


The Systematicity of Vowel Realizations in Hong Kong English

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Abstract

This thesis reports an investigation into the systematic underlying phonology of Hong Kong English (HKE) by examining the realization patterns of shortening and lengthening of the vowels /i:/, /ɪ/, /u:/, /ʊ/, /ɔ:/, /ɒ/, /eɪ/, /aɪ/ and /aʊ/ by twenty-two female and eight male secondary seven students studying at a local Chinese medium of instruction (CMI) school. The participants were asked to take part in conversational interviews with the researcher on daily life topics on an individual basis. This study sought to investigate the effects of phonological factors, which include stress, number of syllables, preceding and following phonological environments, and social factors, which include individual variation among different participants and the participants' English proficiency, on these vowels' realizations, and thus these realizations' underlying patterns. The results show that only the phonological factors have significant effect on the vowel productions while the social factors are found to be insignificant. This suggests the stability of HKE phonology as it operates with a system in which variation is predictable and explicable by phonological factors, and is governed by an internal grammar which is not susceptible to social factors. Second, it demonstrates that the vowel realizations conform to phonological rules and their rankings which are unique to HKE, although they are found to stem from an interaction between the phonologies of English and Cantonese. These findings have the implication that new varieties such as HKE have to be explored on their own terms by delving into data internal to the varieties so that patterns would not be obscured by comparisons to the native ones. Language planning implications are that curricular development for these new varieties should aim at international intelligibility while preserving cultural identity, instead of following norms established by the inner circle varieties.

摘要

本論文透過調查二十二名女和八名男中文教學學校的中七學生之元音/i:/、/ɪ/、/u:/、/ʊ/、/ɔ:/、/ɒ/、/eɪ/、/aɪ/、/aʊ/縮短和延長模式，研究香港英語的基本音韻系統。參與者逐一與研究員根據日常生活課題討論來收集數據。本研究試圖探討音調，音節數，之前和之後的語音環境之語音因素，與及個體差異和學生的英語水平之社會因素對這些元音發音及其基本模式的影響。首先，它表明了只有語音因素對這些元音發音有影響，而社會因素則沒有產生顯著效果。由於它的系統運作可透過語音因素的變化來預測和解釋，而且它不受到社會因素影響，這表明了香港英語的穩定，及其內部語音體系語法的存在。其次，它亦表明了雖然香港英語的語音體系來自英語及粵語語音體系的互動影響作用，它的元音音位規則和他們的等級是獨一無二的。這些研究結果的含義在於探討新英語必須調查內部的發音模式，而不是透過它們與以英語作為母語國家的英語作比較，否則它的基本發音模式會被混淆。對於語言規劃，英語課程發展的目標應該是國際可理解度，同時保持文化特性，而不是只強調遵從英語國家制定的標準。

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INTRODUCTION

“Hong Kong English” has been increasingly documented and researched in its own right in the last decade (Deterding, Wong, & Kirkpatrick, 2008; Hung, 2000). Such growing interest in Hong Kong English (HKE) among researchers is argued by Deterding et al. (2008) to reflect that HKE is undergoing development into a new and legitimate variety of English, despite the fact that it is in some research referred to as “English in Hong Kong” (Luke & Richards, 1982), “the Hong Kong accent” (Bolton & Kwok, 1990), “the spoken English of Hong Kong” (Stibbard, 2004), or “Cantonese ESL Learners’ English” (Chan, 2006a, 2006b; Chan & Li, 2000) throughout almost three decades.

1.1 Background

Previous work on HKE has tended to focus on errors (Bolton & Kwok, 1990; Chan, 2006a, 2006b; Chan & Li, 2000; Luke & Richards, 1982; Stibbard, 2004). As Bolton (2000) states, a substantial amount of work done on HKE has involved language learning and pedagogy, focusing on students’ pronunciation problems and their strategies compensating for these. Many educational practitioners have been asserting that the English standard of the students in Hong Kong is falling. News reports and editorials about the deteriorating standards of English are not uncommon (for example, Chong, 2007; Tong & Clem, 2007). Consequently, the establishment of

HKE as a new variety has been impeded in the sense that the pronunciation features which are widely recognized among Hong Kongers, such as the devoicing of word-final consonants, are inherently considered errors by society and educational practitioners, and the reports and editorials argue that there is urgent need to get rid of these errors in order to be considered as “competent” users of the language (Bolton & Lim, 2000).

It is likely that these “errors” actually reflect regularities and patterns that are obscured or unexplored due to the natures of perspectives and research designs of the studies conducted to delve into HKE phonology. Studies taking the perspective of considering non-native varieties as dependent on the norms established by the native varieties and thus comparing the varieties’ productions with these norms have yielded different findings from those viewing the non-native varieties as phonological systems which are independent of the target language. For example, the first research approach often intend to judge whether the differences found constitute deviations from native-speaker norms and results in descriptions of deviations from the norms and their corresponding compensation strategies. They tend to conclude that the productions of the new varieties are indicative of a lack of acquisition of the language. The second approach, conversely, produces descriptions of the phonological features of the new varieties by probing into data internal to the varieties. Notwithstanding the disparate approaches, the phonological features outlined from both sides may be compared on

the same ground for discrepancies. There are some main disagreements on the realizations of these features, especially in the vowel system of HKE. For instance, there was no consensus reached as to whether the vowels are realized as an intermediate form between the long duration and short duration consistently (Bolton & Kwok, 1990; Deterding et al., 2008; Hung, 2000) or as three forms of long duration, short duration and an intermediate between the two unsystematically (Chan & Li, 2000; Stibbard, 2004). The lack of investigations into these realizations in light of phonological factors, which are shown to be important in determining allophonic variations (Docherty, 1992; Giegerich, 1992), may have caused some patterns to be obscured and thus contributed to the conclusion that HKE is unstable and unsystematic.

With respect to research designs, almost all of the studies (for example, Deterding et al., 2008; Hung, 2000), except a few (Chan, 2006a, 2006b, 2007), in the literature have employed university students as their participants. Additionally, there has been over-reliance on the use of word lists to elicit data with a careful style of speech. The literature therefore has a lack of knowledge of HKE phonological features and their patterns manifested by speakers other than university students in the Hong Kong population speaking English, and those in a less careful style of speech.

1.2 The focus of this thesis

Addressing these concerns, this thesis sets out to examine the realization patterns of vowel duration shortening and lengthening, which are where the main disagreements concerning the vowel system lie, by analyzing naturalistic conversational data from 30 local secondary school students. This study focuses on studying the effects of social factors, which include individual variation among the participants and proficiency of the speakers, and phonological factors, which encompass stress, number of syllables, preceding phonological environment and following phonological environment, on the vowels' realizations. This study also examines if these variations are in fact indicative of a systematic pattern which is governed by rules and their rankings of an internalized phonological system.

1.3 The structure of this thesis

The structure of this thesis is as follows: This chapter has provided the background to the study, the purpose of the study and the organization of this thesis. Chapter 2 provides a review of the literature. The rationale behind the legitimization of phonologies of new varieties and existing theoretical approaches outlining the systems of non-native varieties are first discussed. The research findings on HKE, with respect to the existence of a systematic and independent phonology of its own, possible factors influencing its productions, such as L1 transfer, as well as the disagreements among

these studies are then presented. An overview of English and Cantonese phonologies is also provided. Chapter 3 introduces the participants and outlines the research setting, selection criteria of participants, and the methods of data collection and analysis. Chapter 4 presents the findings on the effects of proficiency, speaker, stress, number of syllables, preceding phonological environment and following phonological environment on the realizations of long vowels, short vowels and diphthongs, how these factors interact to affect the productions of each type of vowel, and the similarities and differences between the behaviour of these three types of vowels. Chapter 5 discusses the results with reference to the effects that phonological factors, the interaction between Cantonese and English phonologies and social factors have on the realization of vowel length in HKE. The patterns of realizations which reflect the rankings of rules in HKE phonology are also discussed. Finally, chapter 6 concludes by providing implications and limitations of the present study, as well as directions for future research.

LITERATURE REVIEW

This chapter provides the theoretical frameworks and reviews the research findings on HKE, within and from which the present study has developed. The changing scene of the use of English around the globe is first discussed to explore the need to legitimize non-native varieties. Secondly, the existing theoretical approaches describing the systems of non-native varieties are covered. Thirdly, research findings on HKE are discussed, with special reference to the evidence of HKE having a legitimate and systematic phonology of its own in addition to the effects of L1 transfer from Cantonese and phonological factors on its production. The disagreements therein are also addressed by proposing the present study to bridge the gap. Two pilot studies that were conducted prior to the main study are then discussed, leading to the research questions of the present study. Finally, the phonologies of English and Cantonese are outlined, respectively.

2.1 A changing scene: The use of English worldwide

The past few centuries have witnessed the unprecedented and ever-accelerating spread of English around the globe; for the first time in the history of the language, the population of speakers who speak English as their second language (L2) or additional language (AL), be it a second or third language and so forth, outnumbers those who speak English as their first language (L1). This trend of development remains clear as

seen from the many works (for example, Brumfit, 1995; Crystal, 1988, 2003; Phillipson, 1992; Rampton, 1990; Sridhar, 1996; Widdowson, 1994) which have attempted to document the spread of English, although the exact numerical estimation may differ from study to study, depending on the criteria defining native versus non-native speakers and the proficiency level one has to reach to be considered as a speaker of English. Regrettably, there is no single authoritative source of statistical information of population with regard to the use of English. According to “a conservative estimate” (Crystal, 2003, p. 67), by 2003, there were an estimate of 329 million speakers of English as their L1 and an estimate of 430 million speakers of English as their L2 (p. 67-68). Notwithstanding the exclusion of the very large population of speakers of English as their AL, which in fact was estimated to amount to 750 million if one takes “a medium level of conversational competence” (p. 67) as the criterion, speakers for whom English was their L2 already outnumbered those for whom it was their L1. However, for a few main reasons that are outlined below, despite the large population of non-native speakers of English, native speakers still hold the custody over the ownership of the language.

2.1.1 Some old pictures and present fallacies

The three main fallacies that native speakers of English own the language, and native varieties are stable and the most intelligible ones are still ingrained beliefs

despite the many studies attempting to deny these old pictures.

2.1.1.1 Fallacy one – Native English(es) as the starting point and the end point

English has continuously been taught to people who have another first language. Seeking to describe the different patterns of development and use of English in different areas where English is not the first language, and to recognize the status of these non-native varieties on a sociolinguistic basis, Kachru (1992) has outlined the spread of English in three concentric circles, namely the inner circle, the outer or extended circle, and the expanding or extending circle. Kachru's inner circle refers to the countries where English is the primary and native language, and they serve as the traditional bases for "norm-providing". The varieties spoken in these countries are considered the standard of English for its learners. His outer or extended circle comprises countries where English functions as an L2 and assumes an important role in governments and institutions. This circle is considered "norm-developing" as the standardization of their varieties is underway in these countries. The expanding or extending circle is made up of countries where English is a foreign language, and is not given any special official or administrative status. This renders them the status of "norm-dependent", "in the sense that the criteria by which usage is judged are imported from the ENL [English native speaker] countries, primarily the UK and USA" (Jenkins, 2000, p. 12). Albeit his pioneering efforts in legitimizing World

Englishes, a term used to refer to the indigenized and nativized varieties that are equally established as their older counterparts, Kachru's concentric circles still place great emphasis on the notion or fancy of a single "norm".

This results in an interesting paradox that, as Seidlhofer (2005) argued, the majority of speakers of English do not have English as their L1 and most of the verbal exchanges in English involves these speakers of English as L2 or AL only, without the presence of any native speakers, and yet "native speakers are still generally assumed to be the ones that provide the models of acceptable usage, irrespective of who uses English, with whom, or where" (p. 59). The fallacy that learners of English have to approximate, especially for the aspect of pronunciation, the varieties of the inner circle, which are in most cases Received Pronunciation (RP) and General American English (GA), stems mostly from this crucial fallacy of the perceived ownership of the language by native speakers.

However, as Jenkins (2000) argues, "it differs crucially from other foreign languages such as Spanish, Russian, Japanese, and so on, which continue to be learnt predominantly for communication with their L1 speakers, usually in the L1 country" (p. 6). She further maintains that it may be justifiable for native speakers to establish their own norms when they are involved in these verbal interactions. This, however, may not be true when the communication involves non-native speakers only (p. 7). In recognition of the status of English as an international language, Widdowson (1994)

made the strong claim that native speakers have to be irrelevant if English is to achieve a truly international status (p. 385).

All these denials of the authority of the native varieties would then appear to give rise to a sense of insecurity and vulnerability for the educational practitioners, for they no longer have any models for the students to follow. Yet, this misunderstanding of the existence of a single norm of the native English is exactly where another fallacy lies.

2.1.1.2 Fallacy two – The stability of native models

One popular reason as to why native varieties are in favour with the teachers and textbook designers is that they are perceived to be more stable and more resistant to change, and therefore they could be followed. It is, however, questionable whether one can eliminate the inherent nature of evolution of language and delimit even the internal and regional variations within one single variety. It is generally agreed by applied linguists (for example, Jenkins, 2000; Preston, 2005; Przedlacka, 2005) that RP and GA are generally used in classrooms as the models for learners of English. Accordingly, these two varieties, their phonological variations in particular, are examined to explain why they may also fall short of the educational practitioners' expectations of providing an invariant reference point.

In her article titled "*Models and Myth: Updating the (Non)standard Accents*", Przedlacka (2005) makes it very clear, by providing evidence of changes in

pronunciation that happened in the latter half of the 20th century, that “like all other varieties, RP accent is constantly evolving”, and it is a myth that “the accent is...an invariant structure, a monolith that is resistant to change” (p. 18). Przedlacka raises an important and often overlooked piece of fact that RP is nothing more than an accent which is also susceptible to change. The documented changes of RP include the use of [i]¹ for the unstressed final-position /ɪ/ (Gimson, 1984; Wells, 1970; Windsor-Lewis, 1990); the replacement of /ə/ for /ɪ/ in the unstressed syllables (Fabricius, 2002b; Gimson, 1984); the retraction and lowering of /æ/ (Cruttenden, 1994; Gimson, 1984; Henton, 1983; Wells, 1982; Windsor-Lewis, 1990); the fronting of the GOOSE vowel (Bauer, 1984; Henton, 1983; Przedlacka, 2002); the use of the glottal stop for the syllable non-initial /t/ (Cruttenden, 2001; Fabricius, 2002a; Ramsaran, 1990); and dark /ɪ/ vocalization (Cruttenden, 1994; Wells, 1982). The fronting of the GOOSE vowel is the most inspiring change for it is in line with the universal pattern, according to Przedlacka (2005), that the vowel manifests a more central quality with some extent of rounding, which is also present in the South East varieties of England and other varieties such as those in the US and New Zealand. Interestingly, this corroborates Crystal’s (1995) argument that the native varieties, notwithstanding their speakers’

¹ The actual and physical pronunciation of a sound depends entirely on the phonological environment it is in, that is the sounds before and after it. Following standard International Phonetic Association (IPA) transcription practice, slant brackets are used when the sounds referred are phonemes; and square brackets are used when the sounds are actual realizations. Thereafter in this paper, this practice will be followed.

preferences or objections, begin to be under the influence of the international pronunciation. For these reasons, like all other varieties, it is subject to variation and change. What complicates the matter further is the fact that according to Crystal (1995), less than three percent of the whole British population speaks pure RP. Far more common is what is known as “modified RP”, which is a combination of RP and regional variations. It is thus almost impossible for one to identify a single RP to be a reliable norm.

As for the learners targeting at American English, there is another misconception that people in the United States all speak one single variety, namely GA. This remains a myth as “there is no such thing – not for pragmatics, grammar, lexicon, or pronunciation” (Preston, 2005, p. 37). Dealing solely with the pronunciation aspect, Preston (2005) outlines two typical vowel systems of younger Americans, the Northern Cities Vowel Shift and the Southern Vowel Shift, which are not only dramatically different from each other, but also from how one would describe GA. The Northern Cities Vowel Shift is found in the cities around the Great Lakes, such as Chicago and Milwaukee, and is “the pronunciation of the best-educated speakers in those cities” (p. 40). Some instances of the shift are the shift from /ʌ/ to [ɔ] and that from /ɪ/ to [ɛ]. With the Southern Vowel Shift, for instance, nearly all the mid and high back vowels undergo a great deal of fronting; the diphthong /aʊ/ is realized as [æu]; and /ɔ/ is diphthongized to become [aʊ]. He sums up that “contrary to popular belief,

Northerners and Southerners sound more different today than they would have one hundred years ago” (Preston, 2005, p. 42). Accordingly, even the perceived most prestigious native varieties fail to satisfy the unrealistic criteria of resistance to any internal variation and change over time to model English learners. By the same token, these provide ample evidence that the New Englishes are not alone in manifesting internal and regional variations, and these are the result of the inherent evolving nature of languages but not necessarily the indications of a lack of systematicity and stability.

2.1.1.3 Fallacy three – The unarguable definite intelligibility of native varieties

Another popular argument against the use of New Englishes in teaching the language is that the regional unique features may cause unintelligibility when the two speakers do not share the same L1. It therefore sounds logical to stick with the native varieties to ensure intelligibility of English as it functions as an international lingua franca. This, however, may not seem as rational as it appears when one examines closely the aspect of pronunciation, which presumably affects the intelligibility of a variety most directly. Jenkins (2000), for instance, argues that RP “is by no means the easiest accent for an L2 learner to acquire, either productively or receptively, as compared with certain regional accents, such as Scottish English” (p. 15). Such comment should not come as a surprise due to a number of features that RP and GA manifest. Unlike some other languages such as Spanish, there is no direct

correspondence between English pronunciation and its orthography. RP makes it even harder for the learners in that it consists of a relatively large number of diphthongs and triphthongs as compared to other varieties; and it elides the /r/ sound after vowels even if there is the letter “r” in the orthography. Although GA has a smaller set of diphthongs than RP, both varieties use weak forms, which is not universal to all native varieties and may present difficulty to the learners, especially in the classroom settings where words are frequently learnt in isolation rather than in natural connected speech.

Empirical studies (for example, Deterding & Kirkpatrick, 2006; Smith & Bisazza, 1982; Smith & Rafiqzad, 1979), which might date back to three decades ago, have already shown that the inner circle varieties are not necessarily the most intelligible varieties. In a study investigating South-East Asian Englishes and their intelligibilities by Deterding and Kirkpatrick (2006), they found that some of their shared pronunciation features that are considered to “deviate” from the “standards”, such as the use of full vowels in function words, in fact enhance intelligibility to other speakers in the region. In an attempt to examine the comprehensibility of the favourably evaluated variety Estuary English, which is considered “young, modern and democratic” (Przedlacka, 2005, p. 27) by both L1 and L2 speakers, it was found that the trend of the substitution of /f/ for /θ/ in the word-initial position may cause confusions over whether the word spoken was “three” or “free” as the realizations were identical as [fri:]. As such, the equivalence between unintelligibility and New

Englishes remains a fallacy.

2.1.2 English as an international language – The legitimacy of New Englishes

Dismissing the unfair judgments of an inherent lack of stability and intelligibility of New Englishes as compared with the inner circle varieties and thus the rationale for the denial of New Englishes as equally legitimate varieties in their own right, the investigation of the systematicities of these varieties, their variations and changes would then seem in order. This line of research should be given recognition in the research agenda of investigations into the phonologies of English varieties. The denial of HKE contradicts the sociolinguists' research objectives: The interest in language variations and the relationship between sense of identity and variety, and their refusal to be judgmental towards any variety that could fulfill communicative functions (Seidlhofer, 2005, p. 63).

Capturing the intertwined relationship between identity construction of a community and the development of a new variety, Schneider (2007) proposed “the Dynamic Model of the evolution of Postcolonial Englishes” (p. 29) which attempted to describe a universal underlying process driving the formation of these varieties when the transplantation of a language occurs. In the initial phase, which he terms as “foundation” (p. 33), the indigenous language does not tend to have much influence on the target language. In the second phase, which he calls “exonormative stabilization”

(p. 36), the expanding range of language contacts between the indigenous language and the target language results in “more fundamental changes in the linguistic system(s) of English” (p.39). It initially has greater effect on the lexical level, but its influence will later extend to the syntactic and morphological structures. Phase 3 is what he refers to as “nativization”, in which fundamental cultural and linguistic transformation takes place. New identity construction happens alongside changes in the linguistic system on the lexical, phonological, syntactic, discourse and stylistic level which serve as an identity marker. Both communities of the native speakers of English and the local people consider such changes as positive. In Phase 4, “endonormative stabilization” (p. 48) happens so that a new variety which is stabilized to a large extent after the processes of linguistic changes and is distinct from other varieties in certain aspects is produced. The variety is considered as notably homogeneous and such property is emphasized. In Phase 4, which he calls “differentiation” (p. 52), the new variety is well established to an extent that ethnic, social and regional group-specific varieties emerge as L1 or L2.

Schneider’s (2007) model outlined possible language changes on all linguistic levels in each phase of development of a new variety. However, the present study focuses on the phonological level only as it is highly influenced by Jenkins’ (2000) following viewpoint:

In attempting to ‘democratize’ the English language, I identify pronunciation as

the area of greatest prejudice and preconception, and the one most resistant to change on all sides. So, although many of the issues at stake are at heart cultural and political, they are embedded in and symbolized externally by phonology and phonological attitudes. It is, therefore, to changes in these that we must look if English is to achieve true integrity as an international language, and thus we have another major motivation for giving EIL [English as an international language] phonology a high profile. (p. 4)

In sum, this section has shown that native varieties of the inner circle do not establish standards for non-native speakers to follow as they are not found to be the most stable and intelligible varieties in comparison to non-native varieties. In order for English to become international, the ownership has to be released from the native speakers. Since non-native varieties show rich variations, fulfill communicative functions and are loaded with socio-cultural identity, phonologies of non-native varieties should thus constitute a new line of research and be given undivided attention.

Consequently, whether it is true that, as Luke and Richards (1982) commented, there is little sociolinguistics basis for the development of HKE, we have to examine its phonological system to see whether we can find rich internal phonological variations which are different from the native varieties and serve communicative purposes in the community. Only when the systematicity or a lack of systematicity of

HKE phonology is identified can we have the basis for the discussion of its sociolinguistic existence. Accordingly, the following section discusses the previous findings on the unique phonological features of HKE and thus the need for its legitimization on a phonological basis.

2.2 Theoretical frameworks and research findings on HKE

Before the findings on HKE phonology are discussed, it is important to discuss the general approaches employed to outline the systems of non-native varieties as their differences result in different perspectives in viewing the data. There exists two popular theoretical approaches, with the second one attempting to eliminate the drawbacks of the first. They are now discussed in detail respectively.

2.2.1 Approaches in describing the systems of non-native varieties

The first approach regards the native varieties as the yardstick against which the non-native varieties are compared, thanks to the aforementioned fallacies. The descriptions of the non-native varieties are largely lists of “errors” or “deviations” from the “norm”. Bolton and Kwok (1990), Chan and Li (2000) and Stibbard (2004) used this approach to investigate the pronunciation of HKE. Chan and Li (2000) even published a non-empirically supported paper about the “pronunciation problems” of Hong Kongers solely by contrasting the phonologies of English and Cantonese. This

approach is based on the Contrastive Analysis Hypothesis (CAH) (Lado, 1957), which postulates that learners' ease and difficulty encountered in L2 learning correspond directly and solely to the areas of similarities and differences between their L1s and the target language.

However, Mohanan (1992) and sociolinguists such as Kachru (1983, 1986) raised a concern that such kind of comparison may only yield item-to-item comparisons but not a description of the system, and that "stable non-native varieties have an independent structural and socio-cultural existence of their own" (Mohanan, 1992, p. 111). This is based on Selinker's (1972) Interlanguage Hypothesis (ILH), postulating that a learner internalizes a system of rules and results in an interlanguage, which maybe independent of both the learner's L1 and the target language. Compared to the CAH (1957), the ILH attaches less importance to the target language. The second methodology thus arose, maintaining that the analysis should be based on data internal to the non-native varieties, which introduced the study of morphophonemic alternations as one of the methods. An example is the comparison of the actual realizations of stems and stems with suffixation such as "pig" and "piggy", which allows the researchers to determine if it is a systematic property to devolve the sound at the word / stem-final positions.

In sum, the first theoretical approach regards native varieties as establishing the standards for the language, thus rendering non-native varieties as systems which are

dependent on these norms. The second approach considers the non-native varieties as independent structural and socio-cultural systems, which may be independent of both the L1 and the target language. Both approaches have been adopted by researchers probing into the phonology of HKE. Within disparate theoretical frameworks, these researchers adopted different perspectives in analysing the data and hence reported dissimilar findings concerning HKE phonology. These research studies are discussed below in detail.

2.2.2 The phonology of HKE

Adopting the older approach of investigating non-native varieties by comparing them with the native varieties, HKE speakers' productions have been studied in light of their degree of acquisition of the English Language. Based on the deviations from the norms established by the native varieties, L1 transfer from Cantonese was often named the primary factor in affecting HKE's productions as interference. Other factors, such as the phonological and social factors, were largely unexplored as HKE was not considered a legitimate variety on a linguistic and sociolinguistic basis.

2.2.2.1 The significance of L1 transfer from Cantonese

Luke and Richards (1982) was probably the earliest published paper which included a mention of the phonology of HKE. The main concern of this paper was to

examine the role of English in Hong Kong. It was maintained that “English in Hong Kong”, as opposed to HKE, has little basis for indigenization. Hence, there was only a brief outline of some phonological features of HKE as a supplement to the discussion. They argued that the “typical features” of a speaker of “English in Hong Kong” with an intermediate proficiency encompassed substitution of, for instance, [f] for /θ/, [dʒ] for /ð/, and [w] for /v/, deletion of final /t/, /s/ and /d/, initial [n] [l] variation, addition of [d] before the past tense marker, consonant cluster reduction, and devoicing of lenis consonants from, for instance, /z/ to [s], and /b/ to [p] (Luke and Richards, 1982, p. 58-59). Adopting the first theoretical approach of considering native varieties as norm-providing, these feature changes stemmed from their comparison of HKE phonology with that of the RP, which served as the norm in the study. However, no empirical findings were offered in the study to support the postulation of these features.

