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Syllabification Paradox - Hong Kong Transliteration of English Words

Lian Hee Wee
Hong Kong Baptist University, lianhee@hkbu.edu.hk

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L.H. Wee
Hong Kong Baptist University
lianhee@hkbu.edu.hk

1. Introduction

This paper considers two fairly simple patterns found in Cantonese loanword phonology: the breaking up of consonant clusters by epenthesis and by deletion.

(1) a. Pattern 1: Epenthesis

		English	HK Transliteration
i.	"stick"	[stɪk]	[si.tik]
ii.	"spoon"	[spu:n]	[si.pun]
iii.	"plum"	[plʌm]	[pou.lʌm]

b. Pattern 2: Deletion

		English	HK Transliteration
i.	"lamp"	[læmp]	[lɛm]
ii.	"lift"	[lɪft]	[lip]
iii.	"act"	[ækt]	[ɛk]

In saying that consonant clusters are broken up, one should not be led to think that this is a description of the phonology of what may be a variety of English (in this case Hong Kong) in terms of deviation from a perceived standard. (See Mohanan 1992 for extensive discussion on the fallacies of such an approach.) Instead, the question should be: When Cantonese speakers hear English words, what made them borrow those words into forms deviant from what was articulated by English speakers? For example, since an English speaker clearly says "stick", it is puzzling that the Cantonese speaker should borrow the same word in a deviant form [si.tik]

The solution to this is fairly straightforward. Cantonese phonology does not allow consonant clusters, hence all borrowings that contain consonant clusters would be broken up. In the case of (1), since epenthesis only applies to word-initial clusters and deletion only to word-final clusters, the following two rules may be postulated:

(2) Rules for breaking up consonant clusters
a. Epenthesis rule Ø → V / #C__C
b. Deletion rule C → Ø / C__# ; where # indicates word boundary

Given (2), one would be puzzled to find cases like (3), where both epenthesis and deletion apply.

(3) Opacity: Deletion and Epenthesis

		English	HK Transliteration
i.	"last"	[lɑ:st]	[la.si]
ii.	"soft"	[sɒft]	[sɔ.fu]
iii.	"left"	[lɛft]	[lɛ.fu][1]

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[1] My informants told me that in a drill (e.g. police marching), "left" may be called out as [lɛt] or [lɛp]. This paper will not concern itself with such specific use.

With its specific reference to word-initial boundary, the epenthesis rule in (2a) has no role to play in (3). In the light of (4), this would indeed seem to be correct.

(4) Fricative coda avoidance

		English	HK Transliteration
i.	"bus"	[bʌs]	[ba.si]
ii.	"case"	[keis]	[kei.si]
iii.	"five"	[faiv]	[fai.fu]

The epenthesis at word-final positions is triggered by the fricative rather than by the presence of consonant clusters.

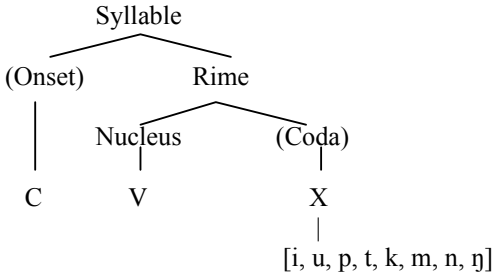
(5) Word-final epenthesis rule

Ø → V / C __#
|
[fricative]

While the observation in (5) is correct, it misses the point that the two epenthesis processes and the deletion process are all part of the repair strategies used to make borrowed English words conform to Cantonese phonology.

As argued in Yip (1993), it is not the case that loanword phonology in Cantonese is the result of having a separate component of grammar. Rather, it is by subjecting the English source words to the phonological systems of Cantonese that produces the differences between loanwords and source words. This is most easy to see if we recognize that the Cantonese syllable is maximally 3 segments with certain restrictions on the coda.

(6) The Cantonese Syllable[2]



Given the structure in (6), it is hardly surprising that consonant clusters in the English source words would be broken up when transliterated. Likewise, since fricative codas are disallowed in Cantonese, they are avoided. In this case, epenthesis is the chosen strategy because that would allow for the fricative to be syllabified as the onset of another syllable. Clearly, the rules in (2) and (5) are repair strategies. They take input source words and then parse them in a way so that the outcome would conform to (6). This leads us to conclude that any account for loanword syllabification must capture this property.

