MORPHOLOGICAL DOUBLING AND LEXICAL PHONOLOGY: THE CASE OF CANTONESE

A dissertation submitted to The University of Manchester for the degree of Master of Arts in the Faculty of Humanities

2010

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Contents

(Word count: 12,642)

List of abbreviations and notational symbols

A, B, etc	short-hand representations of Cantonese/Chinese syllables
BRCT	Base-Reduplicant Correspondence Theory
FAITHBR	base-reduplicant faithfulness constraint
FAITHIO	input-output faithfulness constraint
Ft_1	first foot
IPA	International Phonetic Alphabet
L	left edge of a morphological or phonological constituent
LP	Lexical Phonology
M	markedness (in OT)
MDT	Morphological Doubling Theory
OT	Optimality Theory
R	right edge of a morphological or phonological constituent
RED	reduplicant
RStem	reduplicative stem
T	floating high tone that triggers tone alternation
TETU	The Emergence of The Unmarked
Wd	(morphological) word

☞	an attested form which wins in an OT tableau
☹	an attested form which does not win in an OT tableau
💣	an unattested form which wins in an OT tableau
>>	outranks (in terms of OT constraints)
→	becomes (in derivation)
←	is derived from
σ	syllable
σ1	the first syllable (e.g. in a stem)
[ ]	left-hand and right-hand morphological boundaries
*	ungrammatical, unattested form
....	phonological segments of unspecified quantity

Abstract

Throughout this thesis, I examine the phonology-morphology interface of Cantonese. The productive morpho-phonological processes in Cantonese are tone alternation, affixation and reduplication. These processes are described and analyzed in detail. Tone alternation is a stem-final process triggered by a floating high tone. Affixation is modeled as subcategorization requirements, thus wiping the surface descriptive prefix-suffix-infix distinction. Reduplication is analyzed as self-compounding. These three processes are found to apply in the following order: first reduplication, then tone alternation, and affixation at last.

Reduplication features prominently in this thesis. Two dominant but competing theories of reduplication are juxtaposed. The first one is phonologically-based Base-Reduplicant Correspondence Theory (BRCT; McCarthy & Prince 1995), whereas the other one is Morphological Doubling Theory (MDT; Inkelas & Zoll 2005). Cantonese reduplication exhibits tonal overwriting, a fixed tonal pattern within the domain of the reduplicative copies. MDT is demonstrated to be superior over BRCT, because the overwriting phonological material is not due to its unmarkedness or markedness whatsoever.

Finally, a four-level model of the Lexical Phonology of Cantonese is proposed. The model integrates MDT and Lexical Phonology. The results are that a level can self-copy with the two copies arriving at the next level by undergoing potentially divergent cophonologies (level fission), and that

the two copies reunite at yet the next level, again potentially with its own cophonology (level fusion). Several implications of this model are briefly discussed.

Declaration

No portion of the work referred to in the dissertation has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Copyright statement

Acknowledgements

I am indebted to my advisor Yuni Kim whose remarks and questions are always intellectually challenging and stimulating. Many of the ideas discussed in this thesis would not have existed without Yuni's insightful comments. At various stages during the preparation of this thesis, I have benefited from valuable comments from Ricardo Bermúdez-Otero, Eva Schultze-Berndt and Alan Yu. My sincere thanks also go to Stephen Matthews and Virginia Yip who, during my stay in Hong Kong for writing up this thesis, offered me research support and university library access. All remaining errors and shortcomings in this thesis are of course my own.

1. Introduction

Reduplication has proved to be one of the most important areas in the study of the phonology-morphology interface. Intuitively, reduplication is both phonological and morphological. It is morphological because, as in other affixational processes, there is addition of new phonological material to a base to give rise to a derived form with a meaning related to that of the base. What makes reduplication distinctive from other linguistic phenomena is its phonological perspective: uncontroversially there is some kind of copying, in the sense that the new phonological material for a morphological process (here, reduplication) is not pre-specified, but comes from the base itself. Such copying can be in full, or only part of the base. It is the latter case that has been fueling the theoretical study of reduplication. Typical examples include cases where the reduplicant is of a particular prosodic size or it has fixed phonology material (e.g. English *shm*- reduplication).

Recent research on reduplication focuses on the division of labor between phonology and morphology. Two competing theories have emerged: one phonological, and the other morphological. In the phonological camp, the locus is phonological copying. Reduplication is considered no different from other affixational processes in having a morpheme, RED(uplicant) in this case. RED is phonologically empty and has its content filled up by copying from the base. The current representative of such phonological-copying theories is Base-Reduplicant Correspondence Theory (BRCT; McCarthy & Prince 1995) couched within classic (i.e., parallel) Optimality Theory (OT). BRCT hinges on faithfulness relations among input, output, base and reduplicant evaluated in the optimality-theoretic

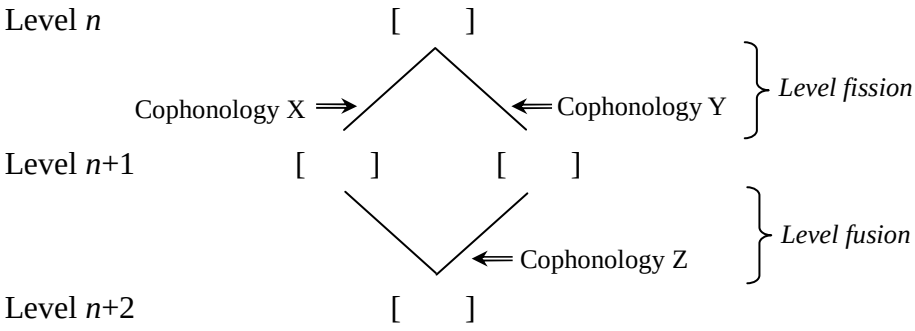
fashion with markedness constraints for the language under investigating. Crucially, McCarthy and Prince (1995) build on the observations by Wilbur (1973) of the over- and under-application effects. Emerging from the morphological camp, however, is a recent competing theory of reduplication, Morphological Doubling Theory (MDT; Inkelas & Zoll 2005, Inkelas 2008), which applies cophonologies (Inkelas & Zoll 2007) to treat morphologically conditioned phonological processes. In short, MDT treats reduplication as first doubling a morphological constituent then modifying one or both of the copies if necessary.

In the theoretical literature, more often than not arguments are made based on only a small fragment of data (typically of an unfamiliar language), however detailed the analysis is. In light of the morphophonological nature of reduplication, it is essential that the morphophonology of a language be well understood when an analysis of reduplication in this language is advanced. This thesis aims precisely at demonstrating this point, by looking into Hong Kong Cantonese (Sino-Tibetan). As will be clear later, with a thorough understanding of Cantonese morphophonology in general, MDT will be shown to be superior over BRCT in analyzing Cantonese reduplication. This is the first goal of this thesis.

As reduplication is morphophonological, it is lexical as opposed to postlexical. It follows, therefore, that a theory of reduplication should, and must, be understood in the context of Lexical Phonology (LP; Kiparsky 1982) with morphology as levels. It is unclear how BRCT can be fit into LP, because classic OT does not allow derivation and hence no morphological

levels. As for MDT, although it is non-derivational in Inkelas and Zoll's conception, I propose that MDT can be integrated into LP to analyze reduplication and morphophonology in general. This is entirely possible if the initial doubled forms (the two copies) in MDT are thought of as sisters in the same level in LP. This motivates a novel instantiation of LP:

(1)



In terms of LP, reduplication opens up the possibility of a level self-copying and undergoing two potentially different cophonologies to arrive at the next level with two sisters. This is LEVEL FISSION. In (1), the two sisters at level *n*+1 have undergone level fission from level *n* and may be phonologically identical, or may not be depending on cophonologies X and Y. When these two sisters reunite at the next level, a cophonology may potentially apply here – LEVEL FUSION. It is the second goal of this thesis that a comprehensive analysis of the Lexical Phonology of Cantonese is advanced.

The structure of this thesis is as follows. Chapter 2 examines the morphology-phonology interface of Cantonese. Two morpho-phonological processes are described and analyzed: tone alternation and affixation. Chapter 3 focuses on reduplication, another morpho-phonological process in Cantonese. Reduplication is exemplified and analyzed in turn by BRCT and

MDT respectively. It is argued that MDT is superior over BRCT in treating the Cantonese data. A reduplicative language game in Cantonese is also discusses. In chapter 4, a model integrating MDT into LP is proposed and employed to advance a comprehensive analysis of the Lexical Phonology of Cantonese. Chapter 5 discusses a number of theoretical issues pertaining to Cantonese reduplication and the proposed MDT-LP model. Chapter 6 summarizes and concludes the thesis.

2. Morphology-phonology interleaving in Cantonese

This chapter presents the complex interactions between the morphology and phonology of Cantonese. Tone alternation is first discussed, followed by affixation. Certain affixing processes interact with reduplication. As the discussion unfolds, some ordering of thess morpho-phonological processes is illustrated.

2.1 Tone alternation

Cantonese is a tone language in which every single syllable has a lexical tone; a syllable often corresponds to a morpheme as well. In the realm of the lexical phonology, one can hardly find anything but lexical tones which alternate. This section presents the Cantonese tone system and the tonal processes relevant to the discussion that follows. Specifically, it is argued that tone alternation is right-edged to a morphological constituent.

2.1.1 Tone system

Cantonese has a relatively rich tonal inventory, with level, rising and falling tones. For the purposes of this paper, the lexical tones are categorized into high-register and non-high-register tones respectively:[1]

(2) a. *High-register tones*

High-level	si55 ‘poem’
High-rising	si25 ‘history’

b. *Non-high-register tones*

Mid-level	si33 ‘to try’
Low-rising	si23 ‘market’
Low-level	si22 ‘matter’
Low-falling	si21 ‘time’

[1] All transcriptions are given in IPA. Lexical tones are transcribed with Chao tone numbers immediately following each syllable, with 5 being the highest tone level and 1 the lowest.

High-register tones in (2a) are those which end at the high register (denoted by the second '5' in the Chao tone notation), whereas non-high-register tones in (2b) do not. This distinction is important, since productive tonal processes in Cantonese only result in a high-register tone on the surface.

