Consonants in Cantonese

Loanword Adaptation

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5/12/2006

Submitted in partial fulfillment of the requirements for the
honors BA in linguistics at the University of Chicago

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1   Introduction

This paper presents a study of Cantonese loanwords of English origin. Using a database of Cantonese loanwords and their English origin, we will compare the phonological makeup of the Cantonese words and make generalizations about the adaptation process. We will also compare the generalizations made from this database to the Cantonese loanword literature; in fact, our generalizations greatly depart from the standard understanding of Cantonese loanword phonology. This paper is mostly a descriptive account of Cantonese loanwords, laying the groundwork for more theoretical work in the future.

The term *loanword* has a number of meanings, and one of the goals of this paper is to more clearly define the term. In particular, we need to make the distinction between (a) Cantonese words of foreign origin, (b) adaptation of English words by Cantonese speakers, both phonetic and phonological, and (c) a particular variety of English known as Hong Kong English (HKE). These three distinctions form a kind of continuum, with foreign origin words being decidedly loanwords and HKE being decidedly not loanwords. Likewise, loanwords are a part of the Cantonese grammar, in some form or another, while the traits of HKE are not a part of Cantonese grammar. The present paper concerns the ambiguous middle area of adaptation in (b)—words and phrases that are not established members of the Cantonese lexicon, yet clearly exhibit most of the constraints of the grammar of Cantonese.

2   Introduction to Cantonese Phonology

Cantonese Chinese is a language variety spoken in the Special Autonomous Regions of Hong Kong and Macau, where it is the official language, and in Southern China and various diaspora communities throughout the world. There are approximately 66 million speakers of the language. (Wikipedia) Cantonese is related to many other language varieties in China that go under the name *Chinese* or *Chinese dialects*, the most prominent of which is Mandarin.

We'll now take a look at the vowel, consonant, and tone inventory of Cantonese. The phonemes are given in IPA alongside a particular system of Romanization, known as Jyutping, used by the Linguistic Society of Hong Kong. The rest of the paper will use Jyutping Romanization.

In terms of vowels, Cantonese has 11 monophthongs, 7 of which ([i, y, ɛ, œ, a, ɔ, u], represented in Jyutping as *i, yu, e, oe, aa, o, u*, respectively) occur in both open and closed syllables. These vowels are long in open syllables and short in closed syllables. The remaining 4 monophthongs ([ɪ, ɵ, ɐ, ʊ], Jyutping *i, eo, a, u*) are extra-short and occur only in closed syllables. (Zee 1999) There are also a number of diphthongs in the language. As the Jyutping equivalents might suggest, there is some reason to believe the [i]–[ɪ] and [u]–[ʊ] distinctions are allophonic. Namely, [ɪ] and [ʊ] occur before velars [k] and [ŋ],

Cantonese has six tones. In Jyutping they are assigned the numbers 1–6, and their tone contours are, from tone 1 to tone 6: 55, 35, 33, 21, 13, 22.

There is a four-way place distinction for stops—bilabial, alveolar, velar, and labial-velar. There is also an alveolar affricate. The stops and affricates have an aspiration distinction, which is represented in Jyutping as a voicing distinction. This gives us Jyutping *p, b, t, d, k, g, kw, gw, c, z*, where in IPA we would categorize these sounds as [p^h, p, t^h, t, k^h, g, k^{wh}, k^w, ts^h, ts]. Cantonese has three nasals [m, n, ŋ], in Jyutping *m, n, ng*. There are also the fricatives *f, s, h* and the approximants *j, w, l*, all of which are the same for IPA and Jyutping. All of the consonants in the phoneme inventory can be onsets, but only the nasals and stops can be coda consonants (except for the labial-velar stops). Coda stops are unaspirated and unreleased, [p˺, t˺, k˺], and are written in Jyutping as *p, t, k*.

3   Introduction to the Database

The source material for the database is a Chinese Almanac from mid-twentieth century Hong Kong. While the book deals mostly with Chinese astrology, there is also a section on learning English. This nine page section consists of everyday English words and phrases, alongside their Chinese translations and pronunciation guides, given in Cantonese Chinese characters. Because we know the pronunciation of each of the characters, in effect we have a small Cantonese-English dictionary with non-standard pronunciation guides. Figure (1) shows an example entry for *daughter*.

(1)   Chinese translation → ← English word

← Cantonese pron.
do˧˥taa˥

This book was manually encoded to a computer-readable format. Each token from the dictionary was then broken up into the different Cantonese syllables, with the corresponding English phonological information. There are 465 phrase tokens in the database, which correspond to 1,263 Cantonese syllables. The English pronunciation of each word is taken from the Oxford English Dictionary, and represents Received Pronunciation British English as closely as possible. English pronunciation is given in IPA; Cantonese pronunciation is given in the Jyutping Romanization developed by the Linguistic Society of Hong Kong (LSHK). An example for the token 'daughter' is given below.

