國立政治大學語言學研究所碩士論文

National Chengchi University
Graduate Institute of Linguistics
Master Thesis

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台灣韓中空耳之音韻分析

Phonological Analysis of Korean Kong-er in Taiwan Mandarin

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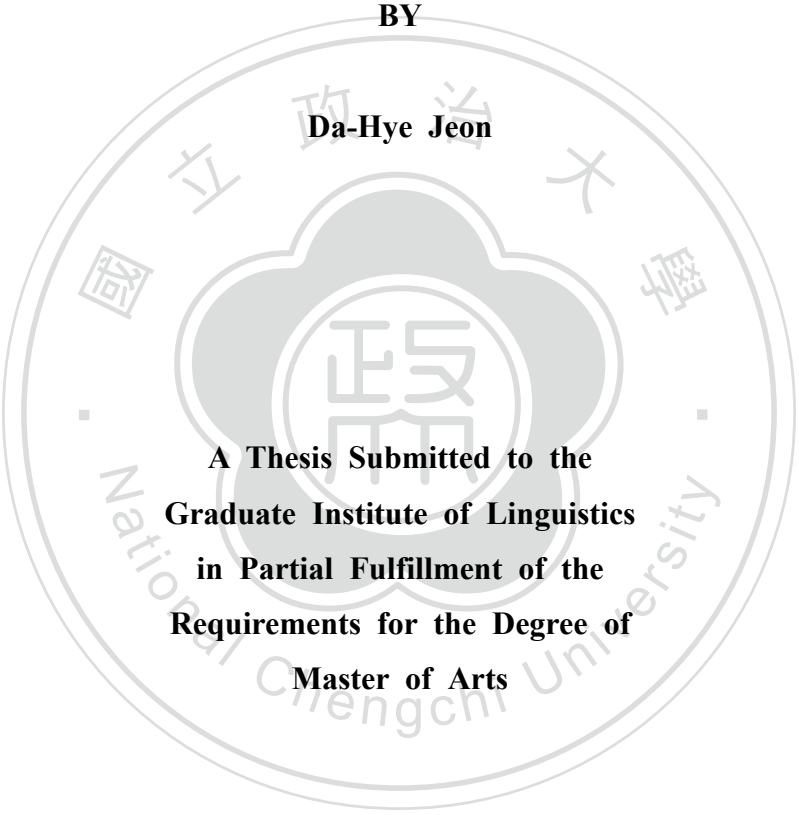
中華民國一零七年一月
January, 2018

PHONOLOGICAL ANALYSIS OF KOREAN KONG-ER IN TAIWAN MANDARIN

BY

Da-Hye Jeon

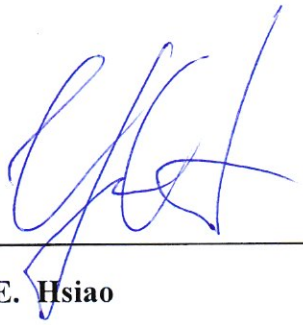


A Thesis Submitted to the
Graduate Institute of Linguistics
in Partial Fulfillment of the
Requirements for the Degree of
Master of Arts

January 2018

The members of the Committee approve the thesis of Da Hye Jeon

defended on December 19, 2017



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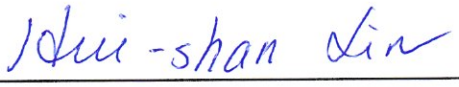

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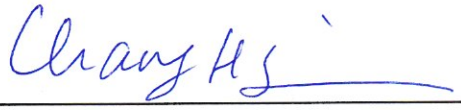

Hsun-huei Chang, Director, Graduate Institute of Linguistics

To my devoted and lovely mom.

Acknowledgement

致謝辭

來台灣交換期間發現台灣的魅力。留在政大念碩士的這幾年的很快就過去了，終於畢業了啦！

首先，要特別感謝我的指導教授蕭宇超老師。從一年級的「音韻學」課開始，老師用老師的方式，又簡單又有趣的讓我進入到音韻學的世界，也感謝進入工作室後讓我慢慢熟悉音韻學。都是因為有老師的指導而能夠參加研討會發表，能夠完成碩士班的這條路。感謝老師，平常老師告訴我們的做研究者，做老師的道理，以及當學生的禮節。感謝老師，總是仁慈告訴我怎麼找研究主題，也給我方向。如果沒有老師，愚蠢笨笨的我，絕不能畢業的！

接著我要感謝擔任我的口試委員：林蕙珊老師與吳瑾瑋老師。謝謝老師針對我的論文給了很多建議，與提供了沒有思考過的想法。老師們的建議以及鼓勵讓我的這篇論文更完整，更成熟。

感謝在政大念碩士時教我的所有老師。研究所（以及英文系）的老師們對我都很親切，細心的教我各語言學世界，才能順利修完學分，也能夠在異地克服留學時間。張郇慧所長、何萬順老師、萬依萍老師、RIK DE BUSSER 老師、徐嘉慧老師、賴惠玲老師真的非常感謝師長們的功勞。特別是 Rik 老師給我兩次的助教機會，這機會在留學生活中幫助我了很多。還有不能忘記惠鈴助教學姐，沒有妳我什麼都不會做到的！

在音韻理論工作室的大家也是我能夠畢業的來源之一。謝謝怡臻以及旺楨學姐的貼心與鼓勵，在工作室的時間當中，問你們的問題應該不能算，但妳們都很細心的回我還鼓勵我，真的不知道怎麼感謝。也要感謝子權學長，你的豐富的語

言學與語言的知識幫助我很多。最後，謝謝 Johnny 學長一直關心我，並關於我的論文。

接下來我要感謝跟我一起孤軍奮鬪的同學們以及在台灣留學中幫助我的很多朋友們。一開始不習慣留學生活，也難適應外文上課環境的我，因為有你們我才能慢慢適應到，也能畢業的。真的感謝願意當我的朋友，告訴我很多技巧以及知識！特別感謝，我的 bestie 筱翎，你不只是我的台灣生活，而是我的人生給我了很大的影響，也當了我人生中很重要的好友。真的非常感謝妳對我的關心以及鼓勵。還感謝中文所的汪，對我來說，妳就代表「台灣」。妳讓我了解真正的台灣，讓我脫出韓國的保守文化。這四年半的台灣生活中，感謝你總是給我聰明以及客觀建議，我非常希望妳幸福。再來，感謝泥泥、瑪麗、玉米以及其他 103 級同學們，永遠的 buddy 張懿，雄韓會的瑋星、德軒。感謝大家！