Loanword syllabification of the kind presented in Hong Kong borrowings of English words is deceptively simple when they are in fact extremely hard to capture in the context of loanwords. This paper attempts to unravel the challenges present by the syllabification of loanwords and argues that neither a derivational approach, a classical Optimality Theoretic approach, nor a multiple scansion approach adequately provides an account. Instead, the best bet must be a

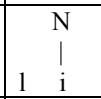
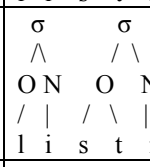
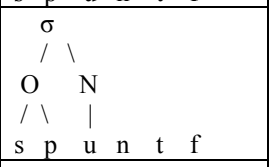
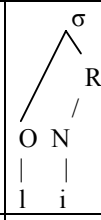
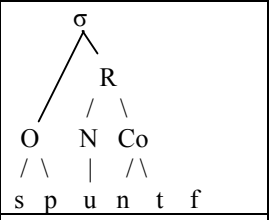
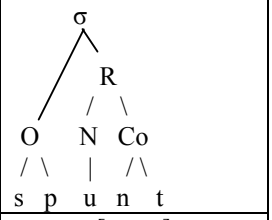
[2] The model is largely simplified in the sense that Cantonese also allows for syllabic nasals as nucleus and for some glides [j, w] to be onsets. This has little impact on the discussion here.

combination of both approaches where derivational histories are encoded into structural representations of the kind argued for in Orgun (1996) and Wee (2004).

2. Paradoxical Ordering

This section presents a derivational attempt at the syllabification of Cantonese loanwords. It must be borne in mind that syllabification is generally not specified in the underlying representations. This is because syllabification is generally predictable from sonority peaks. A typical syllabification procedure would go like this:

(7) A typical syllabification procedure

	"list" /list/	"listing" /listiŋ/	/spuntf/
i. Parse V into Nucleus			
ii. Parse C into Onset			
iii. Parse C into Coda			
iv. Repair (stray erasure)	N.A.	N.A.	
Output	[list]	[lis.tiŋ]	[spunt]

In (7), I present 3 input strings (2 real words and 1 coined string) and show how they might be syllabified in English. After all the vowels are identified as nucleus, the next step would be to parse as many consonants preceding the vowels as possible into onsets. It is for this reason that [t] is syllabified into the onset for "listing". Remaining consonants are parsed into codas. Both steps (7ii) and (7iii) only go as far as the consonantal string is allowed by the syllable structure of English.[3] With the coined example /spuntf/, the final [f] cannot be parsed into the coda. It would either be elided by stray erasure (shown here) or else a vowel would have to be appended so that [f] may be syllabified as the onset in [fV].

It should be clear that it is important to order these steps the way they are ordered here of the algorithm will fail to produce the attested outputs. (For details on syllabification algorithms, see Blevins 1995.)

When presented with a foreign string of sounds, such as English, the Cantonese speaker would also be applying similar syllabification algorithms. Only in this case, syllabification would be confined to the Cantonese syllable template rather than an English one. One cannot resort to a priori reference to syllable internal constituents such as onsets or codas. In other words, it is unacceptable for us to say that Cantonese takes the ONSET consonant cluster and breaks them up

[3] Which happens to be [sCCVVCCC#s], where # is a morpheme boundary, C = consonant, V = vowel and s = [s].

by epenthesis. This is because the notion ONSET does not exist at the point of the input. The input is merely a string of segments to be parsed into syllables.

It turns out that it is possible to derive the results in (1), (3) and (4) by simply ordering the rules in (2) and (5) with respect to syllabification. For convenience, we will consider the example of "stamp" [si.tam] and "last" [la.si][4]. The procedure is given below.

(8) Deriving the Syllabification of Loanwords

	"stamp" /stamp/	"last" /last/
i. Deletion rule C → Ø / C__ #	stam	las
ii. Parse V into Nucleus	N | s t a m	N | l a s
iii. Parse C into Onset	σ / \ O N | | s t a m	σ /\ O N / | l a s
iv. Parse C into Coda	σ /\ R / \ O N Co | | | s t a m	N.A. since [s] is not a legitimate coda in Cantonese.
v. Epenthesis (both word-initial and Word-final)	σ σ R R | / \ O N O N Co | | | | s **i** t a m	σ σ R R | | O N O N | | | | l a s **i**
Output	[si.tam]	[la.si]

As may be seen in (8), it is possible to derive the right results. In fact, (8) even successfully captures the fact that both epenthesis procedures (word-initially and –finally) are the same process. However, (8) is not a satisfactory account because the deletion rule (8i) is clearly also part of the "repair" strategies to achieve conformity with Cantonese syllable template. There is no reason why (8i) and (8v) should be so separated if their jobs are really just to modify the input string to conform to Cantonese syllable template. Also, repair strategies come last, so that (8i) would seem awkward to be the very first step. It may also strike some of us as weird that epenthesis as a repair strategy requires another round of syllabification.