(2)

English word	word pron.	Cantonese character	Cantonese σ pron.	corresponding English pron.		
daughter	ˈdɔ.tə	朵	do2	dɔ	stressed	phrase initial
daughter	ˈdɔ.tə	他	taa1	tə	post tonic	phrase final

Unfortunately, most of the data had to be hand-coded. The printing was not of high enough quality or regularity to allow the use of optical character recognition (OCR) software. OCR works best for printed Latin characters in simple linear order—as can be seen from the example scan above, our text does not qualify as a best-case scenario for OCR. The use of relatively non-standard characters for the Cantonese pronunciation also creates a difficult case for OCR. Thus, the information from the text had to be copied by

hand. Furthermore, the most difficult task was to connect the phonological information of the Cantonese syllables with the corresponding English phonological segments. While many cases are relatively straightforward (see 'daughter'), some are perplexing (as in 'yards' /jɑdz/, which is nativized as 丫戛 aa1aat3), and in any case, this type of task is very difficult to automate with a computer program, as it requires a great deal of linguistic intuition.

This hand-coded information was bulk-loaded into a relational database running the MySQL Database Management System. In order to view and search the database, we used a custom PHP web-based front-end. With this system, we were able to analyze the patterns of the data using regular expressions, exploring the connections between Cantonese pronunciations and the corresponding British English pronunciations. The database is freely accessible on the Internet at clml.uchicago.edu/test/cantonese/ — the ease of accessibility will hopefully facilitate research by other linguists beyond the scope of this paper.

We assume that this section of the Chinese Almanac was written by a single individual, and that it represents this person's opinion of what English words sound like when he speaks them in Cantonese. This situation can be viewed as both beneficial and detrimental for different reasons. In terms of the actual object of study, we are not directly focusing on the language of a community—we're looking at the language of an individual at a particular moment of time (we can safely assume it wouldn't take more than a few days to write the section), so we don't have to worry about variability between different individuals or variability in time. Even so, it is possible that generalizations about the author's language can be extended, in some degree, to the language of other Cantonese speakers in general. This database also gives us a more objective stance to test our hypotheses. In a laboratory or interview setting, it is possible that what we are studying is not what we think we're studying. In this particular case, there is some question as to the distinction between words of foreign origin, adaptations made on the spot, and speaking with an accent or a different variety of English. Whatever the author of our text was doing, we can assume that he was doing it relatively consistently, which helps prevent the need to control for this distinction.

On the other hand, the use of a database of this sort has its share of disadvantages. We don't have reliable phonetic data available—we only have a broad transcription of the author's speech, by way of Cantonese characters. The use of these characters conflates a number of issues. When the author chose a character to represent a syllable of speech, he did so with multiple constraints. The largest constraint is the Cantonese language as he speaks it—as with any language, the author would not pronounce a syllable that is completely disallowed in any register or lexical stratum of Cantonese. But there is also an orthographic constraint at work here, one that is specific to this situation. By using single characters to represent single syllables, the only syllables that can be written down are those that have corresponding morphemes in Cantonese. This is in comparison to some Chinese dictionaries, which will use multiple characters as a pronunciation guide to a syllable—for instance, one character can have the correct onset, and the other character can have the correct rime, and so combining the features of both characters can result in a novel syllable in the language. Unfortunately, our text uses a more simplified system which is susceptible to lexical/orthographic gaps. Because the orthography is based on the lexicon of morphemes, this means a lexical gap could result

3

in a particular syllable being chosen over another one, even if the lexical gap syllable is a perfectly valid Cantonese syllable, phonologically speaking.

4   Patterns That Emerge From the Database

In this section, we will be taking a look at the various patterns (or lack thereof) that emerge from a survey of the database. We'll compare these patterns to analyses from previous work on Cantonese loanword phonology. In particular, we'll see how our findings compare to those of Silverman (1992) and Yip (2002) in their analysis of Cantonese loanwords, as well as how they compare to Hung (2000)'s description of Hong Kong English.

Stress to Tone Mappings:

Silverman (1992), citing Cheung (1986), presents an account of stress-to-tone mapping for Cantonese loanwords. According to this account, monosyllabic words will be assigned a high tone, because the monosyllable receives primary stress in English, and therefore has high relative pitch in English. For disyllabic forms with final stress, the first syllable will have a medium tone, while the final syllable will get the high tone, due to the English stress. Epenthesized vowels will receive low tone.

Our data does not completely corroborate this story. Of the 64 monosyllabic Cantonese phrases in our database, 39 did indeed have high tone (first tone, with a contour of 55). The rest of the monosyllables had a number of different tones. These different values can be seen in the table below.

(3)

Tone	# of tokens	Tone contour	Eng. example	Cantonese	1st tone version in lex?
1	39	55	one	wan1	(yes)
2	1	35	ham	ham2	yes
3	8	33	eat	jit3	no
4	8	21	pound	pong4	yes
5	2	13	land	laang5	no (but lang1 is in lex)
6	5	22	dog	dok6	no

This does not invalidate the observations made by Cheung and Silverman. A full 60% of the monosyllables have high tone, so it cannot simply be an accident of the loanword lexicon. Furthermore, it is important to remember that our database is from a written source—the author might have chosen to sacrifice tone quality because no single character represented the desired syllable with the correct first tone. This is a testable hypothesis—by searching a database of Cantonese words, we can see if there are words with the same segmental information but with first tone. For instance, there are a number of Cantonese words (and Cantonese characters) for the syllable *ham1*. There is no *jit1* or *dok1* in Cantonese, however. The table below shows the various non-first-tone monosyllabic words. Interestingly, 46% of the words have no first-tone equivalent, while 54% do.