Based on their observations, Luke and Richards (1982) posited that transfer from Cantonese had a primary effect on HKE phonology. It followed that some realizations found in HKE, such as [ɑ:ŋ] for /aʊn/ as in “sound”, were to comply with the phonotactic constraints of Cantonese (p. 59). It was also found that stressed syllables in English were manifested by HKE speakers by assigning them a high falling tone. In accordance with the syllable-timing of Cantonese, stress was found to be imposed on every syllable (p. 60). As such, Luke and Richards (1982) attributed the phonological

patterns identified for HKE only to the L1 transfer from Cantonese.

Almost one decade later, Bolton and Kwok (1990) was the first paper attempting to give a more detailed and structural description of both segmental and suprasegmental features of HKE. They assembled and analysed speech samples from a range of local speakers to determine what might be considered to be the typical features of HKE phonology. The main features of the vowel system outlined were the neutralization of contrasts between the long and short vowels and the use of an intermediate one between the two as a substitution; the realization of the schwa as the rounded Cantonese central vowel /œ/; the monophthongization of diphthongs in closed syllables; the realization of /əʊ/ as the rounded Cantonese diphthong /ou/; and the actualization of the schwa in full value. The features of the consonant system were mainly concerned with replacement by another sound, for instance, /θ/ by [f], /ð/ by [d], /v/ by [w] and /ʃ/ by [s], non-release of stops /p/, /t/, /k/ and /d/ in word-final position, simplification of consonant clusters and devoicing of voiced consonants, such as from /b/ to [b̥], /d/ to [d̥], /z/ to [s] and /g/ to [g̥]. Bolton and Kwok (1990) argued that these phonological features stemmed from the “phonological ‘interference’ from Cantonese” (p. 152). Although they maintained that transfer from Cantonese is a “powerful” factor in explaining the productions, they also acknowledged the fact that such transfer effects “may not be the only mechanism at work” (p. 152).

These findings were obtained from a corpus consisting of “tape-recordings of

television and radio news broadcasts; speeches in the Legislative Council; interviews with the local employees of banks, financial institutions and trading companies; and interviews with students at the University of Hong Kong” (Bolton & Kwok, 1990, p. 150-151). These sources, however, might not be representative of the whole Hong Kong population. Similar to Luke and Richards (1982), who also adopted the first theoretical approach of regarding native varieties as establishing the standard for the language, the phonology of HKE was compared to that of the RP. Segmental differences between the phonologies of the two as discussed above were outlined. The analysis did not examine phonological factors such as phonological environments which might have affected the production in the study.

Stibbard (2004) was the first research study of HKE making use of natural speech. The seventeen undergraduate participants were asked to complete two information exchange activities, which were map-reading and pegboard description tasks, and one retelling task of a short story from memory. It was indeed essential to use natural speech to investigate HKE when so many researchers had virtually used citation words to probe into HKE phonology (for example, Eckman, 1981; Edge, 1991; Hung, 2000 ; Peng & Ann, 2004; Peng & Setter, 2000). However, it is noteworthy that these tasks were arguably cognitively loaded as the participants had to familiarize themselves with the map and the pegboard, and to memorize the details of the story provided by the researcher within a short time and with the presence of the researcher. Details on how

much speech data were obtained from each of the participants were not given, but it was reported that 9609 seconds of data were analysed in total.

Stibbard (2004) attempted to investigate the “co-occurring segmental errors” (p. 127) of the pronunciation of HKE by making comparisons of HKE with Standard Southern British English and GA. Several salient and noteworthy claims were made. First, the data of this study supported the findings of the previous studies that features of pronunciation such as the lack of contrasts between long and short vowels and devoicing of voiced consonants were widespread in HKE. In particular, his data supported the observations made by Chan and Li (2000) that vowels which show contrasts in length and tenseness in the RP and GA were found in HKE as occasionally long and tense; others as short and lax; and the rest as an intermediate between these two. However, they were not necessarily in the “correct” forms of the intended words. He denied the arguments made by Hung (2000) that the intermediate form is the single form that exists in the inventory of HKE and that these vowels are consistently pronounced as such on all occasions. Secondly, he argued that the use of word lists instead of eliciting naturalistic data by, for instance, Hung (2000) and Peng and Setter (2000), “may have led to unusually careful and accurate pronunciation” (Stibbard, 2004, p. 128). Employing word list in eliciting data was therefore said to have obscured the fact that “there seems to be no potential limit to the number of co-occurrences of phonemic overlap in a single word” (p. 131). In other words, the

author argued that “errors” present in HKE such as the neutralization of length contrasts in some vowels may co-occur within one single word. These variations are unsystematic as “what features appear in the speech of particular speakers and within the same speaker’s speech” are unknown (p. 131), and thus may have affected intelligibility of the speech.

He further proposed that the lack of contrasts in vowel length was owing to a lack of such kind of distinctive pairs in Cantonese (p. 127). Accordingly, the distinction between /i:/ and /ɪ/, /ɔ:/ and /ɒ/, /u:/ and /ʊ/, and /æ/ and /e/ were improperly neutralized. By the same token, the contrasts in voicing between voiced and voiceless consonants were also lost in HKE as these sounds were replaced by transferring from Cantonese, which has a smaller inventory of sound contrasts (p. 128). For these reasons, Stibbard (2004) recognized transfer effect from Cantonese as the major factor affecting the phonology of HKE.

Employing the newer approach of considering non-native varieties as having phonologies in their own right, many studies were conducted to provide evidence of the existence of HKE phonological system by outlining and analysing the regularities of its phonological features. This perspective yielded different findings from the other approach in the sense that transfer from Cantonese was not identified as the only factor affecting the productions of HKE in the form of interference. It instead was described as playing a significant role in shaping the phonological development of HKE. These

studies are now discussed in greater detail.

2.2.2.2 HKE as an independent phonological system

In an attempt of a structural description of HKE phonology, Hung (2000) postulated an underlying phonemic system for HKE. Adopting the second theoretical approach, he sought to give an inventory of phonemes of HKE and describe the phonetic realizations of its phonemes, namely the alternation. Addressing the growing recognition of the drawback of comparing the non-native varieties directly with the native ones, Hung (2000) made use of a batch of words designed to capture all the possible vowel and consonant contrasts in various phonological environments. The data were based on the recordings of fifteen first-year undergraduates at the Hong Kong Baptist University. Similar to Luke and Richards (1982) and Bolton and Kwok (1990), his study examined “the English spoken by educated young people who were born and raised in Hong Kong” (Hung, 2000, p. 339).

The main findings of Hung’s (2000) study were that there were no length/tenseness contrasts in vowels and no voicing contrasts in fricatives. The vowels that contrast in length/tenseness were replaced with an intermediate one between the two. As to the fricative voicing contrasts, there existed only four voiceless fricatives, which were /f/, /θ/, /s/ and /ʃ/, in their consonant system in any position of the words, whether initial, medial or final. He also discussed some phonological properties that

might be unique to HKE, although his arguments were inconclusive due to a lack of sufficient data. He found that the diphthong /aɪ/ was in some phonological environments realized as [aɪ] and in some as [ʌɪ]. For instance, only [aɪ] was realized in open syllables. However, he could not reach a concrete conclusion in this regard due to a lack of robust data.

This study was the first to conclude that HKE has a legitimate and systematic phonological system of its own. Additionally, Hung (2000) argued that although transfer from Cantonese was evident, “its phonological system cannot be reduced entirely to the phonology of either Cantonese or English, but needs to be investigated on its own terms” (p. 354). It was also the first study which took the factor of phonological environments into account, as seen from Hung’s (2000) intentional design of the word lists to capture all the possible vowel and consonant contrasts in various, though not all, phonological environments. However, the patterns of phonetic actualizations of phonemes of HKE phonology were still not examined in light of their variations in different phonological environments. While the main focus of this study was on outlining the phonemic inventory and their phonetic realizations, many distributions of sounds and phonological phenomena demanded further investigations.

Deterding et al. (2008) sought to chart the pronunciation patterns of HKE and to “establish the degree to which the English spoken in the territory is unique or is participating in an emergent regional English lingua franca” (p. 149) by making

comparisons with other new Englishes such as Singapore English so as to examine it from a more global perspective. Noticing the gap in the literature caused by the heavy reliance on the use of word lists in the previous studies, they elicited connected speech by asking the participants “Can you tell me what you did on your last vacation?” Also unlike the previous studies done on HKE which were largely investigating the whole inventory of the existing phonemes and their phonetic realizations, the authors particularly examined the pronunciation of initial TH, initial and final consonant clusters, L-vocalization, initial [n]/[l], monophthongs, diphthongs in FACE and GOAT, vowel reduction, rhythm, and sentence stress, and provided acoustic measurements and frequency counts for some of them.

Deterding et al. (2008) reported that some findings were consistent with the findings of previous studies, such as the substitution of [f] for /θ/ and final consonant cluster simplification. Despite the documentation of initial [n]/[l] free variation in HKE phonology in a good deal of previous studies (Bolton & Kwok, 1990; Hung, 2000; Luke & Richards, 1982), Deterding et al. (2008) did not find such feature in the data (p. 160-161). In terms of vowels, confirming the findings of Bolton and Kwok (1990) and Hung (2000), there was a merging tendency of /æ/ and /e/, /i:/ and /ɪ/, and /ɔ:/ and /ɒ/ (p. 162). However, many of these arguments were inconclusive. As the authors stated, they would need more extensive data. Similar to all the previous studies (for example, Bolton & Kwok, 1990; Hung, 2000; Stibbard, 2004), the phonetic

realizations of sounds in HKE were not delved into with respect to phonological factors such as phonological environments and stress.

This study also analysed the phonological systems of HKE with reference to those of the other native and non-native varieties. The features of pronunciation of HKE were summarized under four categories. The first category of features is those that are unique to HKE and are attributed to transfer from the first language, namely Cantonese, such as the free variation of initial [l] and [ŋ]. The second category is the features and patterns that are also found in other new varieties, such as Singapore English. An example is the neutralization of long and short vowels in addition to /æ/ and /e/ in HKE. The features are said to be participating in the emerging lingua franca in the larger region of South-East Asia. In the third category, there are some features in HKE that are said to be also found in most varieties of English, including the native ones, such as the vocalization of the dark [ɪ]. The final one is the features that are found in British English but not in any other new varieties in the South-East Asia region, such as the replacement of initial /ð/ with [f] in content words. These categories clearly indicate that HKE phonology has to be studied on its own terms, as neither of the L1, target language or emerging patterns of new varieties in the region alone can fully explain its production patterns.

Attempting to probe into the productions of consonant clusters, syllable structure and the phonotactics of HKE, Setter (2008) made a comparison between the data

collected from the class presentations given by 10 female and 10 male second and third year undergraduates at a Hong Kong university and the data from the SCRIBE corpus of British English speakers. It was shown that syllable types found in the two varieties were similar in a good proportion (p. 512), but HKE was found to have “a less complex syllable structure than BrE” and “a more complex syllable structure than Cantonese” (p. 514). Among the possible combinations of syllable structures in HKE, there was a relatively large amount of clusters ended with an obstruent, particularly clusters of the sequence nasal + obstruent (p. 514). The differences of syllable structures in complexity from those of Cantonese and English are indicative of the salient fact that HKE phonology and its phonotactics are not directly attributable to the target language or the L1 alone. Its preference for clusters ending with an obstruent over others may be suggestive of the existence of a separable independent system operating with some internal rules or patterns.

In an attempt to adopt a generative linguistics approach to examine the phonological patterns of L-vocalization and tone placement of HKE and Singapore English to discern Englishization and Nativization, Wee (2008) proposed several rules governing L-vocalization, such as the assimilation of /l/ in the coda position to the preceding round vowel such as /ɔ:/ and /u:/ in HKE (p. 487). Delving into the tone assignment in HKE and Singapore English, Wee (2008) provided striking evidence of the construction of phonologies of new varieties as a result of the interaction of the

target language and L1 (English and Chinese in this case) phonologies. He proposed that the tonal system of both varieties were an “inheritance from both English and the local languages, with English supplying more or less a certain metrical system with polysyllabic strings, while the local Chinese languages supply tones and a system of their assignment” (Wee, 2008, p. 491). This study also indicated that the systematic phonological patterns of the varieties reflected their internal mental grammars by examining the participants’ linguistic intuitions with the aid of experiments. By probing into their mental grammars, he showed that the phonological patterns in question were generated and governed by the rules as well as their rankings in these grammars. Accordingly, he concluded that both new varieties have “psychological realities” and “are not partial or incomplete grammars” (Wee, 2008, p. 496), which are the result of the L1 and the target language coming into contact.

The above two sections have summarized the major findings on the phonology of HKE, with the first section discussing studies which have identified L1 transfer from Cantonese as the primary factor in explaining the HKE productions and the second discussing previous studies which have demonstrated the existence of HKE as a legitimate and systematic phonological system in its own right. It should now be clear that while Cantonese plays an important role in the formation of HKE phonology, HKE has phonology in its own right, which is made up of and governed by systematic internalized grammars instead of being dependent on the L1, the target language or the

emerging patterns found in other new varieties of the region.

With respect to the variations within the system, the features of realizations of consonants were consistent to a great extent while those of vowels were in disagreement among researchers (Bolton & Kwok, 1990; Chan & Li, 2000; Deterding et al., 2008; Hung, 2000; Luke & Richards, 1982; Stibbard, 2004). The main disagreement lies in whether there was total neutralization of the vowels and thus the substitution of an intermediate form between the two forms. Since this discussion shaped the present study, it would be returned to in a later section. Besides, none of the studies reviewed in this section investigated the phonetic realizations of the sounds with respect to phonological factors, such as phonological environments and stress, which are very likely to have an influence on the sounds' allophonic variations. The next section thus moves on to discuss studies which indicate the significance of phonological factors in HKE phonology.

2.2.2.3 The importance of scrutiny of phonological factors

In fact, as early as Eckman (1981), there were already studies involving studies of specific phonological phenomena of HKE consonants. However, these were for the sake of proving the Interlanguage Hypothesis (ILH) but not investigating the systematicity of HKE. Eckman (1981) adopted the approach of considering the non-native varieties as independent of the native ones in investigating the phenomenon

of terminal devoicing. It was found that the two native speakers of Cantonese devoiced word-final obstruents while the two Japanese native speakers inserted a schwa after the voiced obstruent in the word-final position. As a follow-up paper of Eckman (1981), Edge (1991) studied word-final devoicing of obstruents in seven native speakers of Cantonese, with respect to the native varieties. It was found that the speakers devoiced word-final alveolar stops, as in “hard” [hɑ:d̥], and yet they maintained such contrast in word-medial positions, as in “riding” [ɹɑ:dɪŋ]. Meanwhile, devoicing of the fricatives /z/ and /v/ was found in both the word-initial and word-medial positions. It is evident from these two studies that phonological environments, which vary as the position of the sound in the word changes, may have an influence on the allophonic realizations.

Peng and Setter (2000) sought to describe and analyse the phenomenon of consonant cluster simplification in the English of two native Cantonese speakers in Hong Kong by adopting a purely qualitative approach. They proposed that the simplification process is systematic as they found that such simplification only occurred with alveolar plosives and only when they were in a coda consonant cluster, suggesting the emergence of systematicity in HKE. As a continuation, Peng and Ann (2004) studied the obstruent voicing and devoicing in the English of two Cantonese speakers. The major finding was that the rates of voicing and devoicing varied with the phonological environment. Specifically, they found that “stem-final obstruents are more likely to devoice in prevoiceless and word-final positions than in prevocalic and

pre-sonorant positions” (p. 535). These research studies have indicated that it is worth studying particular phenomena in HKE phonology, given that they are studied in terms of phonological environments rather than generally.

In an investigation of the productions of initial consonant clusters by six form four and form five students from different local secondary schools, which had never been done before by other researchers, and another six English majors in their third year of study from a local university, Chan (2006b) clearly advocated the approach of taking the native varieties as the norm against which the participants’ productions were compared by recruiting three native speakers of English to serve as a control group. She reported that deletion and substitution were the most common strategies employed by the participants. Sound-wise, certain segments, especially the liquids, were found to have presented more “difficulty” than the other segments in the same onset to the Hong Kong participants. She further proposed the phonological rule of the participants to neutralize the liquids of /l/ and /r/ when they occurred in consonant clusters.

However, the intricate relationships of the identified problems and strategies, or their patterns of occurrences in the study remained unexplored. There were only enumerations of the occasions where the sounds were deleted or modified. These findings were significant though as they indicated that not all types of sounds received the same treatment when they were in different positions in the syllable or were preceded and followed by different sounds. It is worth probing into why the sounds

were realized in one way on one occasion and another way on another occasion. For instance, it was found that liquids were most prone to deletion, and yet it was unclear why the realization of the word “spleen” was [spi:n], with the liquid /l/ deleted, while that of “screen” was [sri:n], with the plosive /k/ deleted on this occasion rather than the liquid. Such deletion of /k/ was not in line with the trend she found in the productions. The plosives are also less marked than the approximants. Accordingly, there was not ample evidence that a lack of acquisition of the sounds by the participants was the only reason explaining why the participants manifested certain features that deviated from the productions by the control group. It remained unclear whether the participants intentionally chose to manifest these features. Additionally, the study concluded that “there also seems to exist, in the interlanguages of the participants, a phonological rule which neutralizes liquids occurring in clusters” (p. 353-354). This indeed casts light on the importance of phonological rules as one of the possible factors regulating these participants’ productions.

Also with six secondary 4 or 5 students and six undergraduate English majors as in the previous study (Chan, 2006b), Chan (2006a) studied the productions of English final singleton consonants of the participants. It was found that a preceding round and back vowel such as /u:/ in “cool” and a diphthong having a round and back vowel as the second component such as /əʊ/ in “whole” might have contributed to the “least number of accurate articulations”, whereas a preceding close and front vowel such as

/l/ in “kill” might have caused the most number of accurate articulations” (Chan, 2006a, p. 305). Although Chan (2006a) has taken the perspective that these productions reflected their error patterns which is fundamentally different from the perspective of viewing non-native phonologies in their own right, it provides striking evidence that preceding phonological environment is crucial in affecting the allophonic variations of the sounds.

Investigating the validity of the Markedness Differential Hypothesis in predicting and explaining the relative degrees of “difficulty” of word-final voiced obstruents, voiceless obstruents and sonorant consonants experienced by “Cantonese ESL learners of English” (Chan, 2007, p. 231), it was found that both secondary school students and undergraduate English majors who participated in the study experienced most difficulty with word-final voiced obstruents and dark [l] while word-final nasals and voiceless obstruents did not pose much challenge for the participants. Chan (2007) argued that the difficulty encountered by the participants was not in accordance with that predicted by the Markedness Differential Hypothesis (p. 246-247). She further suggested that allophonic variations which vary to a great extent in different contexts instead of implicational universals have to be scrutinized in explaining the participants’ productions (p. 248). Notwithstanding the approach of considering non-native varieties’ features as errors in this study, it again suggests the importance of phonological factors of these internalized systems other than their comparisons with

the L1 and target language systems.

In view of all these three studies by Chan (2006a, 2006b, 2007) as well as Eckman (1981), Edge (1991), Peng and Setter (2000) and Peng and Ann (2004), it becomes evident that whether the approach of examining non-native phonologies with respect to deviations from the standards as established by the native varieties in the inner circle or the approach of regarding non-native varieties as internalized phonological system that is independent of any native varieties is adopted, the effects of phonological factors such as preceding and following phonological environments on the allophonic variations should not be rendered secondary to the comparisons of the productions to the native varieties or mere descriptions of the actualizations.

Such need for investigation into the effects of phonological factors further gives rise to the question of how these factors may interact with each other to affect the productions and how significant these factors are. The literature has no knowledge of this hitherto. Accordingly, the following section discusses how a variation analysis of HKE may address these concerns.

2.2.3 The need for a variation analysis of HKE in bridging the gap

Many of the studies adopting the approach of comparing the L2 productions with the native varieties (for example, Bolton & Kwok, 1990; Chan, 2006a, 2006b) are unarguably placing their focus mainly, if not entirely, on the productions, and have

neglected the fact that every speaker of a language, be it as the L1 or an AL, is in fact an active agent of use of the language. For this reason, instead of employing frequency or percentage counts as in some studies (for example, Deterding et al., 2008; Chan, 2006a, 2006b), a variation analysis has to be implemented to delve into the variation patterns and the reasons behind their formations. As argued by Hung (2000), Cantonese may have an important influence on HKE phonology. It, however, has to be studied on its own terms as neither Cantonese nor English alone is sufficient in explaining all the production patterns. This is most evident when Setter (2008) demonstrated that permissible syllable types and phonotactics of HKE phonology were different from those of English and Cantonese phonologies. The employment of a variation analysis is in order if one is “interested in identifying and weighting the factors which promote the occurrence of one form or another in linguistic output” (Preston, 1996, p. 33). It appears that the process of formation of the phonological patterns and the reasons why the productions are the way they are today were not given due attention in previous studies. For this reason, the transfer effect from Cantonese remained the only factor identified to have an influence on HKE phonology. Some phonological patterns might even risk being obscured by making comparisons with the native varieties. As such, what promotes one allophonic form over another was largely unexplored.

There have been many misunderstandings of variation analysis, especially when it

comes to the analysis of the non-native varieties of a language. A quotation from Brown (1976) would have made these misunderstandings clearer than any other things would.

A sociolinguist's reaction to such a definition [i.e., one which contrasts 'systematicity' with 'variability'] may be justifiably negative, since his definition of variation might well incorporate the notion of internal consistency. But I think the contrast is acceptable in second language research so long as one does not too hastily conclude that a set of utterances shows variability simply because one cannot "find" systematicity. (p. 138, quoted in Preston, 1996, p. 25)

This apparently shows a great deal of misunderstanding of the underlying working principle and methodology of variation analysis. The hinted sameness or overlapping of variability and the lack of evidence of systematicity is ill-founded. As explained by Preston (1996), "if free variation [i.e. the lack of systematicity] exists, it is established by showing that plausible influencing factors have been subjected to a quantitative analysis and have been found to have no effect on the occurrences of the dependent variable" (p. 24-25). The intention of running a variation analysis is to provide the likelihood of occurrence of a variable form and a contextual factor in quantitative terms, and thus to allow interpretations of patterns and systematicity, if there is any. It is, however, not used to justify for the existence of systematicity even if there is not any in reality. It is this misunderstanding that has rendered variation

analyses of patterns and systematicities of non-native varieties invalid. Attempting to investigate why the productions of vowels contrasting in length manifest the present variation patterns, a variation analysis was thus the approach adopted in the present study.

Apart from the need for investigations into the effects of phonological environments, one can also remark that there are a number of issues in connection with investigations into HKE from the previous sections. First, possibly due to the availability of access to participants, almost all of the studies, except Chan (2006a, 2006b, 2007), recruited participants from universities, which is questionable since these educated young speakers may not be representative of the larger population speaking HKE. Secondly, the research questions were often not fully addressed due to the limitations of methodology. Thirdly, all of the studies on HKE were either about the whole inventory of sounds or only a single particular phenomenon of its consonant system. None of these studies attempted to study the distributions of realizations of the sounds that are identified to have shown features unique to HKE in light of phonological factors. Additionally, none of the studies, except those seeking to describe the whole inventory of HKE, has ever examined the productions of vowels. All of them have only studied the phonological phenomena of consonants (Chan, 2006a, 2006b; Eckman, 1981; Edge, 1991; Peng & Setter, 2000; Peng & Ann, 2004). If HKE is to be established as a new variety, this unexplored aspect demands urgent

attention if one makes reference to the processes of emergence and development of Singapore English. After tremendous amounts of work have been dedicated to describing the whole inventory of phonemes and their phonetic realizations of the variety (Bao, 1998; Brown, Deterding, & Low, 2000, 2005; Deterding, 2007b; Hung, 1995; Levis, 2005; Low & Deterding, 2002; Platt & Weber, 1980; Poedjosoedarmo, 2000; Tay, 1982; Tongue, 1979; Wee, 2004), many works are dedicated to solely the vowel systems (Brown, 1988; Deterding, 2000, 2003, 2005, 2007a; binte Hashim & Brown, 2000; Heng & Deterding, 2005; Lee & Lim, 2000; van Bergem, 1995), which parallel those to the consonant systems (Gut, 2005; Setter & Deterding, 2003; Tan, 2005) to have a more balanced and full development. Thus, the vowel productions of HKE demand studying with a rigorously designed methodology.

While the phonological features of consonant realizations were largely consistent, there were contradictions in the findings of the aforementioned studies on HKE by Bolton and Kwok (1990), Chan and Li (2000), Deterding et al. (2008), Hung (2000) and Stibbard (2004) on the productions of vowels in HKE. Simply put, the acoustic findings of Deterding et al. (2008) confirmed Bolton and Kwok (1990) and Hung's (2000) findings that vowels having contrasts in length and tenseness, such as /i:/ and /ɪ/, and some vowels having contrasts in openness, such as /æ/ and /e/, in some older varieties such as RP tended to be merged in HKE and had the realizations of an intermediate form, although they reported that it was not clear if the vowels /ɔ:/ and /ɒ/

were fully merged. On the contrary, disagreeing with these researchers' claims, Stibbard (2004) "lends weight to Chan & Li's (2000) view of instability rather than stability" (p. 128) in that they were "on occasion pronounced very long and tense, on others short and lax, not necessarily correctly for the intended word, and on other occasions intermediate between the two" (p. 130). The key disagreements among these researchers therefore lie in whether there are three realizations of the contrasted pairs of vowels or only one as the intermediate form, and whether they are produced consistently with patterns. These two then lead to the arguments of whether the production variations demonstrate stability or a lack of stability.