最後感謝永遠不離不棄的家人。謝謝總是鼓勵我的媽媽，我會繼續努力學媽媽的賢明。謝謝爸爸在韓國想我很多擔心我很多。謝謝多恩和多亨替我照顧爸爸媽媽。真的要感謝的人太多了。很高興我周圍有這麼多好人與好朋友，覺得我很幸運。一路走來不容易，若是多年後回想起這段時光，我想記憶裡會充滿著笑聲與溫暖。感恩，감사합니다！

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國 立 政 治 大 學 研 究 所 碩 士 論 文 提 要

研究所別：語言學研究所

論文名稱： 台灣韓中空耳之音韻分析

指導教授：蕭宇超

研究生：田多惠

論文提要內容：（共 1 冊，16493 字，分 5 章）

本研究主要探討台灣的韓文歌曲中以空耳方式對譯成中文的音韻現象。藉由 11 首韓文歌中收錄 955 個音韻詞（2690 個音節）作為分析之語料。本研究之語料顯示，韓語源詞會調整成中文之語音系統（Mandarin phonotactics），而其中 8.07%使用注音符號或英文字且違反中文之語音系統。語音違規（phonotactic violation）還可分為兩類：一、按照韓語語法系統違反中文語音系統。二、按照中介語語法違反中文語音系統。

而大部分音譯符合中文之語音系統，結果如下：緊張閉鎖音（tensed obstruent）做鬆弛化，並以中文的不送氣閉鎖音取而代之。韓語中的音節尾 /p、t、k、m、l/ 被刪除，或被中文之合法音節尾 /n、ŋ/ 所取代。滑音 /j/ 會插入清齦顎塞擦音（post alveolar affricates）/tɕ、tɕ^{h}、tɕ’/的後面。韓語元音 /ɯ/ 被降音到 /ɤ、ə/，而單元音 /o、ʌ/ 和 /e/ 被雙元音化為 [ou] 和 [ei]。除了按照中文語音系統音譯的現象之外，本文還觀察到隨著韓語語音系統音譯的 CV 序列（sequencese），也觀察到隨著中文與韓文之間的中介語音譯的序列。隨著韓語（L2）語音系統的序列是：軟齶音（velars）/ k、k^{h}、k’、h / 和 [+high, -back]元音 /i/，以及牙音/ n/ 和 [-high, +back]元音 /ʌ、o/。這兩個序列會保留韓文語音系統的 CV 組合。

另一方面，諸如軟齶音 /k、k^h、k’、h/ 和唇音（labial）/p、ph、p’、m / 等非舌冠音（coronal）在母音/jʌ/前出現，會隨著中介語語音系統音譯。此外，齒齦音/s、s’/ 和 元音/e/ 會隨著中介語語音系統輸出。

本研究基於優選理論（Optimality Theory）和 Ranking Ordering Model of Eval 探討韓中空耳之音譯變體（variations）。結果顯示，在韓文文法中做 top-ranked 的制約會被降級，這支持了 Miao（2005）和 Broselow（2004）的中文語音系統比韓文語音系更重要的作用。然而，一些音譯違反中文之語音系統，以保持類似於源詞的音。因此，結果反映出韓文語音系統和中介語語音系統也影響韓中空耳音譯過程。

Abstract

This thesis investigates the Korean-Mandarin Kong-er in Taiwan. 955 phonological words (2690 syllables) from 11 songs are collected. The major part of the corpus shows that Korean source words are adjusted to the Mandarin phonotactic system, while 8.07% of the whole show phonotactic violation by using either Zhuyin (the Chinese transliteration system for Taiwan Mandarin) or English. The phonotactic violations also can be divided into two groups: one for violations that follow Korean grammar and the other for violations that show the emergence of an interlanguage grammar.

The majority of the patterns of the adaptations conform to Mandarin phonotactics. Tensed obstruents are de-tensed and replaced by unaspirated counterparts in Mandarin. Illicit codas such as /p, t, k, m, l/ in Korean are deleted or replaced by the Mandarin licit codas /n, ŋ/. The glide /j/ is prone to be inserted after the alveolar-palatal affricates /tɕ, tɕh, tɕ'/, which follows Mandarin phonotactics. The Korean /ɯ/ vowel is prone to being lowered to /ɤ, ə/, and the monophthongs /o, ʌ/ and /e/ are diphthongized as [ou] and [ei].

Apart from the adaptations that follow Mandarin phonotactics, this thesis also observes CV sequences that follow Korean phonotactics and also an interlanguage between Mandarin and Korean. The sequences that follow Korean (L2) are the velars /k, kh, k', h/ and the [+high, -back] vowel /i/, and the dental /n/ and the [-high, +back] vowels /ʌ, o/. These two sequences are prone to preserving CV manners and features. On the other hand, non-coronal consonants such as the velars /k, kh, k', h/ and the labials /p, ph, p', m/ mostly induce phonotactic violation following interlanguage phonology before /jʌ/. Also, the alveolars /s, s'/ an

d /e/ induce interlanguage output, which is not allowed in either the L1 or the L2.

The patterns and sequences are analyzed based on the Optimality Theory a nd Rank Ordering Model of EVAL to account for the variations. The results exp lain the fact that the Korean top-ranked constraints are demoted in the adaptatio n, supporting both Miao (2005) and Broselow (2004) that Mandarin phonology p lays a more important role than Korean phonology does. However, some of the adaptations violate Mandarin phonology in order to preserve a sound similar to t hat of the source word. Thus, the results reflect that Korean phonology and the emergence of an interlanguage have a partial influence on KM Kong-er adaptatio n.