(4)

word	has 1st ver?	word	has 1st ver?	word	has 1st ver?	word	has 1st ver?
ham2	yes	paak3	yes	wan4	yes	nou5	

jit3		kut3		man4	yes	dok6	
ai3	yes	put3		lin4		nim6	yes
hei3	yes	pong4	yes	mun4	yes	jip6	
fok3		wong4	yes	pin4	yes	wik6	
lyut3		lo4	yes	laang5		hap6	yes

Now let's take a look at epenthetic vowels. Some words pattern just like Cheung describes. For instance, *wife* is nativized in the database as wai1fu6, with a high tone for the first syllable (non-epenthetic), and a low tone for the second (epenthetic) syllable. However, not all words work this way. The Cantonese loanword for *pence* has a low tone for both syllables—bin6si6, and *ounce* has a high tone for both syllables—on1si1. In terms of onset clusters, we have *stick* si6dik1, with a low epenthesized vowel like Cheung would expect, but we also have *bread* bou3lat1, with a medium tone on the epenthesized vowel, and *dry* dou1laai1, with a high tone on the epenthesized vowel.

Obstruent-liquid onset clusters and the lack of bi-syllabicity effects:

When an English word contains an obstruent-liquid onset cluster, both the obstruent and the liquid are represented in the Cantonese loanword. The obstruent is usually the same as the English version, sometimes with a change in aspiration, and the liquid is always an [l]. The only exceptions to this are *private car* laa1wai1kaa2, which fails to represent the English /p/, and *clock* fu1lok3, where the English /k/ corresponds to a fricative [f]. The English cluster is not a cluster in the Cantonese loanwords—an epenthesized vowel goes between the two consonants. The choice of epenthesized vowel quality and tone is extremely varied. Low vowels, mid vowels, and high vowels can be found, as both diphthongs and monophthongs, and all the tones besides fifth tone (tone contour 13) are utilized. Sometimes the epenthesized syllables have coda consonants (e.g. *cloth* kuk1lou6si6), but most of the time they are open.

(5)

Tone	Example	Example	Vowel	Example	Example
1	angry	jing1gei1lei6	aa	ground nut	kaa2long4noi6nik6
2	clinic	gu2lin4nik1	ei	ice cream	ai2si6gei6lim4
3	bread	bou3lat1	eoi	street	si6deoi1lyut3
4	afraid	aa3fu4lai4	i	sleep	si6luk6pou2
6	black tea	bou6lik6tik1	ou	one drop	wan1dou1lap6
			u	flower	fu1lou6waa5

Vowel epenthesis is a common strategy for loanwords, but vowel epenthesis as a near-universal strategy is not what we expected after reading the literature. Silverman (1992) has an interesting analysis on the effect of word length on obstruent-liquid clusters. In this analysis, a vowel is epenthesized (and the liquid is salvaged) if the resulting form will be bi-syllabic; otherwise, the liquid is dropped. For instance, Silverman presents the minimal pair *print* [pilin] and *printer* [pɛnta]. The bi-syllabicity effect causes the *print* to have an epenthesized vowel (and retain the liquid), while *printer* will drop the liquid to remain bi-syllabic. Yip (2002) also presents an analysis based on data similar to Silverman's—the bi-syllabicity effect is responsible for the differences

between *plum* [powlɐm] and *freezer* [fiːsaː]. Like the generalizations of stress-to-tone mapping, our loanword database does not support the generalizations of bi-syllabicity made in the Cantonese loanword literature. The one instance of liquid dropping, *private car*, is minimally a tri-syllabic phrase, so it would be odd if bi-syllabicity were the reason for this effect. Moreover, the obstruent is the segment to drop, while according to Silverman and Yip we would expect the liquid to drop, in analogy to *freezer*. Again, this is not to say that their analysis is wrong or faulty—it is clear that the loanwords that we have recorded in our database are distinct from the loanwords that they have studied.

Liquids in codas:

Now that we have examined onset clusters of obstruents and liquids, we will take a look at the opposite situation—liquids followed by obstruents in coda position. This situation will be limited to the lateral approximant /l/, because the alveolar approximant [ɹ] does not occur in coda position in British English, Hong Kong English, or in Cantonese. What would be a coda [ɹ] in American English or some other rhotic dialects does not appear in our database. That is to say, there is no adaptation of coda /r/ into any other liquid or vowel sound, and this is to be expected given the influence of British English and HKE.

For the /l/ + obstruent situation, every possible adaptation is represented in the database. The simplest case—deleting both coda consonants—is found in the word *salt* so1. Sometimes, the *l* drops out, leaving the obstruent as a coda, as in *whelk* wik6, or as the onset of an epenthesized syllable, as in *ten taelz* din1dei6si1. Other times, the obstruent drops out, with *l* attaching to the epenthesized final ou6, as in *cold* gou3lou6. Finally, a Cantonese loanword can keep both of the English coda consonants, using multiple instances of epenthesis, such as *twelve* to1lou6fu4. Of the ten cases of /l/ + obstruent codas, one token drops both, four tokens drop the obstruent, three drop the *l*, and two drop neither.