There were also some degrees of disagreement as to the productions of diphthongs in HKE. Hung (2000) postulated an inventory of eight diphthongs for HKE from his acoustic measurement findings, namely /eɪ/, /aɪ/, /aʊ/, /oʊ/, /ɔɪ/, /ɪə/, /ɛə/, and /ʊə/, and he raised an interesting phenomenon of the realizations of /aɪ/ as [ʌɪ] in some certain words. Yet, he failed to draw conclusions due to the limited tokens of words from his data, and therefore it was unclear as to, for example, whether these two were contrastive or predictable allophones of the same phoneme. Bolton and Kwok (1990) and Chan and Li (2000) agreed with each other that monophthongization occurred for some of the diphthongs such as /eɪ/ and /ɛə/ in HKE. Hung (2000) also reported that although the aforementioned diphthongs existed in the inventory of HKE, there seemed to be some distributional phenomena and syllable-structure constraints for the

productions of the sequence diphthong + oral or nasal stop. Regrettably, this was not covered in his study or any other previous studies but this “promises to be a fruitful area of investigation” (Hung, 2000, p. 354). Unlike the contrasted pairs of monophthongs, the disagreement lies in the phonetic rather than the phonemic level. There seems to be no disagreement as to whether the diphthongs exist as phonemes in HKE, but rather whether the diphthongs are monophthongized or not. Deterding et al. (2008) only examined the diphthongs /eɪ/ and /əʊ/, and they maintained that HKE produced the two as diphthongs, unlike other new varieties such as Singapore English that monophthongizes them. Stibbard (2004) did not investigate diphthongs but he raised a concern because of these studies’ disagreements over the productions of the diphthongs.

It is argued that the presence of these disagreements over vowels is due to the lack of systematic investigations into the patterns of occurrences of these vowels with respect to phonological factors such as phonological environments. None of the studies suggesting the emergence of systematicity and stability of HKE or studies suggesting the lack of these have examined the patterns of occurrences systematically. Phonological environments play a crucial role in sound variations, not only in the new varieties but also in the native ones. For instance, it is accepted to be normal in all the varieties for the word-final lenis obstruents to be devoiced except when they are followed by a voiced sound and when they are in consonant clusters (Docherty, 1992,

p. 35), and for all the vowels before voiceless syllable / word-final consonants to be shortened (Roach, 2000, p. 50). These are termed as the “phonological rules” as they govern the allophonic variations in different phonological environments. Hence, it is essential to investigate the patterns of variations and to develop these “phonological rules” for HKE after its phonemic inventory is largely described, if it is to be established as a new variety. It is also felt that the claim made by Stibbard (2004) that many realizations in HKE are “indubitably wrong” and “would not be accepted in any variety of English” (p. 131) is unfair. There is no reason why HKE’s patterns of pronunciations are necessarily “wrong” when one takes into account the case of Singapore English. They also, for instance, do not make distinctions between long and short vowels (for example, Deterding, 2003, 2005 for the vowel system), and yet it is widely accepted as an established new variety, and no one denies its existence because of a lack of comprehensibility by speakers of other varieties.

To fill these identified gaps and to address the disagreements, the present study aims at examining the effects of phonological factors on the realizations of the vowels, specifically those contrasting in duration, and identifying the underlying patterns of these that are unique to HKE with the help of a variation analysis. Prior to the main study, two pilot studies were conducted to identify possible patterns for investigation and they are detailed in the following section.

2.2.4 Pilot studies

Two pilot studies were conducted before the main study commenced to identify realizations of the vowels that are unique to HKE. Four secondary six students (by the time the pilot studies were conducted, they were going to be promoted to secondary seven) participated in two pilot studies. They were all born, raised and educated in Hong Kong, and none of them had ever been to an English-speaking country. The first pilot study asked the participants to read two word lists comprising monosyllabic words which were at best in minimal pairs to capture all the vowels. They were required to read the word lists twice and all the words from the two lists were mixed together so that they would not read the same word two times at once and that they could not identify the pairs of words that contrast with each other, such as “bit” and “beat”. The second pilot study sought to elicit naturalistic data and therefore the four were asked to freely discuss some topics that much resembled to the daily use of English, such as a discussion of food choice in Hong Kong. The researcher did not participate in the whole discussion, which lasted for about 40 minutes. Accordingly, the two pilot studies elicited different styles of speech; with the first one the most careful style of speech and the second one the least careful.

Comparing the data obtained from these two studies, it was found that the pairs of vowels that contrast in length and tenseness, namely /i:/ and /ɪ/, /u:/ and /ʊ/, and /ɔ:/ and /ɒ/, did exist in the two styles of speech. Three forms, which were the long one,

the short one and an intermediate one between the two, of the pairs of vowel contrasts were found to be produced in some words but not the others in both pilot studies. Thus, it seemed to suggest that the occurrences of these contrasts were sensitive to the environments or at least the words they were in rather than the style of speech, although for the pair of /u:/ and /ʊ/, bigger contrast was found in pilot study one, which is in fact also acceptable among the native speakers of English in the careful style of speech. As for the pair of vowels /æ/ and /e/ that contrast in openness, both were found in the reading of the citation words while only /e/ was found in the conversational data. Thus, except /æ/ and /e/, the realizations of the vowels which contrast in length and tenseness did not confirm what Bolton and Kwok (1990) and Hung (2000) found that there was total neutralization of the vowels and replacement by an intermediate form. What was found is closer to Deterding et al. (2008) that they tended to merge and were not as apart as in the older native varieties, but it demanded further investigations whether they were really fully merged. It also did not lend weight to Stibbard's (2004) claims that the realizations of these vowel contrasts were unstable and unsystematic because some words such as "choose" were consistently produced by the participants as having the long form. These queries constituted the focus of the present study.

Another contradiction in findings from the previous studies is concerned with the diphthongs, as is mentioned earlier in this chapter. Findings from these two pilot studies agreed and yet also disagreed to various previous studies. As far as the

monophthongization of the diphthongs is concerned, the findings did not agree with Deterding et al.'s (2008) claims that the diphthongs are always realized as the diphthongs as is the case in the older native varieties, and yet they were found to be largely realized as diphthongs with only a few exceptions of monophthongization. Accordingly, they did not lend weight to Bolton and Kwok (1990) and Chan and Li's (2000) suggestions that they are always monophthongized so that the diphthongs do not exist in the HKE inventory. It was, however, found that the diphthongs /eɪ aɪ aʊ/ might vary in their durations as their monophthong counterparts. On some occasions, the durations of these diphthongs were longer while on others they seemed to have undergone shortening, although these variations were not as evident as those of monophthongs. Such contrast in diphthong duration was found in both styles of speech. Owing to the findings of the pilot studies that the participants only manifested a few cases of monophthongization while indicating a more noteworthy realization variations in duration, the present study centered on investigating variations of duration of monophthongs contrasting in length and diphthongs.

All other diphthongs and all the triphthongs did not show much uniqueness and they are not where the central disagreements lie in the previous studies, therefore they were not investigated in this study. It was believed that the study of effects of phonological environments and the underlying patterns could offer an explanation to the contradictions in the findings.

Since the previous sections have identified both the target language, English, and the L1, Cantonese, to have major roles in the development of HKE phonology, it is important to have an overview of English and Cantonese phonologies to facilitate the understanding of the formation of HKE phonology. They are thus presented respectively in the following section.

2.3 English and Cantonese Phonologies

2.3.1 English Phonology

There are a total of 12 monophthongs in the vowel system of English, as outlined in Chart 2.1 on the following page. They are long vowels /i: ɜ: ɑ: ɔ: u:/ and short vowels /ɪ e æ ʌ ɒ ʊ ə/, contrasting with each other in length. Apart from monophthongs, another important component of English vowel system is diphthongs, which are sounds that compose of a glide from the first vowel to the second (Roach, 2004, p. 21). British English has 8 diphthongs and they are /ɪə eə ʊə eɪ aɪ ɔɪ əʊ aʊ/ as outlined in Chart 2.2 on the following page. All diphthongs are described as falling since the first vowel is much longer and stronger phonetically than the second vowel (Roach, 2004, p. 21; Spencer, 1996, p. 30).

Chart 2.1 A chart of English vowel phonemes (adapted from Roach, 2004)

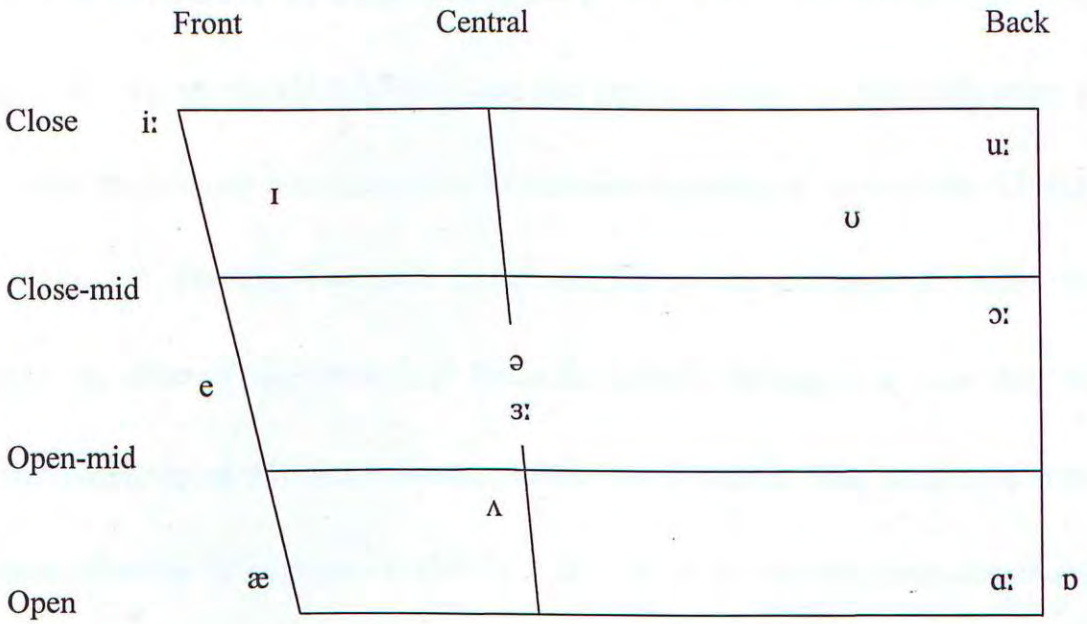
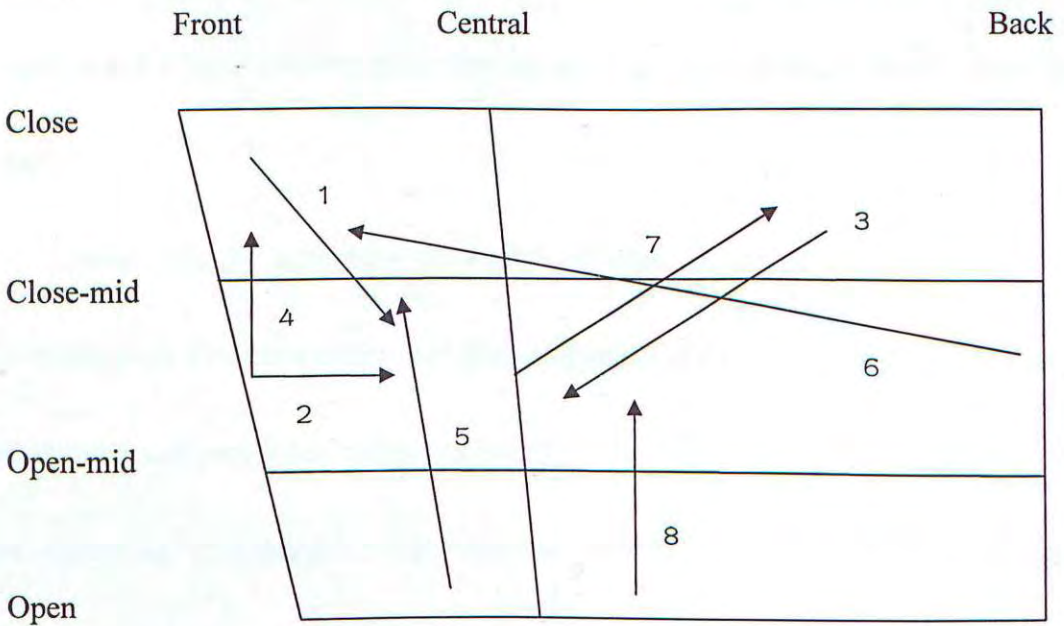


Chart 2.2 A chart of English diphthong phonemes (adapted from Roach, 2004)

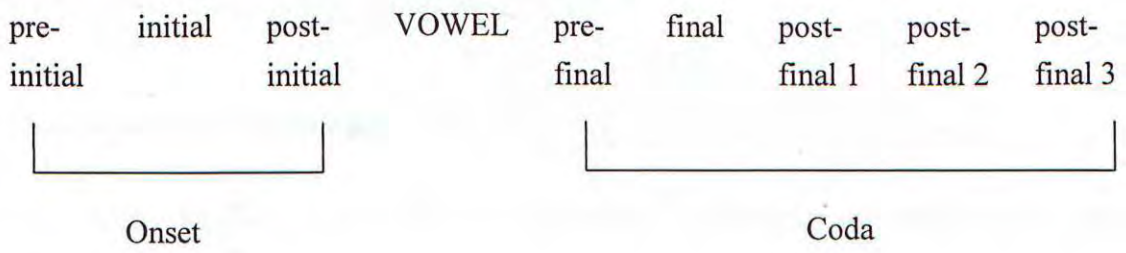


- 1 - /ɪə/
- 2 - /eə/
- 3 - /ʊə/
- 4 - /eɪ/

- 5 - /aɪ/
- 6 - /ɔɪ/
- 7 - /əʊ/
- 8 - /aʊ/

Notwithstanding the implication of the given names “short vowels” and “long vowels”, they are merely relatively short and long in comparison with each other as vowels’ lengths vary to a great extent in different phonological environments (Roach, 2004, p. 15). The length variation is not rendered by their phonemic properties, but rather the effect of allophonic rules. Based on acoustic findings, it is stated that “the short allophones of the ‘long’ phoneme /i:/ are shorter than the long allophones of the ‘short’ phoneme /ɪ/” (Giegerich, 1992, p. 234). The allophonic rules state that vowels preceding a voiced obstruent are long; those preceding a sonorant or a pause are half-long; and those preceding a voiceless obstruent are short (p. 235). As such, vowel length is not a rigidly binary phonemic feature that can distinguish vowels from each other.

English has 24 consonant phonemes in total, as shown in Table 2.1 on the following page by their manners and places of articulation. English syllable structure is much more complex when compared with that of Cantonese. As Roach (2004) states, the following diagrammatic representation describes the maximum phonological structure of English:



From Roach (2004, p. 76)

Syllable onset is optional in English. The constituents of onsets range from zero to maximally three consonants. The formation of consonant clusters in onset and coda positions of English is in compliance with the Sonority Sequencing Generalization, which states that “[i]n any syllable, there is a segment constituting a sonority peak [i.e. the vowel] that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values” (Spencer, 1996, p. 89). Hence, the order of, for example, sonorant plus obstruent is not permissible in English (Spencer, 1996, p. 83).

Table 2.1 An overview of English consonant phonemes (adapted from Roach, 2004, p. 65)

Manner of articulation	Place of articulation							
	Bilabial	Labiodental	Dental	Alveolar	Palato-alveolar	Palatal	Velar	Glottal
Plosive	p b			t d			k g	
Fricative		f v	θ ð	s z	ʃ ʒ			h
Affricate					tʃ dʒ			
Nasal	m			n			ŋ	
Lateral				l				
Approximant	w				r	j		

Note: With each pair of phonemes with the same place and manner of articulation but differ in whether they are voiced or voiceless, the symbol for the voiced consonant is placed to the left of that for the voiceless counterpart.

2.3.2 Cantonese Phonology

While English is an intonation language, Cantonese is a monosyllabic tone language. A Cantonese syllable corresponds to a complete word and carries one of the

nine tones, which serve an equally important function as the consonants and vowels since a change in tone alone may distinguish one word from another semantically. As shown in Table 2.2 below, except the word carrying tone level 8, all the other words with the 8 tone levels are comprised of the same sounds /si/, and yet they are different from each other in their pronunciation, written forms and meanings due to a change in the tone. The nine tones of Cantonese are shown in Table 2.2 below.

Table 2.2 An overview of Cantonese tones with examples (adapted from Bauer & Benedict, 1997; Chan & Li, 2000)

Tone Level	Tone Contour	Example	Tone Level	Tone Contour	Example
1	High-Level 陰平	/si1/ 思 “to think”	7	High Stopped 陰入	/sik7/ 色 “colour”
2	High-Rising 陰上	/si2/ 史 “history”			
3	Mid-Level 陰去	/si3/ 試 “to try”	8	Mid Stopped 中入	/sek8/ 錫 “tin”
4	Mid-Low Falling 陽平	/si4/ 時 “time”			
5	Mid-Low Rising 陽上	/si5/ 市 “market”	9	Mid-Low Stopped 陽入	/sik9/ 食 “to eat”
6	Mid-Low Level 陽去	/si6/ 事 “thing”			

Cantonese’s syllable structure is relatively simple. The minimal syllable structure of Cantonese takes only the nucleus, which may be a vowel, a diphthong² or a syllabic consonant, which is restricted to be either the bilabial nasal /m/ or the velar nasal /ŋ/ (Bauer & Benedict, 1997, p. 12-13). In other words, onset and coda are optional in

² As will be discussed later, the description of the vowels and diphthongs receives different treatments as linguists vary. The definition of what constitutes a Cantonese diphthong will be returned to later. For simplicity, whether it is comprised of two vowels or a vowel plus a semi-vowel, it is termed collectively as a diphthong and the semi-vowel would be treated as a vowel instead of a consonant in the present paper.

Cantonese. All the six types of Cantonese consonants, namely the plosives, fricatives, nasals, affricates, lateral and approximants, are permissible in the onset position of a Cantonese syllable (Bauer & Benedict, 1997, p. 12-13). There are two phonotactic constraints as to what constitutes the coda position in a Cantonese syllable. This depends on the contour tones that the word carries. For the words carrying one of the tone levels from 1 to 6 as listed in Table 2.2, they may appear in an open syllable or in a closed syllable with the coda being one of the nasals /m n ŋ/. For the words carrying one of the tone levels from 7 to 9, they have to be followed by a coda which is restricted to be one of the stops /p t k/ (Bauer & Benedict, 1997, p. 12-13).

The description of the sound system of Cantonese, however, is not as straightforward as that of English. There have been disagreements over the descriptions, especially the vowel system (for example, Bauer & Benedict, 1997; Hashimoto, 1972; Zee, 1991, 1993, 1996, 1999), partly because of the “more than one way of analyzing the vowel contrasts” (Bauer & Benedict, 1997, p. 33) by linguists (Bauer & Benedict, 1997; Hashimoto, 1972; Zee, 1991, 1993). Despite the several acoustic analyses (Kao, 1971; Lee, 1993; Li, 1985; Zee, 1993) conducted, the relationship therein is complicated and no consensus has hitherto been reached. The disagreements mainly lie in whether the length of the vowels are phonemic and contrastive or allophonic and complementary, and whether the diphthongs of

Cantonese are consisted of a vowel plus a semi-vowel, which may be /w/, /j/ or /y/³, or two vowels as in English.

It has been argued that “vowel length should be regarded as a distinctive feature of Cantonese vowels” (Bauer & Benedict, 1997, p. 46). However, it appears that the significance of length in contrasting sounds lies in an allophonic level rather than a phonemic level, for these studies have only investigated the durations of the vowels in different phonological environments. None of the studies had made it clear whether this contrast in length constitutes a contrast in meaning. This results in different treatments of Cantonese vowel system. Since Kao (1971) found that acoustically the average duration of long vowels in the syllables of V:Cnas⁴ and V:Cstop are approximately twice the length of the short vowels in the syllables of VCnas and VCstop (p. 49) and this was confirmed by the findings of Li (1985), the present paper adapts the vowel system by Bauer and Benedict (1997). This vowel system incorporates a total of 10 vowel phonemes, as shown in Chart 2.3 on the following page.

With respect to the vowels’ allophonic variations, Kao (1971) found that both the long and short vowels were shortened when they were followed by a nasal consonant

³ /y/ is a high front round vowel which is distinguished from /j/ in Cantonese’s phonemic inventory, and is only found after the central round short vowel /ə/ in diphthong /əy/ (Bauer & Benedict, 1997, p. 33).

⁴ Thereafter in the present paper the symbols V: denotes long vowel; V denotes short vowel; T denotes tone; Ci denotes initial consonant; Cf denotes final consonant; Csyl denotes syllabic consonant; Cnas denotes nasal consonant; Cstop denotes stop consonant; and Csw denotes semi-vowel consonant.

(p. 47-48). It was intriguing that when they preceded a stop consonant, the long vowels were further shortened while the short vowels were not further shortened in comparison to their realizations preceding a nasal (p. 47-48). These findings were confirmed in a later study (Li, 1985, p. 31).

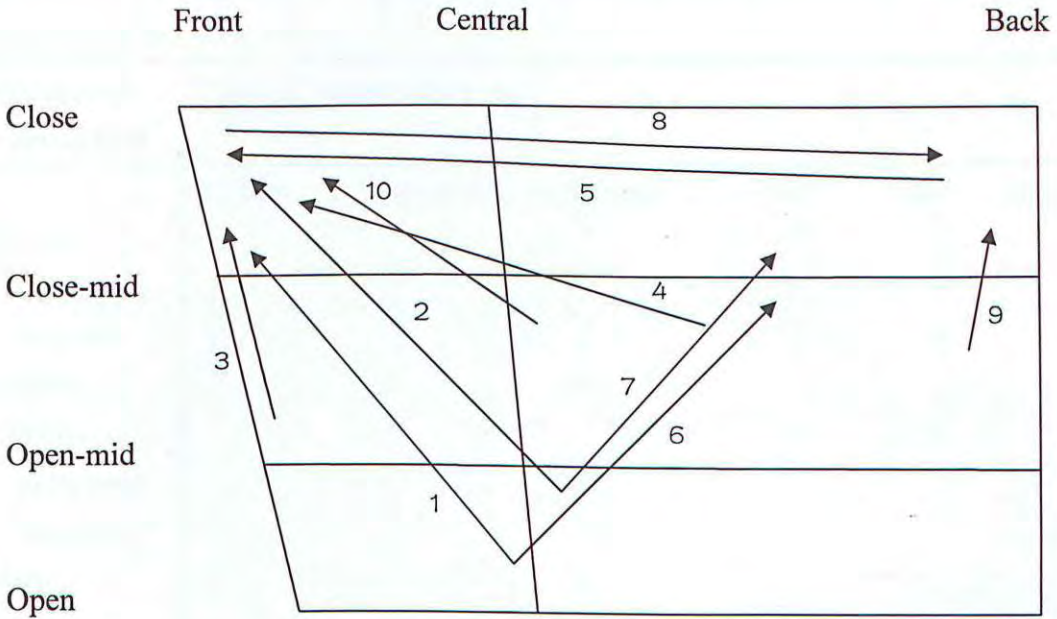
Chart 2.3 A chart of Cantonese vowel phonemes (adapted from Bauer & Benedict, 1997; Zee, 1991)

	Front	Central	Back
Close	i: y:		u:
Close-mid		ə	ɯ
Open-mid	ɛ:	œ:	ɔ:
Open		ɚ	
		a:	

The description of Cantonese diphthongs is even more complicated than that of monophthongs. Zee (1993) found that Cantonese diphthongs can be classified into two groups based on his acoustic measurements of the first and second elements of the diphthongs. Durations of the first elements and those of the second elements of /ai au oi iu ui/ are approximately 3:1 while those of /ɛi ei ɯu ou ɔy/ are 2:1, shedding light again on the importance of length in distinguishing vowels in Cantonese. Bauer and Benedict's (1997) description was an adaptation of Zee's description based on his

findings. There, however, exists a primary disagreement as to whether the diphthongs are consisted of two vowels as in English or one vowel plus a semi-vowel. Bauer and Benedict (1997) and Kao (1971) proposed that a Cantonese diphthong is comprised of a “nuclear vowel followed by one of the final approximants -w, -j, or -y” (p. 56) which serve as a semi-vowel. On the other hand, Hashimoto (1972) suggested that a Cantonese vowel is comprised of a sequence of two vowels. As such, Cantonese diphthongs are consisted of a vowel followed by one of the two vowels /i/ and /u/, or the semi-vowel /y/ for the special case of /øy/. There exists a difficulty in “deciding when we have a diphthong...and when we have a vowel + glide sequence. A very short high vowel can be more or less indistinguishable from a glide in many languages, so it is difficult to make a principled choice” (Spencer, 1996, p. 31). For this reason, the present paper does not take a stance and both manners of description are outlined in Chart 2.4 on the following page. Yet, for simplicity, both are termed a diphthong in this thesis. Suprasegmentally, the primary stress of a Cantonese diphthong is placed on the first vowel while the second part is relatively unstressed (Bauer & Benedict, 1997, p. 57).

Chart 2.4 A chart of Cantonese diphthong phonemes (adapted from Bauer & Benedict, 1997; Zee, 1991)



1 – /a:i/ or /a:j/

2 – /ɛi/ or /ɛj/

3 – /ei/ or /ej/

4 – /ɔ:i/ or /ɔ:j/

5 – /u:i/ or /u:j/

6 – /a:u/ or /a:w/

7 – /ɛu/ or /ɛw/

8 – /i:u/ or /i:w/

9 – /ou/ or /ow/

10 – /ɛy/

Note: The symbols employed by linguists who propose that the vowels are consisted of two vowels are placed to the left of those adopted by the linguists who propose that the vowels are comprised of one vowel and one semi-vowel.