2.1.2 Sandhi and non-sandhi tone alternation

As noted above, lexical tones in Cantonese may alternate. This is due to a rich array of morphophonological and semantic reasons (Matthews & Yip 1994, Bauer & Benedict 1997). In the productive cases, a non-high-register tone (one of those in (2b)) becomes a rising tone reaching the high register. I refer to this phenomenon as TONE ALTERNATION. Informally:

(3) 2X → 25 or 3X → 35 (X denotes a non-5 Chao tone number)[2]

Tone alternation can broadly be classified into two types: one whose triggering environment is comprised of a synchronically recoverable syllable (i.e., a sandhi process)[3] and the other without such phonological material (i.e., a realizational, non-sandhi process). In this paper, the latter constitutes what is of interest. With no ambiguity, the term "tone alternation" hereafter refers only to this realizational type.

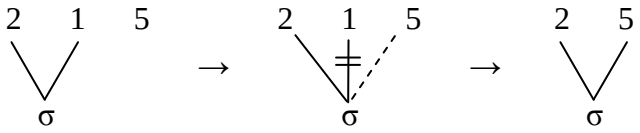
Tone alternation has been treated in various ways in the theoretical literature. The usual phonological treatment is an autosegmental analysis (Chen 2000, Yip 2002). A floating high tone first docks to the end of the

[2] I assume the process to only affect the tonal end-point without disturbing the tonal onset phonologically, following Yip (2002).

[3] Sandhi tone alternation refers to the case where the segmental content of a syllable is deleted leaving a floating high tone behind. This floating tone docks to the preceding syllable, with the mechanism described in (4). Though optional, this process is common whereby grammatical markers/modals (underlined below) are phonetically reduced:

tsou22 jɐt̚5 tsou22 ~ tsou25 tsou22 'do (ATTEMPTIVE)'
si33 tsɔ35 ~ si35 'try (PERFECTIVE)'

syllable in question, triggering the delinking of the medial tone. It is non-sandhi because the floating high tone does not come from a synchronically recoverable syllable. An example with a low-falling tone 21 as the input is as follows:

(4) 

Below are examples for all non-high-register tones as inputs, based on Bauer & Benedict (1997: 198) and Matthews & Yip (1994: 26).

(5)	a.	sœŋ33	‘appearance; photo’	→	sœŋ35	‘photo’
	b.	jɐu23	‘friend’	→	jɐu25	‘guy’
	c.	wuɪ22	‘to meet; meeting’	→	wuɪ25	‘to meet; meeting’
	d.	jɐu21	‘to paint (verb); oil’	→	jɐu25	‘paint (noun); oil’

The semantics of tone alternation is far from being clear. Nonetheless, a certain form with tone alternation is generally perceived with a higher degree of familiarity or affection than the counterpart with no tone alternation. If these examples are put in context, some regularity is observed: the derived rising tone only occurs at the right edge of a morphological domain, tentatively the word here. In each pair of examples in (6) below, swapping the syllables in bold would result in ungrammaticality.

(6)	a.	**sœŋ33** pʰin35	‘photo’	→	jɪŋ25 **sœŋ35**	‘take photos’
	b.	pʰɐŋ21 **jɐu23**	‘friend’	→	fatˀ33 siu55 **jɐu25**	‘fanatic’
	c.	**wuɪ22** ji23	‘meeting’	→	hɔɪ55 **wuɪ25**	‘to hold/attend a meeting’
	d.	sʊkˀ55 mɐɪ23 **jɐu21**	‘corn oil’	→	ka55 **jɐu25**	‘fill up with fuel’

The right-edged nature of tone alternation is confirmed in place names

which are arguably monomorphemic. Data are from Bauer & Benedict (1997: 200-201), where tone alternation is optional.

(7)	a.	hɐu21 si55 tœn22	~	hɐu21 si55 **tœn25**	'Houston'
	b.	ou33 mun21	~	ou33 **mun25**	'Macau'
	c.	ts^{h}im23 lɔ21	~	ts^{h}im23 **lɔ25**	'(an old name of) Thailand'

We will arrive at a fuller picture of tone alternation once we consider affixation, the focus of the next sub-section.

2.2 Affixation

In Cantonese, affixes resemble content syllables/words prosodically in that they are also full-fledged syllables, each with its own lexical tone.[4] In general, affixation is a 'straightforward' matter of morpheme concatenation with no concomitant phonological processes, the only exception being tone alternation. In this section, I will first illustrate affixes which always surface adpositionally (i.e., as prefixes or suffixes, section 2.2.1). Second, adpositional affixes emerging as infixes under certain circumstances are exemplified (section 2.2.2). This motivates the need for a more articulate theory of affixation, which should not be regarded as a simple matter of linear concatenation. Following Yu's (2007a) Phonological Subcategorization approach to treating infixation, I adopt Generalized Alignment (McCarthy & Prince 1993) as the basis of inviolable subcategorization frames in aligning an affix to its stem. Building on this, I move on to discuss affixes which always surface as infixes (section 2.2.3).

[4] My definition of Cantonese affixation departs from that of Matthews & Yip (1994, To appear), where the status of quite a number of "affixes" classified as such is open to question. In this thesis, I only consider affixes which are bound and denote grammatical functions as bona fide affixes.

With the subcategorization approach, the descriptive prefix-infix-suffix distinction is wiped out.

2.2.1 Prefixes and suffixes

There exist several affixes which always surface as prefixes and suffixes. Of particular interest are those which interact with tone alternation.

(8) Diminutives

a. with suffix *tsɐɪ25* but not tone alternation

apˀ33	‘duck’	→	apˀ33 **tsɐɪ25**	‘duckling’
ts^{h}akˀ22	‘thief’	→	ts^{h}akˀ22 **tsɐɪ25**	‘little thief’

b. with tone alternation but not suffix *tsɐɪ25*

apˀ33	‘duck’	→	apˀ**35**	‘duckling’	but *apˀ**35 tsɐɪ25**
ts^{h}akˀ22	‘thief’	→	ts^{h}akˀ**25**	‘little thief’	but *ts^{h}akˀ**25 tsɐɪ25**

(9) Vocative *a33* (prefix)

a. ma21 → **a33** ma21 ‘grandma’ kɔ55 → **a33** kɔ55 ‘(elder) brother’

b. Vocatives with surnames exhibit tone alternation:
wɔŋ21 → **a33** wɔŋ**25** (surname) tsiu22 → **aa3** tsiu**25** (surname)

For common nouns, diminutives can be formed in two ways, either by suffixation of *tsɐɪ25* (8a) or tone alternation (8b). The two processes, however, cannot co-occur. Presumably, double exponence of the same morphological feature (diminutive in this case) is prohibited. As for prefixation, a productive prefix is *a33* in the vocative construction of address terms (9). When the input is a surname, a concomitant process is tone alternation on the surname.

Surnames in address terms deserve more attention as they cast light on tone alternation. In fact, the diminutive suffix *tsɐɪ25* can also be used with surnames, crucially with tone alternation as well:

(10) Diminutives *tsɐɪ25* with surnames

wɔŋ21 → **wɔŋ25** tsɐɪ25 but *wɔŋ21 tsɐɪ25

tsiu22 → **tsiu25** tsɐɪ25 but *tsiu22 tsɐɪ25

There are two issues here. First, address terms seem to oblige double exponence of the diminutive morphological feature. Second, a syllable with a derived rising tone is followed by an affix, which apparent contradicts the right-edge claim about tone alternation made in section 2.1.2 above. These issues are resolved once (non-sandhi) tone alternation is better understood.

Tone alternation for diminutives originated from a high-tone affix whose segmental material has been lost (Yu 2007b). In other words, the two types of tone alternation, sandhi and non-sandhi, were historically the same. In fact, synchronically there are fluctuating cases of morphological processes, intermediate between tone alternation and affixation. For certain grammatical markers, there are variations between mere affixation of a high-tone affix and tone alternation with segmental loss (see footnote 3 above for examples from aspect markers). The non-sandhi tone alternation for diminutives can thus be considered a historical relic of a once existent high-tone diminutive affix. Synchronically, many native speakers are unaware of any relationship between a form with derived rising tone and its base (Kam 1977), and hence the nebulous semantics of tone alternation (section 2.1.2). As for forms such as those in (10), surnames can be regarded as exhibiting stem-allomorphy, with tone alternation having (quasi-)empty semantics. Diminutive, then, is exponed by affixation of *tsaɪ25* which selects the allomorph with tone alternation. Morphophonologically, the paradoxes of surface double exponence of diminutive and non-right-edged

tone alternation vanish if tone alternation is more specifically understood as stem-final (rather than vaguely as right-edged), and applies *before* affixation.

(11) Ordering of tone alternation before affixation
(**T** denotes the floating high tone triggering tone alternation)

a. Vocative with a surname: [a33 [surname] **T**]$_{\text{vocative}}$

	Tone alternation		*a33*-prefixation	
tsʰɐn21	→	tsʰɐn**25**	→	**a33** tsʰɐn25

b. Diminutive with a surname: [[surname] **T** tsɐɪ25]$_{\text{diminutive}}$

	Tone alternation		*tsɐɪ35*-suffixation	
tsʰɐn21	→	tsʰɐn**25**	→	tsʰɐn25 **tsɐɪ25**

Formally, **T** must immediately follow a right-hand morphological boundary (11). More discussion on this will be in section 3.2 when we consider attenuative constructions in which tone alternation and affixation interact with reduplication.

2.2.2 The need for a more articulate model of affixation

Certain affixes in Cantonese behave unusually with respect to those which always surface adpositionally. Aspect in Cantonese is marked by an affix which typically follows the verb:

(12) si33 **tsɔ25** ‘try (PERFECTIVE)’ si33 **kɐn25** ‘try (PROGRESSIVE)’
si33 **kʷɔ33** ‘try (EXPERIENTIAL)’ si33 **tsy22** ‘try (CONTINUOUS)’

However, when the verb is disyllabic, there are cases where the affix may surface as either a suffix or an infix (Matthews & Yip 1994: 201):

(13) ji21 mɐn21 (literally ‘move-citizen’) →
ji21 mɐn21 **tsɔ25** ~ ji21 **tsɔ25** mɐn21 ‘migrate (PERFECTIVE)’
t^hœʏ33 jɐu55 (literally ‘retreat-rest’) →
t^hœʏ33 jɐu55 **tsɔ25** ~ t^hœʏ33 **tsɔ25** jɐu55 ‘retire (PERFECTIVE)’

In fact, variations arise because the individual syllables in the disyllabic verb have meanings of their own (see the gloss in (13)). The disyllabic verb, therefore, potentially has two possible analyses: either the whole disyllabic constituent as a verb or only the first syllable is treated as the verb domain sensitive to the morphological process of affixation.