There are also 34 tokens where the lateral occurs alone in coda position. For this situation, there are two possible adaptations—drop the *l* or epenthesize a vowel. Interestingly, exactly half of the tokens (17) choose the former adaptation (e.g. *hospital* ho2si6bit1dou6), and the other half of the tokens choose the latter (e.g. *pencil* pin4si6lou6). There are a number of general patterns. It seems that phrase-final stop+əl sequences tend to use deletion. Examples include *uncle* ang1guk1, *bicycle* bai6si6gu2, *bottle* but3tou3, and *cable* kei4bou3 (the single counter-example is *pineapple* paai4aa3bou2lou6). On the other hand, stressed V+l sequences tend to use epenthesis, as in *small* si6maa1laa3, *coal* gou3lou6, or *soldier* sou1lau6zaa3. [why is there this difference]

The back vowels (Jyutping u, o, and ou) also play a very significant role in the adaptation process. With the exception of *small* and *soldier* (shown above), all epenthesized syllables are of the form lou6 (or occasionally lou3). Moreover, even when the *l* is deleted, the vowel before the deleted *l* is almost always a back vowel, and usually is *o* or *ou* (the one exception is *ovaltine* o1waa4tin4). In British English (and many other Englishes) a lateral in coda position is pronounced as a 'dark *l*', a velarized lateral approximant. In Hong Kong English, according to Hung (2000), coda /l/ is realized as a

velar [w] when it precedes a non-back vowel, and is deleted otherwise. Hung gives *feel* [fiw] and *cool* [ku] as examples of this distinction.

The Cantonese loanwords of our database exhibit vocalization of the *l*, but in a different way from HKE. In HKE, the lateral is vocalized as a glide, and this vocalization is conditioned by the preceding vowel. In our database, the vocalization determines the entire vowel-quality of the preceding or following syllable, and sometimes the vocalization will appear alongside the lateral. That is to say, with the epenthesized lou6, the lateral remains, and the epenthesized vowel is like a vocalization of that lateral, as in the HKE [w]. When there is deletion, the preceding vowel takes on the characteristics of the lateral, much like the HKE addition of [w] to the preceding syllable.

In terms of phonetics, the reason for *l* vocalizing to a [w] (in HKE) or [ɔ], [u], and [ow] (in our database) might relate to perception. Ladefoged gives the formants for laterals to be in the neighborhood of 250, 1200, and 2400 Hz. Back vowels have formant patterns similar to those of laterals, and so it's not outlandish for the laterals to adapt in such a way.

Closed syllables in Cantonese:

As mentioned above, the only allowable coda consonants in Cantonese are *m, n, ng, p, t, k*, where stops are unreleased. As might be expected, we find these coda consonants in various loanwords in our database. The reason for these coda consonants ranges from the obvious to extremely puzzling.

Some coda consonants in Cantonese are taken directly from coda consonants in English. Examples include *son* san1, *stick* si6dik1, and *no good* nou5kut3. Notice that the voiced and voiceless English coda stops correspond to a single voicing in Cantonese (unreleased), as there is no voicing distinction for codas in Cantonese.

Other coda consonants are adaptations. For instance, a fricative might strengthen to a stop, as in *give* gip3. Some coda consonants look like they might be metathesis, like the metathesis of *s* and *t* in *artist* aa1bit3si6.

The most interesting case is when an English consonant is made a geminate. Most varieties of English do not have geminate consonants (except possibly between word boundaries), yet many Cantonese loanwords will have coda consonant-onset consonant sequences of the same value. For instance, the English *butter* is nativized as but6tyut3, or *rabbit* as lap1bit1. This is not just an orthographic effect, because there are also examples like *president* paa3lei5sit3doen6 and *Saturday* saat3to1de1, where the English is not spelled with double-letters.

It's important to point out certain constraints on Cantonese syllables. In particular, there is a constraint that does not let the short *a* vowel occur in an open syllable. So, for a word like *return*, a coda consonant might be required if the first vowel has to be an *a*. In this case, a consonant does occur in the coda, but that consonant is a *p*: lap6tan1. If all that was needed was any coda consonant, a geminate *t* would seem to be the more natural choice. Reasoning along these lines is further complicated by the constraints of tone and lexical inventory. The only lexical item with the segments *lat* has the first tone, so if the sixth tone is necessary for *return*, other coda consonants might be the only option. This is all speculative because any generalizations of stress-to-tone mappings in this database are tendencies at best, as we have already discussed.

For a large number of the cases, there doesn't seem to be any pattern or reason for the coda consonants to exist—for example, *please* pou2lap6si1 or *dark* daat6gei6.

Plain onsets—stops and aspiration:
We will now take a look at plain onset stops in Cantonese. For this purpose, we took an inventory of English aspirated and unaspirated stops and how they correspond to their Cantonese counterparts in loanwords. We only looked at stops in onset position, and only those stops that were unambiguously the sole onset consonant—for instance, 'candy' would have a plain onset *d*, because *n* makes a good coda in Cantonese, and *nd* is a bad onset cluster in both English and Cantonese. The table below shows the various English onset stops and the segments they correspond to in Cantonese. Note that although we are using the term aspiration, which is more phonetically accurate when discussing stops in English and Cantonese, we are still using the symbols for voiced and voiceless stops. This is for ease of use, because typical transcriptions of English use the symbols *p t k b d g*, and the Jyutping system of Cantonese Romanization also uses these same symbols.

