty ratings for the production and transcription of twelve CVs and 82 IPA consonants were collected from 155 English-speaking students studying in the first year of a prequalifying Speech and Language Therapy (SLT) course. The data were analysed using logistical regression and decision trees to explain the factors that affect perceived difficulty in production and transcription.

The results confirm that students rate the perceived difficulty of vowels both in transcription and production as more difficult than that of IPA consonants. Corner vowels from the primary CVs are perceived to be least difficult, followed by CV9 and the non-corner vowels from the primary CVs, leaving the non-corner vowels from the secondary CVs as the ones perceived to be most difficult. This appears to be a combination of familiarity, i.e. a similar vowel is present in their Northern English accent, and visibility, i.e. .

The research reported increases our understanding of students' perceived difficulty of producing and transcribing Cardinal Vowels which can effectively be employed to inform pedagogical approaches to the teaching of Cardinal Vowels.

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