Phonetic Transfer of Code-switching in a Hong Kong Trilingual Corpus

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Introduction: Studies on the impact of code-switching on phonetic realizations have often relied on data from single-word utterance, which do not reflect its naturalistic nature, in which switching typically does not occur with every single word. Corpus-based continuous speech, in contrast, offers a more ecologically valid source. Models of multilingual speech control - Inhibitory Control Model (ICM) and Revised Speech Learning Model (SLM-r) offer insights into how linguistic systems are integrated during code-switching. ICM predicts asymmetrical L2-to-L1 transfer during code-switching for unbalanced multilinguals, where only L2 affects L1 (Green, 1986). Meanwhile, SLM-r proposes a common phonetic space that allows interactions across languages without specifying the direction (Flege & Bohn, 2021). The present study investigates the most common form of code-switching in Hong Kong, in which Cantonese serves as the matrix language and English as the embedded language. Specifically, this study asks: Do phonologically similar vowels across the two languages interact during code-switching?

Method: The trilingual speech corpus used in this study comprises of Cantonese (HKC), English (HKE), and Mandarin (HKM) recordings from ninety-three Hong Kong multilinguals (fifty-two females), spanning from university students to retired seniors. A key strength of this corpus is that all three languages are produced by the same speakers, a feature rarely found in existing corpora and valuable for cross-linguistic comparisons. The speech is continuous yet controlled, as speakers constructed their utterances with a list of target words. Although originally created for other purposes (e.g., Cao et al., 2024), it includes both monolingual and code-switching speech, making it suitable for the present study. Twelve L1-HKC university students (six females) with comparable English proficiency were selected. Monolingual speech in HKC and HKE was collected through a passage-reading task, and code-switching speech consisting of HKC (the matrix) and HKE (the embedded language) through a story retelling task. Three corner vowels (HKC: /iː, aː, uː/; HKE: /i, ʌ, u/) were analyzed. Midpoint F1 and F2 values were extracted, normalized, and compared between conditions within language using LMMs.

Results: For all English's corner vowels, F1 and F2 did not differ significantly between the monolingual and code-switching conditions. In contrast, for the Cantonese corner vowels, the F2 of the back vowel /uː/ was significantly fronter in the code-switching condition than in the monolingual condition ($\beta = 0.27$, $SE = 0.05$, $t(1477) = 5.94$, $p < .0001$), although the F1 of all vowels and the F2 of /iː/ and /aː/ showed no significant differences between conditions. The results are illustrated in Figure 1.

Discussion: The observed fronting of HKC /uː/ in code-switching shows a unidirectional convergence in F2, whereby HKC /uː/ becomes acoustically more similar to its phonological fronter counterpart /u/ in HKE. Such phonetic convergence supports the SLM-r's notion of a common phonetic space and demonstrates the flexibility of L1 and L2 categories, in which distinct categories can merge into a composite category. The findings also support the ICM that L1 residual inhibition persists due to the previously higher inhibition used in its suppression during code-switching from L2 to L1, resulting in asymmetric transfer. However, the vowel-specific nature of this convergence remains to be explored. Given that HKE /u/ is generally fronted (Deterding et al., 2008; Mok et al., 2023), the specific transfer observed may be driven by the acoustic salience of this corner vowel. Future work using this corpus for multilingual research is ongoing.

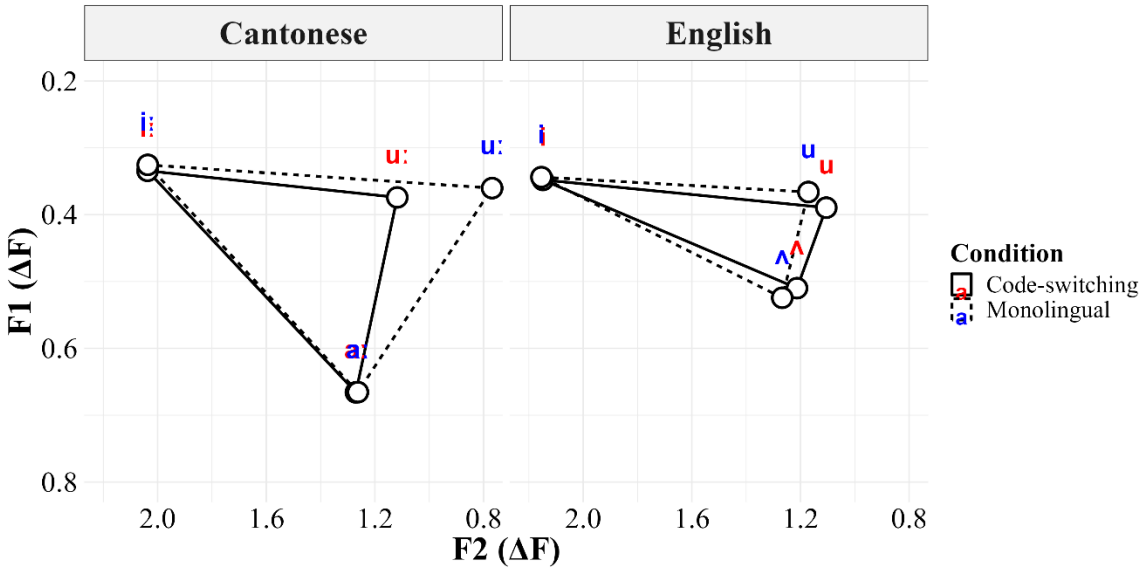

Figure 1. Vowel Space Between Conditions for Each Language

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