

PHONOLOGY IN NEW VARIETIES OF ENGLISH: HONG KONG ENGLISH DIPHTHONGS

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ABSTRACT

Studies of vowels in Hong Kong English (HKE) have revealed that it has diphthongs which are not dissimilar from British English (BrE). However, impressionistically, diphthongs in HKE can and do sound different.

This paper looks at two perceptual phenomena: monophthongisation of GOAT; and coda consonant loss in words containing closing diphthongs followed by a geminate alveolar plosive. We indicate that patterns of production exist which could cause problems of intelligibility for listeners who are less familiar with the variety.

Keywords: Diphthongs; Hong Kong English; L1 transfer; syllable structure.

1. INTRODUCTION

There has been a fair amount of research on phonology and pronunciation in HKE. For example, Hung's [8] overview of the phonology of the variety was followed up by Deterding, Wong and Kirkpatrick [6] who found that, although HKE shares many phonological features with Singapore English (SE), it also contains features found only in BrE but not in other Englishes in South-East Asia; they attributed such differences to the different developmental stages of the two English varieties. Peng and Setter [9] looked at consonant cluster deletion; Setter considered speech rhythm [10] and syllable structure [11]; and Setter et al. [12] found that the production of juncture cues in HKE made it more intelligible than SE or BrE to HKE, SE and BrE listeners.

HKE is undoubtedly influenced by Cantonese, which is the first language (L1) of HKE speakers. This being the case, one might expect diphthongs followed by coda consonants to be affected, as Cantonese phonology considers the coda position to be occupied by the diphthongal glide [2]. This paper looks at two perceived features associated with diphthongs in HKE: monophthongisation of the GOAT vowel; and coda consonant loss in words containing closing diphthongs followed by /d/ where the next word begins with /t/. Instrumental analysis indicates how these two features are actually

produced by HKE speakers. We then discuss the possible effects of these productions on listeners who are unfamiliar with HKE.

2. THE SYLLABLE IN CANTONESE AND ENGLISH

2.1. Cantonese

Cheung [4] views the syllable as the "primary phonological isolate" in Cantonese and analyses it as follows, where S = syllable, T = tone, O = onset, R = rime, V = vowel and Cd = coda:

$$(1) \quad S \rightarrow T (+ O) + R \\ R \rightarrow V (+ Cd)$$

From this description, it can be seen that the coda is an optional element in Cantonese. As mentioned, Cantonese syllable structure determines that, in diphthongs, the coda position is occupied by the glide element; there are no syllables in Cantonese which have diphthong + oral or nasal stop as the rime. Figure 1 below, adapted from Bauer and Benedict [2], gives all possible combinations of rime elements in Cantonese, with the glides given as [j], [y] or [w] (second, third and fourth columns), and \emptyset indicating an open syllable.

Figure 1: Rime elements in Cantonese.

	j	y	w	m/p	n/t	ŋ/k	\emptyset
i:	-	-	+	+	+	-	+
I	-	-	-	-	-	+	-
y:	-	-	-	-	+	-	+
ɛ:	-	-	-	-	-	+	+
e	+	-	-	-	-	-	-
œ	-	-	-	-	-	+	+
ø	-	+	-	-	+	-	-
a:	+	-	+	+	+	+	+
ɐ	+	-	+	+	+	+	-
u:	+	-	-	-	+	-	+
U	-	-	-	-	-	+	-
ɔ:	+	-	-	-	+	+	+
o	-	-	+	-	-	-	-

Where there is an oral stop coda, this is strongly glottalised and has the effect of shortening the preceding vowel quite considerably [2,4].

2.2. British English

BrE, by comparison, is much less restrictive. Not only are consonants permitted to follow diphthongs, it is possible to have diphthongs followed by consonant clusters (e.g., *most*; *bikes*; *sounds*). It is also possible to have fricatives, alveolar lateral /l/ (e.g., *boil*) and voiced obstruents (e.g., *hide*; *rouse*) following a diphthong; in Cantonese, these types of sound are not found in syllable coda position at all.

Like Cantonese, the type of consonant has an effect on the duration of the preceding vowel in BrE, with voiceless obstruent consonants shortening it considerably; this is known as (pre-)fortis clipping [1], as voiceless obstruents are sometimes referred to as fortis (in comparison with lenis).