Chapter 1

Introduction

1.1 Research Issue

This thesis investigates loanword adaptations of Korean-Mandarin Kong-er (hereafter KM Kong-er) in Taiwan. 'Kong-er (空耳)' is a transliterated lyric of a song, which can be divided into two different kinds of linguistic phenomena: namely, 'Semantic Kong-er' and 'Phonological Kong-er'. The semantic form of Kong-er refers to a mimicking of the lyrics of a foreign song using a potential homophonic translation. This kind of Kong-er is intended to create semantically humorous effects (Otake, 2007), such as soramimi (そらみみ) in Japanese and Mondegreen in English do. On the other hand, the phonological form of Kong-er, which is the focus of the investigation in this thesis, also uses potential homophones in the adaptation, with the purposes to allow L2-illiterate speakers to easily sing an L2 song with the Kong-er lyrics written in the way of an L1 transcription. Unlike the semantic Kong-er, the phonological Kong-er focuses on the similarity of sounds rather than of the semantic effects throughout the process of the adapation. For example, a Korean word /sa.raŋ/ '*love*' is adapted as [sa.laŋ] (撒狼) based solely on the similarity in the sound and without any consideration of the semantic meaning.

In Taiwan, the phonological Kong-er lyrics are mostly derived from the lyrics of K-pop songs and shared among youngsters who are Mandarin speakers. Since the number of loanwords from Korean (based on either sound or meaning) is not rich in Mandarin,

little related research has been undertaken. Thus, this thesis expects to contribute to a better understanding of the process of phonological adaptation between the two languages.

This thesis establishes a Korean-Mandarin Kong-er corpus, which includes 955 phonological words including 2690 syllables. Five phonological patterns which follow Mandarin phonotactics are focused to analyzed, and an analysis of two types of phonotactic violation is also given. The present analysis then applies the framework of Optimality Theory (Prince and Smolensky, 1993/2004) in the tenet of Rank-ordering Model of EVAL (Coetzee, 2006).

This thesis is engaged in the pursuit of three questions: What kind of phonological processes are involved in Kong-er adaptation? What roles do Korean phonology and Mandarin phonology play in Kong-er adaptation? Which language do Mandarin speakers follow? The L1 or L2 or neither of them?

The rest of the thesis is organized as follows. Chapter 2 reviews previous literature, including (1) previous studies of the loanword phonology correlated to KM Kong-er, and (2) the theoretical framework of the Optimality Theory (OT). Chapter 3 introduces the corpus established for the purpose of this study and analyzes the observed patterns. Chapter 4 analyzes the adaptation systems used in KM Kong-er within the framework of OT. Chapter 5 provides a summary and conclusion of the thesis.

1.2 The Sound Systems of Korean and Mandarin

The phonetic inventories of the Korean and Mandarin languages are tabulated in this section. The sound system of Korean in this thesis is based on the Standard Korean used in South Korea, and the Mandarin system is based on the Standard Chinese used in Taiwan. Taiwan Mandarin is phonetically varied from mainland Mandarin in the way that

the retroflex sound is usually replaced by dental counterparts (Chuang & Fon, 2010). The maximal syllable form of the Korean and Mandarin languages is identical: (C)(G)V(C).

In Korean phonotactics, the alveolo-palatal affricates /tɕ, tɕ^{h}, tɕ'/ are not allowed to precede the semi-vowel /j/ (Sin *et al.*, 2012). For example, neither *tɕjʌ nor *tɕju are allowed in Korean phonotactics. In Mandarin, on the other hand, the alveolo-palatal affricates /tɕ, tɕ^{h}/ only occur before the [+high, -back] vocoids such as /i(j), y(ɥ)/ (Lin, 2007). Also, Mandarin does not allow /o/ and /e/ to solely appear in a rhyme.

Phonetic inventories of Korean consonants and Mandarin consonants are shown in tables (1) and (2), respectively. Korean obstruents are considered to have three uncommon contrasts: lax, tense and aspirated. Mandarin, however, only has the aspiration contrast. For a transcription of the tense obstruents, this thesis uses an apostrophe after a consonant. In the phonetic inventories of both languages, voicing does not construct any contrast of consonants in the phonetic inventories of either language, but it still can appear as an allophone in the intervocalic position. However, the [±voice] contrast in the intervocalic position is irrelevant to this current analysis, and thus, is not inscribed in this thesis. Since the form of a source word in KM Kong-er is a phonetic form, the phonetic form of Korean is introduced here.

(1) Korean consonants (based on Sin *et al*. 2012)

	Bilabial	Alveolar	Alveolo-palatal	Velar	Glottal
Stop (plosive)					
Lax	p	t		k	
Tense	p’	t’		k’	
Aspirated	p^h	t^h		k^h	
Fricative					
Lax		s			h
Tense		s’			
Affricate					
Lax			tɕ		
Tense			tɕ’		
Aspirated			$tɕ^h$		
Nasal	m	n		ŋ (coda)	
Liquid (lateral approximant)		l			

(2) Mandarin consonants (based on Lin, 2007)

	Bilabial	Labial -dental	Dental	Post-alveolar	Alveolo -palatal	Palatal	Velar
Stop (plosive)							
Unaspirated	p		t				k
Aspirated	p^h		t^h				k^h
Fricative							
Unaspirated		f	s	ʂ	ɕ		x
Aspirated							
Affricate							
Unaspirated			tʂ		tɕ		
Aspirated			ts^h	$tʂ^h$	$tɕ^h$		
Nasal	m		n				ŋ (coda)
Approximant	w ɥ			ɹ		j ɥ	w
Lateral approximant			l				

While an underlying glide is regarded as a vowel in Korean, the surface form of a glide is considered to be a consonant. Also, the glides '/w/, /ɥ/ and /j/' in Mandarin are classified as consonants either in the underlying or the surfaced form as shown in table (2). Since the source language of KM Kong-er adaptation is that of the Korean phonetic form, this thesis regards a glide as a consonant.