(6)

English C	Aspirated C	Unasp. C	Other	Examples	
p	25	3	g	take supper:	toei1sat1got3
t	46	12	s	artist:	aa1bit3si6
			b	want to buy:	wong4si1bei1
k	25	26	c	captain:	cau4pou2deon6
			h	cup:	hap6
b	1	39	Ø	automobile:	aa3tou3mo4
d	1	27			
g	3	21			

From the table we can see that there is an interesting asymmetry between aspirated and unaspirated stops. The unaspirated stops, with six exceptions, remain unaspirated (and one of those exceptions is from syllable deletion). The aspirated stops, on the other hand, seem to be more likely to lose their aspiration. There is also a gradation in terms of place of articulation for aspirated stops—/p/ has a few unaspirated tokens in Cantonese, /t/ has a few more, and /k/ has half of its tokens unaspirated.

It would be difficult to formalize this in standard Optimality Theory, as the asymmetry expressed is not absolute—it's only a tendency. [aspiration a marked feature, more likely to drop than to be added… Where can I go from there?]

Fricatives and affricates:
Some of the English fricatives correspond almost exactly to a Cantonese counterpart. For instance, English onset /f/, /s/, and /h/ always correspond to Cantonese [f], [s], and [h], respectively. Other English fricatives exhibit more complex patterns of correspondence, and those will be discussed below. The English /v/ presents a particularly interesting problem, to which we devote its own subsection.

The interdental fricatives /θ/ and /ð/ show a great deal of variation in our database. The voiced /ð/ corresponds to [s], as in *father*, or [d] as in *mother* maa1daa2 (it also takes a [d] in *brother* and *leather*). The voiceless counterpart /θ/ corresponds to [f], [s], [d], and

[w]—examples include *three* fu1lei5, *think* sin1gei6, *one thousand* wan1dau6san4, and *thanks* waan2kei4si6.

The English phoneme /z/ usually corresponds to Cantonese [s], like *dozen* daa2san4, but it can also correspond to [f] (only in *water closet* wo1daa1gei1lou5fu4) or, surprisingly, [b] (only in *residence* wu1laaa1bei6doen6si6). Although onset /s/ always corresponds to [s], it is less reliable in coda position. One instance of coda /s/ corresponds to [t͡s]—the English *sauce* becomes so1ci4. In another instance, the word *gets* becomes git3zi6, the affricate [d͡z] reflecting the position of the *s* after the *t*.

The postalveolar /ʃ/ and /ʒ/ always correspond to the Cantonese [s], as in *shilling* si1ling6, or *television* dak1leot6wai1san4. Likewise, the affricate /dʒ/ always corresponds to [d͡z], like *soldier* sou1lau6zaa3 ([d͡z] is written *z* in Jyutping). On the other hand, /tʃ/ can be [t͡s], [s], [d͡z] (Jyutping *c, s, z*)—examples include *teacher* tik1caa4, *handkerchief* hon3kau3sip3fu1, and *chicken* zit3ging1, respectively.

Below is a table expressing the fricatives and affricates in English onset position, and their corresponding segments in Cantonese loanwords.

(7)

English:	f	v	θ	ð	s	z	ʃ	ʒ	tʃ	dʒ	h
Cantonese:	f	w f	s d f w	s d	s t͡s (d͡z)	s f b	s	s	t͡s s d͡z	d͡z	h

The status of /v/:

Now we will take a look at /v/ and its possible status in the Cantonese loanword phonology. Cantonese has the voiceless equivalent /f/—indeed, when /f/ appears in an English word as an onset, the corresponding Cantonese loanword also has an [f]. In the case of /v/, Cantonese will usually repair it in one of two ways—devoice it to an [f], or make it the approximant [w]. There are 16 tokens of English /v/ in our database—6 of them devoice, 8 of them correspond to [w], and the remaining 2 are repaired in different ways.

In terms of devoicing, an English onset /v/ corresponds to [f] in the tokens *eleven* ji1laai1fan4 and *seven* se3fan4 (as well as those words morphologically related to them, such as *seventeen* and *seventy*). The English coda /v/ often corresponds to the syllable fu1, as in *five*, *twelve*, *gloves*, and *stove* (si6dou1fu1).

When /v/ occurs in onset position in English, it is usually repaired as [w], as in *heavy* hei3wai6 or *vinegar* wan1noi6gaa1. There is one case of coda /v/ becoming [w]— *evening post* ji1wan1ning4pou2si6.

The other cases are both of coda /v/. For the token *give me*, /v/ becomes a stop, as gip3mai5. In the token *have not* haa1naa1, the /v/ is deleted.

Although there is not a great deal of data, we can still attempt an analysis. When onset /v/ corresponds to [f], the only syllable that it surfaces in is fan4—that is to say, in the particular phonological environments in *seven* and *eleven*, there is a preference for the syllable fan4 that overrides a preference for [w]. It likely does not have to do with vowel quality—the word *liver* has a vowel similar to the vowel in *seven*, yet is pronounced in Cantonese as lei5waa4. Neither does it involve the vVn syllable type—*vinegar* wan1noi6gaa1 is a straightforward counter-example. For coda /v/, the only syllable that

[f] surfaces in is fu1, which is quite similar to the situation of onset /v/, but with a different syllable and without the influence of the coda /n/ in *seven* and *eleven*.

