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Cantonese Loanwords: Conflicting Faithfulness in VC Rime Constraints*

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Abstract

This paper focuses on the ways in which English loanwords are brought into line with four phonotactic constraints that restrict the possible combinations of nuclear vowels and coda consonants in Cantonese Chinese. It is found that three of the four constraints are strictly enforced in loans. Repairs change either the vowel or the coda consonant. Parallel to Mandarin, changes in vowel height features ([high], [ATR]) as opposed to changes in vowel backness are employed. Coda consonant changes obey a dorsal > coronal > labial faithfulness hierarchy that mirrors the typology of coda mergers discovered by Chen (1973) for many Chinese dialects. While changes in both the vowel and coda consonant occur, on-line adaptations favor changing the coda and preserving the vowel and suggest that the relative phonetic salience of the nuclear vowel to the coda consonant still plays a role in these adaptations.

Keywords: loanword adaptation; rime constraints; Cantonese; consonant place hierarchy.

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1. Introduction

Within generative grammar loanword phonology was originally treated as a corpus-external source of evidence to validate the productivity of the rules and constraints postulated on the basis of an analysis of a language's core native vocabulary. Sometimes loans contain sound combinations and structures that decide among alternative analyses whose resolution is otherwise indeterminable due to the lack of appropriate corpus-internal evidence (Hyman 1970). With the rise of constraint-based models of phonology such as Optimality Theory (OT) there has been renewed interest in loanword adaptation. OT is well suited to formally express the conflict that typically arises in trying to remain faithful to the loanword source while still satisfying native language (L1) segmental, phonotactic, and prosodic constraints. A topic of particular interest in this line of research is sound similarity. When a segment from the donor language is missing from the grammar of the borrowing language the closest sound is normally chosen. But what is meant by closest? Appealing to simple feature counting does not provide a general answer (Kenstowicz 2003). More subtle and richer phonetic considerations (often highly dependent on context) seem to frequently be at play. Moreover, the adaptations often pose learnability questions since the particular strategies employed may lack any direct counterparts in the L1 grammar (Broselow 2004, 2009). For example, how does the speaker decide whether to employ deletion or epenthesis to adapt a consonant cluster? How does the speaker decide whether to change the vowel or the consonant when faced with a CV or VC sequence that is not permitted in the native language? Chinese is particularly interesting in this regard. It has a CVC syllable template but with many gaps in the possible three-segment strings that can in principle fill out the template. How does the analyst (and the learner) decide whether a missing combination is an accidental gap or a systematic exclusion? Since the language typically lacks morphophonological alternations, one cannot probe the restriction with violations arising from morpheme concatenation to see if they are repaired and if so with what sound change. Loanwords thus provide one valuable source of evidence in this regard.

Cantonese has figured prominently in the theoretical research on loanword phonology. Silverman (1992) was one of the first studies to propose a specific model of how a loanword is adapted, using Cantonese as the case study. The model postulates that the input is the surface (acoustic) form of the output from the donor language (chiefly English). According to Silverman this input is parsed by matching the closest segments drawn from the L1 segment inventory. The acoustic input is also parsed by the gross syllable template CVC. This syllabically licit representation is then brought into conformity with the native language segmental phonotactics by processes of vowel insertion and feature change at a later stage of analysis. In a series of papers discussing Cantonese loanwords from an Optimality Theoretic perspective, Moira Yip (1992, 1996, 2003, 2006) also proposes a two-stage model where the input is first parsed by a prosodic template and then phonotactic constraints are imposed. Yip (2006) examines vowel adaptation, concentrating on how English [æ] and schwa (segments which lack direct analogs in the Cantonese segmental inventory) are treated. She finds a hierarchy in the types of repair processes that impose native constraints. Deletion and epenthesis are employed to repair violations of constraints on consonant clusters and coda consonant restrictions. But licit vowel-consonant VC rime structures are obtained by preferentially adjusting the length of the vowel instead of changing its quality or the place of articulation of the coda consonant.

Our goal in this paper is to provide a more detailed analysis of the vowel adaptations in the Cantonese loans. The discussion proceeds as follows. First we introduce the vowel inventories of English and Cantonese followed by the rime tables showing the attested VC combinations in the core native vocabulary. We then review several well-known restrictions on the combinations. The next section establishes a base-line correspondence between the vowels and coda consonants of English and Cantonese that are evident in contexts where a particular VC phonotactic is not in play. We then turn to loans where an application of the baseline correspondences to the English input would create structures that violate one of the four phonotactic restrictions and show how they are modified. Like Yip, our analysis also relies on OT ranked constraints. As with Silverman (1992) and Yip (2006), our data originate primarily from Chan and Kwok (1982) and Cheung (1986) plus a few additional forms taken from other sources such as Lai (2004) as well as from personal observations of our consultant. The total corpus comprises about 350 words (see Appendix).

It is well known that compared to Japanese and Korean, the number of phonological loans in Chinese languages is much more restricted. This is true for Cantonese as well in spite of the fact that Cantonese and English have been in close contact for over two centuries and that Cantonese is primarily a spoken language and hence loans are normally transmitted orally rather than graphically. The database is thus quite limited, making any analysis tentative and necessarily more speculative compared to other loanword studies. Nevertheless certain generalizations do emerge.

2. Segmental inventory and syllable rime phonotactics

Cantonese is commonly regarded as having the eleven contrasting vowels of (1) on the phonetic surface.

(1) high	i:	y:		u:
mid close	e	ø		o
mid open	ɛ:	œ:		ɔ:
low central			ɐ	
low			a:	
glide	j			w

Unless otherwise noted, we follow the transcription system utilized in Bauer and Benedict (1997). The mid close vowels [e] and [o] are transcribed as high [ɪ] and [ʊ] in other studies. In a spectrographic investigation of ten male speakers, Zee

(2003) finds that [e], [ø], and [o] overlap with [ɛ:], [œ:], and [ɔ:], respectively, in F1-F2 space and are distinguished phonetically by their shorter duration. The same relation holds for [ɐ] vs. [a:]. We reproduce his F1 and F2 measures for corresponding front and back close and open mid vowels as well as the low vowel pair in (2a). This finding also agrees with the speech of our female consultant (shown in 2b), based on three repetitions for each vowel.[1]

(2) first and second formant averages (standard deviations) for selected short and long vowels

a.

	F1	F2
[e]	520 (44)	2127 (140)
[ɛ:]	537 (49)	2088 (142)
[o]	518 (52)	882 (66)
[ɔ:]	544 (59)	871 (79)
[ɐ]	820 (90)	1287 (86)
[a:]	827 (97)	1229 (86)

b.

[i:]	399 (52)	2900 (96)
[e]	678 (61)	2367 (73)
[ɛ:]	691 (45)	2145 (88)
[u:]	426 (56)	792 (37)
[o]	738 (10)	1463 (25)
[ɔ:]	766 (47)	1060 (49)
[ɐ]	949 (35)	1475 (52)
[a:]	1048 (71)	1459 (97)

Cantonese has a bimoraic CVC, CV: syllable template. In syllables lacking a coda the vowel must be long (bimoraic). Codas are restricted to the three nasals [m, n, ŋ] and the corresponding stops [p, t, k], which are unreleased. In addition the language has various diphthongs. We follow the consensus in the literature and treat them as vowel-glide sequences. The vowels [e, ø, o, ɐ] are short and thus barred from an open syllable. A major analytic question is whether the contrast between [e, ø, o, ɐ] and [ɛ:, œ:, ɔ:, a:] is based on vowel quality with duration playing an enhancing role or the other way around. As Zee (2000) notes, most of the previous literature has distinguished these vowels in terms of quality even though they overlap in F1-F2 space. He points out that [e, ø, o, ɐ] are typically found in short syllables closed by a stop or nasal and that their steady-state is very brief (20-40 ms). Consequently, their «vowel quality cannot be discretely localized in any single

1. On the other hand So and Wang (n.d.) find roughly equidistant spacing in F1 among [i:, e, ɛ:] (389/42, 544/106, 738/71) and [u:, o, ɔ:] (434/36, 550/41, 733/71) for the speech of two subjects. Yip (2006) reports a similar finding.

portion of the syllable, but is distributed throughout the period during [which] the voicing is present» (p. 4). As we shall see, the loanword phonology also supports the position that vowel quality predominates over vowel length. For concreteness, we shall assume that the difference is subsumed under the feature Advanced Tongue Root with [e, ø, o, ɐ] being [+ATR] and [ɛ:, œ:, ɔ:, a:] being [–ATR].