(14) [ji21 mɐn21$_{\text{VERB}}$] [**tsɔ25$_{\textbf{AFFIX}}$]** ~ [ji21$_{\text{VERB}}$] [**tsɔ25$_{\textbf{AFFIX}}$]** [mɐn21$_{\text{NOUN}}$]
[t^hœʏ33 jɐu55$_{\text{VERB}}$] [**tsɔ25$_{\textbf{AFFIX}}$]** ~ [t^hœʏ33$_{\text{VERB}}$] [**tsɔ25$_{\textbf{AFFIX}}$]** [jɐu55$_{\text{VERB}}$]

To be sure, the varying behavior of aspect markers such as *tsɔ25* requires a more insightful treatment in addition to the descriptive suffixation-infixation stipulation. Taking into account the aspect affixes in 12 together, they all demonstrate the general observation of post-verbal alignment. A theory capable of capturing the special behavior of aspect affixes such as *tsɔ25* must not miss this generalization.

Following Yu’s (2007a) Phonological Subcategorization approach in his study of infixation, I adopt Generalized Alignment (McCarthy & Prince 1993) as the basis of inviolable subcategorization frames in aligning an affix to its stem. In Yu’s terms, subcategorization is either morphological or phonological. When it is morphological, adpositional affixation obtains. When it is phonological, the affix targets a phonological ‘pivot’ and there are two possible outcomes. If the targeted edge of the phonological pivot coincides with one of the morphological edges of the stem, adpositional

affixation still obtains. However, if this is not the case, infixation results.[5]

The subcategorization frame for the aspect markers discussed is as follows:

(15) Align(Aspect affix, L, Verb, R)
The left edge of the aspect affix is aligned to the right edge of the verb.

This is an example of morphological subcategorization, as the affix is aligned to a morphological constituent (i.e., verb). Interestingly, for the case of the perfective marker *tsɔ25*, infixation is a possible surface realization since the disyllabic verbs in question allow multiple morphological analyses (14).

2.2.3 Infixes

With subcategorization to model affixation, affixes which always surface as infixes are now discussed. Productive examples of infixation in Cantonese include expletive constructions which signifies intensification (Yu 2007a: 134-135).

(16) Expletive *k^{w}ɐi25* 'ghost', *mɐt˺55jɛ23* 'what' (variants: *mɐt˺55*, *mɛ55*)
Subcategorization requirement:
Align(Expletive, L, σ1, R)

With the first syllable of the word as the pivot, the left edge of the expletive affix is aligned to the right edge of the pivot. This is a case of phonological subcategorization, since the pivot is a phonological constituent (i.e., syllable). Some of the most illustrative examples are foreign place names

[5] The situation in which one and the same affix may give rise to these two different outcomes (i.e., adpositional in some cases but infixing in others) will be discussed in section 3.1 on Cantonese attenuatives.

rendered in Chinese that are presumably monomorphemic:

(17)	tɔ55 jy21	tɔ55 **k^{w}ɐi25** jy21	‘redundant’
	ka55 la21 tai22	ka55 **mɐt˧55** la21 tai22	‘Canada’
	mou21 leɪ23 k^{h}ɐu21 si55	mou21 **mɛ55** leɪ23 k^{h}ɐu21 si55	‘Mauritius’
	sik˧22 fan22	sik˧22 **mɐt˧55 jɛ23** fan22	‘to eat (rice)’

Intriguingly, the expletive affixes introduced above can be combined to strengthen intensification. First, both *mɐt˧55* and *mɛ55* ‘what’ can be followed by *kwɐi25* ‘ghost’ to form another two infixes (i.e., *mɐt˧55kwɐi25* and *mɛ55kwɐi25*) with the subcategorization requirement as in (16). Second, *kwɐi25* can be infixed into *mɐt˧55jɛ23*, the result of which is yet another infix *mɐt˧55kwɐi25jɛ23*, again subject to the same subcategorization mechanism – a situation which could be referred to as “nested infixation”, e.g. *tɔ55**mɐt˧55kwɐi25jɛ23**jy21*.[6]

Other robust infixation constructions are interrogatives and attemptives. These constructions involve reduplication:

(18) Interrogatives with *m̩21*

Subcategorization requirement: Align(m̩21, L, σ1, R)

Examples:

sœŋ25	→	sœŋ25 **m̩21** sœŋ25	‘want’
lɛŋ33	→	lɛŋ33 **m̩21** lɛŋ33	‘beautiful’

(19) Attemptives with *jɐt˧55*

Subcategorization requirement: Align(jɐt˧55, L, σ1, R)

Examples:

mɐn22	→	mɐn22 **jɐt˧55** mɐn22	‘ask’
t^{h}ɐɪ25	→	t^{h}ɐɪ25 **jɐt˧55** t^{h}ɐɪ25	‘look’

[6] Bracket erasure is assumed after the infix *kwai35* is infixed into *mɐt˧55jɛ23*. That is, morphophonological processes with *mɐt˧55kwɐi35jɛ23* as a “nested” infix are blind to its internal structure of *kwai35* with respect to *mɐt˧55jɛ23*.

Like the expletives, the subcategorization requirements for both interrogatives and attemptives are assumed to hinge on the first syllable of the word. In these cases, the affix is infixed between the two copies of the verb or adjective. In order for these subcategorization frames to stand valid, reduplication is proposed to apply *before* affixation (20). If affixation applied before reduplication (e.g., *mɐn22* → *mɐn22* ***jɐt˧˥55***), it is unclear how the output would be reduplicated to give the attested form.

(20) Ordering of reduplication before affixation

a. Interrogative

Reduplication		ALIGN(*m̩21*, L, σ1, R)		
lɛŋ33	→	lɛŋ33 lɛŋ33	→	lɛŋ33 **m̩21** lɛŋ33 ‘beautiful’

b. Attemptive

Reduplication		ALIGN(*jɐt˧˥55*, L, σ1, R)		
mɐn22	→	mɐn22 mɐn22	→	mɐn22 **jɐt˧˥55** mɐn22 ‘ask’

2.3 Ordering

Throughout this chapter, I have provided a detailed analysis of tone alternation as a stem-final process, as well as affixation with subcategorization frames and its interaction with reduplication. In the course of argumentation, there has emerged an ordering among reduplication, tone alternation and affixation: tone alternation before affixation; reduplication before affixation. Logically, it can be concluded that affixation always applies last. However, the ordering between reduplication and tone alternation is still unknown from the data discussed so far. To set the stage for filling this gap, the next chapter will focus on attenuatives in Cantonese which exhibit reduplication, tone alternation and affixation altogether. I will turn back to the issue of ordering in chapter 4.

3. Reduplication as morphological doubling in Cantonese

Reduplication is a highly productive morphological process in Cantonese. Instances of reduplicative constructions are found in all major word classes. On the one hand, some belong to total reduplication (i.e., full copying), with typical iconic semantics such as plurality or totality for nouns (e.g. *tsœŋ55* 'piece (a classifier)' → *tsœŋ55tsœŋ55* 'all pieces'). On the other hand, reduplication often interacts with affixation, as illustrated in the previous chapter, and sometimes with tone alternation as well. In the following, key cases are first highlighted (section 3.1). Section 3.2 draws attention to what I refer to as tonal overwriting, where there is a fixed tonal pattern in a reduplicative construction. Tonal overwriting is so called as it is analogous with melodic overwriting in reduplication with fixed segments (Alderete et al. 1999). It is the key phenomenon which will be shown to support Morphological Doubling Theory (MDT; Inkelas & Zoll 2005) rather than Base-Reduplicant Correspondence Theory (BRCT; McCarthy & Prince 1995) as a theory of reduplication. In section 3.3, I branch out into a Cantonese-based language game that hinges on reduplication. Section 3.4 summarizes this chapter with theoretical comments.

3.1 Reduplication in Cantonese

Reduplicative constructions that concern us are interrogatives, attenuatives and attemptives. All three constructions intersect with affixation, whereas attenuatives display tone alternation as well. The foci of discussion are interrogatives and attenuatives.

3.1.1 Interrogatives

Interrogatives and attemptives with monosyllabic inputs, and their interactions with reduplication, were illustrated above in (18) and (19) respectively. Interrogatives, but not attemptives, can be formed with polysyllabic roots.

(21) Interrogative *m̩21*

a. with monosyllabic inputs (repeating (18)):

sœŋ25	→	sœŋ25 **m̩21** sœŋ25	'want'
lɛŋ33	→	lɛŋ33 **m̩21** lɛŋ33	'beautiful'

b. with disyllabic inputs:

tsuŋ55 ji33	→	tsuŋ55 **m̩21** tsuŋ55 ji33	'like'
hɔɪ55 sɐm55	→	hɔɪ55 **m̩21** hɔɪ55 sɐm55	'happy'

These examples confirm the subcategorization frame for *m̩21* posited in (18), which targets the first syllable of the reduplicated stem (e.g., *tsuŋ55tsuŋ55ji33* → *tsuŋ55**m̩21**tsuŋ55ji33*).[7] Coherent with the analysis for cases with monosyllabic roots, for disyllabic roots reduplication applies also before affixation. Were this not the case, it would be analytically difficult to derive from an affixed stem, i.e., *tsuŋ55**m̩21**ji33* —???→ *tsuŋ55**m̩21**tsuŋ55ji33*.