It turns out that it is not possible to solve this problem by simply re-ordering the steps laid out in (8). Any other order would produce unattested forms. It is here that we see the paradox: Repair strategies have to come before and after syllabification.

(9) The ordering paradox
Step 1 Repair: Deletion Rule
Step 2 Parsing into syllable constituents
Step 3 Repair: Epenthesis

3. Optimality Theoretic Account

[4] The matter on vowel quality is irrelevant here, and so will be ignored.

The difficulties in the procedural account given above are exemplary of the criticisms that Optimality Theoretic accounts have against derivational analyses. While rule ordering could produce the attested forms, it provides no account to the conspiracy effects of the rules (in this case the avoidance of consonant clusters), hence provides no deeper insight beyond shallow description of the phenomenon. However, this is not to say that Optimality Theory (OT) could handle this problem either. If one takes a closer look at the epenthesis situations, one would notice that it is both transparent and opaque.

(10) a. Transparent epenthesis

i. /stik/ → [si.tik] "stick"
by Ø → V / #C__C

ii. /bas/ → [ba.si] "bus"
by Ø → V / C __#
|
[fricative]

b. Opaque epenthesis (Counterbleeding opacity)
/last/ → las → [lasi] "last"
by C → Ø / C__# then *by Ø → V / C __#*
|
[fricative]

Within an OT framework, epenthesis would be violation of a faithfulness constraint such as DEP and would only be warranted by dominating markedness constraints. In the case of (10ai) that markedness constraint would be one that disallows for consonant clusters. In the case of (10aii), it would be some kind of coda constraint against fricatives.

(11) ***CC**
Do not allow consonant clusters in the output.
***CO[FRIC]**[5]
Fricatives are not allowed in coda positions.
DEP
Segments in the output must correspond with segments in the input.

By ranking *CC and *CO[FRIC] above DEP, one could easily account for (10a), but it would not do for (10b). This is because the either the deletion of [s] or the insertion of [i] alone would suffice to satisfy both markedness constraint. To resort of both deletion of [t] and the insertion of [i] is over-repairing. The kind of opacity exhibited in (10b) is reminiscent of that found in Tiberian Hebrew which McCarthy (1998, 2000) used to motivate Sympathy Theory – a theory where a special constraint picks out a candidate corresponding to the intermediate form in derivational accounts and then uses that candidate as a basis to select the optimal output.

In the case of Cantonese loanword phonology, to apply Sympathy Theory would require the selector constraint to pick *las as the sympathetic candidate. Selectors are necessarily Faithfulness constraints, so in this case, the possible selectors are FAITH C__# or FAITH[FRIC].

(12) Possible selectors
FAITH C__#
Do not delete the initial consonant of the word final consonant cluster.
FAITH[FRIC]
Do not delete fricatives.

[5] One might argue against the universality of this constraint in this form. However, it remains true that across languages, coda positions do have more stringent restrictions than onsets. The nature of syllable codas, though important, is outside the scope of this paper.

FAITH C__# is a non-starter. It makes reference to the position of the consonant, and hence is a positional faithfulness constraint. However, this positional faithfulness it requires the preservation of a segment that is neither the head of a constituent, nor is it located at the edge of anything.[6]

FAITH[FRIC] fares better and in fact makes a number of correct predictions as may be seen from the fact that in Cantonese loanwords, fricatives generally do not get deleted, exemplified below with OT tableaux

(13) Fricative Faithfulness

		English	HK Transliteration
a.	"bus"	[bʌs]	[ba.si]
b.	"notes"	[nəuts]	[nəut.si]

a.	/bʌs/	FAITH[FRIC]	*CC	*CO[FRIC]	MAX	DEP
i.	bas			*!		
ii.	ba	*!			*	
iii.☞	ba.si					*

b.	/nəuts/	FAITH[FRIC]	*CC	*CO[FRIC]	MAX	DEP
i.	nəuts		*!	*		
ii.	nəut	*!				
iii. ☞	nəut.si					*
iv.	nəu.si				*!	*

Armed now with the most promising selector constraint one could find, the following tableau makes an attempt at capturing the deletion and epenthesis in Cantonese loanword syllabification. The two words chosen are "stamp" and "last", which together includes all the crucial properties that must be accounted for.