In (3) we indicate the duration ratios of the short close mid vowels V to their long open-mid and high-vowel counterparts in checked V-stop and V-nasal rimes. The short vowels serve as the baseline. The ratios are based on the vowel duration measures reported in So and Wang (n.d.) and the graphs in Kao (1971:56). The low vowel ratios are also shown.

(3)

	VT	VN	
e/ɛ:, o/ɔ:	1.8	2.2	
e/i:, o/u:	1.5	1.7	
ɐ/a:	1.7	2.2	
V/V:	1.9	1.9	(Kao 1971)

These ratios approximate the 1 to 2 proportions of short vs. long vowels found in many other languages and support the contention that duration is an important factor in the phonetic realization of the nonhigh vowels in Cantonese.

In (4) we show the average vowel duration measures cited in Bauer and Benedict (1997) based on the measurements in Kao (1971). Using the short mid close and low central vowels as a baseline, we see that the [i:, u:, ɛ:, ɔ:, a:] vowels are approximately twice as long as [e, ø, o, ɐ]. Moreover, the former are lengthened by an additional increment in bimoraic open syllables.

(4)

coda types	average vowel duration	ratio
V:	308 ms.	3.0
V:N/G	203	2.0
V:T	169	1.9
VN/G	100	1.0
VT	89	1.0

We now turn to the VC rime combinations. The long and short low vowels [a:] and [ɐ] combine with all three classes of codas: glides, nasals, and stops. However, for the remaining vowels there are many gaps in the inventory of possible VC combinations. The table below is a synthesis of the rime tables from Hashimoto (1972), Kao (1971), and Bauer and Benedict (1997) for the core native vocabulary. The leftmost column indicates the nuclear vowels and the top row indicates the coda consonants. The row/column intersections show the permissible nucleus+coda rimes.

(5)

	j	y	w	m	n	ŋ	p	t	k
i:			i:w	i:m	i:n		i:p	i:t	
y:					y:n			y:t	
u:	u:j				u:n			u:t	
e	ej					eŋ			ek
ø		øy			øn			øt	
o			ow			oŋ			ok
ɛ:						ɛ:ŋ			ɛ:k
œ:						œ:ŋ			œ:k
ɔ:	ɔj				ɔ:n	ɔ:ŋ		ɔ:t	ɔ:k
ɐ	ɐj		ɐw	ɐw	ɐn	ɐŋ	ɐp	ɐt	ɐk
a:	a:j		a:w	a:m	a:n	a:ŋ	a:p	a:t	a:k

There are four noteworthy restrictions on the nucleus+coda combinations. First, the round vowels do not combine with labial codas except for the homorganic [ow] and [øy] diphthongs. Second, the long and short front mid vowels [ɛ:] and [e] as well as [œ:] do not combine with labial or dental codas in the core native vocabulary.[2] Third, [o] does not combine with [t] and [n]. Finally, the high vowels do not combine with velar codas. The close mid vowels [e] and [o] are in complementary distribution with the high vowels and are treated as allophones of /i:/ and /u:/ by Hashimoto (1972). Kao (1971) follows Chao (1947) and phonemicizes /e/ and /o/, uniting them with the vowel nuclei appearing in the [ej] and [ow] diphthongs. In Optimality Theory (Prince and Smolensky 1993, 2004) with its assumption of Richness of the Base, phonotactic constraints are defined on the output. In this model the four VC rime restrictions can be expressed as the following constraints. We follow SPE (Chomsky and Halle 1968) in assuming that velars are [+high].

(6) Cantonese syllable-rime constraints

a. *OP: *[–cons, +labial] [+cons, +labial]

b. *ET: *[–cons, –high, –low, –back] [+cons, +anterior]

c. *oT: *[–cons, –high, –low, +back, +ATR] [+cons, +anterior]

d. *IK: *[–cons, +high] [+cons, +high]

(6a) bans the combination of a labial vowel and a labial coda consonant. (6b) excludes a rime composed of a front nonhigh vowel [e, ɛ:, œ:, ø] with an anterior (labial, coronal) coda consonant. (6c) bars a combination of close [o] with an anterior consonant. Finally, (6d) bans a rime containing a high vowel plus a dorsal consonant.

2. The short counterpart [ø] of long [œ:] arises from fronting between coronals.

A couple of other restrictions should be mentioned. First, in an observation attributed to Chao (1947:24), Hashimoto (1972:111) states that while a low tone in a checked syllable (Yang-Ru) combines with both long and short vowels, in the Yin-Ru (upper register) tone group the long vs. short categories align with the mid vs. high tonal contrast: long vowels co-occur with mid tone 44 while short vowels co-occur with the high tone 55[3]. Yip (2006) appeals to this constraint, which she dubs *V:O5, to explain certain unexpected vowel adaptations in the loans. Second, the vowels [y:] and [u:] are largely in complementary distribution. They superficially contrast after velars: [ky:n] 'donate' vs. [ku:n] 'official'. Chao (1947) postulated deriving the latter minimal pair from an underlying /k/ vs. /kw/ contrast in the onset.

3. English-Cantonese vowel and coda consonant correspondences

Before turning to the ways in which the native language phonotactic constraints of (6) affect the adaptation of loans, we establish a base-line correspondence for the vowels and coda consonants. Our English transcriptions are based on the Received Pronunciation (RP) represented in such handbooks as Gimson (1980), Wells (1990), and the OED. The data in (7) show the regular vocalic correspondences in an open syllable. These include words where the English tense vowel appears word finally or, as in the case of *bar* and *foul*, where the vowel ends up in final position in the loan through the truncation of a coda consonant. To avoid notational clutter we have not transcribed the tones. There is a regular correspondence between the primary stress of English and the Cantonese high level (55) tone in the loan (Kiu 1977, Silverman 1992).

(7) English (RP) tense vowel - open syllable correspondences

English		Cantonese	
[i:]	CD	[i:]	si:ti:
[u:]	boot	[u:]	pu:t
[ei̯]	gay	[ej]	kej
[əu̯]	OK	[ow]	owkhej
[a:]	bar	[a:]	pa:
[ai̯]	high	[a:j]	ha:j
	pie	[ɐj]	phɐj
[au̯]	powder	[a:w]	pha:wta:
	foul	[ɐw]	fɐw
	ounce	[ɔ:]	ɔ:nsi:
	account	[a:]	a:kha:ŋ
	pound	[ɔ:]	pɔ:ŋ

3. We have been unable to find this citation in Chao (1947).

English diphthongs [ai̯] and [au̯] with a low vowel nucleus are adapted as Cantonese diphthongs in open syllables. The nucleus varies between long [a:] and short [ɐ]: *high* > [ha:j], *pie* > [phɐj]; *powder* > [pha:w.ta:], *chowder* > [tʃɐw.ta:]. In closed syllables the off-glide and coda consonant compete for the single post-nuclear rime slot with the post-nuclear glide normally winning out: *slide* > [si:la:j], *foul* > [fɐw]. This behavior appears regular for [ai̯], while [au̯] has a number of alternative realizations that depend on which of the [+high], [+back], [+round] features of the off-glide are reflected in the nucleus or in the coda, or in both. For *ounce* > [ɔ:n.si:] [+back, +round] appear in the nucleus, for *account* > [a:kha:ŋ] [+high, +back] appear in the coda, while *pound* > [pɔ:ŋ] shows both effects.

Next are words where an English lax vowel appears in an open syllable in the Cantonese loan either because the original word is disyllabic or because it is a monosyllable whose coda [s] regularly opens the syllable through epenthesis.

(8) English lax vowel > Cantonese open syllable

English		Cantonese	
[ɪ]	Miss	[i:]	mi:si:
	civil (engineering)		si:fow
[ɛ]	jelly	[ɛ:]	tsɛ:lej
[æ]	gas	[ɛ:]	kɛ:si:
[ʌ]	bus	[a:]	pa:si:
	hustle		ha:sow
	husband		ha:tci:pɛ:ŋ
[ɒ]	boss	[ɔ:]	pɔ:si:
	philosophy		fi:lɔ:
	body		pɔ:ti:

In these data we see that the native requirement for all syllables to be bimoraic is satisfied by lengthening the vowel and thus creating a mismatch with the short vowel in the English source word, as in *jelly* > [tsɛ:lej] and *boss* > [pɔ:si:].[4]

(9) shows examples where an English lax vowel corresponds to a vowel in a closed syllable in the adaptation.

4. There are a number of loans in which a lax English vowel is adapted by filling the coda with a consonant, which is typically homorganic with the following onset. This strategy seems to occur mostly with high vowels. Examples include *guitar* [ɪ]> [ki:t.tha:], *disco* [ɪ] > [ti:k.si:.khow], *cookie* [ʊ] > [khu:k.khej].