Commonly referred to as A-not-A constructions in Chinese linguistics, interrogatives in Cantonese illustrated above have the infix *m̩21* 'not' which is also the syntactic negator in the language. The subcategorization treatment of *m̩21* for interrogatives, however, presupposes that the constructions are *words*. At this juncture, it is imperative to establish the

[7] See section 3.2.2 below on truncation in the first copy of reduplication.

wordhood of these interrogatives (22a), and reject a syntactic parsing (22b).[8]

(22) Interrogatives as words

	i. Monosyllabic input: [A]	ii. Disyllabic input: [AB]
a.	$[A[ṃ21]A]_{Wd}$	$[A[ṃ21]AB]_{Wd}$
b.	$*[A]_{Wd}[ṃ21]_{Wd}[A]_{Wd}$	$*[A]_{Wd}[ṃ21]_{Wd}[AB]_{Wd}$

$[A]_{Wd}$ denotes a monosyllabic word as the input of the interrogative, and $[AB]_{Wd}$ a disyllabic one. The plausibility of parsing the Cantonese interrogatives as syntactic constructions rather than words may be attributed to linguistic analyses of Mandarin Chinese of which the interrogatives are of the form AB-not-AB that could apparently be analyzed as a construction $[AB]_{Wd}[not]_{Wd}[AB]_{Wd}$ with three words. Importantly, Matthews (1999) argues that one should not assume Chinese languages, however related historically and typologically, to share a common *synchronic* grammar. In the following, I argue that interrogatives in Cantonese are words but not syntactic constructions.

Interrogatives with monosyllabic inputs (22i) offer little or no clue as to whether a morphological (22a) or syntactic analysis (22b) is preferred, because $[A]_{Wd}$ undergoes full copying, and that any instance of the syllable 'A' could be argued to be a morphological constituent. In other words, (22a-i) and (22b-i) are analytically ambiguous.

When an input is disyllabic (22ii), partial reduplication results in the stand-alone occurrence of the syllable 'A' in the first copy: A-*ṃ21*-AB. It follows that, in the syntactic parsing of the interrogative construction

[8] More specifically, the Cantonese interrogatives should be regarded as *morphological* words (Packard 2000).

(22b-ii), this syllable should be a bona fide morphological constituent, as indicated by the morphological boundaries [A]$_{Wd}$[*m̩21*]$_{Wd}$[AB]$_{Wd}$. Examples lending support to this analysis would be those where the two syllables 'A' and 'B' in [AB]$_{Wd}$ could be independently parsed, e.g. *sik22fan22* 'eat, have a meal' (literally 'eat-rice') → *sik22m̩21sik22fan22* (cf. (13) and (14) on aspect). This syntactic parsing for interrogatives, however, collapses when one considers English words code-mixed in Cantonese:

(23) Cantonese interrogatives with English words

happy	→	hap-*m̩21*-happy
understand	→	un-*m̩21*-understand
Manchester	→	Man-*m̩21*-Manchester

The process by which Cantonese interrogatives are formed with English words is a highly productive one. In (23), the English syllables *hap-*, *un-* and *Man-* preceding *m̩21* cannot be words in their own right. Consequently, the syntactic parsing [A]$_{Wd}$[*m̩21*]$_{Wd}$[AB]$_{Wd}$, with the first [A] as a word, does not hold for these examples: the syllable 'A' preceding *m̩21* is a phonological constituent, not a morphological one. In other words, both A-*m̩21*-A and A-*m̩21*-AB should be parsed as words but not syntactic constructions.[9]

3.1.2 Attenuatives

Perhaps the most striking case of reduplication in Cantonese comes from the attenuative which exhibits reduplication, tone alternation and

[9] To be sure, there are other conceivable morphological parsing possibilities but they are dispreferred for analytical reasons. [A-[*m̩21*-A]B], for instance, appears odd when one considers [Man-[*m̩21*-Man]chester] which introduces a morphological boundary inside an otherwise well-formed word, i.e. Man]chester.

affixation altogether. This construction allows both monosyllabic and disyllabic roots.[10]

(24) Cantonese attenuatives

a.	kʷai55	→	kʷai 55 kʷai55 teɪ25	‘well-behaved’
	hʊŋ21	→	hʊŋ21 hʊŋ25 teɪ25	‘red’
	tsʰi33	→	tsʰi33 tsʰi35 teɪ25	‘similar’
	tsɐɪ22	→	tsɐɪ22 tsɐɪ25 teɪ25	‘full (having eaten much)’
b.	tsʰi55 sin33	→	tsʰi55 tsʰi55 teɪ25 sin33	‘crazy’
	pʰa33 tsʰɐu25	→	pʰa33 pʰa33 teɪ25 tsʰɐu25	‘shy’

Several observations are made from Cantonese attenuatives.[11] When the input is monosyllabic, the second reduplicative copy undergoes tone alternation if this syllable bears a non-high-register tone (24a). When the input is disyllabic, only the first syllable is copied, and that tone alternation is prohibited even with syllables of non-high-register tones (24b). The concomitant affix *teɪ25* appears suffixing with monosyllabic inputs, but infixing with disyllabic ones. The remainder of this chapter develops an analysis of Cantonese attenuatives with respect to these observations.

3.2 Tonal overwriting and morphological doubling

A closer examination of the attenuative data in (24a) reveals that, regardless of the base tone, the second reduplicative copy must have its tonal end-point high:

[10] The productivity with disyllabic roots is questionable. Only a handful of forms are commonplace.

[11] The forms given here conform to those in reference grammars including Matthews & Yip (1994, To appear). There is, however, variation among speakers. This issue will be addressed in section 3.2.2.

(25) Tonal overwriting

kʷai55	→	kʷai 55 kʷai55 teɪ25	‘well-behaved’
hʊŋ21	→	hʊŋ21 hʊŋ25 teɪ25	‘red’
tsʰi33	→	tsʰi33 tsʰi35 teɪ25	‘similar’
tsɐɪ22	→	tsɐɪ22 tsɐɪ25 teɪ25	‘full (having eaten much)’

Viewed as a fixed tonal pattern, it is analogous with melodic overwriting whereby one or both of the reduplicative copies contain fixed segments (McCarthy & Prince 1986/1996, Alderete et al. 1999, A. I. Nevins 2005). I refer to this fixed tonal pattern in reduplication as TONAL OVERWRITING. Tonal overwriting in Cantonese is of theoretical interest, as it serves as a testing ground for competing approaches to overwriting in reduplication and, in turn, theories of reduplication more generally.

Currently, one of the dominant approaches to reduplication is Base-Reduplicant Correspondence Theory (BRCT; McCarthy & Prince 1995). BRCT distinguishes the two copies in reduplication as “base” versus “reduplicant”, where the reduplicant is characterized with fixed phonological properties such as fixed prosodic size or fixed phonological material. With parallel Optimality Theory (OT) as the execution program, BRCT ranks markedness constraints with respect to faithfulness relations among base, reduplicant, input and output. Overwriting, then, is modeled as the Emergence of the Unmarked (TETU), which analyzes the overwriting material as some unmarked phonological material that surfaces only in the reduplicant (Alderete et al. 1999). Logically, if the overwriting material cannot be shown to be unmarked in the language under investigation, then a TETU analysis is problematic. In the following, I show that this is precisely the case for Cantonese attenuatives, with a deeper understanding of the

nature of the overwriting material with respect to Cantonese morphophonology in general. After a BRCT analysis of Cantonese attenuatives is demonstrated to be flawed, an alternative analysis is proposed using Morphological Doubling Theory (MDT; Inkelas & Zoll 2005, Inkelas 2008) which deals with overwriting by cophonologies (Inkelas & Zoll 2007).

3.2.1 Non-TETU tonal overwriting

For the sake of argument, I first propose a BRCT analysis for Cantonese attenuatives with monosyllabic inputs (26). In the course of discussion, problems pertaining to the analysis will be highlighted.

(26) Cantonese attenuatives with monosyllabic inputs (repeating (24a))

kʷai55	→	kʷai 55 kʷai55 teɪ25	‘well-behaved’
hʊŋ21	→	hʊŋ21 hʊŋ25 teɪ25	‘red’
tsʰi33	→	tsʰi33 tsʰi35 teɪ25	‘similar’
tsɐɪ22	→	tsɐɪ22 tsɐɪ25 teɪ25	‘full (having eaten much)’

In BRCT, reduplication is conceived of as affixation of a phonologically contentless morpheme RED(uplicant). Regarding the Cantonese data in (26), the second reduplicative copy is presumably RED, since it is this copy which invariably has a high tonal end-point. Overwriting, which is this fixed tonal pattern, is modeled by TETU sandwiching markedness constraints between input-output and base-reduplicant faithfulness constraints: FAITHIO >> M(arkedness) >> FAITHBR. This constraint ranking preserves marked phonological material in the base but bans it in RED. For Cantonese, in order that RED bear the required overwriting material, it is necessary to assume that M is a constraint that

favors high tone, HIGHTONE. For the time being, I formulate this constraint more specifically as follows:

(27) HIGHTONE Assign one violation if the tonal end-point of a syllable is not high, i.e. not '5' in Chao tone notation.

In tableau (28) below, parenthetical notes indicate the sources of constraint violation. RED is underlined in each candidate.

(28)

/huŋ21-RED-tei25/	FAITHIO	HIGHTONE	FAITHBR
☞ a. huŋ21huŋ2**5**tei25		* (huŋ**21**)	*
b. huŋ21huŋ21tei25		**! (huŋ**21**huŋ**21**)	
c. huŋ2**5**huŋ2**5**tei25	*!		

Satisfying HIGHTONE at RED, (28a) triumphs at the cost of base-reduplicant faithfulness. (28b) incurs no faithfulness violation, but neither the base nor RED conforms to the high-register tone requirement. (28c) fulfils this tonal preference but fatally violates the high-ranking input-output faithfulness constraint.

Even though the TETU analysis may seem to work, there is a fundamental issue: the postulation of HIGHTONE. The constraint is satisfied when the tonal end-point of a syllable is high. Cross-linguistically, however, a constraint formulated as such does not seem to be supported. Positing a rather language-specific is undesirable in an OT analysis, as argued in Nevins & Vaux (2008). Theoretically, it would compromise the hypothesis that OT constraints are universal.

More importantly, this hypothetical constraint implies that high tone is

unmarked in Cantonese. In empirical terms, the alleged unmarkedness of certain tones in Cantonese is highly questionable. The analysis relies on the assumption that the high-rising tone (25 or 35) is more unmarked than the base tones such as 21, 22 and 33. Type and token frequencies of Cantonese tones in corpus studies do not seem to support this assumption. From (29), level tones 55, 33 and 22 outweigh contour tones both by token and type frequencies. Tone 25/35 is less frequent than 33 and 22.