2.3. The present study

Our study investigates two factors affecting diphthongs followed by coda consonants in HKE. It was instigated by the first author's interest in this subject as a speaker of BrE listening to speakers of HKE produce words containing these sequences, as there seemed to be a loss of contrast in some productions which could lead to unintelligibility.

The first area under scrutiny is monophthongisation of syllables containing the GOAT vowel. Production of GOAT containing a vowel more similar to BrE THOUGHT could lead to loss of distinction between minimal pairs such as *bowl/ball* and *coat/caught*. While context and grammatical category may help a listener to understand the meaning, unexpected vowel choices can temporarily distract a listener and demand greater cognitive resources be directed to processing the entire stream of speech [3].

The second area is production of coda consonants and duration of the vowel in words containing a closing diphthong which is followed by a geminate alveolar plosive; the gemination is brought about by the occurrence of an alveolar onset to the following syllable. It was noticed that many HKE speakers appeared to elide the final consonant in such situations. This could again lead to issues of unintelligibility if a listener unused to this pattern perceived e.g. *sigh* instead of *side*.

As an exploratory study, instrumental measurements of a small sample of HKE and BrE speakers were carried out to ascertain the differences in patterns of production among HKE speakers who were heard to display the above pronunciation features in comparison with BrE speakers. It should be noted that the authors are not intending to imply that BrE has any superiority over HKE as a variety.

3. METHODOLOGY

3.1. Participants

25 speakers each for BrE and HKE were recruited in Reading and Hong Kong respectively (altogether 50 participants). Participants were all university students with no speech or language impairment. The British speakers were all monolingual native English speakers. Some of them had limited exposure to foreign languages. The Hong Kong participants had not lived in an English-speaking country before, and had received all of their education in Hong Kong. Their accents are typical of the varieties they represent. All participants were paid to participate in the experiment.

3.2. Materials

A list of 65 monosyllabic words was compiled, each containing a unique pairing of an English closing diphthong – /aɪ/, /eɪ/, /ɔɪ/, /aʊ/ or /əʊ/ – and a single-consonant coda. The illegal BrE diphthong codas /r/, /w/, /j/ and /ŋ/, as well as pairings for which real words do not exist, such as /ɔɪb/, were ignored. Centring diphthongs were excluded from this experiment.

Each of the 65 words was inserted into a carrier phrase 'I read _____ to you' with emphatic stress falling on the word 'I' in order to minimize stress and intonational differences between each phrase.

3.1. Procedure

Participants were recorded reading each of the 65 words in the carrier phrase a total of three times each to allow for mistakes or interference, thus producing a total of 195 recordings per speaker. The phrases were initially randomized and split between three groups, which in turn were randomized between speakers.

Recordings were made in a sound-proof booth directly to PC at 44.1kHz, 16 bit mono using the analytical program Audacity and a Samson C01U USB condenser microphone. The recordings were later split into individual recordings of each phrase for further analysis.

4. RESULTS

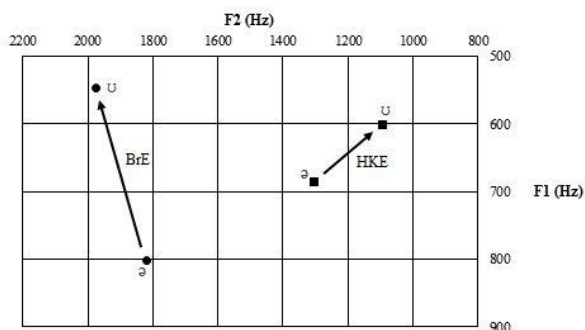
Following initial observations, four HKE speakers (3 female, 1 male) were identified for further analysis as they regularly exhibited the monophthongisation and coda elision described above. Four randomly-selected BrE speakers (all female) were also analysed in the same ways in order to draw equal

comparisons between varieties. Each of the three productions made by the speakers was analysed.

4.1. Monophthongisation

The words *cope*, *robe*, *joke* and *vogue* were identified as frequently containing monophthongised GOAT vowels. PRAAT was used to measure the frequency in Hertz of the first (F1) and second (F2) formants at both the onset and offset of the vowels in all instances of these words in all the speakers analysed (i.e., 48 measurements for each variety). An average was derived from these measurements and is depicted by Figure 1.