(14) A Sympathy Theory Attempt

		English	HK Transliteration
a.	"stamp"	[stæmp]	[si.tam]
b.	"last"	[lɑ:st]]	[la.si]

a.	/stæmp/	★FAITH[FRIC]	*CC	*CO[FRIC]	MAX	DEP
i.	stamp		*			
ii. ☹?	si.tam				*	*
iii.☹?	si.tam.pi					**
iv.☹?	sam				**	
v.	tam	*			**	

b.	/lɑ:st/	★FAITH[FRIC]	*CC	*CO[FRIC]	MAX	DEP
i.	last		*			
ii.	la.si				*	*
iii.	lat	*			*	
iv.	las			*	*	
v. ☹	la.sit[7]					*

[6] Bearing in mind that syllable constituency is not established at this point, there can only be references to morphological boundaries. Also, see Beckman (1998) for details on what positions are possible references for faithfulness.

[7] The selection of this candidate was what worked for Tiberian Hebrew in McCarthy (2000) because in Tiberian Hebrew, it was the epenthesis that triggered the deletion of the final consonant (/dešʔ/ →

In (14), ★ indicates the selector constraints, which identifies the candidates marked ❁ as the sympathetic candidates. In (14a), it is unclear which of the 3 are sympathetic candidates, hence the "?", but in (14b), it is candidate (14b.v).

Even without bringing in the sympathetic constraints ❁CUMUL and ❁DIFF, it is clear that the attempt has failed miserably. Candidate (14b.v) is not the desired sympathetic candidate. Recall that the sympathetic candidate should be *las, identical to the intermediate form in a derivation. Further, the attempt with "stamp" brings into the foreground another problem, highlighted in (15).

(15) Problem with "stamp"

	/stæmp/	*CC	MAX	DEP
i.	stamp	**		
ii.	si.tam		*	*
iii.	si.tam.pi			**
iv.	sam		**	

Notice that high ranking *CC, would trigger only either MAX or DEP, but not both. Given the constraints here, there is no ranking that would pick candidate (15ii) as the winner and yet, it is precisely the attested output.

Thus far, it seems that the OT attempt has failed. The deceptively simple problems remain.

4. Double Scansion

Since neither a derivational account nor an OT account seems to work, the solution must lie somewhere else. The phonology of English loanwords in Hong Kong was probably first studied in Silverman (1990, 1992) and Yip (1990, 1993). In Silverman (1992), loanword phonology is understood as the result of first scanning the original English input for contrasts perceptible to the Cantonese speaker. This perceived input is then fed into the phonology of that Cantonese speaker who then produces an utterance. Within such a model, there are thus two places where modification to the original English can happen: first at the level of perception and second at the level of articulation. Yip (1993) adopts Silverman's multiple-scansion model in her account of Cantonese loanword phonology and uses it to preserve "highly salient segments such as /s/" (p.271). While Yip did not explicitly provide an account for the opaque epenthesis case in (10b), it is clear that for her, the first parse of the English source /sC#/ would produce /s#/ as the input for Cantonese loanwords (e.g. source /lɑst/ is parsed as /las/ before being produced as [la.si]).

While it produces the right results, Yip's account is unsatisfying for two reasons. Firstly, it involves ad hoc assumptions and secondly, it begs the question. Consider the words "notes", "last" and "stick", paying careful attention to the /s/ and /t/ in the English source.

(16)

		English	HK Transliteration
a.	"notes"	[nəuts]	[nəut.si]
b.	"last"	[lɑ:st]	[la.si]
c.	"stick"	[stɪk]	[si.tik]

Except for (16c) "last", the other two cases indicate that /t/ is not only perceptible but also preserved, whether it precedes or follows /s/, and also whether is it is in the initial or final consonant cluster. To adopt Yip's solution, one would have to explain why "t" is not perceptible to Cantonese ears in "last". At best, it would be a highly ad hoc claim that "t" is not perceptible if

---

dešeʔ → [deše]), but in Cantonese loanword syllabification, it is the deletion that triggered the epenthesis.

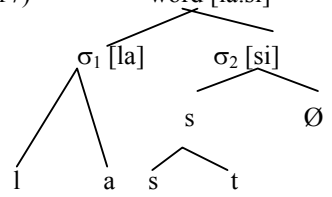
it follows /s/ word-finally.[8] Even with this ad hoc assumption, the question remains: why are some segments perceptible and other not?

In any case, the multiple scansion approach shares the paradox presented in section 2. Repair strategies that achieve the same effects are being separated into different levels, in this case, across two different scans.