(29) Type and token frequencies of Cantonese tones (Leung et al. 2004, adapted from Yu To appear)

Tone[12]	Token	Type
55	30,145	442
33	27,002	399
22	29,660	361
25/35	23,346	310
21	15,898	271
23	15,098	140
Total	141,149	1923

Eschewing the problem of positing a language-specific constraint, one might argue that reformulating HIGHTONE as a constraint favoring high tone in general could render the BRCT analysis tenable. Indeed, a number of tone languages in African are demonstrated to have high as the default unmarked tone, see, e.g. Nash (1992-94) on Ruwund. The revised constraint, HIGHTONE', thus appears to have a stronger cross-linguistic flavor:

(30) HIGHTONE' Assign one violation for each non-high (i.e. non-'5') tone specification.

All else being equal, the constraint would favor a tone specification such as

[12] The category '25/35' represents the derived rising tones 25 and 35 lumped together with the base tone 25, as all the three are virtually undistinguishable in perception (Yu 2007b).

55. As a matter of fact, the corpus count in (29) does show that tone 55 is the most frequent both in terms of token and type frequencies. Another paradox, however, results due to the fundamental design of OT:

(31)

/huŋ21-RED-tei25/	FAITHIO	HIGHTONE'	FAITHBR
💣 a. huŋ21huŋ**55**tei25		*** (**21**, **2**5)	*
☹ b. huŋ21huŋ**2**5tei25		****! (**21**, **2**5, **2**5)	*
c. huŋ21huŋ21tei25		****!* (**21**, **21**, **2**5)	
d. huŋ2**5**huŋ2**5**tei25	*!	*** (**2**5, **2**5, **2**5)	

(31b) should have been the winner in tableau (31) above, but it loses to (31a). Because of the Richness of the Base in OT, candidates such as (31a) with more high tones than the attested form (31a) would erroneously be selected as being more optimal.

To model overwriting, BRCT depends crucially on the idea that the fixed phonological material is unmarked and surfaces at RED. In the above, however, I have shown that any markedness constraint favoring high tone that would be needed for the Cantonese data is untenable. In other words, tonal overwriting in Cantonese attenuatives cannot be due to TETU.[13] In any event, it is unclear how a TETU analysis, however successful for monosyllabic inputs, could use the same constraint ranking to analyze attenuatives with disyllabic bases where overwriting is blocked.

Comparable attenuative constructions in closely related languages cast light upon the nature of tonal overwriting in Cantonese. Mandarin, also a

[13] Yu (To appear) analyzes the reduplicative vocative constructions in Cantonese, some of which are semi-productive with a specific tonal pattern. He concludes that the fixed tonal pattern concerned is not due to TETU either.

Chinese language, has the following forms of attenuatives:

(32) Mandarin attenuatives (Duanmu 2007: 247)

tɕan55	→	tɕan55 tɕaɚ**55** tə	‘sharp-pointed’
ɥan35	→	ɥan35 ɥaɚ**55** tə	‘round’
pʲan214	→	pʲan21 pʲaɚ**55** tə	‘flat’
man51	→	man51 maɚ**55** tə	‘slowly’

In each of the forms in (32), preceding the obligatory affix *tə* is another synchronically recoverable affix *ɚ35* ‘child, son’ which is a diminutive suffix in Mandarin, e.g. *pʲan21pʲan21ɚ35tə* → *pʲan21pʲaɚ55tə*. It is important to note that the tonal and segmental processes by which *ɚ35* triggers at and fuses itself into the preceding syllable are part of the synchronic grammar of Mandarin in general. Turning back to Cantonese, tone alternation is strongly associated with the meaning of diminutive and familiarity since the non-sandhi tone alternation is in fact a historical relic of the sandhi one with segmentful affixes, as discussed in sections 2.1.2 and 2.2.1 above. Structurally speaking, tonal overwriting in Cantonese is no different from tone alternation at the second reduplicative copy of the attenuative construction, in the sense that the result is obliged realization of high tone at the tonal end-point of a syllable. In light of these semantic and structural correlations in relation to the synchronic grammar of Mandarin, I claim that the trigger of tonal overwriting and that of tone alternation is the same floating high tone proposed in (4) and relevant discussion. Tonal overwriting *is* tone alternation in the general grammar of Cantonese; it has nothing to do with markedness or unmarkedness of tones.

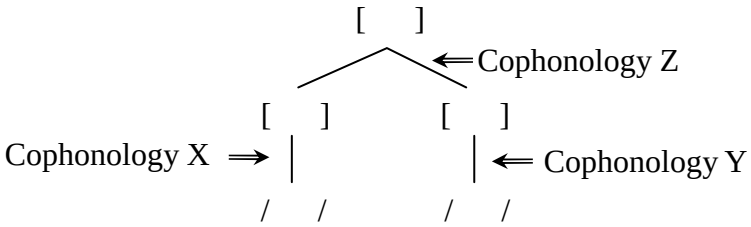
3.2.2 Morphological doubling and the blocking of tonal overwriting

Without losing sight of the nature of tonal overwriting, I propose an

alternative analysis based on Morphological Doubling Theory (MDT; Inkelas & Zoll 2005, Inkelas 2008).

In MDT, reduplication is conceived of as self-compounding of a morphological constituent. Prosodic or other phonological modifications may apply to one or both of the reduplicative copies, via cophonologies. When the two copies are put together, the reduplicative construction may be subject to yet another cophonology. This is schematized in (33) below. Cophonologies X and Y – daughter cophonologies – are those which potentially modify the two reduplicative copies separately, whereas cophonology Z is the mother cophonology that applies to the reduplicative construction itself.

(33) Cophonologies in Morphological Doubling Theory



Before laying out the MDT analysis of Cantonese attenuatives, it is necessary to propose a treatment of the concomitant affix *teɪ25* which is suffixing with monosyllabic inputs (34a), but infixing with disyllabic inputs (34b):

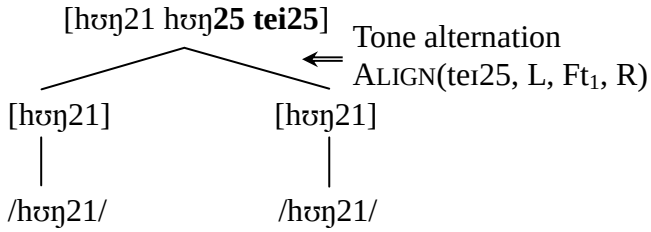
(34) Affix *teɪ25* in Cantonese attenuatives

a.	kʷai55	→	kʷai 55 kʷai55	teɪ25		‘well-behaved’
	hʊŋ21	→	hʊŋ21 hʊŋ25	teɪ25		‘red’
	tsʰi33	→	tsʰi33 tsʰi35	teɪ25		‘similar’
	tsɐɪ22	→	tsɐɪ22 tsɐɪ25	teɪ25		‘full (having eaten)’
b.	tsʰi55 sin33	→	tsʰi55 tsʰi55	teɪ25	sin33	‘crazy’
	pʰa33 tsʰɐu25	→	pʰa33 pʰa33	teɪ25	tsʰɐu25	‘shy’

Following Yu’s (2007a) Phonological Subcategorization approach, I propose that the affix *teɪ25* subcategorizes for the first disyllabic (iambic) foot, motivated for Cantonese in Yip (1994) for independent reasons.[14]

We are now in position for the MDT analysis of Cantonese attenuatives with monosyllabic inputs:

(35) Attenuative *hʊŋ21* ‘red’



The two reduplicative copies do not undergo any modification. Hence, the daughter cophonologies simply specify identity.[15] When these two copies are joined together at the mother node in (35), the mother cophonology brings about tone alternation and the subcategorization of *teɪ25*. Tone alternation applies at the right edge of the reduplicative stem (RStem) regardless of the tone of the input syllable; it applies vacuously in the cases of base tones 55 and 25. Tone alternation precedes the affix *teɪ25*, for

[14] The data based on which Yip (1994) posits the disyllabic foot for Cantonese include vocatives with the prefix *a33* (9).

[15] Or cophonology X, i.e. the first daughter cophonology, may be analyzed to require (vacuous) truncation to the first syllable. This will be motivated when we consider attenuatives with disyllabic inputs below, and interrogatives in section 3.2.3.

historical reasons (section 3.2.1). Using bracket notation, the attenuative construction is illustrated below; **T** represents the floating high tone which triggers tone alternation:

(36) Cantonese attenuatives with monosyllabic inputs
[[Foot]$_{\text{RStem}}$ **T** *teɪ25*]$_{\text{attenuative}}$

What is puzzling is that, when the input is disyllabic, tonal overwriting is blocked, e.g. *p^{h}a33ts^{h}ɐu25* → *p^{h}a33p^{h}a3**3**teɪ25ts^{h}ɐu25* (34b). At this juncture, it is not difficult to understand the reasons behind when one puts together the analyses of tone alternation and the affixation of *teɪ25*: the subcategorization of *teɪ25* for the first foot of the reduplicative stem is inviolable, and that tone alternation applies only when it coincides with the right edge of a morphological constituent. Specifically in attenuatives, tone alternation applies only when the right edge of the reduplicated stem coincides with the left edge of *teɪ25*, and hence the **T** in (36). (37) juxtaposes the difference between monosyllabic and disyllabic inputs. To a certain extent, my subcategorization approach here mimics that of Paster (2006) to phonologically conditioned allomorphy. The difference is that, if **T** were somehow regarded as part of the affix *teɪ25*, then the current situation could be viewed as morphologically conditioned allomorphy, where the distribution of the two allomorphs, **T***teɪ25* and the plain affix *teɪ25*, is conditioned by morphological structure.

(37) a. Attenuative construction #1
[[Foot **]$_{\text{RStem}}$** **T** *teɪ25*]$_{\text{attenuative}}$
e.g. [[hʊŋ21 hʊŋ21] **T** *teɪ25*]

b. Attenuative construction #2
[[Foot *teɪ25* .... **]$_{\text{RStem}}$**]$_{\text{attenuative}}$
e.g. [[p^{h}a33 p^{h}a33 *teɪ25* ts^{h}ɐu25]]

In the case of disyllabic inputs, I assume truncation to the first syllable at the

first daughter cophonology, and that the second daughter cophonology specifies identity, giving rise to a reduplicative stem such as [pʰa33pʰa33tsʰɐu35]$_{RStem}$ for (37b).[16] The affix *teɪ25*, then, appears infixing without tone alternation that would otherwise apply in the case of monosyllabic inputs.