Hung (2000) also deals with the status of /v/, although he is analyzing Hong Kong English, not Cantonese loanwords. Hung's tentative proposal is that /v/ surfaces "as [w] at the beginning of a stressed syllable, and [f] at the beginning of an unstressed syllable." (p. 348) For instance, HKE *even* is pronounced [ˈifən] and *leaving* is pronounced [ˈlifɪŋ], while *event* is pronounced [iˈwɛnt]. This generalization does not capture the loanword data from our database—*heavy*, *private* and *liver* all demonstrate /v/ occurring at the beginning of an unstressed syllable, and all three use [w]. Hung, at the end of his analysis, proposes that there is no /v/ phoneme in HKE, and instead the use of [w] and [f] is lexical, meaning that British English /v/ corresponds to either of the HKE phonemes /w/ and /f/. This might be the only phonemic analysis capable of accounting for the data, both in HKE and in the Cantonese loanwords of our database. [If this is true, what does this say about HKE UR being the input to Cantonese loanwords? Are these loanwords too old? Has HKE changed?]

The status of /r/:

Mandarin Chinese has a retroflex approximant in its consonant inventory, but Cantonese Chinese does not have any segment in its inventory that would be considered rhotic. For this reason, English /r/ mostly corresponds to the lateral approximate /l/ in Cantonese loanwords. It's important to note that [ɹ] does not occur in coda position in British English or HKE, and so our discussion will deal with /r/ as an onset consonant.

As mentioned above, when /r/ appears as a member of an onset cluster in our database, then the first consonant is always preserved with an epenthesized vowel, and an *l* follows in another syllable. This is even the case for three-consonant clusters, such as *street* si6deoi1lyut3. Unsurprisingly, when /r/ occurs alone in onset position, then it corresponds to an onset *l*, as in *narrow* nai4lo4. The way that /r/ behaves in word-initial position is, however, surprising. In 5 of our 11 tokens, /r/ acts like all the examples above, as in *return* lap6tan. In the other six tokens, however, word-initial /r/ corresponds to both a labial-velar approximant [w] and the usual lateral approximant [l]. The token *room*, for instance, corresponds to wu1lam4. The first syllable in these tokens is always wu1, and the following syllable always starts with [l]. Below are the English phrases that begin with /r/ and their corresponding Cantonese loanwords.

/ɹ/ → *l*		/ɹ/ → *wu1l*	
rain	**lin4**	**raincoat**	**wu1leon4guk1**
return	lap6tan1	restaurant	wu1lei5si6do1leon4
red	lyut3	residence	wu1laa1bei5doen6si6
rice	lai4si6	rat	wu1lat1
rabbit	lap1bit1	room	wu1lam4
		radio	wu1lei5dei6ou2

(8)

The near-minimal pair of *rain* and *raincoat* makes it difficult to form a generalization. Either this use of wu1 is in free variation, or the conditioning factor is not available to us in the database.

The reason for the inclusion of wu1 in the Cantonese loanwords can be attributed to a number of factors. Some varieties of English will labialize the alveolar approximant, resulting in something like [ɹʷ]. The Cantonese loanword might be capturing that, but it is unclear why the [w] necessarily precedes the [l], and that does not explain the variation between wu1+[l] and just [l]. Another possible explanation can come from studies of Hong Kong English: Hung (2000) points out that a minority of his Hong Kong English speakers will pronounce all /r/'s as [w], and a majority of his speakers will pronounce onset clusters with /r/ as having a [w], as in 'tries' [tʃwaɪs] (c.f HKE 'twice' [tʃwʌɪs]). Even so, this is not a complete explanation, because it doesn't give a reason for the inclusion of *both* [w] and [l]. It also brings up the question of why /r/ consistently corresponds with [l] in clusters, given the HKE tendency for /r/ to be realized as [w] more consistently in clusters than as a single onset consonant.

5 Previous Work

Phonologists have devised different models of loanword phonology, concerning both the acquisition and production of loanwords. These models vary in their complexity and explanatory power. Interestingly, two important studies on loanword phonology have used Cantonese loanwords as the primary source data—Daniel Silverman's *Multiple scansions in loanword phonology* (1992) and Moira Yip's *Perceptual influences in Cantonese loanword phonology* (2002). We will now compare a number of theoretical models, including Silverman's and Yip's models.

Silverman (1992) is one of the first articles to tackle the phonology of loanwords. He argues for a multi-tiered model of loanword phonology, which he calls *multiple scansions*. In this model, the incoming acoustic signal of a native speaker of English is perceived phonetically by the Cantonese speaker, and this signal is assigned segments and tones from the phoneme inventory of Cantonese, with the phonemes matching as close to the acoustics as possible. This is the first scansion, or the *Perceptual Level*. The full phonology of Cantonese then takes effect, applying Cantonese phonotactic constraints to the new representation as it would to any other phonological representation. This is the second scansion, known as the *Operative Level*. The phonetics and phonology each have their place in this model, with the system of perception being mostly phonetic, yet influenced by the phoneme inventory of the native language.