On the contrary, there is a general consensus in the description of the consonant system. There are a total of nineteen consonants in Cantonese. There are two bilabial plosives /p p^h/; two alveolar plosives /t t^h/; four palatal plosives /k k^h k^w k^{wh}/; one labiodental fricative /f/; one alveolar fricative /s/; one glottal fricative /h/; two alveolar affricates /ts ts^h/, one bilabial nasal /m/; one alveolar nasal /n/; one velar nasal /ŋ/; one alveolar lateral /l/; one bilabial approximant /w/; and one palatal approximant /j/ in Cantonese. They are outlined in Table 2.4 on the following page by their places and

manners of articulation.

Table 2.4 An overview of Cantonese consonant phonemes (adapted from Bauer & Benedict, 1997; Zee, 1991)

Manner of articulation	Place of articulation					
	Bilabial	Labiodental	Alveolar	Palatal	Velar	Glottal
Plosive						
Unaspirated	p		t	k k ^w		
Aspirated	p ^h		t ^h	k ^h k ^{wh}		
Fricative		f	s			h
Affricate						
Unaspirated			ts			
Aspirated			ts ^h			
Nasal	m		n		ŋ	
Lateral			l			
Approximant	w			j		

Investigating the phenomenon of syllable contraction in Cantonese, Hsu (2005) proposed a ranking of a set of universal constraints which appeals to Cantonese by drawing on Optimality Theory (Prince & Smolensky, 1993). Although the study was concerned with the formation of output nucleus from syllable contraction, it provided insights into the ranking of phonotactic constraints which is unique to Cantonese by examining what vowel is preferred or what new vowel is resulted when two or more separate syllables contract into one syllable. Hsu (2005) proposed that “No VS”, which means no short vowel is allowed after a voiceless stop, “Phonotactics (Yod)”, which postulates that the co-occurrence of a front high tense vowel preceding a palatal glide violates the phonotactic constraint of Cantonese, and “Mid Vowel First”, which states that if the input nuclei are a low vowel and a mid vowel, a mid vowel is preferred,

enjoy the same and the highest ranking in Cantonese phonology (p. 126-127). These are followed by “Length Competition”, which states that long vowels are preferred to short vowels, “Phonotactics (Lab)”, which proposes the phonological rule that disallows the co-occurrence of bilabial sounds in the syllable onset and coda positions, and “Phonotactics (Onset)”, which rules out any consonant cluster in the onset position of a Cantonese syllable. These three are also suggested to enjoy the same ranking (p. 126-127).

As Hsu (2005) argues, in contrast to Taiwanese Southern Min, Hakka, and Taiwan Mandarin, which are sonority-oriented languages and give higher ranking to sonority hierarchy (Hsu, 2000, 2002), Cantonese “abides by a set of constraints involving vowel length” (Hsu, 2005, p. 127). As she puts it clearly, “vowel length is distinctive in Cantonese, and the relevant constraints for nucleus contraction ... reflect this language-specific property” (p. 127). Together with the Cantonese phonological rules discussed earlier, this ranking of phonotactic constraints of Cantonese again sheds light on the importance of vowel contrast in Cantonese.

Having laid out the theoretical foundations and previous findings underpinning the current study, the research questions are specified in the following section in light of the concerns raised in the previous sections of this chapter.

2.4 Research questions

The disagreements about the vowel realizations of HKE among the researchers (Bolton & Kwok, 1990; Chan & Li, 2000; Deterding et al., 2008; Hung, 2000; Stibbard, 2004) identified in the literature review and the findings of the pilot studies shaped the research questions of the present study. The main contradictions in the findings of these studies with regard to monophthongs lie mainly in whether the vowels contrasting in duration are realized as consistently an intermediate form between the long duration and the short duration or as three forms, which are the long duration, short duration and an intermediate form between these two. These studies also disagree about whether these vowel variations are systematic and stable, or an indicator of a lack of acquisition as demonstrated by the absence of regularities. In essence, the acoustic findings of Deterding et al. (2008) confirmed Bolton and Kwok's (1990) perceptual analysis and Hung's (2000) acoustic findings that vowels having contrasts in length and tenseness, such as /i:/ and /ɪ/, and some vowels having contrasts in openness, such as /æ/ and /e/, in some older varieties such as RP tended to be merged in HKE, although Deterding et al. (2008) also reported that it was not clear if the vowels were fully merged. On the contrary, disagreeing with these researchers' claims, Stibbard (2004) agreed with Chan and Li's (2000) view that the occurrences of lack of contrasts of these vowels indicated a lack of stability in that they were "on occasion pronounced very long and tense, on others short and lax, not necessarily

correctly for the intended word, and on other occasions intermediate between the two” (p. 130). Since the analysis of the pilot studies indicated that three forms, the long duration, short duration and an intermediate form between these two, of vowels contrasting in length virtually existed across both styles of speech of the four participants while only /e/ of vowels contrasting in openness was found in the naturalistic data in the second pilot study, this study focused on the investigation of variations of vowel contrasts in length.

There were also some degrees of disagreement as to the productions of diphthongs in HKE. Hung (2000) postulated an inventory of eight diphthongs for HKE from his acoustic measurement findings, namely /eɪ/, /aɪ/, /aʊ/, /oʊ/, /ɔɪ/, /ɪə/, /ɛə/, and /ʊə/. Bolton and Kwok (1990) and Chan and Li (2000) agreed with each other that monophthongization occurred for some of the diphthongs such as /eɪ/ and /ɛə/ in HKE. Hung (2000) also reported that although the aforementioned diphthongs existed in the inventory of HKE, there seemed to be some distributional phenomena and syllable-structure constraints for the productions of the sequence diphthong + oral or nasal stop. Unlike the contrasted pairs of monophthongs, the disagreement lies in the phonetic rather than the phonemic level. There seems to be no disagreement as to whether the diphthongs exist as phonemes in HKE, but rather whether the diphthongs are monophthongized or not. Meanwhile, Deterding et al. (2008) only examined the diphthongs /eɪ/ and /əʊ/, and they maintained that HKE always produces the two as

diphthongs.

The pilot studies conducted prior to the present study, however, had disparate findings. The findings of the pilot studies did not confirm Bolton and Kwok (1990) and Chan and Li's (2000) arguments that diphthongs in HKE are always monophthongized. The diphthongs were to a great extent realized as diphthongs, and there were only a few cases of diphthong monophthongization. However, it was more noticeable and intriguing that on some occasions, the diphthongs /eɪ aɪ au/ were found to be shortened. For these reasons, realizations of duration contrasts in monophthongs /i: ɪ ɔ: ɒ u: ʊ/ and diphthongs /eɪ aɪ au/ were investigated in the present study.

In terms of research design and methodology, there are a number of issues in connection with investigations into HKE as summarized from the discussion of the previous sections. First, possibly due to the availability of access to participants, except Chan (2006a, 2006b, 2007), all the studies recruited participants from universities, which might not represent the whole population of HKE speakers. Secondly, the research questions were often not fully addressed due to the limitations of methodology. For instance, there was over-reliance on the use of word lists in eliciting the phonological features of HKE. Patterns of phonological features in less careful style of speech such as conversation on daily topics were not fully explored. Thirdly, all of the studies on HKE were either about the whole inventory of sounds or only a single particular phenomenon of its consonant system. None of these studies

attempted to study the influence of phonological factors, such as phonological environments, on the distributions of realizations of the sounds that are identified to have shown features unique to HKE. Finally, none of the studies, except those seeking to describe the whole inventory of HKE, has ever examined the productions of vowels. All of them have only studied the phonological phenomena of consonants (for example, Chan, 2006a, 2006b; Eckman, 1981; Edge, 1991; Peng & Ann, 2004; Peng & Setter, 2000). This lack of studies about HKE vowel system, together with the disagreements about the vowel realizations identified in the literature, are indicative of the need to delve into the vowel system of HKE.

Addressing these disagreements and identified gaps, the present study investigated the effects of phonological factors, specifically stress, number of syllables, preceding phonological environment and following phonological environment, on the productions of the vowels /i:/, /ɪ/, /u:/, /ʊ/, /ɔ:/, /ɒ/, /eɪ/, /aɪ/ and /aʊ/, and identified the underlying patterns of the realizations. These phonological factors were particularly chosen as they were not fully explored in the literature as discussed earlier. Additionally, there were a number of key factors that could not be controlled as this study sought to examine connected speech of the participants. These factors included stress, number of syllables and individual variation. Accordingly, they were under investigation in this study.

The specific research questions of the present study are as follows:

- a) What are the effects of stress, number of syllables, preceding phonological environment and following phonological environment on the productions of the vowels /i:/, /ɪ/, /u:/, /ʊ/, /ɔ:/, /ɒ/, /eɪ/, /aɪ/ and /aʊ/ in HKE?
- b) How do proficiency of the speakers and individual variation manifested by the speakers influence the productions of these vowels?
- c) What are the underlying patterns of realizations of these sounds with regard to the phonological environments they are in?

METHODOLOGY

This chapter introduces the participants of the study, the thirty local secondary seven students, in addition to the methods employed to collect and analyse the data in the study. First, the research setting and the selection criteria of participants for the study are discussed. This is followed by a description of the participants of this study. Finally, how the data were collected, processed and analysed are explained respectively in detail.

3.1 Research setting and selection of participants

The research setting for this proposed study was a CMI (Chinese medium of instruction) secondary school in Hong Kong. Addressing the issue of generalizability as discussed in the previous chapter, secondary seven students who had their results of English in the HKCEE (Hong Kong Certificate of Education Examination), and who had spent most of their childhood and education in Hong Kong were recruited.

The selection of participants was based on several judgment sampling criteria with regard to the goals of the present research. As Hansen (2006) states, “the goals of the research commonly dictate the methods employed to select participants for the study, with these goals translated into criteria that individuals must meet in order to be included in the study” (p. 40). A primary criterion of utmost importance was to recruit participants who had spent most, if not all, of their childhood and education in Hong

Kong. Secondly, to avoid the question of the effect of transfer, which is “the influence resulting from the similarities and differences between the target language and any other language that has been previously (and perhaps imperfectly) acquired” (Odlin, 1989, p. 27), from languages other than their first language, Cantonese, and to avoid any skewed results in data processing, there was an additional criterion of selecting participants who did not have proficiency of an intermediate level or above in foreign languages. Putonghua was not counted as a foreign language as it has been incorporated into the mainstream education of Hong Kong and thus it in fact constitutes part of the profile of language use of Hong Kong.

Apparently, students from any level of education would fulfil these two criteria. There were, however, several other practical considerations. The secondary school students were preferred to university students so that the data would arguably be more representative of the larger population but not a small group of university-educated people. Additionally, this selection intended to complement the previous studies as they might have been overly reliant on university students in studying HKE. Employing university students only is an implicit selective sampling as the admission to universities already filters out a large group of people in terms of both academic and language performance, for both of these are the main criteria in selecting candidates in undergraduate admission. On the contrary, recruiting secondary school students allowed a fine mixture of the groups of people who might be admitted to universities,

who might be admitted to other tertiary education⁵ institutes, and who might not further their studies after secondary education. As such, the participants were composed of students with mixed performances in English, reflecting the reality of the Hong Kong population. They were also preferred to lower form students for two reasons. Upper form students had already taken the HKCEE and their general grades in English provide an indicator of their English proficiency, which might be a factor contributing to the features of pronunciation they manifest. More importantly, senior form students' English should be more stable than the younger students if the critical period factor is taken into consideration. As Lippi-Green (1997) states, "children are born with the ability to produce the entire set of possible sounds, but eventually restrict themselves to the ones they hear used around them...At some time in adolescence, the ability to acquire language with the same ease as young children atrophies" (p. 46). These students' sound blueprints were thus restricted and it was unlikely that they could remove or eliminate their accent on one occasion or another with intentions. Hence, the seventh form students were particularly selected. The final reason was more of practicality. By the time the researcher proposed the study, the access to the participants was already granted by the school, and the students were willing to seize the chance to practice English in preparation for their upcoming public examination,

⁵ In Hong Kong, post-secondary students may opt for tertiary education provided by universities or other tertiary institutions in pursuing diplomas and associate degrees, which are not on the same grade as the undergraduate degrees, or vocational training based on their examination results.

which helped to reduce the possibility of participant attrition. By the same token, the participants were not paid for their time and yet they were motivated, as seen from their desire for comments from the researcher after each interview.

A total of 30 secondary seven students agreed to participate in the present study. Addressing the request made by the school to minimize the disturbance caused to the routine of the school and for the reason that this was not a longitudinal study investigating one single participant, visits were almost made on daily basis to the school, except when there was a school holiday or weekend, or when the participants were not available. The data collection lasted from November 6, 2008 to November 20, 2008, with a total of 6 visits made to the school. An additional visit to the school was made on November 26, 2007 for one more interview, for one participant was eliminated from the analysis as she did not meet the criteria of selection of participants. She was born in the mainland China and she had received most part of her education there. She had only spent two years in Hong Kong prior to the research. As such, one additional interview with a seventh-form student who was also from the same class as all the other participants was conducted. All the sessions took place in a classroom in the secondary school they were studying so that they were familiar with the setting. The researcher and the participant sat in a manner as if they were having a free conversation, in the hope that they were less intimidated by the presence of the researcher to speak in English. Having obtained the prior consent of the participants

before each session, the interviews were recorded with a SANDISK digital mp3 player.

3.2 The participants

By the time the data were collected, the participants were all in their seventh-form of secondary education in a local CMI school, in preparation for the upcoming Hong Kong Advanced Level Examination (HKAL)⁶. The age of the participants ranged from 17 to 20. 22 of the participants are female and 8 of them are male. 28 participants were born in Hong Kong while the other two were born in China. As both of these two participants had moved to Hong Kong since the age of six, when they entered primary school, they received most part of their education, only except the three-year pre-primary education, in Hong Kong. For this reason, their background did not constitute a violation of the participant selection criteria. Both of them consider themselves Chinese in nationality. Notwithstanding the same place of birth for the other 28 participants, 19 reported they are Chinese, 6 regarded themselves as Hong Kong Chinese while 3 considered themselves Hong Konger, probably by reason of the ambivalent attitudes brought by Hong Kong's colonial history.

All of the participants acquired English in Hong Kong's education system through attending English classes in local schools. 25 participants responded that they started

⁶ Candidates' results in Hong Kong Advanced Level Examination and Hong Kong Certificate of Education Examination are the main considerations in admission to the local universities and tertiary institutions.

learning English since kindergarten when they were three while the other 5 participants have been learning English since Primary 1, when they were about 6 years old. As such, they were considered to be the native speakers of HKE. None of them have family members who are native speakers of English. Additionally, none of the participants ever lived or studied in an English-speaking country. Only 2 out of 30 participants had once spent three weeks in Canada. All the participants have Cantonese as their first language, with 12 of them reporting that they do not know any other languages; 14 speak Putonghua; 2 know some Putonghua; 1 knows some Hakka⁷; 1 know Taishan dialect⁸; 1 has some basic knowledge of Spanish; and one of whom did not answer the question. This is close to the language profile of the general Hong Kong population for two reasons. Some people's ancestors have a mainland Chinese origin and hence it is not uncommon that some people also speak a variety of Chinese other than Cantonese. Besides, Hong Kong's education system has been promoting the incorporation of Putonghua into the mainstream curriculum. Accordingly, most people at least have a basic knowledge of Putonghua while some may even be proficient in the variety. 25 participants considered English as their L2 (second language); 3 regarded English as their L3 (third language), with Putonghua being their L2; 1 reported English as his other language; and 1 participant did not answer the question.

⁷ Hakka is a subdivision of Chinese spoken in the southern part of mainland China by Hakka people.

⁸ Taishan dialect is a variety of Cantonese spoken in a coastal city called Taishan, which is situated in Guangdong Province in China.

In terms of their proficiency in English in the HKCEE, 3 participants obtained Level 5⁹; 8 obtained Level 4; 14 obtained Level 3; and 5 obtained Level 2 in the HKCEE they sat for about one and a half year prior to the data collection of the present study. None of the participants obtained Level 5* or Level 1.

3.3 Research design

3.3.1 Data collection

Naturalistic conversational data were collected in the present study because of three reasons. First, the pilot studies conducted did not indicate that the style of speech had significant effect on the productions of the vowels as the variations of the vowels were equally found in both styles of speech. Secondly, readings of citation words had been overly used in previous studies, and as Deterding (2005) argues, the use of a standard set of words such as the one designed by Wells (1982) is not the most appropriate way to examine the productions of non-native varieties as the frameworks of describing native and non-native varieties are different. Employing a well-designed word list might risk presuming certain production patterns and thus overlooking some unique and unexpected pronunciation features of the variety, which is the aim of any

⁹ The new “Standards-referenced Reporting” for the Chinese and English Language subjected was effective since 2007. In the new grading system, the language performance of the candidates is graded from 1 to 5*, with 1 being the lowest and 5* being the highest. The Hong Kong Examinations and Assessment Authority, which is responsible for designing and administering the examinations, declared that the new numerical grading system is not comparable to the old letter grading system. In other words, level 5* in the new system is not equivalent to grade A in the old system, although both are the corresponding highest grades (Hong Kong Examinations and Assessment Authority, 2008).

study investigating New Englishes. Furthermore, it was found in the pilot studies that reading of citation words resulted in excessively deliberate pronunciations. Although the collection of naturalistic data disallows the exercise of control over the type of data collected, it is employed instead of word lists to avoid the problems as mentioned.

The design of the procedures of the study was also informed by the implications of the pilot studies conducted. Eliciting naturalistic data and eliminating the influence of the speech of the researcher on the participants, it was first intended to have the participants discuss certain topics in groups of 4 or 5 members. It was, however, found in pilot study two that this would introduce several technical problems. First, it was difficult to identify the speakers from the recording, especially when they were of the same gender. Second, it was almost impossible to ensure that sufficient data would be elicited from each participant in free conversation. As such, the data obtained would be greatly imbalanced. Third, if the researcher intended not to interfere with the whole discussion, there might be some undesirable silence without any prompt. Finally, based on the responses of the pilot studies' participants, they had more confidence in completing the task of individual conversation with the researcher ranging from 5 to 10 minutes than the task of group discussion of 4 participants with the researcher ranging from 20 to 40 minutes, although both would elicit the same amount of data from the point of view of a researcher. Together with the rationale that the researcher, being a Hong Konger who was born, raised and educated in Hong Kong, shares similar

background with the participants and would not have much influence on their pronunciation, the participants were interviewed by the researcher. Having said this, it was not an interview in a strict sense. It was intended to be a conversation with the participants about their daily life. The pilot studies also indicated that speech of 10 minutes from each participant would elicit sufficient data for analysis. Accordingly, recruiting 30 participants and eliciting 5 minutes from each of them was preferable to recruiting 15 participants and eliciting 10 minutes from each if the underlying patterns of the realizations of the vowels were to be established. This was much more ambitious and rigorous than what had been done in the previous studies, in the hope that a full picture of pronunciation of the vowels in HKE could be captured.

3.3.2 Procedures

The naturalistic data elicited from the interviews were the primary source of data for the analysis of the vowel realizations in the current study. The background information of the participants served as the secondary source of data, which helped the selective sampling of the participants and the interpretation of the data. The participants were first asked to fill in a personal information survey form about their language profile and their learning of English (a sample of the questionnaire is included in appendix 1). While one participant had finished filling in the form and was being interviewed, another participant was handed the form. All the participants were

asked the same questions in the interviews (a list of the prompting questions is given in appendix 2). Every care was taken to ensure that the topics being discussed resembled those they would encounter in daily life conversation but not, for example, in an oral public examination. Since the English proficiency of different participants vary, the interviews lasted from 4.57 to 11.39 minutes, depending on how much time the participants had taken for warming-up, how much time they had been silent before they responded to the prompts and how talkative they were, to ensure that sufficient amount of data was collected from each participant. As such, the duration of the spontaneous speech of the participants instead of the number of questions they had answered was the controlling factor of the lengths of the interviews, even though not all the conversation guiding questions were finished. Minimizing the effect of the researcher's speech had on the participants, unless further prompts were needed, the participants were allowed to speak as much as possible without any interruption.

3.3.3 Data processing

Each interview was transcribed word-for-word and then phonetically. The interview data were transcribed with the International Phonetic Association (IPA) practice. Ensuring the reliability of the data transcription, the data were first transcribed by the researcher. A random selection of 20% of the data was then transcribed again by the researcher with a few days apart in between each transcription

to ensure accurate transcriptions, with an intra-rater reliability of 99.4%. Another 20% of the data was selected in random and transcribed by another research student who has received training in IPA transcription, with an inter-rater reliability of 99.7%. The few cases of discrepancies were transcribed by a third rater who has also received training in IPA transcription. The transcription of the words in question by the majority, which was two transcribers out of three, was adopted. There was no token of vowels which involved disagreement among the three raters. Also, no cases of vowel contrast required the secondary support from acoustic measurements due to difficulty in determining the length. Acoustic measurements were not used as the means of data processing in this study because this is not the most suitable method for conversational data. As Deterding (2003) argues:

While it is relatively easy to measure the duration of a vowel from a spectrogram, the interpretation of this absolute measurement of duration from conversational data is not so straightforward, because a variety of factors affect duration, including speaking rate, degree of stress, and the influence of neighbouring consonants, especially whether a following consonant is voiced or voiceless. (p.

5)

This study was not experimental in nature as it did not carefully control factors that could affect acoustic measurements of the vowels with the aid of a word list. Moreover, it was not intended to compare the vowel lengths with those of native varieties. The

accurate quantitative measurement of lengths is not the central concern of this study. It instead sought to establish the qualitative phonological differences. Accordingly, the data were transcribed by ear and verified with both intra- and inter-reliabilities.

3.3.4 Data analysis

“Selective sampling” of data was adopted in the selection of words for the analysis in this study, in the sense that only words that contained the dependent variables were analysed. The first 50 words from the end of the conversation were selected for analysis for a few reasons. First, if the words were selected randomly by including every other word, the analysis might have included some words that did not contain the variables that were under investigation. Second, the words were counted backwards as it was assumed that the participants might need some warm-up at the beginning. The conversations lasted only 11.39 minutes at the longest. As such, there should not be any problem of tiredness on the part of the participants or evident shift of style of speech as the participants became more familiar with the researcher. Therefore, counting backwards would seem more sensible. Finally, 50 words from each speaker yielded 1813 tokens of dependent variables in total, which have produced a robust data set for significant results.

Since this study worked on naturalistic conversational data, it was inevitable that there were repetitions of words within the same sentence. Repetitions of words were

only counted if they were found in different sentences in the conversation. Those that occurred in the same sentence of utterance were, however, not counted. Whenever they were repeated not for the sake of correcting themselves within the same sentence, the first utterance of those was selected for the analysis. Yet, if they were correcting their own mispronunciations, the correct one was then selected. The collection of naturalistic conversational data also means that there were a lot of function words, which included prepositions, pronouns and articles. Since these function words were repeated by the participants with a very high frequency and they were less significant in carrying meanings of the utterances in comparison to the lexical words, they were eliminated from the analysis in order to avoid the distortion of the data patterns due to their high frequency of occurrences.

These selected tokens were then investigated in light of the social factors of individual variation and English proficiency of the speakers as well as phonological factors of phonological environments preceding and following the vowels, stress and number of syllables. Prior to the data analysis by VARBRUL (this will be explained in more detail later in this section), a fine manual analysis of the conversational data was conducted to establish the coding scheme, which helped uncover the phonological patterns of vowel realizations in the variation analysis and enhance the data analysis by VARBRUL. The preliminary analysis revealed that there were three dissimilar patterns of lengthening and shortening for long vowels, short vowels and diphthongs. Long

vowels and diphthongs were found to undergo shortening while short vowels were found to show a lengthening. Even though a shortening effect was found for both long vowels and diphthongs, the phonological factors seemed to have different influence on their actualizations. Analysing them collectively as one single group would obscure their unique patterns. As such, they were analysed separately and the dependent variables of this study were regular long vowels, shortened long vowels, regular diphthongs, shortened diphthongs, regular short vowels and lengthened short vowels. Each of the dependent variables was assigned an independent numerical application value for the subsequent VARBRUL analysis. The first application values of each set, which were 0, 2 and 4, were assigned to the shortened or lengthened realizations of the vowels so that their patterns could be discerned. The second application values of each set, namely 1, 3 and 5, were then assigned to the regular realizations of the vowels.

The independent variables of the study were the social factors of proficiency of the speakers and the individual variation among the participants in addition to the phonological factors of stress, number of syllables, preceding phonological environment and following phonological environment. The coding categories of the social factors are discussed first, followed by those of the phonological factors. The factor group of proficiency was divided into two factors, high and low proficiency, based on their results of the subject of English Language in the HKCEE. The HKCEE is a norm-referenced standardized examination and hence the percentage of candidates

receiving a certain grade is consistent every year. According to the Hong Kong Examinations and Assessment Authority, candidates receiving levels 5*, 5 and 4 constituted 19.4% while candidates obtaining levels 3 and 2 occupied 47.8% of candidates sitting for the examination in 2008 (Hong Kong Examinations and Assessment Authority, 2009). The participants' results in the English language subject of this examination could therefore be used as a reliable indicator of their proficiency. Due to the division of percentages, participants receiving level 4 or above were assigned to the high proficiency group while those obtaining level 3 and 2 were assigned to the low proficiency group. Under the factor group of individual variation, the data were coded with respect to the identity of the speaker and hence there were altogether 30 factors.

As for the phonological factors, the group of stress was further categorized into stress and unstressed while number of syllables was divided into from 1 to 5, as 5 was found to be the maximum number of syllables in the words from the interview data. The coding of data by preceding and following phonological environments were in accordance with the patterns of realizations found in the preliminary analysis. It was found that the distinctions of sounds by manner of articulation were small enough to capture the effect of preceding phonological environment. As such, the factor group of preceding phonological environment was further categorized into word-initial position, word-initial position with a preceding pause, vowels, nasals, stops, fricatives,

approximants and lateral, and affricates. However, such distinctions did not appear to be sufficient in capturing all the patterns found due to the effect of following phonological environment in the preliminary analysis. For example, the voicing of sounds having the same manner of articulation, such as voiced and voiceless plosives, was found to have an effect on the vowel realizations. Consequently, the factor group of following phonological environment was divided into sub-categories much more finely depending on the patterns identified so that no nuance in effect would be obscured. There were altogether 18 factors, which encompassed word-final position, word-final position with a following pause, vowels, voiceless affricate, voiced affricate, /m/, /n/, /ŋ/, liquids /r/ and /l/, voiceless plosives, voiced plosives, /s/, /w/, /j/, /f/, /v/, /ʃ θ h/, and /z ð ʒ/. Each token of vowel was coded twice with care according to the coding scheme to avoid any mistakes due to tiredness or distracted attention as any miscoding would distort the realization patterns. With the help of a coding scheme developed from these categories of factor groups, their effects on the vowel realizations were then examined by VARBRUL.