The simplified vowel inventories of the two languages are shown in tables (3) and (4), respectively. Glides are parenthesized in both vowel tables of Korean and Mandarin. The Korean vowel system includes seven monophthongs and ten diphthongs with two

glides /j/ and /w/. The Mandarin vowel system includes five main vowels [i, y, u, a, ə] and other allophones occur in specific contexts (Lin, 2007). [e, o, ɤ] are allophones of the vowel 'ə', and [ɛ, ɑ] are allophones of the vowel 'a'. In the table (4), the five main phonemes are marked by underlining. Also, Mandarin has five monophthongs /i, y, u, a, ə/ and eleven diphthongs derived from the monophthongs. In addition, Mandarin has three glides /j/, /w/ and /ɥ/. The possible vowels in Mandarin are listed in table (4).

(3) Korean vowels (based on Sin et al., 2012)

	Front	Back	
	Unrounded	Unrounded	Rounded
High	i (j)	ɯ	u (w)
Mid	e / æ[1]	ʌ	o
Low		ɑ	

(4) Mandarin vowels (based on Lin, 2012)

	Front		Central	Back	
	Unrounded	Rounded		Unrounded	Rounded
High	i (j)	y (ɥ)			u (w)
Mid	e / ɛ		ə	ɤ	o
Low	a			ɑ	

[1] Since the front-mid vowel /e/ and the front-low vowel /æ/ are not distinctive in the contemporary speech of native speakers (Sin *et al.*, 2012), this thesis regards them as one phonetic form.

In this thesis, phonotactic violations written in other forms of transcription are also analyzed. In Taiwan, a system of phonetic notation called ‘Zhuyin’ is used for the transcription of Mandarin. Zhuyin is widely used in Taiwan, both in learning to comprehend and write Chinese characters in early education, and in entering electronic text. Also, the transcription of other Chinese languages, whose phonotactics do not exist in Mandarin Chinese, is written in Zhuyin in Taiwan. For the ease of comparison, table (5) below shows each of the counterparts between Zhuyin and the IPA (International Phonetic Alphabet).

(5) Zhuyin phonetic system for Mandarin

IPA	Zhuyin	IPA	Zhuyin	IPA	Zhuyin
p	ㄅ	t	ㄉ	k	ㄍ
p^h	ㄆ	t^h	ㄊ	k^h	ㄎ
m	ㄇ	n	ㄋ	x	ㄏ
f	ㄈ	l	ㄌ		
tɕ	ㄐ	tʂ	ㄓ	ts	ㄗ
$tɕ^h$	ㄑ	$tʂ^h$	ㄔ	ts^h	ㄘ
ɕ	ㄒ	ʂ	ㄕ	s	ㄙ
		ɻ	ㄖ		
a	ㄚ	ai	ㄞ	an	ㄢ
o	ㄛ	ei	ㄟ	ən	ㄣ
ɤ	ㄜ	au	ㄠ	aŋ	ㄤ
e	ㄝ	ou	ㄡ	ɤŋ	ㄥ
ɚ	ㄦ				
i	ㄧ				
u	ㄨ				
y	ㄩ				

As shown in table (5), consonants (including glides) solely correspond with each character of Zhuyin. In contrast, vowels are denoted in two ways: one way is that a vowel

corresponds with one Zhuyin character such as ‘a (ㄚ)’ and ‘u (ㄨ)’, and the other way is that a rhyme corresponds with one Zhuyin character such as ‘ai (ㄞ)’ and ‘əŋ (ㄥ)’.

The feature matrix of each Korean consonant and Mandarin consonant is offered in (6) to (9). The first two matrices show Korean obstruents and sonorants, and the latter two show Mandarin obstruents and sonorants.

(6) Feature specifications of Korean obstruents

	p	t	k	s	tɕ	h
	p^h	t^h	k^h	--	$tɕ^h$	--
	p’	t’	k’	s’	tɕ’	--
[sonorant]	-	-	-	-	-	-
[continuant]	-	-	-	+	-	+
[nasal]	-	-	-	-	-	-
[lateral]		-		-	-	
[spread glottis]	-/+/-	-/+/-	-/+/-	-/-	-/+/-	+
[tense]	-/+/+	-/+/+	-/+/+	-/+	-/+/+	-
[strident]	-	-	-	+	+	-
[voice]	+/-/-	+/-/-	+/-/-	+/-	+/-/-	-
[labial]	√					
[coronal]				√	√	
[anterior]	√			√		
[distributed]		-		+	-	
[back]	-	-	+	-	+	+
[high]	-	-	+	-	+	+

(7) Feature specifications of Korean sonorants

	m	n	ŋ	l
[sonorant]	+	+	+	+
[continuant]	-	-	-	-
[nasal]	+	+	+	-
[lateral]		-		+
[labial]	√			
[coronal]		√		√
[anterior]	+	+	-	+
[back]	-	-	+	-
[high]	-	-	+	-

(8) Feature specifications of Mandarin obstruents

	p	t	k	f	s	ʂ	ɕ	ts	tʂ	tɕ	x
	p^h	t^h	k^h	--	--	ɹ	--	ts^h	$tʂ^h$	$tɕ^h$	--
[sonorant]	-	-	-	-	-	-	-	-	-	-	-
[continuant]	-	-	-	+	+	+	+	±	±	±	+
[nasal]	-	-	-	-	-	-	-	-	-	-	-
[lateral]	-	-	-	-	-	-	-	-	-	-	-
[spread glottis]	-/+	-/+	-/+	-	-	-	-	-/+	-/+	-/+	-
[strident]	-	-	-	-	+	+	+	+	+	+	-
[voice]	-	-	-	-	-	-/+	-	-	-	-	-
[labial]	√			√							
[coronal]		√			√	√	√	√	√	√	
[anterior]		+			+	-	-	+	-	-	
[distributed]		-			-	-	+	-	+	+	
[back]	-	-	+	-	-	+	+	-	+	+	+
[high]	-	-	+	-	-	-	+	-	-	+	+