Yip's 1993 paper, *Cantonese loanword phonology and Optimality Theory*, can be seen as an extension to Silverman's work, and as a reflection of changing trends in phonology at the time. Yip chooses to focus on the phonology of the loanword system, akin to Silverman's Operative Level. In doing so, she presents an Optimality Theoretic account of Cantonese loanwords. She is able to account for most of the same data as Silverman, and does so using OT ranked constraints. One of the major arguments of this paper is that the loanword phonology is the same thing as the general phonology of the language. That is to say, the constraint rankings are motivated by Cantonese, and loanwords are subject to these constraints just like native words are.

Yip (2002) is a significant extension to her 1993 work, including additional information from the intervening decade of work on Optimality Theory and the phonetics-phonology interface. Unlike Silverman, Yip (2002) argues for a coalescing of the two levels of loanword phonology into one system. Formalized in Optimality Theory,

Yip integrates perceptual information into the phonology in the form of MIMIC constraints, which enforce faithfulness to the perceived auditory signal. It is these MIMIC constraints that differentiate the native phonology from the loanword phonology—because they only act on 'foreign' input, they keep the loanwords more faithful to the input than we might otherwise think. This system is motivated because a single ranking of MAX >> DEP in the host language cannot account for all the loanword data.

Although it does not directly deal with Cantonese data, Ito and Mester (2003, and earlier work) developed a system of lexical stratification that can also be used to model loanword phonology. In this system, loanwords can belong to various lexical strata, and these lexical strata can be targets for different OT constraints. For instance, there might be a markedness constraint that only targets more native words, and ignores more foreign words, allowing for different generalizations to be made about different strata of the lexicon.

Another interesting article is LaCharité and Paradis' *Category preservation and proximity versus phonetic approximation in loanword adaptation* (2005). Giving an analysis of the relationship between phonetics and phonology in loanwords, LaCharité and Paradis contend that loanword adaptation is largely a phonological system. Their model is mostly based around the idea of category preservation: the underlying representation of the English word undergoes phonological processes to take on phonological feature combinations that comply with the constraints of Cantonese. According to their theory, these new feature combinations should be minimally different from the English feature combinations.

In the analysis of loanwords, a particularly difficult question is that of the underlying representation—just what is the input to the Cantonese phonology? Silverman is very clear on the matter—the input to the first scansion is the British English acoustic signal, which is mapped to Cantonese segments and tones, and this in turn is the input to the second scansion. Yip (1993) agrees with Silverman's proposal of a perceptual scan of the British English phonetics being the UR in Cantonese. Yip (2002) is a little more ambiguous, but it seems to be about the same as her earlier stance. LaCharité and Paradis (2005) have a very different opinion on underlying representations—for them, the UR for British English and the UR for Cantonese loanwords is largely the same. This is because they attribute so much of the loanword phonology to the action of bilingual speakers who are completely fluent in both languages.

6   Discussion

In the introduction, we pointed out the distinction between (a) Cantonese words of foreign origin, (b) adaptation of English words by Cantonese speakers, and (c) Hong Kong English. We also proposed that our database is best categorized as (b) adaptation. The reasoning is as follows: The words in our database are not (a) because they are not 'real' words of the language—most Cantonese speakers are unaware of these words. On the other end of the spectrum, our database most certainly does not reflect anything we might call Hong Kong English—the consonants, vowels, tone system, and syllable structure all belong to Cantonese, and are extremely different from language varieties we would call English. Moreover, it seems that the system described in the dictionary consists of only lexical items—there does not seem to be any accompanying morphology,

syntax, or semantics. So, this puts our object of study somewhere in between these two extremes.

This brings up the question of how the author came up with the adaptations listed in our database. He must have had some English training, as the words are written in English orthography (with only a small number of spelling errors), and the pronunciation given usually sounds like the English equivalent. As LaCharité and Paradis might ask, how much of the adaptation process was phonetic and how much of it was phonological? Given the extreme amount of variation in the correspondence between English phonemes and Cantonese phonemes, we might initially think that the adaptation process here was mostly phonetic. If it were phonological, it would probably be more regular, where one English phoneme corresponds to exactly one Cantonese phoneme. However, the variation we have examined (stress-to-tone, liquids, clusters, fricatives, aspiration, etc.) never seems to be motivated by phonetic factors—for lack of a better analysis, the variation seems more arbitrary than phonetically motivated.

Alan, do you have any ideas for more stuff in the discussion section?

In speculating on the purpose of this dictionary, in its original published form, my advisor and I concluded that one primary purpose was probably communication with the Filipino immigrant population. A large number of Filipino immigrants are domestic helpers, and they primarily communicate with their employers in English. As such, a dictionary like this one would be helpful for Cantonese speakers trying to pick up a couple phrases to use with the maids
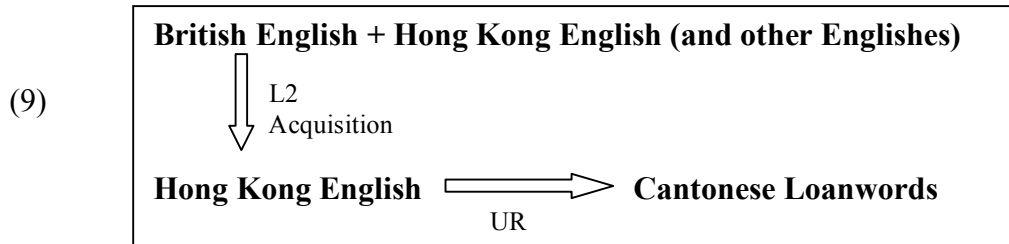
7   Our Theoretical Model

In this section we will put forth our own theory of loanword adaptation and acquisition, which we believe more accurately model loanwords in an actual language community. This is currently a work in progress—it is our hope that patterns from our database and other sources can provide evidence for our system of modeling loanwords.