(9) English lax vowel in closed syllable

English		Cantonese	
[ɪ]	kid	[i:]	khi:t
	pin		phi:n
	lift		li:p
[ɛ]	chemistry	[ɛ:]	khɛ:m
	sex		sɛ:k.si:
	to check		tshɛ:k
[ʌ]	fun	[ɐ]	fɐn
	cut		khɐt
[ɒ]	cocktail	[ɔ:]	kɔ:k.tɛ:

For the [ɛ] > [ɛ:] and [ɒ] > [ɔ:] correspondences, faithfulness to vowel timbre takes precedence over faithfulness to vowel length: a short lax vowel of English is adapted as long in Cantonese in order to match the mid-open/round vowel quality. Following Yip (2006), this choice can be expressed with the OT constraint ranking schema Ident-V Quality » Ident-V Length[5]. The tableaux in (9) show the effect of this ranking when the vowel quality feature is [ATR] (assuming that this is the feature that differentiates open and close mid vowels). The short vowels in Cantonese [ts^{h}ek] and [kok], which are phonotactically permissible before velars, are rejected in favor of the long vowels of [ts^{h}ɛ:k] and [kɔ:k] in order to remain faithful to the vowel quality of the English source words *to check* [ɛ] and *cocktail* [ɒ].

(10) a.

/tʃ[ɛ]k/	Ident-[ATR]	Ident-[round]	Ident-[long]
☞tʃ^{h}ɛ:k			*
tʃ^{h}ek	*!		
tʃ^{h}ɐk	*!		

b.

/k[ɒ]k/	Ident-[ATR]	Ident-[round]	Ident-[long]
☞kɔ:k			*
kok	*!		
kɐk		*!	

5. A handful of loans reverse this ranking so that a lax English vowel is adapted with a short vowel at the expense of a match in vowel quality. These include *lemon* [ɛ] > [leŋ.mu:n], *Miss* [ɪ] > [mɐt.si:], *winner* [ɪ] > [wɐn.na:], and *jazz* [æ] > [tsøk.si:]. They also require the insertion of a coda consonant to satisfy the prosodic requirement of bimoraicity. Korean provides a consonantal analog of the Quality » Quantity ranking. As discussed by Kang (this volume) and Kenstowicz and Sohn (2001) an English lateral in medial position geminates to block the native grammar tap realization of the intervocalic liquid: Aladdin > [allatin] vs. aerobic > [eəropik].

However, faithfulness to vowel quality is overridden when a long vowel is required in order to satisfy the prosodic constraint that the syllable be bimoraic. This is shown in tableau (11). First, [ɐ] is the best match for the English wedge [ʌ] and is regularly selected in a closed syllable, as in *fun* > [fɐn]. But the English [ʌ] is adapted as [a:] when a long vowel is required in an open syllable, as in *hustle* > [ha:sow]. Other examples showing this correspondence include *husband* > [ha:tci:pɛ:ŋ] and *bus* > [pa:si:].

(11)

	/fʌn/	Bimoraic	Ident-[ATR]	Ident-[long]
a.	☞fɐn			
	fa:n		*!	*
b.	/hʌsl/			
	☞ha:sow		*	
	hɐsow	*!		

Finally, the data in (12) show the baseline matching of English stops and nasals with the corresponding coda consonants in Cantonese. Where possible, we cite examples where the nucleus is a low vowel, which is compatible with all three places of articulation for the following consonant.

(12)

English		Cantonese	
[p]	jeep	[p]	tʃi:p
[t]	cut	[t]	khɐt
[k]	mark	[k]	ma:k
[m]	hum	[m]	hɐm
[n]	fun	[n]	fɐn
[ŋ]	king	[ŋ]	kheŋ

With the baseline vocalic correspondences enforced by the Bimoraic » Ident-Quality » Ident-Length ranking schema in place, we now proceed to investigate how the four VC phonotactic constraints mentioned above in (6) are enforced on Cantonese loans.

4. Phonotactic constraint-1: front nonhigh vowels

In the Cantonese native vocabulary the front vowels [ɛ:] as well as [e] and [œ:] are barred before labial and coronal consonants. A few loanwords raise their vowel or change the coda to velar in order to conform to this constraint (13a). But the majority (13b) violate it, creating a new rime combination (Bauer 1985).

(13)

		English		Cantonese	
a.	[ɛ]	cents	[i:]	si:n.si:
		pence		pi:n.si:
		cassette	[e]	ka:sek
		offset		ɔ:sek
	[ei̯]	straight		si:tek.lek
		chocolate		tʃy:ku:lek[6]
	[æ]	jam		tsi:m
b.	[ɛ]	Benz	[ɛ:]	pɛ:n.si:
	[æ]	cancer	[ɛ:]	khɛ:n.sa:
		jam		tsɛ:m
		band		pɛ:n
		captain		khɛ:p.thøn

When viewed from the Optimality Theory perspective, the variation among these adaptations revolves around whether the *ET phonotactic from (6) is respected, and then if it is, where a change is made to enforce it at the cost of a faithfulness violation. The adaptation of *pence* involves a demotion of faithfulness for [high] (and [ATR]) while *offset* involves demotion of faithfulness to the coda consonant. In the adaptation of *Benz* the phonotactic is demoted in order to remain faithful to the vowel quality and coda consonant in the original foreign word. The following tableaux illustrate these three ranking scenarios for *pence*, *offset*, and *Benz*.

(14)

a.	/pɛns/	*ET	Ident-Coronal	Ident-[high]
	☞pi:n.si:			*
	pɛ:n.si:	*!		
	pɛ:ŋ.si:		*!	
b.	/ɔfsɛt/	*ET	Ident[high]	Ident-Coronal
	☞ɔ:sek			*
	ɔ:sɛ:t	*!		
	ɔ:si:t		*!	
c.	/bɛnz/	Ident-[high]	Ident-Coronal	*ET
	☞pɛ:n.si:			*
	pi:n.si:	*!		
	peŋ.si:		*!	

6. The [t] > [k] coda change in the adaptation of *chocolate* suggests that the vowel of the final syllable was interpreted as [ei̯], perhaps based on the spelling.

It is interesting that the adaptation of English [ɛ] as Cantonese [ɔ:] is never found. Feature economy cannot be the reason since this adaptation involves two vowel quality changes (in [back] and [round]), the same number as in [ɛ] to [i:] ([ATR] and [high]). A similar asymmetry has been noted by Lin (2008) in a study of English loans into Mandarin, where changes in vowel height are much more common than changes in backness. This observation is all the more striking since in Mandarin vowel height is contrastive while, for nonhigh vowels, backness is predictable from the surrounding consonants. Nevertheless, faithfulness to the non-contrastive vowel backness dominates faithfulness to the contrastive vowel height. One possible explanation for this asymmetry is that stops are unreleased in the coda in Cantonese. Consequently, the VC formant transitions in the vowel are the only cues to the place of articulation of the following coda consonant. Among these transitions those of the second and third formants are the critical ones in distinguishing one consonantal place from another, while first formant transitions do little if any work here. If Cantonese speakers are especially attuned to the VC transitions in F2 and F3, they may wish to preserve them in the vowel adaptation and hence be more prone to change vowel height, which plays little role in distinguishing coda place.

5. Phonotactic constraints 2 and 3: *IK and *oT

We recall that the short close mid vowels [e, o] have a very restricted distribution in Cantonese native grammar. They are only permitted before dorsal codas as well as in the nucleus of off-glide diphthongs. The loanword phonology supports this analysis since English words with a high vowel plus dorsal coda are regularly realized with the close mid vowels. The corpus unfortunately lacks examples of English [i] before a dorsal such as *leek*, *beak*, etc. that would allow us to determine its behavior in this context.[7]

(15)

English		Cantonese	
[ɪ]	tick	[e]	thek
	sink		seŋ
	king		kheŋ
	slick		si:lek
	stick		si:tek
[ʊ]	snooker	[o]	si:lokka:
	cookie		khokkhi:
[u]	fluke	[o]	fu:lok
	cartoon		ka:toŋ
	saloon		sa:loŋ

7. The loans for *cartoon* and *saloon* may have passed through Mandarin.

So here the native grammar phonotactic constraint *IK consistently overrides faithfulness to the English vowel. Thus, in comparison to the *ET constraint discussed in the preceding section, *IK is more resistant to foreign influence--perhaps because it is formally a dissimilation constraint, at least if formulated in features, as in (6) above. The restriction of front mid vowels to dorsal codas (*ET) is not an instance of any natural phonetic category and so might more easily give way to loanwords.[8] The repair to the *IK constraint consistently involves lowering the high vowel to a close mid vowel. Consequently, faithfulness to [+high] in the vowel is demoted below *IK. Other possible repairs such as changing the coda consonant or lowering the vowel to open mid will be blocked by faithfulness to dorsal place and [ATR], respectively. The tableau in (16a) shows the adaptation of *king* to [kʰeŋ] given the ranking in (16a).