(9) Feature specifications of Mandarin sonorants

	m	n	ŋ	l	ɹ	j	w	ɥ
[sonorant]	+	+	+	+	+	+	+	+
[continuant]	-	-	-	+	+	+	+	+
[nasal]	+	+	+	-	-	-	-	-
[lateral]	-	-	-	+	-	-	-	-
[labial]	√						√	√
[coronal]		√		√	√	√		
[anterior]		+		+	+	-		
[distributed]		-		-	-	+		
[back]	-	-	+	-	-	-	+	-
[high]	-	-	+	-	-	+	+	+

Chapter 2

Literature Review

2.1 Loanword Phonology

Many studies have been done of the phonology of the loanwords found in Mandarin, particularly for the adaptation of English (Miao 2005, Lin 2008, Lü 2013; to name a few). The study of loanwords in Mandarin that are borrowed from Korean is relatively under-investigated since there are only a few examples of loanwords in Mandarin adopted from Korean. It is because the major part of the Korean lexicon consists of sino-Korean words, which are borrowed in the way of graphic loanwords based on the Chinese characters, in the same way that loanwords from Japanese words do.

Since the ultimate purpose of KM Kong-er is to be as similar to the Korean lyrics (input) as possible, the process of KM Kong-er adaptation can plausibly considered as to be a loanword adaptation.

The Kong-er is similar to loanwords in the way that they usually respect the phonotactics of the L1. Shinohara (2001) notes that 'The adaptation of foreign words is a process by which native speakers produce acceptable L1 sound sequences by adjusting (?) the L2 into the L1 system'. Miao (2005) also has observed that the phonetic and phonological system of the L1 has an extensive influence on the result in loanword adaptation.

On the other hand, the Kong-ers also can be interpreted as a kind of interlanguage since the result of KM Kong-er pertains to a phonotactic violation which is not allowed in the language from which the loanword is being borrowed. Broselow (2004) and

Espinosa (2004) indicate that a speaker encountering an L2 may establish his/her own grammar, which is not necessarily identical to the L1 or to the L2.

This thesis will discuss three kinds of adaptations: first, the loanword adaptation following the L1 phonotactics (Mandarin), second, the phonotactic violation with patterns pertaining to the L2 phonotactics (Korean), finally, the phonotactic violation with patterns pertaining neither to L1 nor L2 (interlanguage). The present analysis aims to suggest that the KM Kong-er phonology primarily conforms to Mandarin phonology, but that some parts develop other properties that either follow Korean phonology or interlanguage phonology and are written in a Zhuyin or in an English form.

2.2 Optimality Theory

The Optimality Theory (OT) was proposed by Prince and Smolenky (1993/2004), based on the theory of Universal Grammar (UG). OT provides a linguistic model by which all languages can be explained. In OT, all languages share the same set of constraints but have different rankings between constraints. The language-specific rankings of universal constraints, thus, can explain the systematic differences between languages.

In OT, a language form is not derived by the continual application of transformational rules. Instead, an input has an infinite number of possible candidates (outputs) which are generated by GENERATOR (GEN). The most optimal candidate survives at the end as a winner (output). The optimality of candidates is decided by the language-specific constraint ranking, which contains EVALUATOR (EVAL). The process is not a serial process as all of candidates are evaluated by EVAL simultaneously.

Every OT constraint belongs to two major categories, namely markedness constraints and faithfulness constraints. The markedness constraints deal with well-formed output which is required by the phonological structure. Otherwise, the faithfulness constraints manage the faithfulness of the input and output, so that any disparity between the input and output yields a violation.

(3) Sample OT tableau

Ranking: Constraint A >> Constraint B >> Constraint C, Constraint D

Input	Constraint A	Constraint B	Constraint C	Constraint D
☞ Candidate 1			*!	
Candidate 2	*!			
Candidate 3		*!		
Candidate 4			*!	*(!)

A sample of an OT tableau is shown in (3). There are possible candidates on the left side of the tableau. A constraint standing at the left dominates a constraint standing on the right side when there is a solid line between the two constraints, while a dotted line indicates that there is no hierarchical relationship between the two constraints. The number of asterisk marks denotes the number of violations of the corresponding constraint, and a fatal violation is expressed with an exclamation mark (!). The symbol of a right-pointing hand (☞) indicates the optimal output among the candidates. In the tableau, therefore, ConA is ranked as the highest constraint, and ConC and ConD are ranked as the lowest ones. According to this ranking, candidates 2 and 3, which violated the constraints B and C, are eliminated from the output, respectively, and candidate 1 wins over candidate 4 since candidate 4 violated more on the constraint D.

2.2.1 Local Conjunction of Constraint

A mechanism of complex constraint, called the 'local conjunction of constraints' (Smolensky, 1993/1995), is used in this thesis. A locally conjoined constraint C_1 and C_2 within a local domain of D ($[C_1\&C_2]D$) is violated when both of its conjuncts are violated. Universally, the conjunct constraints C_1 & C_2 is higher-ranked than each of C_1 and C_2. The definition of local conjunction and the ranking of constraints is given in (4).

(4) Local Conjunction (Smolensky 1995: 4)

a. Local Conjunction of C_1 and C_2 in domain *D*, C_1 $\&_1$ C_2, is violated when there is some domain of type *D* in which both C_1 and C_2 are violated.

b. Universally, C_1 $\&_1$ C_2 >> C_1, C_2

In the case of the conjunction of a markedness constraint and a faithfulness constraint, the markedness constraint, which is low-ranked and inactive, is high-ranked and activated when the faithfulness constraint is violated (Łubowicz, 2002; Hsiao, 2015). In this thesis, the markedness constraint *[+aspirated] is activated when the faithfulness constraint IDENT[tense] is violated.

The local conjunction of constraints allows for a wide range of complex phenomena from the Coda Condition (Smolensky 1995), to dissimilation and the Obligatory Contour Principle (Alderete 1997, Itô and Mester 1998), chain shift (Kirchner 1996, Moreton and Smolensky 2002), vowel harmony (Baković 1999) and opacity (Itô and Mester 1998, Moreton and Smolensky 2002). This thesis applies the mechanism to permit complex phenomena related to tensed obstruents and their unaspirated counterparts in chapter 4.