Although they attribute most loanword phonology to bilinguals, LaCharité and Paradis have room in their theory for those speakers with only minor exposure to the source language (in our case, English is the source for the Cantonese loanwords). They cite a study by Best and Strange (1992) on the perception of American English [ɹ] by Japanese monolingual and bilingual speakers. The monolingual speakers were more likely to classify the [ɹ] as a /w/ than as a rhotic /r/, while the bilinguals were more like American English speakers in classifying [ɹ] as /r/. For the monolingual Japanese speakers, LaCharité and Paradis argue the process must have been mostly phonetic—they assign to the English acoustic signal a Japanese segment that it best matches. The bilingual speakers, on the other hand, have some connection between the English /r/ and Japanese /ɾ/. LaCharité and Paradis believe this type of adaptation is an example of loanwords coming directly from the source language's UR, as opposed to being mediated by the source language's phonology and phonetics and that output serving as the UR. In their model, the underlying English /r/ is matched to an underlying Japanese /ɾ/ because this is the best alignment for both of the language's feature geometry.

The model below attempts to reconcile both the phonetic/perceptual account (c.f. Silverman, Yip, Japanese monolinguals) with the phonological account of English UR

serving as the Cantonese UR. It also attempts to integrate second language acquisition with loanword adaptation in a realistic manner. [disclaimer about term HKE and its application outside of Hong Kong, and: HKE is influenced by Cantonese and British English, but it is its own language variety.]

(9)

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┌─────────────────────────────────────────────────────────────────┐
│  British English + Hong Kong English (and other Englishes)        │
│        ‖   L2                                                      │
│        ⇓   Acquisition                                             │
│                                                                   │
│  Hong Kong English  ══════⇒  Cantonese Loanwords                  │
│                       UR                                          │
└─────────────────────────────────────────────────────────────────┘
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The first part of this model is second language acquisition: a native Cantonese speaker learns English as a second language, usually in an English class or an English-language school. Then, this speaker uses their underlying representation of the *Hong Kong English* words as the input to the Cantonese loanword phonology. These Cantonese loanwords might be shared with people who do not speak English, in which case the non-English speaker would use the usual means to learn the underlying representation of the loanwords. The UR for the loanword coiner and the non-English loanword user would probably be similar, but there is room for investigation and debate.

The English that these people learn is usually Hong Kong English. Of course, there must be some influence of British English—HKE is a relatively new variety of English, and the sociolinguistic and comparative linguistic information tells us how important British English is in the history of Hong Kong. At some point, English teachers spoke British English, but now most people are taught by HKE speakers.

The question of phonetics and phonology becomes much more nuanced in this system, but it is nuanced in a logical way. The L2 acquisition of English necessarily starts as a phonetic endeavor—a learner in her first day of English class cannot *a priori* have an underlying representation of any English words. We propose that the UR in this early stage is similar to Silverman's perceptual scansion, perception playing the primary role in governing the UR. However, as the learner acquires more English syntax, morphology, and phonology, the underlying representation of words in the learner's interlanguage changes. New phonemes are added to the interlanguage, and a given word's UR will no longer necessarily resemble Silverman's perceptual scansion. At some point, after years of instruction and practice, the English learner can be said to have acquired the language. In the most frequent case, the learner has acquired the variety of Hong Kong English, which has its own lexical, syntactic, morphological, and phonological attributes. In our model it is these HKE speakers who propagate loanwords.

This model should scale to other loanword situations, but it does not necessarily reflect the system in place in every situation imaginable. Some aspects are dependant on the sociolinguistic context. For instance, in some places there are very few bilingual individuals, or bilingual education is extremely rudimentary. In these cases, we would not expect a variety of English (or some other source language) to be used by many people, and we would therefore expect the loanwords to reflect more of the phonetic output of the source language, rather than any underlying representation or phonological influence

from it. The best example of this is the different types of Japanese loanwords for *water*. The standard loanword adaptation is [woːtaː], used in contemporary times, when most of the population has some knowledge of English. There are other adaptations though, such as [waɾa], and adaptations like these were used in the past in small towns with U.S. military bases, where the people had contact with English (phonetically), but little schooling in English (Mester, personal correspondence).

8 Conclusion and Further Research

Using our database of Cantonese loanwords, we have explored various examples of loanword adaptation, and have looked at some of the implications of these loanwords. We've seen that our data has a great deal of variation, and it tends to exhibit different generalizations than those found in the literature on Cantonese loanwords (Silverman 1992, Yip 2003) as well as being different from generalizations found in Hong Kong English (Hung 2000). We reported on our own research, and we have outlined a general model of loanwords that we believe will be fruitful in future research.

The distinction between phonetic and phonological modes of loanword acquisition is a difficult topic, and there are logical reasons to choose one model or another. It is our hope that, building on the work of this paper, we will be able to explain how *both* phonetic and phonological systems affect loanwords in different ways, and *how* the sociolinguistic context and the context of language learning shape the system of loanwords.

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