There is variation among speakers as to whether tonal overwriting is blocked in attenuatives with disyllabic inputs. All the forms of Cantonese attenuatives discussed thus far are those reported in reference grammars such as Matthews & Yip (1994, To appear). There are, however, speakers who accept and produce forms of attenuatives such as *pʰa33pʰa3**5**teɪ25tsʰɐu25* (← *pʰa33tsʰɐu25*) with tonal overwriting as with monosyllabic inputs. Synchronically, therefore, two groups of speakers exist with slightly different grammars of attenuatives.

(38) Two groups of speakers in relation to attenuatives

	Group A	Group B
disyllabic input:	*pʰa33pʰa3**3**teɪ25tsʰɐu25* [[Foot *teɪ25* ....]$_{RStem}$]	*pʰa33pʰa3**5**teɪ25tsʰɐu25* [[Foot **T** *teɪ25* ....]$_{RStem}$]
monosyllabic input:	*hʊŋ21hʊŋ2**5**teɪ25* [[Foot]$_{RStem}$ **T** *teɪ25*]	*hʊŋ21hʊŋ2**5**teɪ25* [[Foot]$_{RStem}$ **T** *teɪ25*]

The situation can be understood as a case of reanalysis of the application conditions of tone alternation. The arrows in (38) denote the morphological

[16] Truncation to the first syllable is not reduplication-specific, however. Monosyllabicity is actively enforced in other areas of Cantonese grammar. English loans, for example, often exhibit truncation (Luke & Lau 2008), e.g. *in55* 'to attend an interview' (from *interview*). This confirms to the Generalized Phonology Prediction of MDT that "[t]he set of phonological effects found applying within reduplication is equivalent to the set of morphologically conditioned phonological effects found outside of reduplication" (Inkelas & Zoll 2005: 69).

conditions on which tone alternation applies in attenuative in both speaker groups. For group B speakers, the application environment of tone alternation in attenuatives is loosened: tone alternation applies preceding the affix *teɪ25* and does not require its coincidence with the right edge of a morphological constituent.

3.2.3 Beyond attenuatives

With the MDT-based analysis of attenuatives in place, I move on to analyze other reduplicative constructions in Cantonese, specifically attemptives and interrogatives.

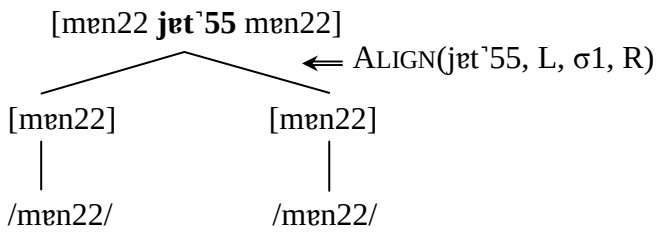
Attemptives admit only monosyllabic inputs and have *jɐt̚55* as an obligatory affix flanked by the two reduplicative copies.

(39) Attemptives with *jɐt̚55* (repeating (19))

mɐn22	→	mɐn22 jɐt̚55 mɐn22	‘ask’
t^{h}ɐɪ25	→	t^{h}ɐɪ25 jɐt̚55 t^{h}ɐɪ25	‘look’

In MDT terms, the input is first doubled by self-compounding. At the mother cophonology, the affix *jɐt̚55* subcategorizes for the first syllable.

(40) Attemptive *mɐn22* ‘ask’



Argued to be words rather than syntactic constructions in section 3.1.1, interrogatives allow both monosyllabic and polysyllabic inputs, including

English words.

(41) Cantonese interrogatives (combining (21) and (23))

a. with monosyllabic inputs:

sœŋ25	→	sœŋ25 m̩21 sœŋ25	'want'
lɛŋ33	→	lɛŋ33 m̩21 lɛŋ33	'beautiful'

b. with disyllabic inputs:

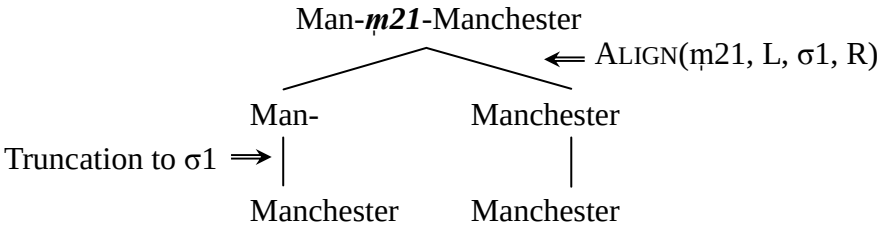
tsuŋ55 ji33	→	tsuŋ55 m̩21 tsuŋ55 ji33	'like'
hɔɪ55 sɐm55	→	hɔɪ55 m̩21 hɔɪ55 sɐm55	'happy'

c. with English words as inputs:

happy	→	hap-*m̩21*-happy
understand	→	un-*m̩21*-understand
Manchester	→	Man-*m̩21*-Manchester

The MDT analysis of interrogatives is similar to that of attemptives, except that the first daughter cophonology requires truncation to the first syllable. The following illustrates the analysis with the English word *Manchester* as the input. It is noteworthy that attenuatives and interrogatives share the same first daughter cophonology (cf. section 3.2.2).

(42) Interrogative *Manchester*



3.3 Language game

This section describes and analyzes a Cantonese-based language game featuring reduplication, reported in Jernudd and Yue (1995). The input to the secret language is the output of the syntax and lexical phonology of Cantonese proper. The language game essentially doubles all syllables. (43)

illustrates two examples, each of which shows the language game output in the first line and the intended Cantonese syllables with vertical bars indicating word boundaries in the second line.[17]

(43) Cantonese language game (Jernudd & Yue 1995)

a. m̩22 s hɐɪ22 sɐɪ55 ɔ22 sɔ55 hou22 sou55 ts^{h}i22 si55 kin22 sin55 k^{w}ɔ22 sɔ55 k^{h}œʏ22 sœʏ55 ka33

m̩21 hɐɪ22 | ɔ23 | hou35 ts^{h}i23 | kin33 k^{w}ɔ33 | k^{h}œʏ23 | ka33

no I seem see-PERFECTIVE her (particle)

'No, I seem to have seen her.'

b. neɪ22 seɪ55 sɪk22 sɪk55 m̩22 sa55 sɪk22 sɪk55 jin22 sin55

neɪ23 | sɪk22 m̩21 sɪk22 | jin55

you eat-INTERROGATIVE cigarette

'Do you smoke?'

The reduplicative language game exhibits both melodic and tonal overwriting:

(44) a. neɪ23 → neɪ22 seɪ55 'you'

b. ɔ22 → ɔ22 sɔ55 'I'

c. m̩21 → m̩22 s 'not' (in (43a))

d. m̩21 → m̩22 sa55 'not' (in (43b))

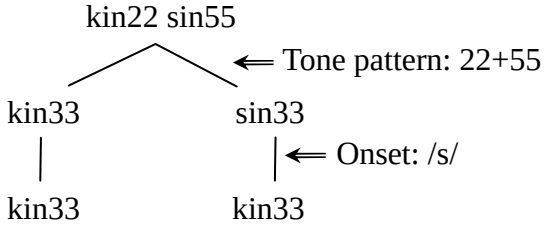
Segmentally, in each disyllabic reduplicative domain, the second copy must begin with *s*- replacing the onset of the input syllable (44a). If the input syllable does not a priori have onset, *s*- is epenthesized (44b). More intriguingly, tonal overwriting in the language game is radical. Regardless of the original lexical tone of the input Cantonese syllable, the output disyllabic constituent in the secret language must bear the low-level tone 22 on the first syllable and the high-level tone 55 on the second (44a, b and d). Lexical contrasts by tone are effectively suspended in the secret language.

[17] Transcription is converted into IPA and Chao tone numbers, with my glossing and translation. In this language game, discourse utterance-final particles and English words code-mixed in speech remain unreduplicated.

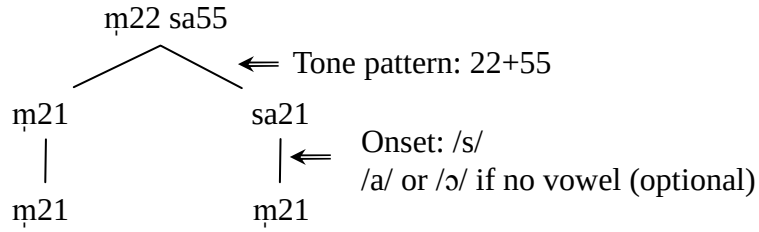
Finally, the behavior of the negator/interrogative suffix *m̩21* is worth underlining. Jernudd and Yue (1995: 158) report that this syllabic nasal can be rendered in three forms in the secret language: *m22 s*, *m22sa55* and *m22sɔ55*, cf. (44c, d). Note that although /s/ is not a legitimate coda or syllabic consonant in Cantonese, the fixed onset /s/ in the secret language can still be realized even without any vowel. The obligatoriness of /s/ in lieu of the syllabic /m/ in the second daughter suggests that the input bilabial nasal is treated as an onset. In the case with no vowel epenthesis following /s/, the high-level tone 55 may still be licensed at this syllable but not phonetically realized if we assume an empty vowel.

The proposed analysis of reduplication in the language game is based on MDT. The second daughter cophonology is responsible for the melodic overwriting making /s/ the onset of the second copy. In the case of *m̩21* as the input syllable, a vowel /a/ or /ɔ/ is optionally epenthesized as well. The fixed tonal pattern of low-level tone 22 followed by high-level tone 55 is due to the mother cophonology. I illustrate the analysis with the input syllables *kin33* 'to see' and *m̩21* (negator/interrogative).

(45) *kin33* 'to see' in the language game



(46) *m̩21* (negator/interrogative)



The fixed tonal pattern is analyzed as part of the mother cophonology rather than the two daughter cophonologies specifying 22 and 55 separately, on the grounds that the disyllabic tonal pattern 22+55 is not unfamiliar to Cantonese speakers. Silverman (1992) reports the following English loans in Cantonese:

(47) English loans in Cantonese

pik22 lik55	break
keɪ22 lim55	cream
si22 tik55	stick
si22 tɔ55	store

Of particular interest in (47) is the way consonant clusters are manifested from the source English monosyllabic words into Cantonese disyllabic words with the fixed tonal pattern 22+55. This may be a source of the similar tonal pattern in the language game described above.