Figure 1: Movement of GOAT vowel from onset /ə/ to offset target /ʊ/ in average BrE and HKE pronunciation of *cope*, *robe*, *joke* and *vogue*.



As the frequency of both the F1 and F2 should be decreasing in a back-closing diphthong, the average offset measurement was subtracted from the average onset for both formants to obtain the degree of movement for each. An independent-variables t-test (the details of which are not reported here) conducted using SPSS found that the degree of movement from F1 onset to F1 offset in BrE was significantly different ($p < 0.001$) to the F1 onset-to-offset movement in HKE; the same degree of significance was found for F2 movements. In addition, the difference in frequency of both formants in both varieties are well past Flanagan's minimum threshold of 5% for noticeable difference [7]; thus, both realisations are true diphthongs.

It is interesting to note that there is a more general contrast in the pronunciation of the GOAT vowel, in that BrE speakers produce this further forward in the vowel space than HKE speakers – indeed, even though he describes fronting in the offset target, much further forward than Cruttenden [5] suggests. That is to say, the overall shape of the HKE movement more closely resembles that expected in traditional RP, although the extent of the movement is relatively small (more like General American [5]), such that a monophthong could be perceived instead of a diphthong. This result is not

unlike Hung's [8] measurements for the diphthong in *coat*.

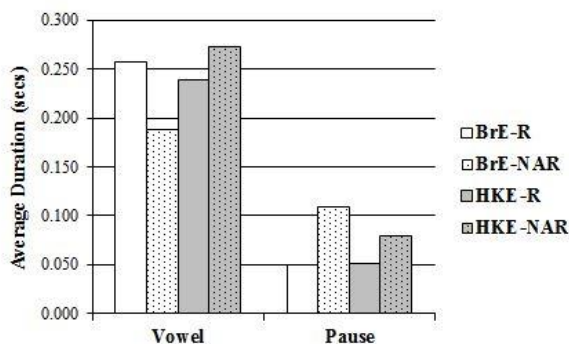
4.2. Coda Elision

The perceived elision of codas was observed in the four HKE speakers as regular where there was no audible release of the /d/ plosive across all five diphthongs, in the words *side*, *fade*, *void*, *loud* and *mode*. PRAAT was again used to measure the length in seconds of the vowel itself as well as the pause preceding the release of the following /t/, with which /d/ would usually be geminate when not audibly released.

Measurements were taken for all recordings of these words for each of the eight speakers, including those where there was an audible release of /d/, which were kept separate. Figure 2 shows that, on average, the shortest diphthongs were found in BrE speakers producing no audible release (BrE-NAR), while the longest were in HKE speakers with this production (HKE-NAR). The shortest pause lengths were shared by speakers of both varieties where there was an audible release (BrE-R and HKE-R) and the longest were by BrE-NAR speakers.

Measurements were not taken to differentiate individual or variety-specific speaking rates; however, this does not affect the relative changes in vowel and pause lengths within varieties shown here.

Figure 2: Average duration of vowel and pause lengths in diphthongs preceding /d/ in HKE and BrE, with both a plosive release (R) and no audible release (NAR).



Independent-variables t-tests were again conducted using SPSS to determine the significance of the roles of English variety and /d/ release (or lack thereof) in vowel and pause lengths. Both varieties individually were found to significantly alter the length of both vowels and pauses based on whether or not the /d/ coda was audibly released ($p < 0.001$). However, it can be seen from Figure 2 that, while BrE-NAR speakers were shortening vowels, HKE-NAR speakers were instead lengthening them; pauses were lengthened in both

varieties. Between varieties, there were no significant effects ($p > 0.05$) between BrE-R and HKE-R speakers; however, BrE-NAR speakers showed a highly significant difference ($p < 0.001$) from HKE-NAR for vowel length only, highlighting the contrast mentioned above.

For BrE speakers, therefore, geminating the /d/ coda with the following /t/ was accompanied by a shortening of the diphthong and lengthening of the pause. For HKE speakers, diphthongs were instead lengthened alongside pauses.

5. DISCUSSION

Although these data are drawn from a small number of speakers in the entire sample – four out of the 25 recorded in each language group – patterns emerge.