Bayley's (1996) study framed the present study in terms of approach of analysis, which was to employ variable rule analysis to study the linguistic constraints. Investigating English learners speaking Mandarin as their L1, Bayley conducted a research on the patterns of linguistic and social constraints on final t/d deletion and affixation in their English by employing variable rule analysis. Variable rule analysis is

an “application of sociolinguistic methods to the study of interlanguage variation” (p. 99) quantitatively. The tokens of words he collected in the interviews were input into the program VARBRUL, which “enables the researcher to account for the multiple [linguistic and social] factors that affect second language production” (p. 116-117).

The phonological and social factors were analysed with variable rule analysis as the goals of the present study matched with the underlying principles of this line of research. As Paolillo (2002) states, “variationist linguistic research begins from the starting point that linguistic forms may have variant realizations that are more-or-less equivalent in different contexts” (p. 23). The different realizations of the vowels identified were argued to be equivalent in different phonological environments. The main reason for conducting a variable rule analysis is that the distribution of these variant realizations is not known to have been propelled by any known linguistic factors and thus not categorically predictable, and therefore they have to be studied statistically (Paolillo, 2002, p. 23). This is especially suitable for the analysis of New Englishes as their underlying patterns of pronunciation are yet to be explored. Normally there are no established models or theories available for the linguistic variant realizations of these varieties. Variable rule analysis enables researchers to account for the phonological factors that “constrain surface realization of underlying forms” (Bayley, 1996, p. 98). It allows examination of the variant forms that the vowels take and the linguistic environments that co-occur with these variable forms. Statements are

made in quantitative terms about the likelihood of co-occurrence of a certain variant realization and a specific phonological environment, thus enabling generalizations and interpretations to be made to reveal the pronunciation patterns.

According to Palillo (2002), there are several key components in the design of a variationist analysis so that interpretations could be made. These components are “the linguistic variable – the element that is said to vary across contexts...; factors in the linguistic context of the variable that are assumed to be involved in the variation...; [and] the way that the researcher collects the data that are intended to reveal the patterns of interest” (p. 23). In the present study, the identified linguistic variables that varied across contexts were the phonetic realizations of the vowels whereas the identified linguistic factors involving in the variation were the social and phonological factors. The patterns that were of interest were the lengthening and shortening of vowels as manifested in the speech of the speakers of HKE. This reinforced the rationale of eliciting naturalistic data.

A computer program known as VARBRUL was used to analyze the data as its underlying working principles matched with the type of data that were collected. Similar to other statistical softwares, VARBRUL imposes certain restrictions on the type of the data being analysed. For instance, it is not suitable in analysing continuous variables (Paolillo, 2002, p. 15). This research was not intended to study linguistic variables in relation to the “moment-by moment shifts in context and the dynamic of

interaction” (Young & Bayley, 1996, p. 259), which is contradictory to the underlying principle of VARBRUL. The variables in this study were categorical in nature and therefore the use of VARBRUL as the analysing tool was sensible. Second, as Young and Bayley (1996) argue, “VARBRUL has been used extensively in the study of variation in phonology and morphophonology because on these linguistic levels it can be uncontroversially assumed that the values of the variable are semantically equivalent” (p. 258). The phonological variations tend to be well-defined and unambiguous, unlike some other areas such as semantics and pragmatics. The phonemes are in most cases realized clearly as one of the realization categories, but not somewhere in between two. Finally, L2 productions, such as the one in this study, tend to be highly variable and VARBRUL is specially designed to deal with such kind of unbalanced naturally-occurring data (Young & Bayley, 1996, p. 256). Since naturalistic data from spontaneous speech instead of a more balanced type of data from controlled experimentation, in which case programs such as ANOVA would be a useful tool (Young & Bayley, 1996, p. 256), were collected, the analysis of an uneven amount of data from each participant demanded the use of VARBRUL.

There were other reasons that are pertinent to the use of VARBRUL in variationist analysis in general. First, VARBRUL allows flexible manipulation of the data, for the program enables related analyses by facilitating recoding of the data for repeated trials (Paolillo, 2002, p. 16). Secondly, the unique feature of the output of VARBRUL had

made it more user-friendly than other programs, as it outputs proportion-like probabilities from 0 to 1 directly which facilitates researchers' interpretations, while other statistical programs output values from negative to positive infinity which demands further transformation by the researcher (Paolillo, 2002, p. 16). Accordingly, VARBRUL proves to be a useful and popular tool in conducting variationist research like the present one.

A VARBRUL analysis, which is discussed in greater detail in the following chapter, was conducted to examine whether the effects of these factor groups were significant to the realizations of the vowels and their respective weights. Several trials were attempted for each dependent variable in order to achieve the best model fit of the weightings of these factors by VARBRUL. Some factor groups were not found to be significant in earlier runs and they were indicated by VARBRUL as knockouts. For this reason, they were removed from further analysis. Some factors in the groups that were determined to be significant by VARBRUL, such as preceding and following phonological environments, were found to have similar effects and thus they were collapsed into one factor to produce the best model fit. Data produced from these runs are discussed in detail in the following chapter.

RESULTS

In this chapter, both descriptive and inferential linguistic analyses of realizations of long vowels, diphthongs and short vowels are discussed. The chapter is organized as follows: Firstly, the effects of proficiency, speaker, stress, number of syllables, preceding phonological environment and following phonological environment on realizations of long vowels, diphthongs and short vowels are discussed respectively, followed by a discussion of how these factors interact to affect the realizations of these three types of vowels. The chapter concludes with a discussion of the similarities and differences between the realizations of long vowels, diphthongs and short vowels.

4.1 Description of the analysis

There were a total of 1813 tokens of vowels extracted from the interview data. Among these, 338 tokens were long vowels /i: ɔ: u:/; 375 tokens were diphthongs /eɪ aɪ aʊ/; and 1100 tokens were short vowels /ɪ ɒ ʊ/. Of these, 161 tokens or 47.6% were shortened long vowels; 118 tokens or 31.5% were shortened diphthongs; and 288 tokens or 26.2% were lengthened short vowels. All three types of vowels were analysed by proficiency, speaker, stress, number of syllables, preceding phonological environment and following phonological environment, as is indicated in Table 4.1. They were run independently as three groups of separate dependent variables as the fine analysis of vowel productions prior to the VARBRUL analysis revealed different

patterns and tendencies as the types of vowels and factor groups varied. Analysing the vowels together as a single dependent variable would inevitably obscure the different patterns of realizations. Details of descriptive statistics are also outlined in Table 4.1 below.

A VARBRUL analysis, which is outlined in Table 4.1, was conducted to test whether the effects of these factor groups were significant to the realizations of the vowels and their respective weights. The dependent variables were regular long vowels and shortened long vowels; regular diphthongs and shortened diphthongs; and regular short vowels and lengthened short vowels respectively. The three application values were shortened long vowels, shortened diphthongs and lengthened short vowels, and they were run separately to determine their realization regularities. The independent variables were proficiency, speaker, stress, number of syllables, preceding phonological environment and following phonological environment. For each dependent variable, several trials were attempted in order to obtain the best model fit of the weightings of these factors by VARBRUL. Some factor groups were not found to be significant in earlier runs and thus were removed from further analysis. Yet they are still included in Table 4.1 for comparison. Some factors in groups that were significant, especially preceding and following phonological environments, were found to have similar effects in VARBRUL runs, they were thus collapsed to produce the best model fit. The collective effects of these collapsed factors are summarized in Table 4.2.

Table 4.1 VARBRUL analysis of vowel production

Factor	Shortened	Shortened	Lengthened
Group	Long Vowels	Diphthongs	Short Vowels
	/i: ɔ: u:/	/eɪ aɪ aʊ/	/ɪ ʊ ʊ/
	# Long Vowels = 338	# Diphthongs = 375	# Short Vowels = 1100
	# Application = 161	# Application = 118	# Application = 288
	47.6%	31.5%	26.2%

1. Proficiency*High*

<i>p</i> **	.436ns ***	.493ns	.596
#	46	51	105
%	39.3%	34.7%	26.4%

Low

<i>p</i>	.538ns	.505ns	.446
#	115	67	183
%	52%	29.4%	26.1%

2. Speaker**Jessica*

<i>p</i>	.953ns	.459ns	.195ns
#	6	12	7
%	85.7%	48%	24.1%

Candy

<i>p</i>	.992ns	.037ns	.225ns
#	8	3	7
%	88.9%	23.1%	17.9%

Sammy

<i>p</i>	ko	.459ns	.233ns
#	9	4	15
%	100%	28.6%	35.7%

Paul

<i>p</i>	.871ns	.756ns	.634ns
#	9	4	9
%	69.2%	23.5%	26.5%

Factor	Shortened	Shortened	Lengthened
Group	Long Vowels	Diphthongs	Short Vowels
	/i: ə: u:/	/ei ai au/	/ɪ ʊ ʊ/

Kim

<i>p</i>	.895ns	.029ns	.536ns
#	5	1	12
%	62.5%	9.1%	24.5%

Raymond

<i>p</i>	.326ns	.195ns	.788ns
#	6	4	17
%	50%	30.8%	42.5%

Wing

<i>p</i>	.025ns	.026ns	.777ns
#	1	1	7
%	8.3%	12.5%	18.9%

May

<i>p</i>	.254ns	.533ns	.461ns
#	8	2	9
%	40%	18.2%	30%

Elaine

<i>p</i>	.203ns	ko	.698ns
#	4	0	15
%	26.7%	0%	44.1%

Hazel

<i>p</i>	.162ns	.955ns	.265ns
#	2	7	5
%	20%	63.6%	13.9%

Alfred

<i>p</i>	.740ns	.555ns	.443ns
#	6	4	8
%	54.5%	36.4%	20%

Factor	Shortened	Shortened	Lengthened
Group	Long Vowels	Diphthongs	Short Vowels
	/i: ɔ: u:/	/ei ai au/	/ɪ ʊ ʊ/

Yanki

<i>p</i>	.552ns	.511ns	.234ns
#	5	5	8
%	50%	31.2%	24.2%

Vinci

<i>p</i>	.457ns	.818ns	.354ns
#	1	3	10
%	11.1%	37.5%	23.8%

Kay

<i>p</i>	.221ns	.375ns	.691ns
#	3	3	10
%	25%	25%	28.6%

Claudia

<i>p</i>	.360ns	.391ns	.866ns
#	5	3	10
%	38.5	20%	37%

Max

<i>p</i>	.609ns	ko	.351ns
#	8	0	7
%	57.1%	0%	20%

Stephy

<i>p</i>	.323ns	ko	.555ns
#	3	0	16
%	37.5%	0%	35.6%

Howard

<i>p</i>	.248ns	.186ns	.634ns
#	3	5	9
%	25%	35.7%	27.3%

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ʊ ʊ/
<i>Sam</i>			
<i>p</i>	.943ns	.230ns	.541ns
#	8	3	10
%	88.9%	27.3%	27%
<i>Heather</i>			
<i>p</i>	.791ns	.727ns	.728ns
#	6	3	11
%	60%	27.3%	26.8%
<i>Stephanie</i>			
<i>p</i>	.557ns	.795ns	.764ns
#	1	6	7
%	14.3%	33.3%	22.6%
<i>Sherry</i>			
<i>p</i>	.535ns	.570ns	.653ns
#	10	2	8
%	66.7%	20%	23.5%
<i>Rainnie</i>			
<i>p</i>	.193ns	.206ns	.699ns
#	4	2	12
%	40%	18.2%	30%
<i>Catherine</i>			
<i>p</i>	.442ns	.949ns	.666ns
#	3	8	6
%	37.5%	53.3%	17.1%
<i>Cecilia</i>			
<i>p</i>	.659ns	.330ns	.502ns
#	6	5	8
%	54.5%	45.5%	21.6%

Factor	Shortened	Shortened	Lengthened
Group	Long Vowels	Diphthongs	Short Vowels
	/i: ə: u:/	/eɪ aɪ aʊ/	/ɪ ʊ ʊ/
<i>Serena</i>			
<i>p</i>	.423ns	.961ns	.739ns
#	5	6	9
%	35.7%	50%	25%
<i>Patricia</i>			
<i>p</i>	.377ns	.853ns	.488ns
#	3	5	17
%	23.1%	41.7%	43.6%
<i>Carol</i>			
<i>p</i>	.647ns	.132ns	.498ns
#	6	5	10
%	50%	45.5%	27%
<i>Karina</i>			
<i>p</i>	.486ns	.239ns	.185ns
#	6	5	4
%	50%	35.7%	12.1%
<i>Patsy</i>			
<i>p</i>	ko	.789ns	.037ns
#	11	4	5
%	100%	44.4%	12.5%
3. Stress			
<i>Stressed</i>			
<i>p</i>	.445	.645	.599ns
#	138	112	62
%	44.2%	34.7%	11.5%

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ʊ ʊ/
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Unstressed

<i>p</i>	.927	.036	.407ns
#	23	6	226
%	88.5%	11.5%	40.3%

4. Number of Syllables

1 syllable

<i>p</i>	.461ns	.639	.092ns
#	58	99	6
%	38.9%	45.8%	1.7%

2 syllables

<i>p</i>	.338ns	.371	.767ns
#	63	16	193
%	48.5%	13.7%	40.7%

3 syllables

<i>p</i>	.586ns	.010	.626ns
#	21	1	46
%	56.8%	3.7%	29.1%

4 syllables

<i>p</i>	.769ns	.914†	.720ns
#	2	2	20
%	50%	14.3%	29.4%

5 syllables

<i>p</i>	.998ns	.914†	.838ns
#	17	0	23
%	94.4%	0%	50%

Factor	Shortened	Shortened	Lengthened
Group	Long Vowels	Diphthongs	Short Vowels
	/i: ɔ: u:/	/eɪ aɪ aʊ/	/ɪ ʊ ʊ/

5. Preceding Phonological Environment

Word-initial

<i>p</i>	.708	.983†	.154
#	14	4	1
%	53.8%	66.7%	1%

Word-initial with preceding pause

<i>p</i>	ko	.983†	ko
#	2	1	0
%	100%	100%	0%

Vowel

<i>p</i>	N/A****	.718	.806
#	0	1	2
%	0%	20%	20%

Stop

<i>p</i>	.618	.211	.565†
#	65	16	114
%	52.4%	22.9%	30.4%

Fricative

<i>p</i>	.387	.071	.565†
#	9	2	16
%	26.5%	2.9%	18.2%

Nasal

<i>p</i>	.383†	.550†	.519
#	20	10	32
%	45.5%	16.9%	27.1%

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ʊ ʊ/
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Approximant and lateral

<i>p</i>	.383†	.550†	.565†
#	51	83	119
%	49.5%	55.7%	33.1%

Affricate

<i>p</i>	ko	.983†	.183
#	0	1	4
%	0%	6.2%	9.8%

6. Following Phonological Environment

Word-final

<i>p</i>	.185†	ko	.979†
#	9	0	147
%	22%	0%	92.5%

Word-final with following pause

<i>p</i>	ko	ko	.979†
#	0	0	44
%	0%	0%	89.8%

Vowel

<i>p</i>	.185†	ko	.979†
#	4	0	1
%	44.4%	0%	14.3%

Voiceless plosive

<i>p</i>	.740†	.945	.083
#	47	106	4
%	75.8%	82.2%	1.6%

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ʊ ʊ/
<i>Voiced plosive</i>			
<i>p</i>	.701	.066†	.321†
#	23	1	5
%	60.5%	2.8%	5.9%
<i>/s/</i>			
<i>p</i>	.372†	.407	.775†
#	18	7	51
%	31.6%	23.3%	41.1%
<i>/f/</i>			
<i>p</i>	.416†	.066†	.321†
#	2	2	6
%	40%	8.3%	7.4%
<i>/v/</i>			
<i>p</i>	.928	ko	.321†
#	7	0	2
%	87.5%	0%	16.7%
<i>/f θ h/</i>			
<i>p</i>	N/A	.008†	.775†
#	0	1	1
%	0%	7.7%	20%
<i>/z ð ʒ/</i>			
<i>p</i>	ko	ko	.775†
#	0	0	0
%	0%	0%	0%
<i>/m/</i>			
<i>p</i>	.372†	ko	.321†
#	2	0	4
%	25%	0%	22.2%

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ʊ ʊ/
<i>/n/</i>			
<i>p</i>	.740†	.008†	.321†
#	19	1	3
%	73.1%	3.6%	3.5%
<i>/ŋ/</i>			
<i>p</i>	N/A	N/A	.200
#	0	0	6
%	0%	0%	4.5%
<i>/w/</i>			
<i>p</i>	.416†	ko	.321†
#	2	0	0
%	40%	0%	0%
<i>/j/</i>			
<i>p</i>	N/A	ko	.775†
#	0	0	0
%	0	0%	0%
<i>/l r/</i>			
<i>p</i>	.185†	ko	.456
#	10	0	13
%	24.4%	0%	15.3%
<i>Voiceless affricate</i>			
<i>p</i>	.740†	N/A	ko
#	18	0	0
%	81.8%	0%	0%

Factor	Shortened	Shortened	Lengthened
Group	Long Vowels	Diphthongs	Short Vowels
	/i: ɔ: u:/	/ei ai au/	/ɪ ʊ ʊ/

Voiced affricate

<i>p</i>	N/A	ko	.775†
#	0	0	1
%	0%	0%	50%
Input Weight	.521	.324	.136
Total χ^2	25.562	37.261	36.823
χ^2 cell	1.06508	.84684	.92058
df****	9	11	10
Significance	$p < .003$	$p = .0001$	$p < .0001$

* To protect the participants' identities, the names of the speakers are pseudonyms. ** = probability *** ns = not significant **** N/A = no token of such present in the interview data ***** df = degree of freedom, which was calculated by subtracting the number of factor groups in the best statistical model fit from the total number of factors within these groups. † These factors were collapsed and run as one single factor as they had similar probabilities in earlier VARBRUL runs.

4.2 Independent variables – Effects of factor groups on vowel productions

4.2.1 Proficiency

A total of 46 tokens, or 39.3%, of shortened long vowels; 51 tokens, or 34.7%, of shortened diphthongs; and 105 tokens, or 26.4%, of lengthened short vowels were produced by high proficiency speakers. High proficiency was found to have a significant effect on lengthening of short vowels only at ($p .596$), but not on shortening of long vowels ($p .436$) and diphthongs ($p .493$). Similarly, low proficiency was also found to have a significant effect on lengthening of short vowels only at ($p .446$), but not on shortening of long vowels ($p .538$) and diphthongs ($p .505$). There was not

much a tendency that proficiency had an effect on the realizations of the vowels.

4.2.2 Speaker

This group of factor was found to be insignificant for the realizations of all three types of vowels, regardless of the many attempts of VARBRUL runs by collapsing speakers who behaved similarly in terms of probabilities. There was, however, a tendency that each speaker revealed a higher probability of realizing one application value out of the three, which was either shortened long vowels, shortened diphthongs or lengthened short vowels, than the others, albeit to different extent across speakers.

The tendency generally fell onto five groups. The first group strongly favoured shortening of long vowels over the shortening of diphthongs and lengthening of short vowels. Jessica strongly favoured shortening of long vowels at (p .953) over shortening of diphthongs (p .459) and lengthening of short vowels (p .195); Candy favoured long vowel shortening at (p .992) a lot more than diphthong shortening (p .037) and short vowel lengthening (p .225); Sammy had no cases of regular long vowels while disfavoured diphthong shortening at (p .459) and short vowel lengthening at (p .233); Kim favoured long vowel shortening at (p .895) over diphthong shortening (p .029) and short vowel lengthening (p .536); Max showed a preference of long vowel shortening (p .609) over short vowel lengthening (p .351) and he had no cases of diphthong shortening; Sam showed a much stronger favour of

long vowel shortening (p .943) over diphthong shortening (p .230) and short vowel lengthening (p .541); Carol favoured long vowel shortening at (p .647) more than diphthong shortening (p .132) and short vowel lengthening (p .498); and Patsy shortened all tokens of long vowels while slightly favoured diphthong shortening at (p .789) and strongly disfavoured short vowel lengthening at (p .037).

The second group of speaker showed a very strong favour of shortening of diphthongs over shortening of long vowels and lengthening of short vowels. Hazel highly favoured diphthong shortening (p .955) over long vowel shortening (p .162) and short vowel lengthening (p .265); Vinci showed a much stronger preference of diphthong shortening (p .818) over long vowel shortening (p .457) and short vowel lengthening (p .354); Catherine favoured diphthong shortening at (p .949) over long vowel shortening (p .442) and short vowel lengthening (p .666); Serena showed a strong favour of diphthong shortening (p .961) over long vowel shortening (p .423) and short vowel lengthening (p .739); and Patricia highly favoured diphthong shortening (p .853) over long vowel shortening (p .377) and short vowel lengthening (p .488).

The third group of tendency indicated that some speakers had preference of short vowel lengthening over shortening of long vowels and diphthongs. Raymond highly favoured short vowel lengthening (p .788) in comparison to shortening of long vowel (p .326) and diphthong (p .195); Wing strongly favoured short vowel lengthening

(*p* .777) while strongly disfavoured shortening of long vowels (*p* .025) and diphthongs (*p* .026); Elaine favoured short vowel lengthening (*p* .698) and disfavoured long vowel shortening (*p* .203) and had no cases of diphthong shortening; Kay showed a strong preference of short vowel lengthening (*p* .691) over shortening of long vowels (*p* .221) and diphthongs (*p* .375); Claudia favoured short vowel lengthening (*p* .866) a lot more than shortening of long vowels (*p* .360) and diphthongs (*p* .391); Howard favoured short vowel lengthening (*p* .634) while strongly disfavoured shortening of long vowels (*p* .248) and diphthongs (*p* .186); and Rainnie had a much higher preference of lengthening of short vowels (*p* .699) over shortening of long vowels (*p* .193) and diphthongs (*p* .206).

The fourth group of speaker did not show a strong preference of favour but rather a strong preference of disfavour. May strongly disfavoured long vowel shortening (*p* .254) while showing neutral tendency for diphthong shortening (*p* .533) and short vowel lengthening (*p* .461); Yanki highly disfavoured short vowel lengthening (*p* .234) while not showing clear preference for shortening of long vowels (*p* .552) and diphthongs (*p* .511); Stephy had no token of shortened diphthong while indicated a disfavour of long vowel shortening (*p* .323) slightly over short vowel lengthening (*p* .555).

The final group of speaker indicated a slighter favour of one application value over the others. Paul favoured long vowel shortening at (*p* .871), which was slightly

over diphthong shortening (p .756) and short vowel lengthening (p .634); Alfred showed a slight preference of long vowel shortening (p .740) over diphthong shortening (p .555) and short vowel lengthening (p .443); Heather slightly favoured shortening of long vowels (p .791) and diphthongs (p .727) and lengthening of short vowels (p .728) to largely the same extent; Stephanie had a slight favour of diphthong shortening (p .795) over short vowel lengthening (p .764) and long vowel shortening (p .557); Sherry did not indicate clear preference in either direction over shortening of long vowels (p .535) and diphthongs (p .570) and lengthening of short vowels (p .653); Cecilia favoured long vowel shortening at (p .659) over short vowel lengthening (p .502) and diphthong shortening (p .330); and Karina indicated a strong disfavour of short vowel lengthening (p .185) and diphthong shortening (p .239), and a very slight disfavour of long vowel shortening (p .486). Given these trends, although speaker was not found to have a significant effect on the realization of any vowel in the present study, it is worthy of further investigation with a larger pool of data as to the different patterns found among speakers.

4.2.3 Stress

A stressed syllable was found to have a significant effect on shortening of long vowels and diphthongs. It promoted diphthong shortening slightly at (p .645) in comparison to long vowel shortening (p .445). A stressed syllable slightly had a

favourable effect on short vowel lengthening at (p .599) and was not found to be significant. In stark contrast to stressed syllable, an unstressed syllable strongly favoured long vowel shortening (p .927) while strongly disfavoured diphthong shortening (p .036). It did not have a significant effect on short vowel lengthening again (p .407).

4.2.4 Number of syllables

Number of syllables was not found to have a significant effect on long vowel shortening and short vowel lengthening. It was only found to be significant for diphthong shortening. There was a slight trend that number of syllables had a more favourable effect on short vowel lengthening than long vowel and diphthong lengthening, except monosyllabic words. This has to be interpreted with caution as there was only 1 token of shortened diphthong in three-syllable words, 2 tokens of shortened diphthongs in four-syllable words, and there was no token of shortened diphthong in five-syllable words. One-syllable words strongly disfavoured short vowel lengthening (p .092) in contrast to long vowel shortening (p .461) and diphthong shortening (p .639). Two-syllable words had a much stronger favourable effect on short vowel lengthening (p .767) than on long vowel (p .338) and diphthong (p .371) shortening. Disregarding diphthong shortening which only had very few tokens, polysyllabic words were found to have similar effects on long vowel shortening and

short vowel lengthening. Three-syllable words favoured short vowel lengthening (p .626) slightly over long vowel shortening (p .586); four-syllable words favoured long vowel shortening (p .769) slightly over short vowel lengthening (p .720); and finally five-syllable words promoted long vowel shortening (p .998) over short vowel lengthening (p .838).