(16) a. *IK, Ident-Dorsal, Ident-[ATR] » Ident-V[high]

b.

/kiŋ/	*IK	Ident-Dorsal	Ident-[ATR]	Ident-V[high]
☞kʰeŋ				*
kʰi:ŋ	*!			
kʰi:n		*!		
kʰɛ:n			*!	

There is one case where arguably the constraint barring the high vowels before a dorsal is enforced by changing the coda: *cigar* is adapted as [ʃy:t.ka:]. Normally when a coda consonant is inserted after a lax vowel in the English word in order to satisfy bimoraicity, it is homorganic with the following consonant, as in *copy* > [khɐp.phi:], *cookie* > [khok.khi:], *cutter* > [kɐt.ta:], *fussy* > [fɐt.si:]. The coda [t] of *cigar* > [ʃy:t.ka:] may be a strategy to retain the [+high] feature on the vowel in the face of the phonotactic banning a high vowel before a high (dorsal) consonant.

The *oT constraint helps to explain the adaptations in (17) where a coronal coda consonant has been changed to dorsal in order to obtain a better vowel-quality match for the nuclear vowel. Also included here are cases where the inserted coda departs from the default homorganic coda-onset cluster.

(17)

	English		Cantonese
[əu̯]	coat	[o]	khok
	volt		fok
	notes		nok.si:
	cone		khoŋ
	saxophone		sek.si:.foŋ
	mignon		mi:n.joŋ
	donut		toŋ.lɐt

8. Feng-fan Hsieh (p.c.) observes that [i] is lowered/laxed before velar codas in Hakka and Chaozhou while an excrescent schwa is inserted in Taiwanese. Edward Flemming reminds us of the English sound change seen in *hoop* [u:], *hoot* [u:], but *hook* [ʊ] where a similar change before dorsals occurred.

Thus, rather than simply being a positional variant of the high vowel, the loanword phonology indicates that [o] is sufficiently distinct to serve as an attractor. Moreover, it indicates that the gap of (short) [o] plus coronal coda in the rime table of (5) is not an accidental one or a mere byproduct of a context-free ban on [e, o]. Rather, a constraint explicitly barring closed [o] before an anterior coda consonant is required: *oT. In contrast to *IK, the repair to *oT consists in changing the coda consonant to dorsal. Thus, Ident-Coronal must be demoted below *oT. The alternative repair changing the coda to labial can be excluded by the labial constraint *OP. Finally, changing the vowel to high or open mid can be blocked by the Ident-V[high] and Ident-[ATR] constraints invoked in the discussion of *ET. The required rankings are shown in (18a) and the adaptation of *coat* > [khok] is shown in (18b).

(18) a. *oT »Ident-Coronal
*OP »Ident-Coronal
Ident-[ATR], Ident-V[high] » Ident-Coronal

b.

/khəu̯t/	*oT	*OP	Ident-[ATR]	Ident-V[high]	Ident-Coronal
☞k^hok					*
k^hot	*!				
k^hop		*!			
k^hu:t				*!	
k^hɔ:t			*!		

It is worth observing that the syllable nuclei of the tense mid vowels are higher in RP than in Standard American (Ladefoged 2006:88). Moreover, the rime tables in Kao (1971) as well as Bauer and Benedict (1997) show close vowel nuclei for Cantonese [ej] and [ow] in contrast to the open nuclei in [ɛ:w] and [ɔ:j]. The close mid vowel nuclei in *coat* > [k^hok] (and *straight* > [si:teklek] from (13)) are thus good matches. But given undominated *oT, they entail a change of the coda consonant.[9]

Our analysis predicts that loans containing a close mid vowel followed by a dorsal consonant should be adapted faithfully since they violate no phonotactic constraint. The examples in (19) show that this is a correct prediction. Unfortunately, the corpus lacks an example like *coke* that would allow us to test this prediction for the back vowel.

9. In a study of the speech of one young male Hong Kong Cantonese speaker, Zee (1999) finds that 10 out of 14 words with an [-ɔ:n] rime have velarized the consonant to [-ɔ:ŋ] and 3 of 3 rimes in [-ɔ:t] appear as [-ɔ:k]. It is thus possible that the *oT constraint is being generalized to include the open mid vowel. It could then combine with *ET to form a general ban on mid vowels and coronal codas.

(19) English Cantonese

[ei̯]	cake	[e]	khek
	shake		sek
	Laker		lekka:

Given the vowel quality » vowel length ranking established earlier, English short open mid vowels before a dorsal have no other motivation to raise to close since they violate no native grammar phonotactic and hence are predicted to adapt as open. The data in (20a) confirm this prediction and the tableau in (20b) shows this adaptation.

(20) a. English Cantonese

[ɛ]	sex	[ɛ:]	sɛ:k.si:
	electrical (engineering)	ji:lɛk	
[ɒ]	block	[ɔ:]	pɔ:k.lɔ:k

b.

/sɛks/	Ident-[high]	Ident-[ATR]	Ident-[long]
☞sɛ:k.si			*
sek.si		*!	
si:k.si	*!		

To summarize, in this section we have seen that the *IK constraint barring a high vowel plus velar coda is consistently enforced by lowering the vowel to close mid. We also found that English close mid vowels before a velar are adapted as Cantonese [e, o] with the familiar vowel timbre » vowel length ranking. A number of loans with English [əu̯] change their coda to dorsal indicating that the close vowel [o] is psychologically salient and that the rime-table gaps of *[ot] *[on] are not accidental but actively enforced by the constraint *oT. Finally, since mid open vowels are permitted before dorsal codas in the native rime table, English [ɛ] and [ɔ] are regularly adapted as Cantonese [ɛ:] and [ɔ:] with the vowel timbre » vowel length mismatch.

6. Phonotatic constraint-4: labial dissimilation

It is well known that in the core vocabulary of Cantonese labial onsets are incompatible with labial rimes. Yip (1989) cites the Middle Chinese-Cantonese correspondences in (21) that show a dissimilation of coda nasals with respect to the onset. According to Bauer (1985) loans like *pump* > [pɐm] indicate that this constraint is no longer enforced in the contemporary language. But aside from the diphthong [ow], the constraint against a round vowel and labial coda found in the rime tables of Hashimoto (1972), Kao (1971), and Bauer and Benedict (1997) is still in effect (Light 1977).

(21) Middle Chinese – Cantonese correspondences (Hashimoto 1972)

*biəm	>	pən	cf.	*ləm > ləm
*biam		pi:n		*liam > li:m

To demonstrate the viability of the restriction on labials, Yip (1989) points to a reflex in the La-mi secret language (22). In this speech disguise if the base vowel is /i/ then /i-i/ is dissimilated to /i-u/, as in *kin* and *yit*. But as shown by *t'im*, this dissimilation is blocked if the coda is a labial.

(22) La-mi secret language

yat	>	lat yit	
kin		lin kun	
yit		lit yut	
t'im		lit t'im	*lit t'um

Can we find reflexes of the VC labial dissimilation constraint in the loanword phonology? The most direct place to look would be for words like *home*, *hope*, *soup*, *loom*. The corpus has very few examples: [ɔ:] *chloroform* > [kɔ:lɔ:fɔ:ŋ]. However, the constraint can be detected more subtly. First, the data in (23a) show that the English back low rounded vowel [ɒ] is normally adapted as [ɔ:]. But if the coda contains a labial (23b), then unround [ɐ] is chosen instead. An alternative strategy, seen in (23c), modifies the coda consonant.

(23)

	English		Cantonese	
a.	[ɒ]	boxing	[ɔ:]	pɔ:k.seŋ
		cocktail		kɔ:k.tɛ:
		franc		fat.lɔ:ŋ
b.	[ɒ]	copy	[ɐ]	khɐp.phi:
		CompLit		khɐm.li:t
		composition		khɐm.phow
		ping-pong ball		peŋ.pɐm.pɔ:
c.	[ɒ]	zombie		sɔ:ŋ.bej
		hamburger		hɔ:n.bow
		prom		pɔ:ŋ

The cases in (23b) involve violation of faithfulness to the rounding of the vowel in the English source, while (23c) retains rounding in the vowel at the cost of changing the place of articulation of the nasal consonant. The tableaux in (24) show how the variant repair strategies changing the vowel or the coda labial play out in the adaptations of *cocktail*, *Complit*, and *zombie*.