The small amount of movement in the GOAT vowel for HKE could result in an auditory lack of contrast between minimal pairs such as *bowl/ball* and *coat/caught*. However, it is not entirely clear whether this arises from L1 transfer from Cantonese /ɔ:/, which can be followed by a /t/ coda (see Table 1), or from a movement towards monophthongisation, where the diphthong is affected by the phonological constraint in Cantonese which does not allow a consonant to follow. What these data do show is that the HKE speakers are producing true diphthongs, as suggested by Hung [8], even though they may be perceived as monophthongs by listeners. The data also reveal rather extreme fronting by the BrE speakers in this sample, and this itself can lead to lack of contrast between e.g. *cake* and *coke*; the first author has certainly seen a UK student being offered a cake in a café when in fact the student ordered a coke.

The coda elision data is much more interesting. While there is little difference between the HKE-R and BrE-R groups where there is a release of the first alveolar plosive, the HKE-NAR speakers' pattern of lengthening the vowel before a geminate consonant could indeed lead to problems of intelligibility; certain words in the data (*side*, *mode*) were produced in such a way that they could be confused with existing words with open syllables (*sigh*, *mow*). One might hypothesise that the BrE-NAR speakers compensate for the lack of plosive release burst in /d/ by shortening their vowel more than in the R condition in order to aid comprehension; HKE-NAR speakers do the opposite. Whether this is a result of the Cantonese phonological constraint which does not permit a consonantal coda following a diphthong actually resulting in an elision of that coda consonant in instances of gemination is not clear; again, further analysis of similar tokens may reveal more.

6. CONCLUSION AND FUTURE RESEARCH

There is not enough data here to generalise about issues of HKE production which might lead to unintelligibility or whether and to what extent features of Cantonese L1 phonology are affecting L2 English, i.e., whether there is L1 transfer. However, it has been revealed that patterns of HKE and BrE GOAT vowel production can be quite different, and that HKE and BrE speakers may have different strategies for dealing with diphthongs followed by a geminate consonant at word boundaries.

The preliminary results encourage us to further investigate the phonetic realisations of all diphthongs in HKE from all recorded speakers; we may then be able to say something more concrete about patterns in HKE as an emerging variety. Future research would necessarily have to include an auditory discrimination test to see whether the GOAT vowel is perceived as a monophthong and whether e.g. *side* and *mode* are perceived as *sigh* and *mow* when produced by HKE speakers in a situation where germination occurs across the word boundary.

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8. REFERENCES

- [1] Ashby, P. 2011. *Understanding Phonetics*. London & New York: Routledge.
- [2] Bauer, R. S., Benedict, P. K. (eds). 1997. *Modern Cantonese Phonology*. Berlin: Mouton de Gruyter.
- [3] Cauldwell, R. 2013. *Phonology for Listening: teaching the stream of speech*. Birmingham: Speech in Action.
- [4] Cheung, K. H. 1986. *The Phonology of Present Day Cantonese*. PhD Thesis, University College London.
- [5] Cruttenden, A. 2014. *Gimson's Pronunciation of English*. London & New York: Routledge.
- [6] Deterding, D, Wong, J., Kirkpatrick, A. 2008. The pronunciation of Hong Kong English. *English World-Wide* 29, 148-175.
- [7] Flanagan, J. L. 1955. A difference limen for vowel formant frequency. *J. Acoust. Soc. Am.* 27, 613-617.
- [8] Hung, T. 2000. Towards a phonology of Hong Kong English. *World Englishes* 19, 337-356.
- [9] Peng, L., Setter, J. 2000. The emergence of systematicity in the English pronunciations of two Cantonese-speaking adults in Hong Kong. *English World-Wide* 21, 81-108.

- [10] Setter, J. 2006. Speech rhythm in world Englishes: the case of Hong Kong. *TESOL Quarterly* 40, 763-782.
- [11] Setter, J. 2008. Consonant clusters in Hong Kong English. *World Englishes* 27, 502-515.
- [12] Setter, J., Mok, P., Low, E. L., Zuo, D., Ao, R. 2014. Word juncture characteristics in world Englishes: a research report. *World Englishes* 33, 278-291.