2.2.2 Rank-ordering Model of EVAL (ROE)

The Rank-ordering Model of EVAL (ROE) is a framework under the OT proposed by Coetzee (2006). In this framework, language phenomena are more than categorical, which producing various variations of one linguistic form. Otherwise, classical OT cannot explain the variation appearing in real linguistic phenomena since the constraint ranking only selects the most optimal candidate as an output without a consideration of other possibilities. Instead of disregarding the non-optimal candidates, the ROE discusses the candidates which appear in reality, and treat them as part of a well-formed phonology.

As classical OT, all of the candidates in the ROE are evaluated by EVAL, and a ranking hierarchy within EVAL decides the well-formedness of the candidate set. The more well-formed candidate is the more high-ranked as decided by the ranking hierarchy, and it is more likely to be selected as the optimal output. It also occurs at a higher frequency in the language than the less well-formed candidates.

Since the well-formed candidates (variation) cannot be infinitely chosen, the criterion called 'critical cut-off' is used. In the ROE, the critical cut-off line separates the constraint set into two strata: constraints ranked above the line and below the line. Constraints ranked above the line function just as a constraint set does in the classical OT, which links to the most optimal and grammatical output among the candidates without any variations. However, constraints ranked below the line are different. Unlike as in classical OT, candidates cannot be ruled out by the constraints ranked below the cut-off line, and can even be considered to be a grammatical and a possible output. In this way, variations arise in the ROE.

(5) A sample tableau with a cut-off line

Input: /i/	DEP [-high]	DEP [+back]	MAX(segment)	*$\tilde{\sigma}$ / {i,u}
☞$_1$ a. ĩ				*
☞$_2$ b. ∅			*	
c. ũ		*!		*
d. other $\tilde{V}$	*!			

In (5), both candidate (5a) and candidate (5b) are variants of the input /i/. The constraints MAX(segment) and *$\tilde{\sigma}$ /{i,u} are placed below the cut-off line to ensure the variation (5ab). Since there is solid line between MAX(segment) and *$\tilde{\sigma}$ /{i,u}, a domination relation exists. The candidate (5a) which violates the constraint on the right side (*$\tilde{\sigma}$/{i,u}) is the first optimal candidate. Also, it occurs more frequently than the second optimal candidate (5b) does. The two constraints DEP[-high] and [+back] eliminate the ungrammatical candidates (5c-d) above the cut-off line.

The cut-off line can induce three possible situations as shown in (6). As in the first scenario in (6a), candidate 1 violates C3, and candidate 2 violates C4. Since C3 and C4 are below the cut-off line, both candidate 1 and candidate 2 are selected as variations of the input. The dominant constraint below the cut-off line decides more optimal/frequent candidate, relatively.

Another possible situation is shown in (6b), where only the best optimal candidate is chosen without any appearance of variation. The cand2 and can3 are both disfavored by the constraints above the cut-off line, and so are deemed ungrammatical.

The last situation in which a cut-off line is induced is shown in (6c), where no variants appear as output either. Since both cand1 and candidate 2 in (6c) are violating

constraints above the cut-off line (C2, C1), the ROE functions exactly as in the classical OT.

(6) Three possible scenarios regarding the critical cut-off line (Coetzee, 2006)

(6a) Variation

	C1	C2	C3	C4
☞$_1$ i. cand$_1$				*
☞$_2$ ii. cand$_2$			*	
iii. cand$_3$		*!		
iv. cand$_4$	*!			

(6b) No variation I

	C1	C2	C3	C4
☞$_1$ i. cand$_1$				*
ii. cand$_2$		*!		
iii. cand$_3$	*!			

(6c) No variation II

	C1	C2	C3	C4
☞$_1$ i. cand$_1$		*		
ii. cand$_2$	*!			

In KM Kong-er adaptation, some input-output mappings induce variations in the forms and some do not. Thus, the ROE is applied in the KM Kong-er analysis to reflect actual result of the adaptation.

Chapter 3

Corpus-based Analysis

This research builds a corpus of Kong-er lyrics containing 955 phonological words (2690 syllables) from 11 songs. The phonological words in the corpus are constructed out of 57 tokens of monosyllable words, 328 of disyllable words, 370 of tri-syllable words, and 200 of polysyllable words (maximum seven syllables). The Korean writing system stipulates that every word is separated by a space except for function words which are attached to the preceding lexical morpheme as in the example (1) shown below.

(1) 수지-가 저녁-에 사과-를 먹었어요.
Suji-SUBJ evening-at apple-OBJ ate.
'Suji ate (an) apple in the evening.'

Thus, this research chose the phonological words as a domain of analysis for two reasons. First, the separation based on the Korean writing rules visually influences Mandarin speakers who create KM Kong-er to perceive a phonological word as a unit. Second, the K-pop songs that this corpus collected are auditorily punctuated to the p-word level to deliver clarity in the meaning. Thus, phonological words influence both the visual and auditory perception of Mandarin speakers.

All of the Kong-er lyrics were collected from four K-pop Kong-er websites[1] managed by Mandarin speakers in Taiwan. The managers of the sites are all female, with an age of between 17-27, and with a mid-to-advanced level of Korean (2-3 years of

[1] Taiwan-based K-pop lyric websites used for the corpus are: http://jyjccc.pixnet.net, http://eros90316.pixnet.net, http://sao742579.pixnet.net, http://jojo4562002.pixnet.net.

studying). In the interviews, which were independently conducted, the Mandarin speakers stated that they relied on both visual inputs from the written source and auditory perception of the songs during the adaptation.

There are two kinds of adaptations in the corpus: one where the data conform to Mandarin phonotactics (L1) and the other where the data violate Mandarin phonotactics by using other transcription such as Zhuyin (the Chinese transliteration system for Taiwan Mandarin) and English. For the adaptations conforming to Mandarin phonotactics, five phonological patterns are observed and discussed namely obstruent de-tensing, coda deletion, glide insertion, lowering and diphthongization. For the adaptation violating Mandarin phonotactics, two types of phonotactic violation are observed: one that follows Korean grammar and the other that follows neither Mandarin grammar nor Korean grammar, which is called interlanguage grammar.