(24) a.

/kɒktel/	*OP	Ident-V[labial]	Ident-C[labial]
☞kɔ:k.tɛ:			
ka:k.tɛ:		*!	

b.

/kɒmp/	*OP	Ident-C[labial]	Ident-V[labial]
☞khɐm			*
khɔ:m	*!		
khɔ:n		*!	

c.

/zɒmbi/	*OP	Ident-V[labial]	Ident-C[labial]
☞sɔ:ŋ.bej			*
sɔ:m.bej	*!		
sa:m.bej		*!	

Another reflex of the labial dissimilation phonotactic concerns the coda filling strategy that provides the extra mora called for by the bimoraic requirement on full syllables. In this situation the inserted consonant normally tracks the place of articulation of the following onset (25a). But if that onset is labial and the vowel is round, then the coda assumes a different point of articulation to avoid a round vowel + labial coda (25b).

(25)	English		Cantonese
a.	spring		si:bi:t.li:ŋ
	salmon		sa:m.mɐn
	franc		fɐt.lɔ:ŋ
	cocoa		kok.ku:
	cookie		khok.khi:
	Fascism		fɐt.saisi:
	gaberdine		gap.ba:di:n
	hysteria		gi:t.si:dailei
	shilling		si:n.li:ŋ
b.	[əu̯]	romance	lɔ:ŋ.ma:n.si:
	[ɔ]	sauna	sɔ:ŋ.na:

7. Other phonotactic constraints

It is well known that back rounded vowels in Cantonese may combine with either coronal onsets or codas but not with both (Chao 1947). The loanword corpus has a few words that show the viability of this constraint. They are listed below in (26). The fronting of the [juw] diphthong seen in *duce* is a regular development independent of the onset or coda and hence cannot be taken as evidence for the *TUT constraint: *IQ* > [a:j.khi:w], *fuse* > [fi:w.si:]. The clearest example is *shoot* > [søt]. The next best are *tenderloin* > [thi:n.ta:løn], where truncation of the offglide of the [oj] diphthong (cf. *coin* > [khɔ:n]) would have yielded an open back vowel [ɔ:] that is here replaced by its short front rounded counterpart [ø], and *rumba* [ɒ] > [lœ:n.pa:], where the coda [m] has been changed to avoid a labial-labial violation that in turn forces the otherwise expected [ɔ:] to front to [œ:]. Finally, the [ɒn] rime seen in the fabric names *orlon*, *nylon*, and *dacron* is adapted variably with fronting [ɔ:løn], change of coda [na:loŋ], or strangely both [tek.khɔ:k.lœ:ŋ].

(26)	fluke	fu:lok
	boot	pu:t
	horn	hɔ:n
	shoot	søt
	tenderloin	thi:n.ta:løn
	duce	ti:w.si:
	rumba	lœ:n.pa:
	function	fɐŋ.søn
	gallon	ka:løn
	nylon	na:loŋ
	orlon	ɔ:løn
	dacron	tek.khɔ:k.lœ:ŋ

8. Summary and implications

In (27) we summarize the rankings posited in our analysis of the loanword adaptations in the face of the four VC rime constraints discussed in this paper.

(27) *ET ≈ Ident-V[high] ≈ Ident-Coronal

*OP » Ident-[round] ≈ Ident-Labial

*IK, Ident-Dorsal » Ident-V[high], Ident-Coronal, Ident-Labial

*oT, Ident-V[high], Ident-[ATR] » Ident-Coronal

The *ET constraint is enforced variably while *IK, *oT, and *OP are undominated. The repairs to *ET and *OP include a change of the nuclear vowel or the coda consonant. For *IK only the vowel is changed and for *oT only the coda consonant.

A major goal of theoretical research into loan phonology is to develop a typology of the possible repairs that bring the loan in line with native grammar constraints. One hopes that ultimately the results obtained in this domain will mesh with judgments of sound similarity in the domains of rhyme and general phonological faithfulness (Steriade 2009). Let us summarize the findings of this study of Cantonese loanwords in light of this more general endeavor. Our first result is that faithfulness for vowel quality dominates faithfulness for length (confirming the finding of Yip 2006). This explained why the short vowel of *to check* [ɛ] was adapted with long [ɛ:] over short [e]. It suggests that in the grammar of Cantonese vowel length enhances the ATR/height contrast.[10] Our second finding is that faithfulness for vowel backness dominates faithfulness for vowel height ([high] and [ATR]) as well as vowel roundness ([round]). We suggested that a vowel's identity in a CVC context is more sensitive to the features of the surrounding consonants that affect F2; a change in vowel height will not alter the CV and VC formant transitions as much as a change along the front-back dimension. The asymmetry between vowel height and backness shows up in other domains where perceptual similarity and distance are at play. For example, the famous study of Peterson and Barney (1951) on confusion among English vowels finds that {ɪ, ɛ, æ} and {ʊ, ɔ, ʌ, ɑ} form distinct sets with confusions along the height dimension but essentially few or none along the front-back dimension. Zwicky's (1976) study of slant rhymes in English rock song lyrics has a similar finding.

A third generalization that emerges from the Cantonese loanword adaptations is that when the coda consonant is altered, the change is almost always to dorsal. For *oT we find both t > k and n > ŋ: *coat* > [khok], *cone* > [khoŋ]. For *ET we have t > k: *offset* > [ɔ:sek]. And for *OP we find several instances of m > ŋ such as *prom* > [pɔ:ŋ] and *zombie* > [sɔ:ŋbej] but just a couple of m > n (*hamburger* > [hɔ:n.bow], rumba > [lœ:n.pa:]). Three possible explanations for this dorsal coda preference suggest themselves. It could reflect the faithfulness wing of the familiar Ident-Dorsal » Ident-Labial » Ident-Coronal hierarchy (de Lacy 2004). The front to back change of coda place is of course well known to students of Chinese historical phonology since the important study of Chen (1973). In a survey of over 20 Chinese dialects Chen found that mergers of place contrasts in the coda invariably proceed in the direction labial > coronal > dorsal with changes in stops typically occurring before changes in nasals. However, faithfulness cannot be the entire story since when a coda labial is changed to satisfy the *OP constraint, the *Dorsal » *Labial » *Coronal markedness hierarchy predicts a coronal repair. This outcome is found (*hamburger* > [hɔ:n.bow], *rumba* > [lœ:n.pa:]). But we have the impression that a dorsal coda is more prevalent, as in *zombie* > [so:ŋ.bej], *prom* > [pɔ:ŋ], *romance* > [lɔ:ŋ.ma:n.si:], *sauna* > [sɔ:ŋ.na]. An alternative explanation is frequency. Since Cantonese coda stops are unreleased and the place cues to coda nasals are relatively weak, one can easily imagine conditions such as noise in which speakers may fail

10. It would be interesting to conduct a study along the lines of Escudero (2005) in which the F1 and duration of the Cantonese mid vowels are systematically varied to see whether vowel height or vowel duration is the major cue to how the vowels are identified. The loanword phonology suggests that Cantonese would align with Southern British English (where vowel quality predominates in the tense-lax opposition of *sit* vs. *seat*) as against Scottish English where duration is the major distinction.

to attend to the VC formant transitions that would be the principal cue to coda place. In such states of uncertainty speakers may resort to statistical reasoning and substitute the place feature that is most common in the lexicon. This line of reasoning leads us to ask for the frequency of Cantonese codas. We are grateful to Xinzhong Liu for the data reported in (28) showing the number of possible CVC combinations (ignoring tone) for each coda consonant in Guanzhou and Hong Kong Cantonese. Remarkably for both the nasals and the stops, the dorsal > coronal > labial hierarchy obtains.[11]

(28)	CVm	38
	CVp	34
	CVn	79
	CVt	73
	CVŋ	108
	CVk	100

This mirrors the typology of mergers across the various Chinese dialects observed by Chen (1973) and suggests that the dorsal > coronal > labial hierarchy is present statistically in dialects that still preserve the ternary place contrast for nasals and stops. Further study is necessary in order to determine whether frequency or markedness or both underlies the oral place hierarchy for Chinese codas.[12]

A third possibility is suggested by Flyne (2012), who documents a number of cases where coronal consonants are replaced by dorsal in both phonological alternations and sound changes as well as in loanword adaptations. For example, in Tlachichiclo Tepehua (Watters 1980, 1988) coda stops and nasals are realized as velar: ho?ati 'man' vs. ho?akna 'men', kap'a 'he forgets it' vs. kawkłi 'he forgot it'. The process also applies in loans: Pepsi > peksi, Huehuetla (Aztec placename) > wewekla. Flyne proposes that the process involves assimilation of the dorsal (tongue body) articulator of the preceding vowel. He follows Halle (2005) in explicitly rejecting the basic premise of feature geometry that when an articulator feature is assimilated, any dependent features such as [back] are as well. Hence, any connection between the frontness or backness of the vowel and the coronal vs. velar realization of the coda must be treated as an independent parameter of variation. More research is needed to determine whether or not the assimilation of articulator features and their bound dependents are as independent as this proposal implies.