4.2.5 Preceding phonological environment

This factor group was found to have a significant effect on productions of all three types of vowels. In word-initial position with a preceding pause, all the long vowels were shortened while no short vowel from the data was lengthened. Both word-initial position and word-initial position with a preceding pause enhanced shortening of long vowels (p .708; and 100% of token respectively) and diphthongs (both at p .983) strongly, and disfavoured lengthening of short vowels (p .154 and 0% of token respectively) strongly. A preceding vowel promoted diphthong shortening at (p .718) and short vowel lengthening at (p .806). Its effect on long vowel shortening remained unclear as there was no token of long vowel preceded by a vowel in the interview data. A preceding stop strongly inhibited diphthong shortening at (p .211) and slightly favoured long vowel shortening at (p .618) and short vowel lengthening at (p .565). A preceding fricative was found to have a very strong disavouring effect on diphthong shortening (p .071) over long vowel shortening (p .387) and short vowel

lengthening (*p* .565). A preceding nasal, approximant and lateral had similar effects on the realizations of all three types of vowels. A preceding nasal highly disfavoured long vowel shortening at (*p* .383) in contrast to diphthong shortening (*p* .550) and short vowel lengthening (*p* .519). Likewise, a preceding approximant or lateral inhibited long vowel shortening at (*p* .383) while slightly favoured diphthong shortening at (*p* .550) and short vowel lengthening at (*p* .565). A preceding affricate was found to have a very strong favourable effect on diphthong shortening at (*p* .983) while its effects on long vowel shortening and short vowel lengthening were on another extreme, as seen from the no cases of the former and its disfavoured effect of the latter at (*p* .183). This, however, should at best be interpreted with caution as there were only 5 tokens in total of realizations of these application values.

Table 4.2 Collective effects of collapsed phonological environment factors on vowel productions

Factor	Shortened	Shortened	Lengthened
Group	Long Vowels	Diphthongs	Short Vowels
	/i: ɔ: u:/	/eɪ aɪ aʊ/	/ɪ ɒ ʊ/

1. Preceding Phonological Environment

	<i>Word-initial</i>	<i>Word-initial, word-initial with preceding pause and affricate</i>	<i>Word-initial</i>
<i>p</i>	.708	.983	.154
#	14	6	1
%	53.8%	26.1%	1%
	<i>Word-initial with preceding pause</i>	<i>Vowel</i>	<i>Word-initial with preceding pause</i>
<i>p</i>	ko	.718	ko
#	2	1	0
%	100%	20%	0%
	<i>Vowel</i>	<i>Stop</i>	<i>Vowel</i>
<i>p</i>	N/A ***	.211	.806
#	0	16	2
%	0%	22.9%	20%

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ɒ ʊ/
	<i>Stop</i>	<i>Fricative</i>	<i>Stop, fricative, approximant and lateral</i>
<i>p</i>	.618	.071	.565
#	65	2	249
%	52.4%	2.9%	30.3%
	<i>Fricative</i>	<i>Nasal, approximant and lateral</i>	<i>Nasal</i>
<i>p</i>	.387	.550	.519
#	9	93	32
%	26.5%	44.7%	27.1%
	<i>Nasal, approximant and lateral</i>		<i>Affricate</i>
<i>p</i>	.383		.183
#	71		4
%	48.3%		9.8%
	<i>Affricate</i>		
<i>p</i>	ko		
#	0		
%	0%		

Factor	Shortened	Shortened	Lengthened
Group	Long Vowels	Diphthongs	Short Vowels
	/i: ɔ: u:/	/eɪ aɪ aʊ/	/ɪ ɒ ʊ/

Order	* <u>Word-initial with preceding pause</u> > <u>Word-initial</u> > <u>Stop</u> > Fricative > Nasal, approximant & lateral	<u>Word-initial, word-initial with preceding pause & affricate</u> > <u>Vowel</u> > <u>Nasal, approximant & lateral</u> > <u>Stop</u> > Fricative	<u>Vowel</u> > <u>Stop, fricative, approximant & lateral</u> > <u>Nasal</u> > Affricate > Word-initial
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2. Following phonological environment

	<i>Word-final, vowel and /l r/</i>	<i>Word-final</i>	<i>Word-final, word-final with following pause and vowel</i>
<i>p</i>	.185	ko	.979
#	23	0	192
%	25.3%	0%	89.3%
	<i>Word-final with following pause</i>	<i>Word-final with following pause</i>	<i>Voiceless plosive</i>
<i>p</i>	ko	ko	.083
#	0	0	4
%	0%	0%	1.6%

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ʊ ʊ/
	<i>Voiceless plosive, /n/ and voiceless affricate</i>	<i>Vowel</i>	<i>Voiced plosive, /f/, /v/, /m/, /n/ & /w/</i>
<i>p</i>	.740	ko	.321
#	60	0	20
%	76.4%	0%	6.97%
	<i>Voiced plosive</i>	<i>Voiceless plosive</i>	<i>/s/, /ʃ θ h/, /z ð ʒ/, /j/ and voiced affricate</i>
<i>p</i>	.701	.945	.775
#	23	106	53
%	60.5%	82.2%	40.5%
	<i>/s/ and /m/</i>	<i>Voiced plosive and /f/</i>	<i>/ŋ/</i>
<i>p</i>	.372	.066	.200
#	20	3	6
%	30.8%	5%	4.5%

Factor Group	Shortened Long Vowels <i>/i: ɔ: u:/</i>	Shortened Diphthongs <i>/eɪ aɪ au/</i>	Lengthened Short Vowels <i>/ɪ ʊ ʊ/</i>
	<i>/f/ and /w/</i>	<i>/s/</i>	<i>/l r/</i>
<i>p</i>	.416	.407	.456
<i>#</i>	4	7	13
<i>%</i>	40%	23.3%	15.3%
	<i>/v/</i>	<i>/v/</i>	<i>Voiceless affricate</i>
<i>p</i>	.928	ko	ko
<i>#</i>	7	0	0
<i>%</i>	87.5%	0%	0%
	<i>/ʃ θ h/</i>	<i>/ʃ θ h/ and /n/</i>	
<i>p</i>	N/A	.008	
<i>#</i>	0	2	
<i>%</i>	0%	4.9%	
	<i>/z ð ʒ/</i>	<i>/z ð ʒ/</i>	
<i>p</i>	ko	ko	
<i>#</i>	0	0	
<i>%</i>	0%	0%	

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ʊ ʊ/
	/ŋ/	/m/	
<i>p</i>	N/A	ko	
#	0	0	
%	0%	0%	
	/j/	/ŋ/	
<i>p</i>	N/A	N/A	
#	0	0	
%	0%	0%	
	<i>Voiced affricate</i>	/w/	
<i>p</i>	N/A	ko	
#	0	0	
%	0%	0%	
		/j/	
<i>p</i>		ko	
#		0	
%		0%	

Factor Group	Shortened Long Vowels /i: ɔ: u:/	Shortened Diphthongs /eɪ aɪ aʊ/	Lengthened Short Vowels /ɪ ʊ ʊ/
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/l r/
p ko
 # 0
 % 0%

Voiceless affricate
p N/A
 # 0
 % 0%

Voiced affricate
p ko
 # 0
 % 0%

Order	<u>*/v/</u> > <u>Voiceless plosive</u> , /n/ & <u>voiceless affricate</u> > <u>Voiced</u> <u>plosive</u> > /f/ & /w/ > /s/ & /m/ > Word-final	<u>Voiceless plosive</u> > /s/ > <u>Voiced plosive</u> & /f/ > /ʃ θ h/ & /n/	<u>Word-final, word-final with</u> <u>following pause & vowel</u> > /s/, <u>/ʃ θ h/, /z ð ʒ/, /j/ & voiced</u> <u>affricate</u> > /l r/ > <u>Voiced</u> <u>plosive</u> , /f/, /v/, /m/, /n/ & /w/ > /ŋ/ > <u>Voiceless plosive</u>
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* Underlining indicates a favourable effect

4.2.6 Following phonological environment

This factor group was found to have significant effects on the realizations of long vowels, diphthongs and short vowels. A word-final position, a word-final position with a following pause and a following vowel had very similar effects on the realizations of all three types of vowels, and hence they were collapsed together for the best model fit, as summarized in Table 4.2 above. These three conditions strongly disfavoured shortening of long vowels and diphthongs, as seen from the zero token of shortened long vowel when it was in a word-initial position with a following pause and zero token of shortened diphthong for all three conditions. These three conditions strongly promoted short vowel lengthening at (p .979) in comparison to the strong collective disavouring effect that a word-final position and a following vowel had on long vowel shortening (p .185).

A following voiced plosive and a following voiceless plosive affected realizations of long vowels, diphthongs and short vowels differently. A following voiceless plosive strongly favoured diphthong shortening (p .945) over long vowel shortening (p .740) while strongly disfavoured short vowel lengthening at (p .083) on another extreme. To the contrary, a following voiced plosive strongly disfavoured diphthong shortening at (p .066) over short vowel lengthening at (p .321) while slightly favoured long vowel shortening at (p .701).

The group of voiceless fricatives affected the realizations of long vowels,

diphthongs and short vowels in different ways. A following /s/ inhibited both long vowel shortening at (*p* .372) and diphthong shortening at (*p* .407) while favoured short vowel lengthening at (*p* .775). In comparison, a following /f/ had a much stronger disfavoured effect of diphthong shortening at (*p* .066) over long vowel shortening at (*p* .416), and unlike a following /s/, it disfavoured short vowel lengthening at (*p* .321). Similarly, a following /ʃ θ h/ also disfavoured diphthong shortening strongly at (*p* .008), and yet, promoted short vowel lengthening at (*p* .775), similar to a following /s/.

Similarly, the group of voiced fricatives also had different effects on realizations of the three types of vowels. A following /v/ disfavoured short vowel lengthening at (*p* .321) and strongly promoted long vowel shortening at (*p* .928), and yet there was no realization of shortened diphthong. On the contrary, under the condition of a following /z ð ʒ/, there were no cases of either shortened long vowel or shortened diphthong and short vowel lengthening was enhanced at (*p* .775).

A following /m/, /n/ or /ŋ/ had largely similar effects on realizations of long vowels, diphthongs and short vowels, despite the only difference that a following /n/ promoted long vowel shortening (*p* .740) while a following /m/ disfavoured such at (*p* .372). There was no realization of shortened diphthong when it was followed by /m/ and such realization was strongly disfavoured at (*p* .008) when it was followed by /n/. There was no token of long vowel and diphthong followed by /ŋ/ in the interview data

for comparison. All following /m/ /n/ and /ŋ/ inhibited short vowel lengthening at (*p* .321, *p* .321, and *p* .200) respectively.

The liquid sounds affected realizations of the three types of vowels in different manners as well. The weights of effects of /w/ and /j/, although found to be significant in VARBRUL analysis, were the results of collapsing with different factor groups due to similar probabilities. As such, a pattern was difficult to discern. As for a following /l r/, there was no realization of shortened diphthong. Shortening of long vowels was strongly disfavoured at (*p* .185) over lengthening of short vowels at (*p* .456).

Since affricates are not as common as other sounds in English, it was within expectation that there was either no token of the vowels in such environment or it was knocked out from the VARBRUL analysis. Notwithstanding this, the phonological environment of a following voiceless affricate is worthy of noticing due to the relatively large percentage of realization of shortened long vowels (81.8%). It was found to have a favourable effect on long vowel shortening at (*p* .740).

In gist, the effects of proficiency, speaker, stress, number of syllables, preceding phonological environment and following phonological environment, on long vowels, diphthongs and short vowels were not identical. There was, however, a more unifying lengthening or shortening effect on the three types of vowels by following phonological environment.

4.3 Dependent variables – The effects of interactions of factor groups on vowel realizations

By vowel type, the findings from the VARBRUL analyses of long vowels, diphthongs and short vowels may also be examined to discern the effects of the factor groups' interactions on their realizations.

4.3.1 Long Vowels

The VARBRUL analysis conducted on long vowel realizations helps determine to what extent they were affected by the speakers' proficiency, speaker, stress, number of syllables, preceding phonological environment and following phonological environment. Results are outlined in Table 4.1 in detail. Three factor groups, stress, preceding phonological environment and following phonological environment, were found to have a significant effect on long vowel shortening ($\chi^2 = 25.562$, 9 df, $p < .003$). Unstressed syllables ($p .927$) strongly favoured long vowel shortening while stressed syllable ($p .445$) slightly disfavoured it. Word-initial position ($p .708$) and a preceding stop ($p .618$) promoted long vowel shortening over a preceding fricative ($p .387$), approximant ($p .383$), lateral ($p .383$) and nasal ($p .383$). Word-initial position with a preceding pause also strongly enhanced long vowel shortening, as seen from its 100% realization. There was no token of shortened long vowel when it was preceded by an affricate. Effect of a preceding vowel could not be determined as there was no

token of such combination from the interview data. With respect to following phonological environment, word-final position (p .185) and a following vowel (p .185) were found to have a strong inhibiting effect over voiceless plosive (p .740) and voiced plosive (p .701), which had similar favourable effects on long vowel shortening. Word-final position with a following pause was a knockout item as there was no realization of shortened long vowel in such environment. The group of fricatives had different effects on realizations of long vowels. A following /s/ (p .372) and a following /f/ (p .416) both disfavoured long vowel shortening while a following /v/ strongly promoted such realization at (p .928). In comparison, a following /n/ (p .740) had favourable effect on long vowel shortening over a following /m/ (p .372). A following /l r/ indicated a very strong disavouring effect at (p .185) over a following /w/ (p .416) and a following voiceless affricate (p .740).

The other factor groups, proficiency, speaker and number of syllables, were found to be insignificant statistically regardless of repeated attempts of collapsing factors indicating similar effects. Albeit insignificant, the data from VARBRUL analysis indicated that there were some patterns. High proficiency of English slightly disfavoured long vowel shortening at (p .436) while low proficiency had one of (p .538). The medium figures were indicative of no inclination to either favouring or disavouring as proficiency varied. As for speaker, they fell onto three groups of tendency. The first group of speaker, including Jessica (p .953), Candy (p .992), Paul

(*p* .871), Kim (*p* .895), Alfred (*p* .740), Max (*p* .609), Sam (*p* .943), Heather (*p* .791), Cecilia (*p* .659) and Carol (*p* .647), showed a favour of long vowel shortening, as against the second group, which encompassed Raymond (*p* .326), Wing (*p* .025), May (*p* .254), Elaine (*p* .203), Hazel (*p* .162), Kay (*p* .221), Claudia (*p* .360), Stephy (*p* .323), Howard (*p* .248), Rainnie (*p* .193) and Patricia (*p* .377) and indicated a disfavour. The third group of speaker included Yanki (*p* .552), Vinci (*p* .457), Stephanie (*p* .557), Sherry (*p* .535), Catherine (*p* .442), Serena (*p* .423) and Karina (*p* .486), who did not show an inclination of favouring or disfavouring. Finally, for the factor group of number of syllables, there was a tendency that as the number of syllables increased, long vowel shortening was increasingly favoured.

4.3.2 Diphthongs

Another VARBRUL analysis was conducted to determine whether the effects of proficiency, speaker, stress, number of syllables, preceding phonological environment and following phonological environment on realizations of diphthongs were significant. Four factor groups, stress, number of syllables, preceding phonological environment and following phonological environment, were found to be statistically significant for shortening of diphthongs ($\chi^2 = 37.261$, 11 df, *p* = .0001). While a stressed syllable slightly favoured diphthong shortening (*p* .645), an unstressed syllable strongly disfavoured such realization (*p* .036). Four-syllable and five-syllable words (both at

p .914 due to collapsing) had a strong inhibiting effect of diphthong shortening while one-syllable words had one of .639, two-syllable words one of .371, and three-syllable words one of .010. It did not follow the tendency found in long vowel shortening that the favourable effect of realization of the variant increased as the number of syllables increased. Word-initial position (*p* .983), word-initial position with a preceding pause (*p* .983), a preceding vowel (*p* .718) and a preceding affricate (*p* .983) were found to have a very strong favourable effect on diphthong shortening while a preceding stop (*p* .211) and a preceding fricative (*p* .071) had a strong disfavouring effect. A preceding nasal (*p* .550), a preceding approximant (*p* .550) and a preceding lateral (*p* .550) seemed to have little effects on diphthong realizations. With respect to following phonological environment, a total of ten factors, word-final position, word-final position with a following pause, a following vowel, a following /v z ð ʒ m w j l r/, and a following voiced affricate, were knocked out from further analysis by VARBRUL as there were no realizations of shortened diphthong when they were followed by these sounds. Also, there were no tokens of diphthongs following /ŋ/ and a voiceless affricate in the interview data. Eliminating all these factors, a following voiceless plosive strongly promoted diphthong shortening at (*p* .945) over a following voiced plosive (*p* .066). A following /f/ (*p* .066), a following /ʃ θ h/ (*p* .008) and a following /n/ (*p* .008) were found to have a very strong disfavouring effect over a following /s/ (*p* .407) on diphthong shortening.

The other two factor groups, although found to be insignificant statistically, revealed some tendencies. Similar to realizations of long vowels, proficiency seemed to have little effects on diphthong shortening. High proficiency had a probability of .493 while low proficiency had one of .505. These again indicated the neutral effect of proficiency on diphthong productions. As for the group of speaker, in much the same way as long vowel shortening, the participants fell onto three groups according to their favouring of diphthong shortening. Paul (*p* .756), Hazel (*p* .955), Vinci (*p* .818), Heather (*p* .727), Stephanie (*p* .795), Catherine (*p* .949), Serena (*p* .961), Patricia (*p* .853) and Patsy (*p* .789) belonged to the same group since they had a favourable effect on diphthong shortening, whereas Candy (*p* .037), Kim (*p* .029), Raymond (*p* .195), Wing (*p* .026), Kay (*p* .375), Claudia (*p* .391), Howard (*p* .186), Sam (*p* .230), Rainnie (*p* .206), Cecilia (*p* .330), Carol (*p* .132) and Karina (*p* .239) belonged to the second group as they showed a disfavouring effect on diphthong shortening. The third group included Jessica (*p* .459), Sammy (*p* .459), May (*p* .533), Alfred (*p* .555), Yanki (*p* .511) and Sherry (*p* .570), who did not seem to indicate a preference for favouring or disfavouring.

4.3.3 Short vowels

Determining the effects of proficiency, speaker, stress, number of syllables, preceding phonological environment and following phonological environment on

realizations of short vowels, another VARBRUL analysis was run independently. Three factors, proficiency, preceding phonological environment and following phonological environment, were found to have a significant effect on short vowel lengthening ($\chi^2 = 36.823$, 10 df, $p < .0001$). High proficiency ($p .596$) had a slight favourable effect on short vowel lengthening over low proficiency ($p .446$). A word-initial position ($p .154$) and a preceding affricate ($p .183$) strongly disfavoured short vowel lengthening while a preceding vowel had a very strong favourable effect at ($p .806$). A preceding stop ($p .565$), a preceding fricative ($p .565$), a preceding nasal ($p .519$), a preceding approximant ($p .565$) and a preceding lateral ($p .565$) were all found to have a slight enhancing effect on short vowel lengthening. A word-final position ($p .979$), a word-final position with a following pause ($p .979$) and a following vowel ($p .979$) all had a very strong favourable effect on short vowel lengthening in contrast to a voiceless plosive ($p .083$) and a voiced plosive ($p .321$) which both strongly disfavoured short vowel lengthening. The group of fricative had very dissimilar effects on short vowel lengthening. A following /s/ ($p .775$), a following /ʃ θ h/ ($p .775$) and a following /z ð ʒ/ ($p .775$) promoted short vowel lengthening in comparison to a following /f/ ($p .321$) and a following /v/ ($p .321$). All nasals, a following /m/ ($p .321$), a following /n/ ($p .321$) and a following /ŋ/ ($p .200$), all indicated a strong disfavoured effect of short vowel lengthening. A following /w/ ($p .321$) and a following /l r/ ($p .456$) also disfavoured short vowel lengthening over a following /j/ ($p .775$) and a following

voiced affricate ($p .775$).

Three factor groups, speaker, stress and number of syllables, were found to be statistically insignificant by VARBRUL on short vowel productions. Nonetheless, the tendency found in these factor groups may be more significant with a larger pool of data. Similar to long vowel and diphthong shortening, the speaker fell into three groups of favouring of short vowel lengthening. The first group of speakers were those who showed a tendency of favouring short vowel lengthening, which included Paul ($p .634$), Raymond ($p .788$), Wing ($p .777$), Elaine ($p .698$), Kay ($p .691$), Claudia ($p .866$), Howard ($p .634$), Heather ($p .728$), Stephanie ($p .764$), Sherry ($p .653$), Rainnie ($p .699$), Catherine ($p .666$) and Serena ($p .739$). The second group of speaker, which included Jessica ($p .195$), Candy ($p .225$), Sammy ($p .233$), Hazel ($p .265$), Yanki ($p .234$), Vinci ($p .354$), Max ($p .351$), Karina ($p .185$) and Patsy ($p .037$), indicated a disfavouring of short vowel lengthening. Kim ($p .536$), May ($p .461$), Alfred ($p .443$), Stephy ($p .555$), Sam ($p .541$), Cecilia ($p .502$), Patricia ($p .488$) and Carol ($p .498$) belonged to the final group of speaker, which showed little tendency to favouring or disfavouring short vowel lengthening. Stress seemed to have demonstrated little effects on short vowel lengthening. While a stressed syllable slightly favoured short vowel lengthening at ($p .599$), an unstressed syllable slightly disfavoured so ($p .407$). Finally, number of syllables was found to have an increasing favourable effect on short vowel lengthening as it increased. One-syllable words

strongly disfavoured short vowel lengthening at (p .092) while two-syllable words, three-syllable words, four-syllable words and five-syllable words were found to have a favourable effect at .767, .626, .720 and .838 respectively.

In sum, not all factor groups were found to be significant for the productions of vowels. Factors that had significant effects on their productions differ from vowel to vowel. Three factors, stress, preceding phonological environment and following phonological environment, were found to have significant effects on long vowel productions. Four factors, stress, number of syllables, preceding phonological environment and following phonological environment, were found to be significant for diphthong productions. Three factors, proficiency, preceding phonological environment and following phonological environment, were found to be significant for the realizations of short vowels.

4.4 A comparison of behaviour of long vowels, diphthongs and short vowels

In comparing the behaviour of long vowels, diphthongs and short vowels, it becomes clear that strong dissimilarities exist between these vowels, confirming the preliminary findings of the fine analysis conducted prior to the VARBRUL analyses. Different factors were found to have different effects on their variations. The only similarity across three groups of vowels that could be identified with confidence was the little effect proficiency had on their variations. Despite the fact that proficiency

was found to have a significant effect on short vowel lengthening, the weightings were not indicating a tendency towards either favouring or disfavouring.

Examining the weightings of different factors, they revealed different behaviour under different conditions and in different phonological environments although they share many common characteristics in English. In the first place, long vowels and diphthongs behaved in almost two extremes depending on the stress of the syllable they were in. When they were found in a stressed syllable, long vowel shortening was slightly disfavoured while diphthong shortening was slightly favoured instead. Intriguingly, an unstressed syllable strongly promoted long vowel shortening at .927 while diphthong shortening was found on another extreme, being strongly inhibited at .036. While syllable stress had opposite and extreme effects on long vowel and diphthong shortening, it had little effect on short vowel lengthening, as seen from stressed syllables' slight favouring of short vowel lengthening at .599 and unstressed syllables' slight disfavouring of such at .407.

Concerning number of syllables, the similarities in their behaviour only emerged when the number of syllables reached four and above, by then they all demonstrated a strong favourable effect. Among the three types of vowels, diphthongs showed stronger similarity to short vowels than to long vowels, perhaps unexpectedly, in that there was a unifying lengthening effect on both diphthongs, as indicated by the small percentages of tokens of shortened diphthongs in words having three or more syllables,

and short vowels generally as the number of syllables increased. On the contrary, while the favourable effect on long vowel shortening increased as the number of syllables increased, the same did not apply to diphthong shortening.

However, in comparing the effects of preceding and following phonological environments on the vowels, the contradiction in findings seemed to have narrowed down. Word-initial position, word-initial position with a preceding pause and a preceding affricate, which had a strong favourable effect on shortening of long vowels and diphthongs, also had a strong disfavoured effect on lengthening of short vowels.

When dissimilarities occurred between the three types of vowels, diphthongs and short vowels tended to share more similarities in their behaviour among the three. A preceding vowel, a preceding nasal, a preceding approximant and a preceding lateral had similar effects in both favouring and magnitude on diphthong shortening and short vowel lengthening while having a strong disfavoured effect on long vowel shortening. The intriguing cases were preceding stop and preceding fricative, which had noticeably distinct effects on the three vowels' variations. A preceding stop strongly disfavoured diphthong shortening while slightly promoted long vowel shortening and short vowel lengthening. Besides, a preceding fricative strongly disfavoured diphthong shortening, not so much with long vowel shortening and slightly favoured short vowel lengthening.

In comparison to preceding phonological environment, there were stronger

similarities demonstrated between the three types of vowels by following phonological environment. In some environments, there was a unifying shortening or lengthening effect on long vowels, diphthongs and short vowels as following phonological environments varied. Word-final position and a following vowel, which had a strong disfavoured effect on long vowel shortening (their effects on diphthong shortening were unknown due to knockouts) and a very strong favourable effect on short vowel lengthening, had a unifying lengthening effect on the vowels. A following voiceless plosive was found to have a strong enhancing effect on both long vowel shortening and diphthong shortening, and a strong disfavoured effect on short vowel lengthening, which was indicative of a general shortening effect. By the same token, a following /s/ and a following /ʃ θ h/, which had favourable effects on short vowel lengthening, had disfavoured effects on both long vowel shortening and diphthong shortening at the same time, which was representative of a general lengthening effect. A following /v/ was found to strongly promote long vowel shortening and disfavour short vowel lengthening, indicative of a unifying shortening effect.