A simplified schema of KM Kong-er adaptation is illustrated in figure 1. Mandarin grammar plays the most important role in KM Kong-er, and two types of violations occupy a minor part of whole, but produce a pronunciation closer to the Korean source.

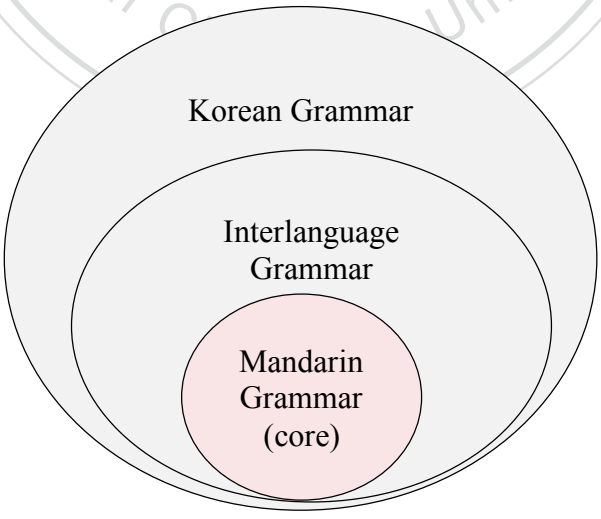


Figure 1. Three types of grammar adopted in KM Kong-er

3.1 Adaptations in Conformity to Mandarin

3.1.1 Consonant Adaptation

Three phonological patterns for the consonants are observed in the Kong-er corpus, which are correlated with obstruent de-tensing in the onset position, coda deletion, and glide insertion[2].

3.1.1.1 Obstruent De-tensing

The Korean consonant has an abundant inventory of obstruents. There is a three-way contrast for the obstruents: lax (plain), tense and aspirated sounds. Examples are /p, p^h, p'/, /t, t^h, t'/, /k, k^h, k'/ in stops, /tɕ, $tɕ^h$, tɕ'/ in affricates and /s, s'/[3] in fricatives. Mandarin does not include [tense] contrast, but does includes [spread glottis] contrast. Examples are /p, p^h/, /t, t^h/, /k, k^h/ in stops, /tɕ, $tɕ^h$/ and /ts, ts^h/ in affricates.

In KM Kong-er adaptation, Korean tensed obstruents are de-tensed to [-spread glottis] counterparts regardless of the way of transcription. For example, the obstruent tense stop /p'/ in /ɯn.p'it/ '*silveriness*' is adjusted to a de-tensed unaspirated counterpart [p] as in 恩比 [ən.pi]. Other examples related to obstruent de-tensing are shown in table (2) below.

[2] In this thesis, glides are categorized into the consonants placed in the onset position.
[3] The Korean fricative only has two contrasts: lax and tense.

(2) Obsturent De-tensing

Korean source	Kong-er in Mandarin	Gloss
a. nun.**p'**it	ɹun.**p**i[4] (潤筆)	'the expression of the eyes.'
b. **t'**o	**t**ou (都)	'again'
c. **k'**ot	**k**ou (勾)	'flower'
d. ʌ.**tɕ'**ʌ.na	ou.**tɕ**jou.na (偶九那)	'Oh dear! (exclamation)'
e. jip.**s'**u.ri	ji.**s**u.li (以速李)	'lip-PAR'

Overall, 87.97% (139/158) of the Korean tensed stops /p', t', k'/ in the corpus are replaced by the Mandarin unaspirated [p, t, k] as in (2a-c), and the rest of the Korean tensed stops (12.03%) are replaced by their unaspirated counterparts in the Zhuyin and English forms. Likewise, the Korean tensed affricate /tɕ'/ and the tensed fricative /s'/ are dominantly replaced by their unaspirated counterparts in Mandarin (2d-e), in 100% (45/45) for the tokens of the affricate [tɕ] and 96.49% (55/57) of the tokens of the fricative [s]. Only two tokens of Korean tensed fricatives are adapted into Zhuyin/English transcription. To sum up, every token with a tensed consonant (260/260) adopts an unaspirated counterpart both in the Mandarin form or in the Zhuyin/English form. The statistics of obstruent de-tensing are shown in (3). The most dominant results from each category are shadowed in the table.

[4] The transcription method for Mandarin-IPA is referred in Lin, Y. H. (2007).

(3) Statistics of Obsturent De-tensing

Korean tensed consonant	Kong-er in Mandarin substitution		Number	Total	Percentage
stop [p', t', k']	aspirated [p^h, t^h, k^h]		0	158	0%
	unaspirated	[p, t, k]	139		100%
		Zhuyin/English	19		
affricate [tɕ']	aspirated [$tɕ^h$]		0	45	0%
	unaspirated [tɕ]		45		100%
fricative [s']	unaspirated	[s]	55	57	100%
		Zhuyin/English	2		
Total	aspirated counterpart		0	260	0%
	unaspirated counterpart		260		100%

As in table (3), 260 syllables are tensed obstruents in the corpus. 260 tokens are de-tensed and replaced by an unaspirated counterpart. It is noticeable that only an unaspirated counterpart is chosen to be adapted when the Mandarin phonotactics also has an aspirated counterpart.

There is a different view on the traditional three-phoneme contrast in Korean, which is related to the fact that a tensed-obstruent only maps to an unaspirated phoneme (Kingston and Diehl, 1994; Kim and Duanmu, 2004). They argue that the feature [+tense] is not needed for the Korean phonology system because the feature [voiced] and the [aspirated]/[spread glottis] inherent in the Korean phonology system can decide their contrasts based on tonogenesis theory. Based on their assertion, it is not necessary to

import the markedness feature [+tense]/[+constricted glottis] into the Korean phonological inventory system, as shown in the table (4).

(4) Comparison of the three-phoneme contrast in Korean

Example	Traditional view	Kim & Duanmu (2004)
p’	tensed	voiceless unaspirated
p	lax/unaspirated	voiced unaspirated
p^h	aspirated	voiceless aspirated

According to Kim & Duanmu (2004), Korean tensed obstruents can be described with [-voice] and [-aspirated] features. Following such classification, the tensed obstruents in the corpus are 100% mapped to the unaspirated counterpart.

