

Cross-linguistic Influences among L1, L2, and L3 Monophthongs by Cantonese Speakers in the Multilingual Context

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Third language (L3) phonological acquisition is a complex process (e.g., Chen & Han, 2019; Kellerman, 1983). Language learners in Hong Kong (HK) and Guangdong province (GD) in Mainland China usually acquire three languages Cantonese, as their first language (L1), Putonghua (Mandarin, hereafter) as their second language (L2), the official language, and English as their L3, the foreign language that needs to be learned. However, the language backgrounds of Cantonese speakers in these two areas are different according to the historical issue. For HK Cantonese speakers, English is the L2, and Mandarin is the L3.

In the revised Motor theory (Lieberman & Mattingly, 1985), listeners interpret the speaker's intended movements to produce specific phonetic features, such as tongue backing. These intended movements can be seen as abstract control units which would control the production of the phonetic feature. Empirical evidence supports this theory and identifies cross-linguistic influences (CLIs). When the target phonetic features are distinct acoustically or most similar acoustically to sounds belonging to different phonemic categories in the listener's L1, they are easy to learn (Pickett, 1999, p. 213). In L3 acquisition, the acquisition process is complex because of the interactions among the three languages that learners learn and use. L3 acquisition models claim that features of all the languages that learners learned could be transferred to the target language (e.g., Westergaard et al., 2017). Vowel systems of Cantonese, Mandarin, and English are different. According to previous studies (Zee, 1991; Lee & Zee, 2003; Roach, 2009), there are 6 monophthongs in Mandarin, 11 in Cantonese, and 12 in English. Previous studies reported that L3 could be affected by several factors, such as L1 status (e.g., Ringbom, 1987), L2 status (e.g., Wrembel, 2010), and proficiency levels of the L2 and L3 of the learners (e.g., Chen & Han, 2019). The different language situations in HK and GD may cause different CLIs. HK speakers' self-reflection confirmed both progressive and regressive CLIs (Chen & Han, 2019); however, only progressive CLIs were identified by GD speakers (Chen & Tian, 2021). These CLIs were mainly summarized from learners' self-reflections on L2 and L3 learning experiences. Few studies used acoustic data to support this. This study aims to use acoustic data to investigate the possible CLIs on monophthongs by Cantonese speakers.

Participants of this study include Cantonese speakers (CSs) and native speakers (NSs) of English and Mandarin. CS participants are 40 university students whose L1 is Cantonese. Twenty of them are from GD, mainland China, whose L2 is Mandarin and L3 is English. The other 20 are from HK, with English as L2 and Mandarin as L3. Participants from both areas were categorized into high (H) and low (L) groups based on their accuracy rates of a diagnostic test, including a Mandarin reading-aloud task and an English reading-aloud task. All CS participants performed English and Mandarin words-reading aloud tasks with both real and pseudo words. For the English task, words have the [h] sound as the initial, English monophthongs as the vowel, and [d] sound as the final (e.g., had [hæd]). For the Mandarin task, all words are open syllables with the [h] sound as the initial, followed by Mandarin monophthongs (e.g., '壺' [hu]). Six NSs of English and Mandarin (3 for each) produced the English and Mandarin tasks, respectively. Three of the CS participants produced a reading-aloud task of their L1 Cantonese, with the [h] sound as the initial, followed by Cantonese monophthongs (e.g., '靴' [œ]). The NSs' data from the three languages were used as references.

Three L2 and L3 sounds of CSs were measured in this study. The first sound is [u], which exists in Cantonese, Mandarin, and English, and the [u] sound in these three languages belongs to the same phonetic category. The first (F1), second (F2), and third (F3) formants of English and Mandarin [u] produced by CSs were compared with NSs of Mandarin and English's production to

identify the possible CLIs. The second and third sounds are English [æ] and Mandarin [ɤ], unique in CSs' L2 or L3. The phonetic features of [æ] and [ɤ] are acoustically distinctive. [æ] is an open front vowel that only exists in L2/L3 English, and [ɤ] is a close back vowel that only exists in L2/L3 Mandarin. CSs' F1, F2, and F3 values of English [æ] were compared with Cantonese and Mandarin NSs' [a]. CSs' production in Mandarin [ɤ] was compared with Cantonese NSs' [œ] and English NSs' [ɜ].

For the [u] sound, which exists in Cantonese, English, and Mandarin, GD participants (both H and L) produced larger F1 values than that of English NSs. However, GD participants produced similar F1 to those of NSs' Cantonese [u] and Mandarin [u]. Acoustic results discovered a combination of L1 (Cantonese) and L2 (Mandarin) progressive CLIs on the vowel in the foreign language English (L3) by GD CSs (both H and L). HK H participants produced larger F2 values on Mandarin [u] than that of NSs but no significant differences with that of Cantonese NSs. Progressive CLIs from L1 to L3 (Mandarin) were identified.

The F1, F2, and F3 values of English [æ] produced by HK and GD CSs received no CLIs from other languages that they learned. The F2 values of Mandarin [ɤ] produced by CSs from the four groups had no statistical differences from that of NSs' English [ɜ]. Their F2 values had statistical differences from that of NSs' Cantonese [œ], except for the HK L group. Acoustic results revealed that CLIs from English to Mandarin (HK H: L2 to L3; GD H & L: L3 to L2) were identified. For the HK L group, a combination of Cantonese and English progressive CLI was identified.

Acoustic results revealed four CLI patterns (both progressively and regressively): 1) a combination of L1 and L2 to L3; 2) L1 to L3; 3) L2 to L3; and 4) L3 to L2. The CLIs for H and L GD participants whose L1 (Cantonese) and L2 (Mandarin) belong to the same language family are consistent. There is a combination of L1 and L2 influences on L3 (English) and a regressive CLI from L3 to L2. For HK speakers, L group participants encountered a combination of L1 and L2 (English) influences on L3 (Mandarin). HK H group participants' L3 received CLIs either from L1 or L2. This study shed light on the monophthongs acquisition in the multilingual context and used acoustic data to support the CLIs.

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