11. More telling would be the type frequencies for the codas, i.e. how many distinct lexical items end in p, t, k, etc. As far as we know, this information is not available.
12. Two recent phonetic studies on the identification of final unreleased stops do not seem to elucidate the front-to-back merger. Chu et al. (2008) find that the identification of unreleased [p, t, k] is significantly affected by the preceding vowel with [ip], [ut] and [ak] being the most optimal combinations, presumably because they show the sharpest VC formant transitions. Marty (2012) finds that French subjects (whose coda stops are typically released) identified unreleased stops most often as [p] since it has the weakest burst and hence is most similar to a stop with zero burst.

Another point worth making is that for both the *ET and *OP constraints, repairs changing the coda consonant or the nuclear vowel were found. This finding casts some doubt on the speculation in Kenstowicz (2006) that when a conflict arises between changing a vowel or a consonant in order to satisfy a CV or VC phonotactic constraint, it will be the more salient vowel that is preserved and the onset or coda consonant that changes. Some of the strongest instances of this phenomenon include the preservation of nondistinctive vowel height in Moroccan Arabic over a distinctive pharyngealization of adjacent consonants (Kenstowicz and Louriz 2010) or the preservation of nondistinctive backness over nasal place in the Mandarin adaptation of English loans (Hsieh, Kenstowicz, and Mou 2009). In both cases there is good evidence that the nondistinctive vowel features enhance the adjacent consonantal contrasts and function as cues for the recovery of the consonantal distinction. For the Cantonese *ET and *OP constraints, the nuclear vowel and coda consonant do not stand in an enhancing relation. Hence, that motivation is missing. But it is still not clear that the relative saliency of vowels over adjacent consonants plays no role in the similarity judgments underlying loanword adaptation. When asked to provide online adaptations, our informants seem to privilege faithfulness to the vowel, as in the following examples: *home* > [hɔːŋ], *hoop* > [huː], *mate* > [mej], *tape* > [tʰej], *bet* > [bɛːt], *sit* > [siːt], *seat* > [siːt]. It is possible that the phonetic salience of the vowel compared to the coda consonants (where stops are unreleased) comes to the fore when the English model is fresh in the Cantonese speaker's consciousness. Perhaps this factor recedes as the loan is transmitted through the speech community, giving rise to the vocalic height changes we have seen in this paper. A systematic sociolinguistic investigation would be required to corroborate this speculation.

Another implication of our study is more general support for phonological constraints as opposed to rules. From a traditional generative perspective, any context-sensitive rule changing X when adjacent to Y creates an *XY, *YX gap in the immediate output. But almost from outset of the generative approach (Stanley 1967), phonological generalizations that do not submit to this interpretation were noted, necessitating static morpheme-structure or surface-structure constraints. From this perspective what is phonologically illicit is the combination of XY regardless of how it may have arisen in the synchrony or diachrony of the language. The fact that we found changes of either the nuclear vowel or the coda consonant for some of the VC rime constraints is thus expected.

Finally, the loanword adaptations reviewed here demonstrate that the gaps in the rime tables noted by Hashimoto (1972), Kao (1971), and Bauer and Benedict (1997) are significant generalizations that are respected (to varying degrees) as a loan is adapted by the native grammar. The loans are thus comparable to the secret language changes Y-R. Chao appealed to in order to demonstrate the psychological reality of a CV restriction in Mandarin in his famous nonuniqueness paper (1934). More generally, loanword adaptations reveal sound substitutions of comparable interest and complexity to the phonological alternations that have been the staple of the generative approach. They allow the more «static» languages of East Asia such as Chinese to occupy a central place in phonological analysis and theory.

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Appendix

Loanword	**RP English**	**Cantonese**
accountancy	ə-kʰawn-tʰən-sɪ	aː-khaːŋ
ace	ejs	ej-siː
alongside	ə-lɔːŋ-sajd	aː-lɔːŋ-sɐj
apple	æpəl	ɛː-poː
arts	ɑːts	aːt-siː
argue	ɑː-gju	aː-kiw
assignment	ə-sajn-mənt	aː-saj-mɐn
ATM	ej-thiː-ɛːm	ej-thiː-ɛː
auntie	ɑːn-tʰiː	aːn-thiː
baby	beɪbi	piː-piː
baccarat	bɑkərɑ	baːk-gaː-lɔːk
ball	bɔːɫ	pɔː
ball-bearing	bɔːɫ-beə-ɹɪŋ	pɔː-pɛː-leŋ
ballet	bæ'leɪ or bæle	baː-lej (21)
band	bænd	pɛːn
bar	bɑr	paː
BBC	biː-biː-siː	piː-piː-siː
BBQ	baː-biː-khjuw	paː-piː-khiːw
bearing	beə-ɹɪŋ	pɛː-leŋ
Beatles	bit-ɫz̩	phej-thɐw-siː
beer	bɪər	pɛː
Benz	benz	pɛːn-siː
berry	bɛrɪ	pɛː-lej
billiards	bɪɫ-jədz	piː-lɛːt
biology	baj-ɒ-lə-dʒɪ	pɐj-ɔː
blouse	blaws	pow-lɐw-siː
body	bɒ-dɪ	pɔː-tiː
boot	buːt	puːt
boss	bɒs	pɔː-siː
bow tie	bəw tʰaj	pow-thaːj
bowling	bəw-lɪŋ	pow-leŋ
boxing	bɒk-sɪŋ	pɔːk-seŋ
boy	bɔj	pɔːj
boycott	bɔj-kʰɒt	puːj-kɔːt
brake	bɹejk	pek-lek
brandy	bɹæn-dɪ	paːk-laːn-tɛj
broker	bɹəw-kʰə	pok-kaː
buffet	bu-fej	pow-fɛj
bumper	bəm-pʰə	pɐm-paː
bun	bʌn	pɐn
bus	bʌs	paː-siː
bye-bye	baj-baj	paːj-paːj
cake	kʰejk	khek

Loanword	RP English	Cantonese
call	kʰɔːɫ	khɔː
callback	kʰɔːɫ-bæk	khɔː-pɛːk
calorie	kʰæɫ-ə-ɹɪ	kaː-low-lej
cancer	kʰæn-sə	khɛːn-saː
cap	kæp	giːp
captain	kʰæp-tʰɪn	khɛːp-thøn
carat	kærət	kaː
card	kʰɑːd	khaːt or khɐt
carnival	kʰɑː-nɪ-vəl	kaː-niːn-waː
cartoon	kʰɑ-tʰun	kaː-toŋ
case	kʰejs	khej-siː
cash	kʰæʃ	khɛː-ʃyː
cashmere	kʰæʃ- mɪə	khɛː-siː-mɛː
cassette	kʰə-sɛt	kʰaː-sek
cast	khɑːst	khaː-siː
CD	siː-diː	siː-tiː
cello	tʃʰe-ləw	tshɛː-low
cents	sɛnts	siːn-siː
cha cha	tʃɑ tʃɑ	tsaː-tsaː
chalk	tʃɔk	tshɔːk
chance	tʃhɑːns	tshaːn-siː
cheap	tʃʰiːp	tʃhiːp
check	tʃʰɛk	tshɛːk
cheese	tshiːz	tʃiː-siː
chemistry	kʰɛm-ə-stɹɪ	khɛːm
cherries	tʃʰɛ-ɹɪz	tshɛː-lɛj-tʃiː
chocolate	tʃʰɒk-lət	tʃyː-kuː-lek
chowder	tʃaʊdər	tsɐw-taː
CID	siː-aːj-diː	siː-aːj-tiː
cider	saɪdər	saiː-daː
cigar	sɪ-gaː	ʃyːt-kaː
civil	sɪ-vɫ̩	siː-fow
class	kʰlɑːs	kʰaː-siː
click	kʰlɪk	khek
clip	kʰlɪp	kiːp
clutch	kʰlətʃ	kek-lek-tʃiː
cocktail	kʰɒk-tʰejɫ	kɔːk-tɛː
cocoa	kʰəw-kʰəw	kok-kuː
coffee	khɒ-fɪ	kaː-fɛː
cognac	khɒn-jæk	kɔːn-jɐp
coil	kʰɔjɫ	khɔːj-low
coin	kʰɔjn	khɔːn
cola	kʰəw-lə	kɔː-laː
cologne	kʰə-ləʊn	kuːloŋ
commission	kʰə-mɪ-ʃn̩	khɐm-miː-søn