3.4 Interim summary and remarks

Up till this point, I have described and analyzed the morpho-phonological processes found in Cantonese: tone alternation as a stem-final process triggered by a floating high tone; affixation modeled by subcategorization relations; and reduplication as morphological doubling. These processes have been demonstrated not to be stand-alone, but interact with one another

depending on the constructions. Specifically, in the treatment of reduplication, I have argued against the optimality-theoretic analysis relying on alleged markedness or unmarkedness, with reference to the fixed tonal pattern in the reduplicative attenuatives which is no different from tone alternation. A reduplicative language game in Cantonese was also explored.

4. Morphological doubling and the Lexical Phonology of Cantonese

With the detailed analyses of the morpho-phonological processes in Cantonese in place, I propose a unified model of the Lexical Phonology of Cantonese in this chapter. Section 4.1 recapitulates findings in chapter 2 previously, with revision based on the analysis of attenuatives, in relation to ordering of the morpho-phonological processes. This constitutes the necessary basis for the analysis of level ordering in Cantonese. Section 4.2 centers on the integration of MDT into Lexical Phonology, which is another crucial area for the proposed comprehensive analysis of Cantonese morphophonology that exhibits reduplication. Section 4.3 presents the four-level model of the Lexical Phonology of Cantonese.

4.1 Ordering revisited

The productive morpho-phonological processes in Cantonese are tone alternation (section 2.1), affixation (section 2.2) and reduplication (chapter 3). Some ordering relations among the three processes have been demonstrated:

(48) Ordering of tone alternation before affixation (repeating (11))

a. Vocative with a surname: [a33 [surname] **T**]$_{\text{vocative}}$

	Tone alternation		*a33*-prefixation	
tsʰɐn21	→	tsʰɐn**25**	→	**a33** tsʰɐn25

b. Diminutive with a surname: [[surname] **T** tsɐɪ25]$_{\text{diminutive}}$

	Tone alternation		*tsɐɪ35*-suffixation	
tsʰɐn21	→	tsʰɐn**25**	→	tsʰɐn25 **tsɐɪ25**

(49) Ordering of reduplication before affixation (repeating (20))

a. Interrogative

Reduplication		ALIGN(*m̩21*, L, σ1, R)		
lɛŋ33	→	lɛŋ33 lɛŋ33	→	lɛŋ33 **m̩21** lɛŋ33 ‘beautiful’

b. Attemptive

Reduplication		ALIGN(*jɐt̚55*, L, σ1, R)		
mɐn22	→	mɐn22 mɐn22	→	mɐn22 **jɐt̚55** mɐn22 ‘ask’

Tone alternation precedes affixation (48), whereas reduplication precedes affixation as well (49). It follows, therefore, that affixation applies last. The gap that remains is the ordering between tone alternation and reduplication. The solution is offered by the attenuative construction:

(50) Ordering of reduplication before tone alternation, in attenuatives

a. Reduplication | Tone alternation | ALIGN(*teɪ35*, L, Ft_1, R)

hʊŋ21 → hʊŋ21 hʊŋ21 → hʊŋ21 hʊŋ25 → hʊŋ21 hʊŋ25 teɪ25 ‘red’

b. Incorrect order of application:

Tone alternation | Reduplication | ALIGN(*teɪ35*, L, Ft_1, R)

hʊŋ21 → hʊŋ25 → hʊŋ25 hʊŋ25 → *hʊŋ**25** hʊŋ**25** teɪ25

In attenuatives, tone alternation applies to a reduplicated stem (section 3.2.2), which logically implies that reduplication must apply before tone alternation. Were tone alternation ordered before reduplication, it would erroneously result in an unattested form with both reduplicative copies exhibiting tone alternation (50b).

We can thus conclude that the morpho-phonological processes are in the following order: reduplication, tone alternation and affixation.

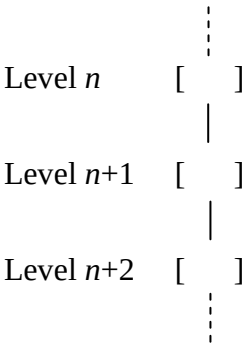
4.2 Level fission and level fusion

The theory of Lexical Phonology (LP; Kiparsky 1982, 1985, among many

others) distinguishes two broad types of phonological processes: lexical and postlexical. The phonological processes in the lexical component, as opposed to the postlexical one, are within what is called morphophonology in the structuralist tradition, since they characteristically refer to morphology represented by levels in LP. If all lexical processes are claimed to precede postlexical processes, then reduplication is necessarily within this lexical component due to its morphophonological nature and its precedence over other morphological processes such as affixation, at least in the case of Cantonese. The question is, therefore, how reduplication is represented in Lexical Phonology.

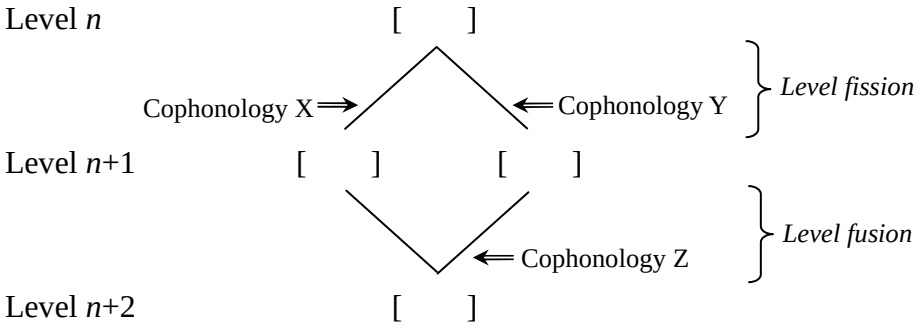
The proposal to be made below essentially integrates MDT, which regards reduplication as morphological doubling, into the model of LP, which typically assumes that a form goes through morphological levels one after another:

(51)



The manner of derivation in (51) does not appear to allow copying or doubling a form. In light of this, I propose that reduplication motivates a novel instantiation of LP:

(52) The MDT-LP model



By the very nature of LP, the mechanism of MDT is employed in a derivational fashion, departing from Inkelas and Zoll's (2005) conception of MDT as a non-derivational theory couched within Sign-Based Morphology (Orgun 1999). In terms of LP, reduplication opens up the possibility of a form at a certain level self-copying and the two copies or sisters separately undergoing two potentially different cophonologies to arrive at the next level – LEVEL FISSION. Retaining Inkelas and Zoll's terminology, these cophonologies are cophonologies X and Y respectively. When the two sisters reunite at the following level, a mother cophonology Z may potentially apply here – LEVEL FUSION.

The next section presents a four-level model of the Lexical Phonology of Cantonese, employing the merging of MDT and LP in the treatment of reduplication.

4.3 The four-level model

Based on the analyses of morpho-phonological processes, I propose that there are four levels in the Lexical Phonology of Cantonese:

(53) The Lexical Phonology of Cantonese

	Level 1	Level 2	Level 3	Level 4
Morphology	root	stem formation (reduplicative or plain)	attenuative *teɪ25* diminutive	vocative *a33* diminutive *tsɐɪ25* expletive *kʷɐɪ25, mɛ55* interrogative *m̩21* attemptive *jɐt55* aspect markers *tsɔ25*, etc
Phonology		truncation	tone alternation	

As shown in (53), the morphological levels are delineated by phonology. Level 1 is the root level with the underlying representation of a lexical item. Level 2 is stem formation, characterized by truncation. The stem thus formed can be plain or reduplicative due to level fission. Level 3 is morphological processes with tone alternation. Lastly, level 4 is affixational processes.

In the following, I justify this model by illustrating how various forms are derived.

I assume roots in level 1 of the Cantonese lexicon to include English words,[18] because there is an increasing number of English loans in Cantonese formed by truncation of the source English words (Luke & Lau 2008), presumably at level 2. (54) shows English verbs truncated to the first syllable; parentheses show the Cantonese pronunciations :

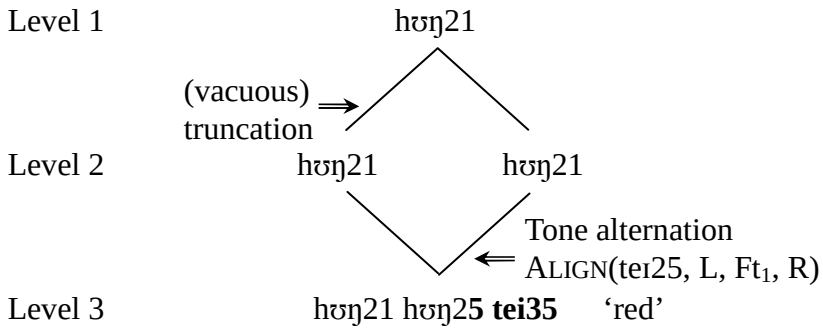
[18] Due to socio-historical reasons, the English language is prevalent in some Cantonese-speaking places such as Hong Kong.

(54) English loans (levels 1 and 2)

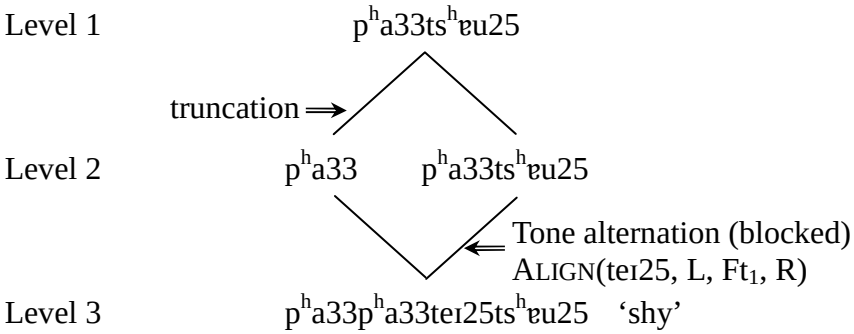
Level 1	Level 2 (with truncation)
register	reg- (*wɛk˧˥55*)
duplicate	dup- (*tɐp˧˥55*)
interview	in- (*in55*)
reply	re- (*wi22*)

Attenuatives are derived through levels 1, 2 and 3. A root leaves level 1 and undergoes level fission. Truncation to the first syllable applies at the first sister (i.e. the first daughter cophonology). The reduplicated stem is formed by level fusion from level 2 to level 3. At level 3, tone alternation applies, followed by the affixation of *teɪ25*. If the root is disyllabic (56), tone alternation is blocked (section 3.2.2).