5. Building Derivation Histories into Structures

From what one can gather in the above analyses, it seems that an adequate account to Cantonese loanword syllabification must recognize that word final consonant clusters are somehow parsed as a constituent before the initial clusters. Thus elision occurs to the final consonant but not the initial. If the remaining final consonant is /s/, it then triggers epenthesis. With word initial consonants, since the onset allows only for one C, any remaining C non-adjacent to the nucleus is preserved by epenthesis. This complicated process is schematically presented below, using "last" and "stamp" as examples.

(17)



Root tier: Output string

Tier 2: FAITH[FRIC] & coda [s] triggers epenthesis

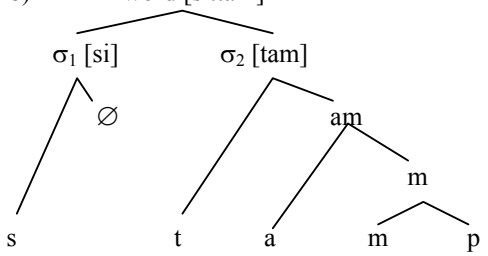
Tier 1: *CC triggers elision of [t]

Tier 0: Input source

Within a framework where non-terminal nodes may be information-bearing (Orgun 1996 and Wee 2004), it is possible to consider each output candidate as a full-blown structure such as that in (17). Notice that in (17), non-terminal nodes carry content information like [la] and [si] which are percolated from the subordinate nodes. Employing OT, it is possible for percolation to be unfaithful, i.e. inter-tier correspondence may not be exact if the constituency violates higher ranked requirements. In the case of [st#], the second [t] is elided because constituency would violate *CC (in the node [s] in tier 1). Likewise, it is also possible for material to be inserted, e.g. σ_2 where the empty rime corresponds with [i] in the dominating node.

Let's consider now another example like "stamp".

(18)



Root tier: Output string

Tier 3: *CC triggers epenthesis

Tier 2

Tier 1: *CC triggers deletion

Tier 0: Input string

(18) is different from (17), because at tier 2, the constituency of [m] with the preceding vowel [a] is legitimate in Cantonese. And hence is easily preferred (say by DEP) when the input does not involve a penultimate /s/. Percolation continues until Tier 3 where initial /s/ may not form a constituent with [tam]. The only recourse would be to either delete one of the offending consonants or to disallow the constituency (hence, the separation of σ_1[si] and σ_2[tam] as two syllables).

It is important to note that (17) and (18) are just two of the many candidate structures that can be produced by GEN given an input string of segments. With the right set of constraints, some

[8] Without /s/, word-final /t/ is preserved, as in "beat" is loaned into Cantonese as [bit].

structures and the various inter-tier correspondences would be ruled out as non-optimal. A successful analysis would be one where (17) is chosen as optimal for an English source #CVsC# and where (18) is chosen for sources where the source is #CCVCC#

The account provided here is certainly incomplete, but it shows promise in addressing the problems presented. By allowing for inter-tier correspondence of information, derivational histories are captured. The whole solution thus becomes a situation where a number of derivational histories (by virtue of different structures and their various inter-tier correspondence possibilities) are compared for optimality with respect to the language's ranking hierarchy of universal constraints. That way, there is no need for the paradoxical separation of repair strategies. Epenthesis or deletion is the result of unfaithful inter-tier correspondence triggered by *CC. The choice of epenthesis or deletion would lie on the kind of structure chosen as optimal.

Accepting an account like that in (17) and (18) requires accepting the following:

(19) Inter-tier Correspondence Theory (Wee 2004)
Carriage of information
All nodes (terminal or non-terminal) are information-bearing.
Correspondence of information
There is a correspondence of the information content between nodes that stand in immediate domination.
Violability of correspondence
Correspondence of information between nodes is not necessarily perfect.

Like Orgun (1996), Wee would have to concede that output candidates are not linear strings but are structures. In addition, such structures are such that input strings would form the terminal nodes, and it is the root node that would correspond to what has conventionally been regarded as output strings.

6. Conclusion

Despite the fairly straightforward observations that can be made of the syllabification of loanwords from English to Cantonese, it turns out to be very challenging. This is because of the simultaneously transparent and opaque derivational effects with respect to the same repair strategies to fir English sequences into Cantonese syllables. Because of this, derivational accounts end up in paradoxical orderings where repairs have to precede and follow syllabification. OT accounts run afoul because of its inherent difficulties with opacity and also because in this case, it has to select at once transparent and opaque candidates at the behest of the same markedness constraint. The most promising solution turns out to be Inter-tier Correspondence Theory where candidates are structural representations with information-bearing non-terminal nodes. This allows for the comparison of derivational histories and thus allow for the capture of both transparent and opaque effects simultaneously.

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