Loanword	**RP English**	**Cantonese**
Comp. Lit.	khɒmp-lɪt	khɐm-liːt
composition	kʰɒm-pʰə-zɪ-ʃn̩	khɐm-phow
computer	kʰəm-pʰju-tʰə	khɐm-phiːw-thaː
condenser	khən-dɛn-sa	khɔːn-tɛːn-saː
cone	koʊn	koŋ
cookie	kʰʊk-ɪ	khok-khiː
copy	kʰɒp-ɪ	khɐp-phiː
corner	kʰɔː-nə	khɔːn-naː
court	kɔrt or koʊrt	kɔːt
cousin	kʌzən	kaː-sɐn
cover	kʰʌv-ə	kɐp-faː
coxswain	kʰɒk-sn̩	khɔːk-sɐn
cracker	kʰrækʰə	haːk.lek.kaː
cream	kʰɹiːm	kej-liːm
curry	kʰʌ-ɹɪ	kaː-lɛj
cushion	kʰʊ-ʃn̩	khuː-san
cut	kʰʌt	khɐt
cutlet	kʰʌt-lət	kɐt-liːt
cutter	kʰʌt-ə	kɐt-taː
dacron	dæ-kʰɹən	tek-khɔːk-lœːŋ
daddy	dæ-dɪ	tɛː-tiː
darling	dɑrlɪŋ	daː-leŋ
DDT	diː-diː-thiː	tiː-tiː-thiː
deuce	djuːs	tiu-siː
dinner	dɪnər	diːn-naː
disco	dɪs-kʰəw	tek-siː-kow
DJ	diː-dʒej	tiː-tsej
dockyard	dɒk-jɑːd	tɔːk-jaː
doctor	dɒk-tər	dɔːk-taː
dollar	dɒ-lə	taː-laː
donut	dəw-nət	toŋ-lɐt
dozen	dʌz-ən	taː
duce	djuːs	tiːw-siː
dynamo	daj-nə-məw	taː-laːm-mow
economics	iː-kʰə-nɒm-ɪks	jiː-khɔːn or jiː-khɔːn
electrical	ɪ-lek-tʰɹɪ-kʰɫ̩	jiː-lɛːk
encore	ɑŋkɔr	ɛːn-khɔː
Eng. Lit.	ɪŋ-lit	ɛːŋ-liːt
engine	en-dʒɪn	ɛː-tʃiːn
essay	es-ej	ɛː-sej
fibre	faɪbə	faːipaː
face	fejs	fei-siː
fans	fænz	feːn-siː, faːn-syː
fail	fejɫ	fej-low
Ferrari	fə-ɹɑ-ɹi	faːt-lai-lei

Loanword	**RP English**	**Cantonese**
fare	feə	fej
fashion	fæ-ʃn̩	faː-sɐn
fibre	faj-bə	faːj-paː
file	fajɫ	faːj-low
film	fiɫm	fej-lɐm
flange	flændʒ	fɐt-laːn
flannel	flæ-nəl	faːt-laːn
floor-show	flɔː-ʃəw	fɔː-sow
fluke	fluːk	fuː-lok
forecast	fɔː-kɑːst	fɔː-khaː-si
foreman	fɔː-mən	fɔː-mɐn
foul	fawɫ	fɐw
frank	fɹæŋk	faːt-lɔːŋ
freezer	fɹiː-zə	fliː-saː
friend	fɹɪnd	fɛːn
fun	fʌn	fɐn
fuse	fjuːz	fiːw-siː
function	fəŋk-ʃn̩	fɐŋ-søn
fussy	fʌs-ɪ	fɐt-siː
gabardine	gæ-bə- diːn	kaː-paː-tiːn
gallon	gæɫ-lən	kaː-løn
game	gejm	kɛːm
gas	gæs	gɛː-siː
gay	geɪ	kej
gin fizz	dʒɪn fiz	tʃiːn-fej-si
gin sling	dʒɪn slɪŋ	tʃiː-siː-leŋ
golf	gɒlf, gɔlf, or gɒf	goː-yiː-fuː
good-bye	gʊd-baj	kuːt-paːj
gross	gɹəws	lɔː
guard	gɑːd	gɐt
guitar	gɪ-tʰɑː	kiːt-thaː
Gurkha	gɜː-kʰə	kœːkaː
guts	gʌts	kɐt-siː
hello	hə-ləw	haː-low
hi-fi	haj-faj	hɐj-fɐj
high	haj	haːj
high-class	haj-kʰlɑːs	haːj-khaː-siː
Hillman	hɪɫ-mən	hej-low-mɐn
hormone	hɔr-moʊn	hoː-yiː-muŋ
horn	hɔːn	hɔːn
hum	hʌm	hɐm
husband	hʌz-bənd	haː-siː-bɐn
hysteria	hɪstɪərɪə	giːt-siː-tai.ei
inch	ɪntʃ	iːn-tʃiː
insure	ɪn-ʃʊə	jiːn-sɔː

Loanword	RP English	Cantonese
IQ	aːj-khjuːw	aːj-khiːw
jack	dʒæk	tsek
jacket	dʒæk-ɪt	tsɛːk-khɛːt
Jaguar	dʒæg-jʊə	tsɛː-kaː
jam	dʒæm	tsɛːm
jeans	dʒinz	tʃiːn
jeep	dʒip	tʃiːp
jelly	dʒe-lɪ	tsɛː-lej
jersey	dʒɜː-zɪ	tsɛː-siː
jockey	dʒɒk-ɪ	tsɔːk-khiː
jumbo	dʒʌmboʊ	tsɐn-pow
jump ball	dʒʌmp bɔːɫ	tsɐm-pɔː
kid	kʰɪd	khiːt
king	kʰɪŋ	kheŋ
king size	kʰɪŋ-sajz	kheŋ-saːj-siː
KMB	khej-ɛːm-biː	khej-ɛːm-piː
Kodak	kʰəw-dæk	khɔː-taːt
label	lej-bəl	lei-pou
lace	lejs	lej-siː
lacquer	læk-ə	lek-kaː
laser	lej-zə	løy-seː
last	lɑst	laː-siː
LC	ɛːl-si	ɛː-low-si
lemon	lɛmən	liːŋ-muːŋ
letter	lɛt-ə	lɛːt-thaː
license	laj-sn̩s	laːj-sɐn
lift	lɪft	liːp
linen	lɪn-ən	liːn-jɐn
literature	lɪtərətʃər	liːt
lorry	lɒ-ɹɪ	lɔː-liː
lotion	loʊʃən	lɔː-ʃɐn
Lysol	laj-sɒɫ	laːj-sow
madam	mædəm	mɛː-duːm
major	mej-dʒə	mɛː-tsaː
margarine	mɑː-dʒə-ɹiːn	maː-tʃiː-liːn
margin	mɑː-dʒɪn	maː-tʃiːn
mark	mɑːk	maːk (verb) mɐk (noun)
market	mɑrkɪt	maː-kɛːt
mask	mɑːsk	maː-siː
maths	mæθs	mɛːt-si
MC	ɛːm-siː	mə
mechanical	mə-kʰæn-ɪ-kʰɫ̩	mɛːk-khɛːn
meter	mi-tʰə	mɐj
microphone	maj-khrə-fəwn	mɐj-kow-foŋ
microphone	maj-kʰɹə-fəwn	mɐj