(55) Attenuative (monosyllabic root; levels 1, 2 and 3)



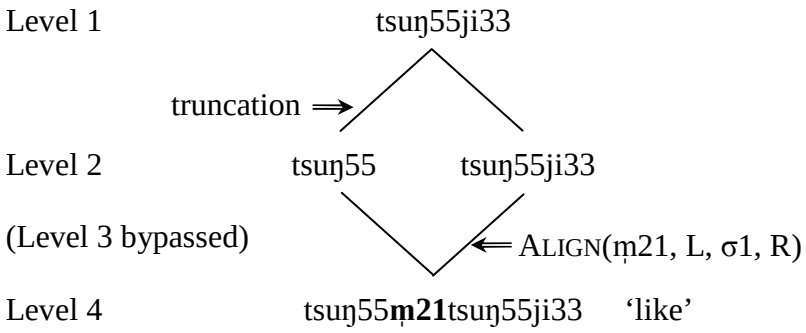
(56) Attenuative (disyllabic root; levels 1, 2 and 3)



An interesting case is provided by interrogatives, presumably going through

levels 1, 2 and 4. Following Inkelas and Orgun's (1995) analysis of Turkish, I assume level economy, which allows a form to skip the phonology of a level if the level's morphology is irrelevant. The derivation of interrogatives is similar to that of attenuatives, except that level 3 is skipped, and that affixation is effected at level 4 rather than level 3.

(57) Interrogative (levels 1, 2 and 4)



Likewise, level 2 may also be skipped. Diminutives with surnames require levels 1, 3 and 4.

(58) Diminutive with a surname (levels 1, 3 and 4)

Level 1	Level 2	Level 3	Level 4
	(skipped)	(with tone alternation)	
ts^{h}ɐn21		ts^{h}ɐn2**5**	ts^{h}ɐn2**5 tsɐɪ25**

In the above, I have justified the ordering of levels and their relevant morphology and phonology specifically by illustrating level 1 followed by level 2 (54), levels 2 followed by level 3 (55)-(56), and level 3 followed by level 4 (58).

5. Theoretical implications

Understanding reduplication as morphological doubling and merging this concept into Lexical Phonology yield a number of interesting theoretical consequences. Limited by the scope of the current study, in this chapter I briefly discuss a number of them, which point to possible directions of further research.

5.1 Non-local reduplication

One of the recent lines of research in the theoretical study of reduplication is the issue of non-local reduplication, i.e. the situation in which the two reduplicative copies are not adjacent to each other (Riggle 2004, Shaw 2005). Non-local reduplication is of interest because researchers working with the optimality-theoretical tradition using BRCT have apparently assumed base-reduplicant adjacency by the correspondence relation between the base and the reduplicant. Recall, however, that Cantonese attemptives and interrogatives are precisely counter-examples to this assumption (sections 2.2.3 and 3.1). It is noteworthy that Shaw (2005) makes two observations regarding non-local reduplication which are valid for Cantonese:

> ‘First, where reduplicant-base adjacency is disrupted, the intervening segmentalism consistently has morphological integrity; it is not simply a phonological string. Secondly, the intervening morphology is infixal, subject to prosodic – rather than strictly morphological – alignment constraints.’ (Shaw 2005: 162)

Consider the Cantonese interrogative *Man*-m̩21-*Manchester*, with an English word *Manchester* as the input. Indeed, *-m̩21-* is an affix which could independently be parsed as the negator in Cantonese, and that the alignment of *-m̩21-* is a case of phonological subcategorization (section 3.1.1).

The idea that non-local reduplication is something special and marked is puzzling. If the analysis of Cantonese reduplication is based on morphological doubling with ordering of morpho-phonological processes, there is nothing surprising about the two reduplicative copies being non-adjacent to each other. To be sure, processes later than reduplication may well infix in-between the two copies. In principle, the approach to reduplication that I adopt in this thesis has no intrinsic power of obliging or prohibiting adjacency. Nonetheless, diachronic or psycholinguistic/ processing factors may disprefer non-local reduplication. It would be interesting to cross-linguistically find instances where the two reduplicative copies are disrupted by more than one morphological constituents.

5.2 Properties of the MDT-LP model

The proposed MDT-LP model has a number of properties, two of which I discuss here.

The MDT-LP model implies that a language with reduplication has at least three levels. In this study, I have demonstrated that Cantonese is a language where reduplication is lexically at the stem level, or more “inside” in the lexicon. A prediction is that, in a language which is relatively more complex morphologically (i.e. with more levels), reduplication may be at

later levels in the lexicon, e.g. the word level.

Another proper is concerned with the identity of the two reduplicative copies. Inkelas and Zoll (2005) stress that such identity is morpho-semantic, rather than phonological. To support this claim, they cite instances of synonym constructions where a compound is formed with two words which are semantically very similarly but phonologically divergent (pp59-61). Researchers have expressed doubt as to whether this is the kind of reduplication that we discuss (see, e.g. Downing 2007). In fact, in the MDT-LP model here, both morpho-semantic and phonological identity of the two reduplicative copies need not be stipulated either: they fall out naturally from the basic design of the model due to level fission.

5.3 Constrained successiveness and sustainedness

In light of level fission and level fusion, the following two hypotheses with respect to the MDT-LP model shall be tested in further research:

(59) a. Constrained Successiveness Hypothesis:

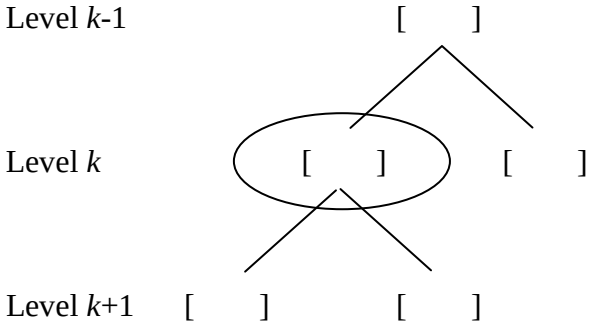
At level *k* with two sisters which come into being by level fission from level *k*-1, any of the two sisters at level *k* cannot undergo level fission to arrive at level *k*+1.

b. Constrained Sustainedness Hypothesis:

At level *k* with two sisters which come into being by level fission from level *k*-1, these two sisters must undergo level fusion (i.e., they must reunite) to arrive at level *k*+1 (that is, they cannot remain as sisters at level *k*+1 and refrain from level fusion).

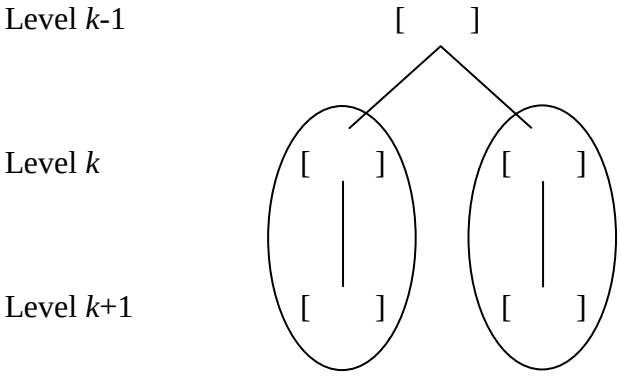
In other words, constrained successiveness bans the case illustrated below in (60), where a sister (circled) from level fission undergoes level fission.

(60) Violating the Constrained Successiveness Hypothesis



The Constrained Sustainedness Hypothesis disallows the situation such as (61), where two level fission-generated sisters (both circled) at level *k*+1 remain as sisters at level *k*+1.

(61) Violating the Constrained Sustainedness Hypothesis



These two hypotheses are necessary to constrain the model of integration of MDT into LP, again probably due to diachronic and processing factors. The first hypothesis, Constrained Successiveness, prohibits infinite doubling. The second hypothesis, Constrained Sustainedness, ensures that two sisters do not undergo divergent cophonologies through successive levels, which would otherwise make the two copies so distinct that the construction does

not merit the classification of reduplication as such, nor undergo level fission in the first place. These two hypotheses shall be evaluated in a cross-linguistic approach.

6. Summary and conclusions

Throughout this thesis, I have explored the phonology-morphology interface of Cantonese. The productive morpho-phonological processes in Cantonese are tone alternation, affixation and reduplication. These processes were described and analyzed in detail. Tone alternation is a stem-final process triggered by a floating high tone. Affixation is modeled as subcategorization requirements, thus wiping the surface descriptive prefix-suffix-infix distinction. Reduplication is analyzed as self-compounding. These three processes are found to apply in the following order: first reduplication, then tone alternation, and affixation at last.

Reduplication has featured prominently in this thesis. Two dominant but competing theories of reduplication were juxtaposed. The first one was phonologically-based Base-Reduplicant Correspondence Theory (BRCT; McCarthy & Prince 1995), whereas the other one was Morphological Doubling Theory (MDT; Inkelas & Zoll 2005). Cantonese reduplication exhibits tonal overwriting, a fixed tonal pattern within the domain of the reduplicative copies. MDT was demonstrated to be superior over BRCT, because the overwriting phonological material is not due to its unmarkedness or markedness whatsoever.

Finally, a four-level model of the Lexical Phonology of Cantonese was proposed. The model has integrated MDT and Lexical Phonology. The results were that a level can self-copy with the two copies arriving at the next level by undergoing potentially divergent cophonologies (level fission), and that the two copies reunite at yet the next level, again potentially with

its own cophonology (level fusion). Several implications of this model were briefly discussed.

To put MDT and LP together for one language may appear to be a formidable task, since it would be require a comprehensive understanding of the reduplicative constructions and the morphophonology of that particular language. Nonetheless, an important moral from this thesis is that, a phenomenon in a language cannot be understood properly unless one puts it in the larger context of the grammar of the language under study. Specifically, reduplication of a particular language can be analyzed properly only when there is a good picture of the morphophonology of this language. Further research will explore synchronic and diachronic issues pertaining to the proposed MDT-LP model, both within and beyond Cantonese.

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