A following /f/ had a similar disfavoured effect of long vowel shortening and short vowel lengthening in terms of magnitude while indicating a very strong inhibiting effect of diphthong shortening; a following /m/ and a following /w/ also had similar disfavoured effects in magnitude on long vowel shortening and short vowel lengthening while diphthong shortening indicated a knockout item; and a following /l

r/ disfavoured long vowel shortening and short vowel lengthening, although to different extent, while diphthong shortening was knocked out. The more intriguing cases were a following voiced plosive and a following /n/, which both had very strong disavouring effects on diphthong shortening, not so strong inhibiting effects on short vowel lengthening and relatively strong favourable effects on long vowel shortening. As for the remaining following phonological environments, which included word-final position with a following pause, a following /z ð ʒ/, a following /ŋ/, a following /j/, a following voiceless affricate and a following voiced affricate, a comparison across three groups of vowels could not be discerned as there were only results from VARBRUL for one type of vowel but not the other two, either due to knocking out or absence of such combination of sounds in the interview data.

In sum, collectively speaking, stress, number of syllables, preceding phonological environment and following phonological environment had more significant and noticeable effects on long vowels, diphthongs and short vowels than proficiency and speaker. Specifically, preceding and following phonological environments were the most significant factor groups, since they were found significant for productions of all three types of vowels. In comparison to stress and number of syllables, they also had less contradictory and distinct effects on the behaviour of the three types of vowels. There were stronger similarities between diphthongs and short vowels as phonological environments varied. More differences than similarities were also found between the

behaviour of long vowels and diphthongs, and their behaviour varied widely from factor to factor. Factors that promoted shortening of long vowels might not also have the same effects on diphthongs, and vice versa. Also, preceding and following sounds that have same voicing or same manner of articulation might not have similar effects on the realizations of the vowels.

DISCUSSION

This chapter first addresses the research questions of the current study by discussing the effects of phonological factors, which include stress, number of syllables, preceding and following phonological environments, in addition to social factors, which encompass individual variation and English proficiency of the participants, on the realizations of the vowels /i:/, /ɪ/, /u:/, /ʊ/, /ɔ:/, /ɒ/, /eɪ/, /aɪ/ and /aʊ/ in HKE, and finally the realization patterns of these vowels with regard to the phonological environments. The chapter then examines the L1 transfer effect of Cantonese on HKE phonology and its interaction with English phonological rules by investigating the effects of phonological factors on the realizations of these vowels, and their productions' underlying patterns. Specifically, with reference to Cantonese phonological rules, rankings of constraints in Cantonese phonotactics and sonority hierarchy, the effects of following phonological environment are firstly discussed, followed by preceding phonological environment, stress, and finally number of syllables. Drawing on the interaction of English phonology and Cantonese phonology in HKE, the rankings of constraints in HKE's phonology is discussed. These are finally followed by a discussion of the implications of insignificance of proficiency and speaker for vowel realizations and HKE phonology as a whole.

5.1 Addressing the research questions

This study sought to delve into HKE's vowel realizations by examining the following research questions:

- a) What are the effects of stress, number of syllables, preceding phonological environment and following phonological environment on the productions of the vowels /i:/, /ɪ/, /u:/, /ʊ/, /ɔ:/, /ɒ/, /eɪ/, /aɪ/ and /aʊ/ in HKE?
- b) How do proficiency of the speakers and individual variation influence the productions of these vowels?
- c) What are the underlying patterns of realizations of these sounds with regard to the phonological environments they are in?

Each of these is addressed respectively in this section. This is largely descriptive since explanations of these findings are given in the following sections.

Addressing the first research question, the effects of the phonological factors on long vowels, diphthongs and short vowels were not identical. All the phonological factors were found to have significant effects on the vowels' productions, although only preceding and following phonological environments had an influence on all three types of vowels. Stress was only found to have a significant, and yet disparate, effect on long vowel and diphthong shortening. While a stressed syllable had a slightly disfavoured effect on long vowel shortening and an unstressed syllable had a very strong favourable effect on diphthong shortening, a stressed syllable conversely had a slight enhancing effect on diphthong shortening and an unstressed syllable had a very

strong inhibiting effect on diphthong shortening. With respect to number of syllables, it was found to have a significant effect on diphthong shortening only. However, the findings indicated some interesting patterns. Number of syllables had dissimilar effects on long vowels, diphthongs and short vowels again. Whereas the shortening effect on long vowels became more favourable as the number of syllables increased, the same effect did not apply to diphthongs. Only one-syllable words slightly favoured diphthong shortening. All the other numbers of syllables demonstrated inhibiting effects. As for short vowels, the lengthening effect became more favourable and noticeable as the number of syllables increased. It thus had a generally lengthening effect on diphthongs and short vowels.

Preceding and following phonological environments were found to be significant for all three types of vowels. Since the answers to the first and third research questions overlap to some extent, they are addressed to as one revised question: What are the realization patterns of vowels in different phonological environments? The preceding phonological environment can be categorized into three groups, firstly, the absence of a preceding sound; secondly, sounds that do not exist in Cantonese inventory or sounds that may form a sequence that violates the phonotactics of Cantonese with the vowel; and finally, sounds that show some degree of overlapping with those in Cantonese. The absence of a preceding sound had a unifying shortening effect on all three types of vowels. The effects of sounds that do not exist in the inventory of Cantonese, which

are virtually the affricates, and those that may constitute an illegal sequence with the vowel in Cantonese phonotactics, which are vowels, cannot be discerned due to their original rare co-occurrences in English. The third group of sounds, which shows some overlap with Cantonese inventory such as nasals, was found to have relatively neutral or a slightly disfavoured effect on the realizations of the vowels as shortened or lengthened.

The classifications of following phonological environments are slightly different from those of preceding phonological environments. They are categorized into four groups. The first one is the absence of a following sound; the second one are sounds that are not permitted to occupy the coda position of a Cantonese syllable, which include vowels, voiced plosives, all fricatives and all affricates; the third one are sounds that are also allowed in the syllable coda position of Cantonese, which are voiceless plosives and nasals; and the final one are approximants and lateral. The final group has to be distinguished from the third group for two reasons. First, they were not shown to have the same effects on the vowel realizations by VARBRUL analyses. Second, lateral and approximant /r/ cannot constitute a syllable coda in Cantonese, but they were found to have similar effects on the vowels as the other two approximants /w j/.

The absence of a following sound was found to enhance lengthening of all three types of vowels. The effects of sounds that are not permissible in the coda position of a

Cantonese syllable on the vowels were related to their corresponding sonority values. It was found that the more sonorous the sounds were, the more prominent the lengthening effect they had on the vowels. The third group of sound, which consists of voiceless plosives and nasals, was found to have a unifying shortening effect on all three types of vowels. As for the final group of sound, which comprises lateral and approximants, it had disfavoured effects on both shortening and lengthening of the vowels.

Concerning the second research question, which sought to investigate the effects of speaker and proficiency on the vowel productions, it was found that speaker was insignificant for all three types of vowels while English proficiency had a significant effect on the short vowels only.

Having identified their patterns of realizations in this section, the following sections attempt to offer explanations for their occurrences.

5.2 Following phonological environment

5.2.1 L1 transfer from Cantonese

Corroborating findings from the prior studies (Bolton & Kwok, 1990; Chan & Li, 2000; Hung, 2000; Luke & Richards, 1982; Stibbard, 2004; Wee, 2008), L1 transfer from Cantonese has a significant effect on the speakers' vowel productions in the current study. However, findings of the present study do not confirm Bolton and Kwok

(1990) and Hung's (2000) findings that L1 transfer has a detrimental effect on English vowel productions so that the length contrasts between long vowels and short vowels are neutralized and replaced with an intermediate form between the two. It corroborates Stibbard (2004) and Chan and Li's (2000) findings that the vowels are in some instances produced as long and tense, in others as short and lax, and in the rest as an intermediate form, and yet it does not lend weight to their claims that these are the evidences suggesting a lack of stability of HKE. The present study's findings also do not contradict Deterding et al.'s (2008) acoustic findings that vowels contrasting in length tend to merge but they are not fully merged in HKE. In fact, L1 transfer from Cantonese is found to have a primary effect on vowel productions of HKE and the underlying patterns would remain veiled if HKE productions are not investigated with respect to transfer effects of phonological rules and constraints ranking from Cantonese and the effect of sonority hierarchy.

5.2.1.1 Transfer of Cantonese phonological rules and phonotactic constraints

Similar to English, Cantonese is relatively not restrictive in terms of what is permitted in the onset position. All Cantonese consonants, plosives, fricatives, nasals, affricates, lateral and approximants, are permissible in the onset position. To the contrary, the coda position of Cantonese is restricted to unaspirated stops and nasals only. Additionally, there are two phonotactic constraints stating that words carrying

one of the tone levels from 1 to 6 may have zero coda or a coda constituted by one of the nasals /m n ŋ/ while it is obligatory for words carrying one of the tone levels from 7 to 9 to have a closed syllable with a coda of one of the stops /p t k/ (Bauer & Benedict, 1997, p. 12-13). In comparison to English's syllable structure, Cantonese has a relatively simple syllable structure of CVC maximally. This knowledge of Cantonese phonology is essential in helping us understand the patterns of vowel shortening and lengthening.

Notwithstanding the scarcity of investigations into Cantonese phonology, Kao (1971) and Li (1985) found that syllable structure, whether it is an open or a closed one; inherent vowel length, whether it is long or short; and word-final sounds are the factors which determine vowel durations in Cantonese. Firstly, long vowels are found to have longer durations in open syllables than long vowels or short vowels in closed syllables. Secondly, in comparison to short vowels, long vowels have longer durations in closed syllables. Thirdly, vowels in syllables ending with /m n ŋ/ are longer than those ending with /p t k/ (Kao, 1971, p. 58). Both long and short vowels are shortened when they precede a nasal consonant (Kao, 1971, p. 47-48). When they precede a stop consonant, which is in fact a voiceless stop since Cantonese does not have voiced stops in any position in its inventory, long vowels are further shortened in contrast to those followed by a nasal while the length of short vowels is shortened to largely the same extent as the ones preceding a nasal (Kao, 1971, p. 49; Li, 1985, p. 31).

These rules are found to have a direct and noticeable effect on productions of long and short vowels by the thirty speakers in this study, without which full explanation of the underlying patterns of vowel productions would have been impossible. In the present study, a following voiceless plosive had a very strong favourable effect on shortening of both long vowels and diphthongs and a very strong disfavouring effect on short vowel lengthening. One may argue that British English phonological rule which states that vowels are shortened before fortis consonants (Roach, 2000, p. 50) has a primary and most significant effect on this shortening effect of vowels. However, the interaction of phonological rules of both English and Cantonese become more evident when the vowels' realizations preceding nasals are examined. A following /m/ was found to disfavour long vowel shortening and short vowel lengthening; a following /n/ was found to promote long vowel shortening and strongly disfavour diphthong shortening and short vowel lengthening; while a following /ŋ/ was found to strongly disfavour short vowel lengthening. There were no tokens of long vowel and diphthong followed by /ŋ/ in the interview data and so no comparison could be made across the three types of vowels. These results indicate that English phonological rules may explain why a following /m/ had a disfavouring effect of long vowel shortening, and yet it alone cannot explain all the realization patterns. In compliance with English phonological rules, long and short vowels are not shortened when they precede a nasal. For this reason, the favourable effect a following /n/ has on long vowel shortening and

the disfavouring effect a following /m/, /n/ and /ŋ/ have on short vowel lengthening are in accordance with Cantonese phonological rules to shorten vowels when they precede a nasal (Kao, 1971, p. 47-48; Li, 1985, p. 31). Accordingly, a following voiceless plosive and a following nasal favour long vowels to be shortened and disfavour short vowels to be lengthened.

However, it is important to note that the transfer of Cantonese phonological rules is not applicable to diphthongs, as seen from the zero token of shortened diphthong when followed by /m/ and the very limited token of shortened diphthong when followed by /n/, probably since these rules do not affect Cantonese diphthongs, which are proposed to consist of a short vowel and one of the semi-vowels /w j y/ by some researchers (for example, Bauer & Benedict, 1997; Kao, 1971). English phonological rules may thus have a greater effect on diphthong than Cantonese phonological rules do, for English diphthongs are less similar to Cantonese diphthongs in comparison to the groups of long vowels and short vowels. For this reason, phonological rules of the two languages arguably have different effects on long vowels, short vowels and diphthongs, which are dependent on their similarities to their Cantonese counterparts.

Investigating the phenomenon of syllable contraction in Cantonese, Hsu (2005) proposes a ranking of a set of universal constraints which appeals to Cantonese by drawing on Optimality Theory (Prince & Smolensky, 1993). Although the study was concerned with the formation of output nucleus from syllable contraction, it provides

insights into the rankings of phonotactic constraints which are unique to Cantonese by examining what vowel is preferred or what new vowel is resulted when two or more separate syllables contract into one syllable. Hsu (2005) found that although Cantonese has the phonological rule of shortening long and short vowels when they precede a stop consonant, it also has the phonotactic constraint that the short low vowel /e/ cannot precede a voiceless stop from the observation of syllable contraction. Whether such constraint applies to other short vowels in Cantonese remained unclear due to the limitation of available data. As such, the output syllable from the contraction lengthens the short vowel. However, this phonotactic constraint does not apply to a following sonorant. A following sonorant allows short vowels in the output nucleus and does not have a lengthening effect on them. Sonorants that exist in Cantonese's inventory and that are permissible to occupy the syllable-final position include /m n ŋ/ and /j w y/ if Cantonese diphthongs are considered to consist of a vowel and a semi-vowel. This adds up with the effect of Cantonese phonological rules to the disavouring effect a following /m/, /n/ and /ŋ/ have on short vowel lengthening. Additionally, this phonotactic constraint justifies the disavouring effect a following /w/ and /l r/ have on short vowel lengthening. The effect a following /j/ has on short vowel lengthening remains unclear as there was no token of such and the favourable output weight was due to collapsing with other factors. The disavouring effects a following /w/ and a following /l r/ have on long vowel shortening are also in line with the Cantonese

constraint that long vowels are prioritized over short vowels, which Hsu (2005) termed as a constraint of “length competition” (p. 119). This, however, was found to have a relatively low ranking and thus its effect is only evident when there are no other competing constraints such as phonological rules which are given more importance and have more prominent effects on the realizations of vowels when they precede voiceless plosives and nasals.

These findings disagree with Chan and Li (2000) and Stibbard’s (2004) arguments that HKE neutralizes English phonemic vowel length contrast since Cantonese does not distinguish vowels by duration. As Hsu (2005) argues, in contrast to Taiwanese Southern Min, Hakka, and Taiwan Mandarin, which are sonority-oriented languages and give higher ranking to sonority hierarchy (Hsu, 2000, 2002), Cantonese “abides by a set of constraints involving vowel length” (p. 127). As she puts it clearly, “vowel length is distinctive in Cantonese, and the relevant constraints for nucleus contraction ... reflect this language-specific property” (p. 127). It is thus not surprising that such highly ranked constraint is transferred from Cantonese to English.

Bolton and Kwok (1990) and Hung’s (2000) findings that long vowels and short vowels are neutralized and replaced by an intermediate form between the two by HKE speakers, as well as Deterding et al.’s (2008) acoustic findings that vowels contrasting in length tend to merge but they are not fully merged in HKE may well be accounted for by the lengthening and shortening of vowels under, for instance, the circumstances

identified above and many others that follow in this section. This also illustrates why Stibbard (2004) and Chan and Li (2000) have the observation that the vowels are in some instances produced as long and tense, in others as short and lax, and in the rest as an intermediate form. This reflects the true picture of pronunciation of HKE. The findings, however, does not lend weight to the argument that a lack of stability of HKE is suggested. It should now be clear that investigating Hong Kong English by comparison against native English varieties and without making any reference to Cantonese phonology obscures the underlying patterns of HKE pronunciation and leads to the conclusion that HKE is erroneous and unstable due to a lack of acquisition.

5.2.1.2 Effect of sonority distance

Given the small inventory of sound that is permissible in the syllable-final position in Cantonese in contrast to English, one may argue that transfer from Cantonese cannot account for the patterns found in realizations of vowels followed by sounds not allowed by Cantonese in the coda position, which include all the non-sonorants and vowels. However, the fact that Cantonese places great emphasis on sonority hierarchy has to be considered when studying the vowel production patterns. Although, in comparison to other Chinese varieties such as Hakka, it places vowel length constraint in an even higher ranking, it does not contradict its lower but still important emphasis on sonority hierarchy. Cantonese is in strict compliance with the

Sonority Sequencing Principle that “[i]n any syllable, there is a segment constituting a sonority peak [i.e. the vowel] that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values” (Spencer, 1996, p. 89). Cantonese has a simple syllable structure of CVC and the vowel in the nucleus constitutes the sonority peak and the sonority value decreases from the vowel to the syllable-initial and final position respectively. This fact together with the restriction that Cantonese only allows nasals and stops in its syllable-final position, and only sonorants and voiceless non-sonorants in its syllable-initial position, most of which have relatively low sonority values in the sonority hierarchy, suggests its preference for a large sonority distance in Cantonese. For these reasons, all English syllables which are larger than CVC are considered to be more marked than Cantonese CVC syllables in terms of sonority, when one takes into consideration that even closer sonority distance in a consonant cluster is found to contribute to more marked segments (Broselow & Finer, 1991). While there were apparently no tokens of words pronounced with remedial strategies such as deletion and feature change (Hansen, 2001, 2004) from the interview data, one may ponder how they manage to pronounce these more marked syllables. It is found that instead of deleting or modifying the consonant clusters that are commonly found in English words, vowels are lengthened or shortened to accommodate HKE speakers’ preference for a larger sonority distance.

Lengthening effect on short vowels is found to be more prominent and the

shortening effect of long vowels and diphthongs more hindered when the following sound is more sonorous. The sonority hierarchy is vowels > glides > laterals > nasals > fricatives > stops from the most sonorous to the least (Hansen, 2006, p. 18). Except in cases of syllabic consonants, the syllable nucleus is made up of a vowel, which is the most sonorous group of sound. When it is preceded or followed by a sonorous sound, their co-occurrence results in a small sonority distance which violates the phonological preference of Cantonese. Investigating stress, tone and pretonic length in East Slavic varieties, Bethin (2006) found that if the vowel in the stressed syllable is a high one, the high tone is placed on the preceding syllable and to accommodate the rise in pitch, the vowel in the preceding syllable is lengthened (p. 139). She demonstrates that “the differences in intrinsic vowel duration are interpreted as a sonority hierarchy with respect to high tone association ... The placement of high tone favours a vowel with higher sonority over one with lower sonority” (Bethin, 2006, p. 146). Vowel lengthening facilitates vowel lowering and thus increases the sonority value of the vowel so that it is a better carrier of tonal contrast (p. 149). Despite the seemingly irrelevance of the focus of this study to the present study, the effect of vowel lengthening on increased sonority value of a vowel is of great importance to explaining the underlying patterns found in the vowel realizations when the following phonological environment is sounds that are not permissible in Cantonese syllable-final position.

The primary factor accounting for the lengthening effect on vowels in certain following phonological environments, which could not be explained by English phonological rules, is to reduce markedness of the corresponding syllable by increasing the sonority distance between the vowel and the following sound. It is found that a following vowel, which is the most sonorous group of sound in the sonority hierarchy, is found to have a unifying lengthening effect on vowels, as indicated by its very strong disavouring effect on long vowel and diphthong shortening and very strong favourable effect on short vowel lengthening. Such lengthening is not attributable to English phonological rules but the small sonority distance stemming from two consecutive vowels. By lengthening the corresponding vowel, its sonority value is increased and hence it is in better compliance with Cantonese's preference for a larger sonority difference. This also illustrates why there is no evidence that the participants in the present study resorted to strategies such as consonant cluster deletion.

With reference to the groups of plosives and fricatives, which are the least sonorous sounds in the hierarchy, there is a tendency that as the sounds get more sonorous, the lengthening effect on the vowels gets more prominent. When the vowels are followed by a voiced plosive, its favourable effect on long vowel shortening and inhibiting effect on short vowel lengthening are indicative of a general shortening effect. Although a following voiced plosive is not found to have a favourable effect on

diphthong shortening, it may well be due to the fact that there are too few tokens for a more prominent effect. Voiced plosive is the least sonorous sounds in comparison to other groups of sounds. Accordingly, the sonority distance between the preceding vowel and the plosive is not small enough to give a lengthening effect on the vowels. Similarly, a following /f/ is not found to have a lengthening effect on the vowels. The sonority distance between a following /f/ and a vowel is not large enough to facilitate a lengthening effect. However, the sonority distance between a vowel and a following /f/ is larger than that between a vowel and a following voiced plosive. Accordingly, a following /f/ does not favour long vowel and diphthong shortening which may render a decrease in sonority difference. Both /s/ and the group of /ʃ θ h/ are found to have unifying lengthening effects on the vowels. A following /s/ favours short vowel lengthening and disfavours long vowel and diphthong shortening while a following /ʃ θ h/ is found to favour short vowel lengthening and inhibit diphthong shortening. There is no token of long vowel followed by /ʃ θ h/ in the interview data for comparison. The disfavouring effect a following /s/, /f/ and /ʃ θ h/ have on long vowel and diphthong shortening provide striking evidence that Cantonese constraints and preference have higher rankings than English phonological rule, which states that vowels preceding a syllable or word-final fortis consonant is shortened (Roach, 2000, p. 50), in HKE. Consequently, it is proposed that HKE phonology places sonority hierarchy in a higher ranking than English phonological rules.

As one moves higher up the sonority hierarchy, the lengthening effect becomes more evident. A following /z ð ʒ/, which are more sonorous than voiceless fricatives, have a lengthening effect on short vowels. It is, however, unclear as to why a following /v/ has a very strong favourable effect on long vowel shortening and a disfavouring effect on short vowel lengthening despite its higher sonority value. It is proposed that place of articulation may also have an effect on vowel lengthening / shortening. A following /v/ and a following /f/, which are both labiodental, have similar inhibiting effects on short vowel lengthening and show similar distinct behaviour from the patterns found for other fricatives. This area is worth further investigation with a larger pool of data to have a more well-founded conclusion.

Undergoing lengthening to enhance the intrinsic length of the vowels may not seem entirely surprising as native varieties of English also manifest such property under specific circumstances. An intermediate form [i] is found, for instance, in “morpheme-final position when such words have suffixes beginning with vowels”, such as “happier” [hæpiə]; in “a prefix such as those spelt ‘re’, ‘pre’, ‘de’ if it precedes a vowel and is unstressed”, such as “react” [riækt]; in “suffixes spelt ‘iate’, ‘ious’ when they have two syllables”, such as “appreciate” [əpri:ʃiət] (Roach, 2004, p. 85). Intriguingly, the lengthening occurs when there are two consecutive vowels in these documented situations. One may notice that such lengthening is also found in circumstances not mentioned by Roach (2004) such as “situation” [sitʃueɪʃən] and

“graduate” [grædzueɪt]. Despite the fact that it remains unclear whether these occasions of lengthening are due to the existence of two consecutive vowels and hence the small sonority distance, as is the case in HKE, it is argued that at least vowel lengthening does not violate English phonotactics.

5.2.1.3 Further evidence on the interaction of Cantonese and English phonologies

An interaction of transfer effect from Cantonese and effect of allophonic variations from English is evident in the unifying lengthening effect of vowels in word-final position and word-final position with a following pause. With or without a following pause, word-final position is found to strongly favour short vowel lengthening. The strong inhibiting effect a word-final position has on shortening of long vowels and the knocking out of shortened diphthongs in a word-final position, as well as shortened long vowels and shortened diphthongs in a word-final position with a following pause due to zero realization are all indicative of the lengthening effect on the vowels. Such lengthening is arguably an indicator of influence from both English and Cantonese. It is documented that /ɪ/ is lengthened to [i] in word-final position of words ending in “y” or “ey” such as “happy” in English (Roach, 2004, p. 85). All other short vowels are not permissible in open syllables without any coda in English. Hence, we may deduce that short vowels are lengthened in word-final position in English. As such, the almost categorical lengthening effect found in word-final position, whether

with or without a following pause, is indicative of English's influence.

L1 transfer from Cantonese may also have an effect, for it is demonstrated that sound lengthening has the function of allowing a greater tonal contrast (Zhang, 2002, 2004). One of the principal differences between English and Cantonese lies in the importance attached to tone and stress. Cantonese is a tone language and a change in tone with all the sounds remaining the same would yield a new word with different semantic meanings. It is also a syllable-timed language and hence stress does not play a significant role. To the contrary, English is an intonation language and tones only serve a suprasegmental function. Stress is instead very crucial in both production and perception to understand the meaning. Accordingly, undergoing lengthening allows HKE speakers to accommodate greater tonal contrasts than would have possibly been allowed in native varieties of English. Such tonal contrast may facilitate placement of stress, which is not found in Cantonese, by enhancing a pitch contrast by HKE speakers.

5.3 Preceding phonological environment

The L1 transfer effect from Cantonese also surfaces when a comparison is made between the effects of preceding phonological environment and following phonological environment on the vowel realizations. Cantonese is less restrictive in terms of what is allowable in the onset position. All Cantonese consonants, including

the plosives /p t k k^w p^h t^h k^h k^{wh}/, the fricatives /f s h/, the nasals /m n ŋ/, the affricates /ts ts^h/, the lateral /l/ and the approximants /w j/ are permissible in the onset position of a syllable. Since there is a good deal of overlap of sounds allowed in onset in English and Cantonese, the effect of preceding phonological environment on the realizations of vowels is much more neutral. Although nasals, approximants and lateral are among the most sonorous sounds, the vowels do not seem to undergo a significant lengthening to increase the sonority distance since Cantonese also allow all these sounds except /r/ in its syllable onset position. Accordingly, a preceding nasal, approximant and lateral have similar neutral effects on diphthong shortening and short vowel lengthening, and similar slight disfavoured effects on long vowel shortening.