Loanword	**RP English**	**Cantonese**
mild	majɫd	mɐj
mile	majɫ	mɐj
minced	mɪnst	mɪːn-tʃiː
mink	mɪŋk	miːŋ
Miss	mɪs	miː-siː
mold	məwɫd	mow
mommy	mɑː-mɪ	maː-miː
Morris (car)	mɒ-ɹɪs	mɔː-lej-siː
motor	məw-tʰə	mɔː-ta
movie	muː-vi	muː-fiː
MTR	ɛːm-thiː-aː	ɛːm-thiː-aː-low
NG	ɛːn-dʒiː	ɛːn-tʃiː
nickle	nɪkəl	nik-kow
notebook	noʊt-bʊk	lɔː-bok
notes	nəwts	nok-siː
number	nʌm-bə	nɐm-paː or lɐm-paː
number one	nʌm-bə wʌn	nɐm-paː-wɐn
nylon	naj-lɒn	naː-loŋ
off	ɒf	ɔː-fuː
office	ɒf-əs	ɔː-fej-siː
OK	ow-khej	ow-khej
omelette	ɒm-lɪt	ɐm-liːt
oral	ɔː-ɹəɫ	ɔː-low
orange	ɔrɪndʒ	ɔː-løn-tʃiː
order	ɔː-də	ɔː-taː
orlon	ɔː-lɒn	ɔː-løn
OT	ow-thiː	ow-thiː
Ovaltine	əw-vɫ̩-tʰiːn	ow-waː-thiːn
over	əw-və	ɔː-faː
ounce	awns	ɔːn-siː
P	phiː	phiː
pair	pʰeə	phɛː
pan	pʰæn	phaːŋ
pancake	pʰæn-kʰejk	paːn-khek
paper	peɪpər	pej-pa
park	pʰɑːk	phaːk
pass	phɑːs	phaː-siː
partner	pʰɑːt-nə	phaːt-naː
party	pʰɑː-tʰɪ	phaːt-thiː
passport	pʰɑːs-pʰɔːt	phaː-siː-phɔːt
pence	phɛns	piːn-siː
penny	phɛni	pɛnː-niː
percent	pʰə-sent	paː-siːn or phœː-sɛn
philosophy	fɪ-lɒ-sə-fi	fiː-lɔː
physics	fɪz-ɪks	fiː

Loanword	**RP English**	**Cantonese**
pie	pʰaj	phɐj
pin	pin	pi:n
ping-pong ball	pʰɪŋ-pʰɒŋ-bɔ:ɫ	peŋ-pɐm-pɔ:
pizza	pʰɪ:t-sə	phej-sa:
place	pʰlejs	phej-si: or phej-lej-si:
plum	pʰlʌm	pow-lɐm
poker	poʊkər	pɔk:-ka
political	pʰə-lɪt-ɪ-kʰɫ̩	phow-li:t
port	pʰɔ:t	pu:t
pose	phəwz	phow-si:
post	phəwst	phow-si:
postcard	pʰəwst-kʰɑ:d	phow-si:-kha:t
poster	poʊstər	pɔ:-sta
potential	pʰə-tʰen-ʃɫ̩	phow-thɛ:n-sow
pound	pʰawnd	pɔ:ŋ
powder	paʊdər	pha:w-ta
professor	pʰɹə-fɛ-sə	phow-fɛ:-sa:
psychology	saj-kʰɒ-lə-dʒɪ	saj-khɔ:
pump	pʰʌmp	pɐm
PVC	phi:-vi:-si:	phi:-wi:-si:
qualification	kʰwɒ-lɪ-fɪ-kʰej-ʃn̩	khwɔ:-li:
quart	kʰwɔ:t	kwɐt
quarter	kʰwɔ:-tʰə	kwɐt
quinella	kʰwɪ-neɫ-ə	khwi:n-nɛ:-la:
quinella	kʰwɪ-neɫ-ə	khi:w
ream	ɹi:m	li:m
roller	ɹəw-lə	low-la:
Rolls	ɹəwɫz	low-si:
Royce	ɹɔjs	lɔ:j-si:
rouble	ɹu:-bɫ̩	low-pow
round	ɹaʊnd	la:n
rum	ɹʌm	lɐm
rumba	ɹʌm-bə	lœ:n-pa:
rupee	ɹu:-pʰi:	low-pej
salad	sæɫ-əd	sa:-løt
salmon	sæmən	sa:-mu:n
saloon	sə-lu:n	sa:-loŋ
sample	sɑ:m-pʰɫ̩	sa:m-phow
sandwich	sæn-wɪdʒ	sa:m-mɐn-tʃi:
satay	sɑ-teɪ	sa:-tɛ:
sardine	sɑ:-di:n	sa:-ti:n
sauna	saʊ-nə	sɔ:ŋ-na:
saxophone	sæk-sə-fəwn	sek-si:-foŋ
score	skɔ:	si:-kɔ:
sergeant	sɑ:-dʒənt	sa:-tʃin

Loanword	RP English	Cantonese
set	sɛt	søt
sex	sɛks	sɛːk-siː
shaft	ʃɑːft	sɐp
shake	ʃejk	sek
sharp	ʃɑːp	saːp
shilling	ʃɪɫ-lɪŋ	siːn-leŋ
shirt	ʃɜrt	sœːt
shoot	ʃuːt	søt
show	ʃəw	sow
shutter	ʃət-ə	sɐt-taː
sideboard	sajd-bɔːd	sɐj-puːt
sink	siŋk	seŋ
sir	sɜː	aː-sœː
sirloin	sɜː-lɔjn	sɐj-laːŋ
size	sajz	saːj-siː
slick	slɪk	siː-lek
slide	slajd	siː-laːj
smart	smɑːt	siː-maːt or siː-maːk
snooker	snʊk-ə	siː-lok-kaː
social	səw-ʃɫ̩	sow-sow
sociology	səw-sɪ-ɒ-lə-dʒɪ	sow-siː
socket	sɒk-ət	sɔː-kiːt
soda	səw-də	sɔː-taː
sofa	səw-fə	sɔː-faː
soft	sɔft	sɔː-fuː
solicitor	sə-lɪs-ɪ-tʰə	sow-liːt
sorry	sɒ-ɹi	sɔː-liː
souffle	suː-flej	sɔː-fuː-lej
spanner	spæn-nə	siː-paː-laː
spare	speə	siː-pɛː
spark	spɑːk	siː-paːk
sports shirt	spɔːts-ʃɜt	siː-puːt-søt
stamp	stæmp	siː-taːm
start	stɑːt	siː-thaːt
statistics	stə-tʰɪs-tɪks	siː-tɛːt
steam	stiːm	siː-tiːm
stick	stɪk	siː-tek
store	stɔː	siː-tɔː
straight	strejt	siː-tek-lek
strawberry	stɹɔ-bə-ɹɪ	siː-tɔː-pɛː-lej
style	stajɫ	siː-taːj-low
sugar	ʃʊgər	suː-kaː
sundae	sʌn-dej	sɐn-tej
Sunkist	sʌn-kʰɪst	sɐn-khej-si
switch	swɪtʃ	siː-wiːt-tʃiː

Loanword	RP English	Cantonese
T-shirt	tʰi-ʃɜːt	thiːsøt
table	teɪbəl	tej-bow
tart	tɑrt	thaːt
taxi	tʰæk-sɪ	tek-siː
TB	thiː-piː	thiː-piː
tenderloin	tʰen-də-lɔjn	thiːn-taː-løn
tennis	tʰen-ɪs	thɛːŋ-nej-siː or thɛːn-ni-siː
thank you	θæŋk-juː	teŋ-kiːw
tick	tʰɪk	thek
tie	tʰaj	thaːj
tips	tʰɪps	thiːp-siː
tire	tʰajə	thaːj
toast	tʰəwst	tɔː-siː
TOEFL	thow-fəɫ	thow-fow
ton	tʰʌn	tøn
tonic	tʰɒnɪk	thɔːn-nek
tutor	tʰjuː-tʰə	thiw-thaː
tutorial	tʰjuː- tʰɔː-ɹɪ-əɫ	thiːw-thɔː
TV	thiː-viː	thiː-wiː
uncle	eŋ-kʰɫ̩	ɐŋ-khow
understand	ən-də-stænd	ɐn
valve	væɫv	waː-low
van	væn	wɛːn
vanilla	və-nɪɫ-ə	wɐn-niː-laː
vaseline	væ-sə-liːn	faː-siː-leŋ
very good	ve-ɹɪ-gʊd	wɛː-liː-kuːt
vitamin	vaɪtəmɪn, vɪtəmɪn	wɐː-taː-miŋ
volley	vɒlɪ	wɔː-lei
Volkswagen	vəwks-wɑː-gən	fok-siː
volt	vewɫt	fɔːt
volume	vɒɫ-juːm	wɔː-lɐm
wafer	weɪfə	wɐj-faː
waiter	wej-tʰə	wej-thaː
walkman	wɔkmən	wɔːk-mɐn
warrant	wɒrənt	faː-leŋor wɔː-leŋ, wɔːløn
waste	wejst	wɐj-siː
watt	wɒt	wɔːk
whiskey	hwɪs-kʰɪ	wɐj-siː-kej
wide-angle	wajd-æŋ-gɫ̩	waːj-ɛːŋ-kow
wife	wajf	wɐj-fuː
winner	wɪn-ə	wɐn-naː
wire	wajə	wɐj-jaː
yeast	jiːst	jiː-siː