A similar transfer effect from Cantonese is also found on the vowel realizations following a stop and a fricative. Similar to a preceding nasal, lateral and approximant, a preceding stop and fricative manifest a slight favourable effect on short vowel lengthening for two reasons. First, the common plosives and fricatives in onset position shared by Cantonese and English allow L1 positive transfer. Second, lengthening of vowels is not noticeably enhanced due to a relatively long sonority distance between the nucleus and the sounds in question, for stops and fricatives are the least sonorous sounds in the hierarchy. As such, a disfavoured effect is found on diphthong shortening when the preceding sound is a stop, and on long vowel and diphthong shortening when the preceding sound is a fricative. There are virtually no

reasons for HKE speakers to shorten a long vowel or a diphthong under such phonological environments. The slightly favourable effect a preceding stop has on long vowel shortening and the difference in magnitude manifested in the effects of a preceding stop and fricative have on shortening of long vowels and diphthongs may well be explained by the different following phonological environments which, as discussed earlier in this chapter, have comparatively much stronger effects on the vowel realizations.

Effects of an initial position, an initial position with a preceding pause, a preceding vowel and a preceding affricate cannot be discerned as there are too few tokens to reach any concrete conclusion. Notwithstanding this, there appears a pattern that word-initial position and word-initial position with a preceding pause both have unifying shortening effects on vowels, as seen from the strongly favoured long vowel and diphthong shortening and strongly disfavoured short vowel lengthening in word-initial position in addition to the categorical long vowel and diphthong shortening and short vowel lengthening in word-initial position with a preceding pause. Besides, a preceding vowel also seems to have a lengthening effect on short vowels, which is similar to the effect of a following vowel. However, these patterns demand further investigation for a more solid conclusion.

Intriguingly, under the factor group of preceding phonological environment, a stronger similarity is found between diphthongs and short vowels than between long

vowels and diphthongs. For instance, a following nasal, approximant and lateral have a similar neutral effect on diphthong shortening and short vowel lengthening while they are found to have disfavoured effects on long vowel shortening. This may seem counter-intuitive as English long vowels and diphthongs demonstrate similar properties and behaviour. This is, however, comprehensible when Cantonese phonology is scrutinized. Researchers such as Bauer and Benedict (1997) and Kao (1971) proposed that Cantonese diphthongs are made up of a short vowel and one of the semi-vowels /w j y/, although other researchers such as Hashimoto (1972) and Zee (1991) argue that Cantonese vowels are comprised of two vowels as in English. It is then not entirely surprising that diphthongs and short vowels demonstrate stronger similarity in terms of impacts of preceding phonological environment as the diphthongs may be interpreted as a short vowel followed by an approximant. Both English and Cantonese have falling diphthongs as the first vowel is much longer and stronger phonetically than the second vowel (Roach, 2004, p. 21; Spencer, 1996, p. 30). As such, the first vowel of a diphthong, which is similar to a short vowel, is under greater influence of the preceding phonological environment and hence it has different characteristics and properties from the long vowels which intrinsically have long duration.

5.4 Stress

The strong similarity between diphthongs and short vowels in HKE is even more evident when the effect of stress on the vowel realizations is examined. A stressed syllable has a slight disfavoured effect on long vowel shortening while an unstressed syllable almost has a categorical favourable effect on long vowel shortening. Such shortening is arguably due to making up the principal difference between Cantonese and English in isochrony. English is a stress-timed language while Cantonese is a syllable-timed language. Stress is contrastive in English but not in Cantonese. Instead of stressing every syllable as the speakers would do in Cantonese, HKE speakers indicate the stressing of the stressed syllable by high tone placement. This corroborates Wee's (2008) finding that at least one syllable of a legitimate HKE word would be assigned a high or high falling tone, whose differences do not contribute to a meaning contrast in Cantonese, to serve the function of stressing (p. 488). As he puts it precisely and clearly as follows:

Stress can be phonetically manifested as a variation in pitch, an extension in length, or a manifestation in amplitude (loudness). In other words, either of these parameters would suffice to indicate any accentuation in the relevant syllable, and thus the stress does not have a definite manifestation. One cannot claim that all stressed syllables are longer, louder, or higher, but one can claim that if a syllable is longer, louder, or higher, then it is stressed. (p. 488)

This seemingly simple logic is crucial in interpreting the relationship between stressing and the lengthening / shortening of vowels found in the present study. As explained earlier in this chapter, a vowel is lowered and thus its sonority value is increased to accommodate a higher tone by undergoing lengthening. Since HKE speakers realize a stressed syllable by assigning it a higher tone, it is thus not surprising that such is achieved by inhibiting shortening of the long vowels in stressed syllables as well as by promoting shortening of the long vowels in almost every unstressed syllable as seen from the probability output by VARBRUL. For these reasons, stress-timing is enhanced through vowel shortening and lengthening.

Diphthongs demonstrate entirely different behaviour in comparison to long vowels under the influence of stress. A stressed syllable is found to slightly favour diphthong shortening and an unstressed syllable is found to have an almost categorical disfavoured effect on diphthong shortening, which is to the contrary of the behaviour of long vowels. A secondary VARBRUL run was set up to examine the effect of stressing on regular, that is unshortened, diphthongs. An unstressed syllable had a very strong favourable effect on realizations of regular diphthongs at .965. Such unexpected outcome would not have been comprehensible without making reference to stress's effect on short vowel realizations. Stress was found to have insignificant effect on short vowel realizations. This suggests again that HKE diphthongs show stronger similarity to short vowels due to the transfer effect from Cantonese so that diphthongs

are consisted of a short vowel and a semi-vowel. Accordingly, an unstressed syllable does not have a similar favourable effect on shortening of diphthongs as long vowels do. Comparatively speaking, stressing or unstressing of diphthongs and short vowels do not violate Cantonese phonology to an extent as much as unstressing of long vowels since diphthongs and short vowels are intrinsically shorter in duration. Long vowels, however, are inherently long in duration and the longer length hinders a stress-timing if one considers the logic that a syllable which is longer is more likely to be perceived as stressed. Consequently, there is a stark contrast between the effect of an unstressed syllable on long vowels and that on diphthongs.

5.5 Number of syllables

Number of syllables is not a determining factor in vowel length in the present study, as suggested by its insignificant effects on the realizations of long vowels and short vowels. It is only found to have a significant effect on diphthong shortening. A monosyllabic word slightly promotes while a two-syllable word disfavours diphthong shortening. Although the number of tokens of shortened diphthongs in three-syllable, four-syllable and five-syllable words are too few to produce a reliable weight by VARBRUL, the small number and percentage imply that shortening is not promoted. Despite the slight favourable effect of one syllable on diphthong shortening, there is a pattern that shortening is not favoured and regular diphthong occurs much more

frequently. Since the effect of one syllable does not match the emerging patterns seen from the effects of polysyllabic words on diphthong shortening and since the magnitude of favouring is not particularly large, it is considered worthwhile to conduct more research to verify the effect of number of syllables. The insignificant effect of number of syllables has on long vowel and short vowel realizations also suggest that this factor alone may not have a great impact on vowel realizations, although it may have interacted with other factors to produce the model explaining the diphthong shortening.

5.6 Ranking of constraints in HKE phonology

It should now be clear that HKE phonology is an outcome of the interaction of Cantonese phonology and English phonology. Researching into the formation of phonological patterns of vowel productions unveils HKE phonology's ranking of phonotactic constraints as a product of such interaction and demonstrates that HKE phonology is governed by a set of ranked rules internalized in its deeper phonological grammar. It is proposed that phonotactic constraints stemming from Cantonese phonology generally enjoy a higher ranking than phonological rules of English in HKE phonology. Within these Cantonese phonotactic constraints, it appears that Cantonese phonological rules are ranked highest, followed by Cantonese phonotactics' preference for a short vowel in front of an approximant and then "Length Competition" (Hsu,

2005, p. 119), which means long vowels are preferred to short vowels, and finally the compliance with sonority hierarchy is placed a relatively lower ranking.

Such a ranking is suggested in light of the vowel realization patterns. In the first place, the shortening effect of a following nasal on vowels is in accordance with Cantonese phonological rules, regardless of the constraints imposed by English phonological rules. Second, compliance with Cantonese's phonotactics that short vowels instead of long vowels are preferred when they are followed by an approximant is illustrative of the disfavouring effect a following liquid and a following approximant have on short vowel lengthening, despite their high sonority values and the rule of "Length Competition". Finally, violating British English phonological rule which states that vowels preceding a syllable or word-final fortis consonant are shortened (Roach, 2000, p. 50), vowels preceding /s/ and /ʃ θ h/ are lengthened to comply with Cantonese's preference for a larger sonority distance. This is, however, not to convey the message that HKE phonology totally disregards English phonological rules. When Cantonese phonological rules and phonotactics, which are prioritized in governing vowel realizations, are not violated, an interaction of Cantonese phonology and English phonology is evident. For instance, while sonority hierarchy has a lesser effect on the less sonorous sounds such as voiced plosives, English phonological rules are found to have a more noticeable effect on their realizations, as indicated by the disfavouring effect on short vowel lengthening. The presence of such ranking indicates

that similar to all other legitimate languages and their varieties, HKE has an internal phonological system governing the sound productions so that it is predictable and explicable.

5.7 Implications of insignificance of proficiency and speaker

Proficiency is found to be insignificant in affecting vowel length by VARBRUL in the present study. It does not have a significant effect on long vowel and diphthong shortening. Even though it has a significant effect on short vowel lengthening, its effect is shown to be neutral, neither promoting nor hindering it. This may form a strong evidence supporting the legitimacy of HKE on a sociolinguistic basis, in the sense that education may still be important in nurturing the language but the notion of language competence or proficiency may not be entirely relevant to the formation of any of the phonological patterns identified and thus the discussion of HKE phonology. Additionally, the factor of speaker is also not found to be significant in affecting the vowel length. It follows that individual variation among the participants does not seem to have a noticeable impact on the phonological patterns identified in this study. Phonological factors, which include stress, number of syllables, preceding phonological environment and following phonological environment, are the only factors that are found to have impacts on the phonological patterns of HKE by VARBRUL. This demonstrates that HKE has an operating system of phonology in

which variation is indicative of stability rather than a lack of stability, as some researchers such as Stibbard (2004), Chan and Li (2000) and Chan (2006b) argue, for such variation is predictable and explicable by phonological factors, and is governed by an internal grammar which may not be susceptible to social factors such as proficiency, gender and instruction outside mainstream school, which some participants reported receiving. However, it is still desirable to conduct more studies investigating the effects of these two social factors with a larger number of participants involved. The phonological patterns which are independent of any native varieties identified in this study also do not lend weight to Luke and Richards' (1982) claims that HKE has little basis for indigenization.

Although the results presented in this study are not intended to be comprehensive by focusing on vowels and the criteria of selection of participants might not have addressed the importance of other social factors such as age and socioeconomic class, the present study has two-fold significance in research agenda investigating New Englishes. In the first place, HKE has been shown to have a systematic and stable phonological system which is well-governed by a set of rules and constraints, as discussed in this chapter. Secondly, at least from the perspective of phonology, it shows that HKE is a variety of English in its own right, which has evolved as an outcome of interaction of Cantonese and English phonologies. For this reason, it is neither solely generated from Cantonese nor the native varieties of English. This is

most evident when neither English phonology nor Cantonese phonology alone can explain the phonological patterns identified in this chapter. Only when researchers delve into the languages from which the new variety of English stem can we unveil the underlying patterns. If native varieties continue to serve as a yardstick against which the new varieties are compared, we may risk overlooking many important patterns and reach the seemingly “foregone conclusion” that non-native varieties are unstable as an outcome of a lack of acquisition while in fact underlying patterns are obscured by item-to-item comparison with the native varieties. This study further strengthens Mohanan (1992) and sociolinguists such as Kachru’s (1983, 1986) stance that non-native varieties are stable structural and socio-cultural systems which are independent of the native varieties, and that data internal to the variety have to be studied to uncover its patterns. With reference to the Dynamic Model proposed by Schneider (2007), it is speculated that Hong Kong English may be undergoing Phase 3 “nativization” from the perspective of phonology. The findings of this research show that HKE has its own phonological patterning which stems from the interaction of both phonologies of Cantonese and English. In other words, the phonological system of HKE is nativized by its speakers as seen from the considerable transfer effect from the L1. However, HKE has to be studied with regard to other linguistic levels such as its syntax before we can confidently reach a concrete conclusion.

IMPLICATIONS, LIMITATIONS, DIRECTIONS OF FUTURE RESEARCH

AND CONCLUSION

The preceding chapters have shown that HKE has a systematic underlying phonology as indicated by the patterns of vowel lengthening and shortening. The vowel realizations conform to phonological rules that are unique to HKE, which stem from an interaction of Cantonese phonology and English phonology. Its phonology develops from such interaction to have its own system so that it is neither solely generated from Cantonese phonology nor English phonology. The preceding chapters have also demonstrated that HKE, similar to all other legitimate languages and their varieties, possesses a ranking of phonological constraints in its phonology which governs vowel realizations. For these reasons, at least with respect to phonology, HKE is a new variety in its own right, which is not secondary to any language and to any native varieties in the inner circle.

6.1 Implications

Based on the findings, the implications of the present study are two-fold. First, this study informs the research agenda of investigations into new Englishes in the sense that it shows how analysing data internal to the new varieties unveils underlying patterns which would have otherwise been obscured by comparisons with native varieties. Additionally, it suggests how VARBRUL may serve as a useful tool in

delving into the phonologies of World Englishes. Second, future directions of curricular design for English language teaching may draw on the findings of this study. The results of this study also have cultural implications as to balancing between the capacity for global communication and the nurture of a local English culture which develops in line with other Hong Kong local cultures.

6.1.1 Future investigations into New Englishes

Naturalistic conversation data were examined without any attempt to making comparison with the native varieties in the inner circle in this study. Durations of vowels of HKE were not compared against those of native varieties; the lengths were instead determined by comparing HKE's vowel realizations against each other. Such an approach is based on the argument (Kachru, 1983, 1986; Mohanan, 1992) that new varieties may have internalized a set of rules that are independent of the native varieties of English. This study has demonstrated that if the vowel lengths of HKE are compared against those of native varieties, as have been done by many researchers investigating HKE phonology (for example, Bolton & Kwok, 1990; Chan & Li, 2000; Stibbard, 2004), one may reach the conclusion that HKE's vowel realizations demonstrate a lack of stability as indicated by the unsystematic lengthening and shortening. Even if HKE is investigated in its own right but vowel durations are examined, whether acoustically or perceptually, in isolation without making any

reference to phonological factors such as phonological environment (for example, Deterding et al., 2008; Hung, 2000), one may be misled to conclude that vowel length contrasts are neutralized. The phonological patterns identified in this study only became clear when interaction of English phonology and Cantonese phonology was examined in depth. For this reason, phonologies of new varieties have to be treated as internalized systems and any attempt to compare them with any other varieties may prove misleading. Additionally, the findings of the present study have an implication that simply arguing the absence of a sociolinguistic basis for the development of HKE as a new variety and ignoring the phonological patterns found from its speakers does not contribute to a better understanding of the linguistic reality.

In terms of methodology, VARBRUL may serve as a useful tool in studying the phonologies of New Englishes. Some researchers investigating HKE phonology employ and report percentage or frequency count of a particular pronunciation feature's occurrence for analysis (for example, Deterding et al., 2008; Chan, 2006a, 2006b). However, these descriptive analyses do not provide statistics on how different linguistic and social factors may interact with each other to give the language outcomes and also their relative significance. Concrete evidence on the insignificance of social factors to the production of the participants in the present study would not have been possible without the use of VARBRUL. Additionally, the use of VARBRUL may also promote comparisons across studies, especially with regard to the weightings

of different factors when production of participants with different background is scrutinized. Hence, it is suggested to incorporate the use of VARBRUL in the line of research into new Englishes.

6.1.2 Language planning

One may ponder if it is true that language proficiency is irrelevant to the discussion of HKE, there is no reason for the parents to send their children to schools and more importantly, it is useless to administer any examinations evaluating learners' language proficiency. This is, however, not true when one recognizes the reality of how HKE speakers acquire the variety. Admittedly, much language use is in Cantonese and English may not be used in a wide range of settings in the society. However, it is also true that a large proportion of Hong Kong's population acquires English in school and a proportion of them reach a very high proficiency. Similar to the participants of this study, they have never received any education in an English-speaking country and yet they speak high standard and intelligible English. Classroom settings arguably serve similar functions as other social settings as the local English teachers also speak HKE with their students. It may sound anomalous but it is exactly through such interactions that the variety is transmitted from one generation to the next. Schools are small communities where HKE is spoken, as seen from the unconscious acquisition of these phonological patterns by the participants, who are secondary seven students in a

local CMI school, in this study. This is confirmed by Wee (2008) who demonstrated that the phonological patterns of a new variety are generated by rules of a mental grammar and their rankings and hence they “reflect a deeper mental organization of language” (p. 496). Accordingly, the phonological patterns of vowel shortening and lengthening, the factors motivating them, and the ranking of rules identified in the preceding chapters also reflect the participants’ deeper phonological mental grammar. For this reason, any attempt to help students get rid of an identifiable accent and acquire a native-like accent may remain futile. As Wee (2008) puts it, “the teaching of language must take into consideration the factors that contribute to the construction of such a mental grammar...[which] is dependent on linguistic exposure” (p. 496).

Having said this, does it mean that Hong Kong education system should from now on never employ local English teachers but only native English teachers (NETs) to teach the students? Or does it mean that we should not employ NETs as Hong Kong students cannot get rid of an accent regardless of any effort? The answers are no. Instead, it is desirable to strike a balance between intelligibility and preservation of identity as expressed through accent. In fact, there is huge room for HKE’s development in this direction. As demonstrated in chapter two, RP and GA, which generally serve as models to follow in schools, are not necessarily the most intelligible varieties (Deterding, 2005; Deterding & Kirkpatrick, 2006; Smith & Bisazza, 1982; Smith & Rafiqzad, 1979). As Jenkins (2000) also argues, developing new varieties

which may diverge from norms established by native varieties while maintaining intelligibility should be the most viable solution. Considering the phonological patterns of vowel shortening and lengthening identified in this study, one may argue that undergoing shortening / lengthening will potentially endanger phonemic length contrasts and risk comprehensibility (Gordon, 2002, p. 73). However, such an argument may have stemmed from a misconception that vowel duration is a rigid and definable phonemic property. Vowels contrasting in length are merely relatively longer or shorter in comparison to each other as they vary to a great extent depending on the phonological rules which govern their realizations (Roach, 2004, p. 15). It is found that, based on acoustic findings, the long allophones of short vowels (i.e. lengthened short vowels) are longer than the short allophones of long vowels (i.e. shortened long vowels) (Giegerich, 1992, p. 234). In other words, even in the norms of native varieties, there are four ranges of durations of vowels. HKE also has such fine distinction of vowel length and there is, therefore, no reason that intelligibility would be jeopardized.

For these reasons, local English teachers help preserve transmission of the variety from generation to generation and nurture cultural development of HKE under the influence of Hong Kong local culture. Local English teachers can serve as classroom models for the learners. On the other hand, it is still desirable to have NETs in Hong Kong's education system as HKE is inherently originated from a bicultural or even a multicultural society due to the influence of its colonial history, media and pop culture.

It is for this reason that HKE was found to be highly intelligible in an international context to people who may not be familiar with the features of the variety, and HKE speakers were even found to be more intelligible than their Singapore English counterparts (Kirkpatrick, Deterding & Wong, 2008, p. 364-365). Understanding how HKE has come to the way it is now helps us make decisions of how to develop the variety while maintaining intelligibility.

6.2 Limitations of the present study

Since almost every piece of research into HKE (for example, Deterding et al., 2008; Hung, 2000; Stibbard, 2004) was based on data collected from university students, there was a need to recruit non-university students to probe into the issue to enhance generalizability. Although recruiting secondary school students addresses this need for participants with mixed English proficiency and probably mixed abilities as some would be admitted to university, some would be admitted to other tertiary education and some would join the workforce after their graduation, the participants were of similar age and were all students by the time the data were collected. Consequently, the effects of social factors such as age and socioeconomic class on vowel realizations could not be determined, although proficiency and individual variation among the speakers were found to be insignificant.

Although the previous chapter argues that individual variation manifested by the

speakers and their proficiency may not be relevant to the phonology of HKE but one may argue that the present study only recruited students from one single secondary school. The insignificance of social factors to the production of HKE should at best be interpreted as possibly be confined to the group of participants of this study. The findings of this study may not be generalizable to the whole population of Hong Kong English speakers. More studies may be conducted for comparison, as it is desirable to examine whether different school settings may contribute to different weightings of the phonological and social factors and thus yield different models.

Additionally, despite the use of the terms “long vowels”, “diphthongs” and “short vowels” throughout this paper for simplicity, not all long vowels, diphthongs and short vowels present in HKE inventory were studied. The selection of vowels examined in the present study was based on findings of previous studies as well as results of pilot studies. There is need for a more comprehensive study investigating the whole vowel inventory to be undertaken to have a more solid conclusion of the phonological patterns.

Finally, this study mainly focused on the realization of length contrasts of vowels, which is probably one of the key issues that has attracted most disagreements among researchers investigating HKE (for example, Bolton & Kwok, 1990; Chan & Li, 2000; Deterding et al., 2008; Hung, 2000; Stibbard, 2004). Dismissing the evidence of a lack of systematicity and stability of HKE from a lack of contrast in vowel duration may

not entail evidence of stability of HKE, as this would demand more research into the realizations of all vowels and consonants present in HKE inventory. However, this study is crucial in showing that HKE has to be studied with respect to phonological factors such as phonological environment to unveil its systematicity and in its own right.

6.3 Directions of future research

The phonological patterns of vowel shortening and lengthening established in the present study obviously demands more investigation. For instance, this study's analysis was based on naturalistic data collected from conversation between each of the participants and the researcher, who is also a Hong Konger. Such methodology at least raises two questions. Are the same patterns found when the words are pronounced in isolation or in a careful style of speech? Will different patterns appear when the conversation partner is a non-local, for the participants may be more conscious of their pronunciation and they may intentionally align it to the norms and standards established in the inner circle? Moreover, since the study only examined /i:/, /ɪ/, /u:/, /ʊ/, /ɔ:/, /ɒ/, /eɪ/, /aɪ/ and /aʊ/, can the shortening and lengthening patterns identified be generalized to other vowels of HKE? Additionally, since the pool of participant did not include speakers of different socioeconomic classes and from different ranges of age, it raises the question of how well do these patterns apply to different groups of speakers

by social factors. It is thus desirable to have a finer distinction between social groups and study their effects on the vowel realizations. Finally, the findings may be verified with the aid of acoustic measurements, although it is arguably not the most appropriate way to study vowel lengths in connected speech.

More broadly speaking, it should now be evident that more research has to be undertaken to examine the underlying phonological patterns and thus phonological rules of HKE by studying how they are governed by the abstract rules and their rankings in the phonological grammar of HKE. It is, however, necessary to study these internalized phonological grammar by analysing data internal to the variety but not by comparing the variety against the native ones as such an approach will inevitably veil the underlying patterns. Analysing HKE as a new variety in its own right, there is need for more research to examine all the phonological patterns of realizations of the whole inventory of consonants and vowels. After phonological rules of HKE have been established, the next step will be to identify which of the realizations that are in accordance with these rules are phonemes and which are their allophones. Finally, it is also important to undertake more research into the international intelligibility of HKE outside Hong Kong, especially to people who have no knowledge of the variety's features.

6.4 Conclusion

This thesis set out to examine the need for legitimizing non-native varieties on a phonological basis and the theoretical approaches adopted to outline these varieties' productions. By taking the approach of viewing Hong Kong English as a variety in its own right, data internal to the variety were studied by comparing the durations of the phonetic realizations of /i:/, /ɪ/, /u:/, /ʊ/, /ɔ:/, /ɒ/, /eɪ/, /aɪ/ and /aʊ/ among themselves rather than with those of native varieties. This study has contributed to resolve the disagreements among researchers about the vowel durations of HKE, by showing that their variations are generated and governed by a set of phonological rules and their rankings in the phonology of HKE. Accordingly, the previous studies which have not studied the productions with respect to the phonological factors obscured the underlying systematicity. The findings also confirm that HKE has phonology in its own right for two reasons. First, these rules develop from an interwoven interaction between English and Cantonese phonologies, to an extent that it is neither solely generated from either English or Cantonese. Second, these rules and their rankings are predictable and explicable with reference to phonological factors, and they are not reliant on the participants' English proficiency. This study thus concludes that HKE has a systematic and stable phonological system in its own right.

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Appendix 1 Questionnaire of personal information

Thank you very much for your help in this research! Please be reassured that your identity will not be disclosed at any stage of the research and in any part of the thesis.

- 1) Name:
- 2) Age:
- 3) Nationality:
- 4) Place of Birth:
- 5) Have you ever stayed in an English-speaking country? If yes, for how long?
- 6) Have you ever lived in an English-speaking country? If yes, for how long?
- 7) Have you ever studied in an English-speaking country? If yes, for how long?
- 8) Are you studying in a CMI (Chinese medium of instruction) or an EMI (English medium of instruction) school?
- 9) What is your first language (mother tongue)?
- 10) What other languages do you speak other than Cantonese and English?
- 11) You speak English as a L1 (the first language) / L2 (the second language) / L3 (the third language) / L4 (the fourth language) / others
- 12) When did you start learning English?
- 13) How many years have you been studying English?
- 14) Have you ever received any instructions of English outside your school (e.g. in private tutorials) in the past?
- 15) Are you currently receiving any instructions of English outside your school (e.g. in private tutorials)?
- 16) Would you mind telling me your grade in English in HKCEE?
- 17) Would you mind if I contact you later for research purposes? If you don't mind, could you please give me your phone number?

Appendix 2 Conversational interview prompting questions

- 1) Could you please introduce yourself a bit? You could tell me your name, your characters, your hobbies etc.
- 2) Do you have any opportunity to use English outside classroom?
- 3) Have you ever talked to a native speaker of English? If yes, how was that experience?
- 4) How do you feel when you have to speak English publicly, e.g. in front of the whole class?
- 5) How do you practice English in free time?
- 6) What would you like to do after you graduate from the secondary school? Why?
- 7) What kind of lifestyle would you like to have when you grow up and become independent?

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