3.1.1.2 Coda Deletion

The Korean phonological inventory allows seven consonants to occur in a coda position, including the three stops /p, t, k/, the three nasals /m, n, ŋ/, and one liquid /l/. However, the Mandarin phonological inventory only allows two nasals in a coda position: /n/ and /ŋ/. In KM Kong-er adaptation, Mandarin speakers can use three strategies on Korean seven codas: deletion, replacement and retainment.

First, the dominant strategy is coda deletion (422/866, 48.73%). Overall, the deletion occurs regardless of the types of Korean coda (stop, nasal, or liquid). It occurs in different percentages depending on the coda types. The type of coda of which the greatest number of the deletions occur is that of the stops /p, t, k/ (99.22%). The type of which the second largest amount of the deletions occur is that of the liquid /l/ (97.13%). The type

of which the least number of deletions occur is that of the nasal coda /m, n, ŋ/ (17.39%). Examples of coda deletion are shown in (5).

(5) Coda deletion

Korean source	Kong-er in Mandarin	Gloss
a. pʰa**p**.kʰon	pʰa.kʰoŋ (怕空)	'popcorn'
b. wa.jin.pi**t**	wa.jin.pi (哇音比)	'wine color'
c. hwa**k**	hwa (畫)	'suddenly'
d. han.tsʰa**m**	xan.tɕja (含家)	'for a while'
e. pu**n**.mjʌŋ	pʰu.mjou (普謬)	'obviously'
f. he**ŋ**.un	xei.wən (黑溫)	'luck'
g. mo**l**.ra	mwo.la (摸拉)	'not to know'

Table (5) shows how the stop codas /p, t, k/ (5a-c), the nasal codas /m, n, ŋ/ (5d-f), the liquid coda /l/ (5g) are deleted during the Kong-er adaptation. The statistics of coda deletion are shown in (6) below.

(6) Statistics of coda deletion

Korean coda group		Number	Total	Percentage
stop	Vp, Vt, Vk	127	128	99.22%
liquid	Vl	203	209	97.13%
nasal	Vm, Vn, Vŋ	92	529	17.39%
Total		422	866	48.73%

As in (6), 99.22% of the stop codas are deleted, and 97.13% of liquid coda is also deleted. However, the nasal codas /m, n, ŋ/ are the least deleted for 17.39% of the whole.

Secondly, 20.90% (181/866) of the tokens use the replacement strategy during the coda adaptation. The coda type which is subject to the most replacements is that of the nasal type /m, n, ŋ/ (174/529, 32.89%). In contrast, only six tokens in liquid /l/, and one token in the stops /p, t, k/ are replaced by the Mandarin nasal codas /n, ŋ/. Examples of coda replacement are shown in (7).

(7) Coda replacement

Korean source	Kong-er in Mandarin	Gloss
a. mo.tɯ**n**	mwo.tə**ŋ** (摸登)	'every'
b. tɕu**ŋ**.tok	zu**n**.tou (尊斗)	'addiction'
c. pa.ra**m**.man	pa.la**ŋ**.man (巴朗曼)	'only wind'
d. ma.mɯ**l**	ma.mə**n** (馬悶)	'heart-OBJ'

In table (7), the nasal coda /n/ is replaced by the other nasal coda /ŋ/ (7a), and the nasal coda /ŋ/ is replaced by nasal coda /n/ (7b). The Korean nasal coda /m/ and the liquid coda /l/ are also replaced by the Mandarin nasal codas /n, ŋ/ (7cd). The statistics of the coda replacement are shown in (8).

(8) Statistics of coda replacement

Korean coda group		Number	Total	Percentage
obsturent	Vp, Vt, Vk	1	128	0.78%
liquid	Vl	6	209	2.87%
nasal	Vm, Vn, Vŋ	174	529	32.89%
Total		181	866	20.90%

The last strategy used in coda adaptation is retainment (263/866, 30.37%). The retainment only occurs in the case of the codas /n, ŋ/, which are legal codas in both of the

two languages. The Korean nasal codas /n, ŋ/ are either retained or replaced without regularities. The overall statistics of coda adaptation are presented in table (9).

(9) Statistics of coda adaptations

Korean coda structure		Kong-er in Mandarin substitution	Number	Total	Percentage
stop	Vp Vt Vk	deletion	127	128	99.22%
		replacement (_n/_ŋ)	1		0.78%
liquid	Vl	deletion	203	209	97.13%
		replacement (_n/_ŋ)	6		2.87%
nasal	Vm	deletion	18	92	19.57%
		replacement (_n/_ŋ)	74		80.43%
	Vn, Vŋ	deletion	74	437	16.93%
		retainment	263		60.18%
		replacement	100		22.88%
Total		deletion	422	866	48.73%
		replacement	181		20.90%
		retainment	263		30.37%

These results demonstrate that the phonetic features of a coda have largely influenced the process of Kong-er adaptation, especially in the case of coda deletion and replacement. Unlike the stop codas /p, t, k/ that are mostly deleted (127/128, 99.22%), a large amount of /m/ codas are turned into other nasal codas, either [n] or [ŋ] (74/92, 80.43%). Also, 2.87% of the tokens of the Korean liquid coda /l/ are replaced by Mandarin nasals.

In this regard, ‘sonority’ can explain the result. Sonority is one way for sound to be classified (Selkirk, 1984) and it is related to the degree to which the mouth opens during

an articulation. The more sonorant the sound is, the higher the tendency there is for it to be perceived as voiced. Based on the investigation of Yavas and Gogate (1999), the phonemic awareness of coda consonants is deeply related to the sonority relations in the language acquisition of children. They also found that the perception and segmentation of less sonorant codas are easier than that of more sonorant ones. According to the general patterns of the sonority scale shown in (10), Mandarin speakers follow strategies in the adaptation of Korean codas simply to retain nasality, and/or sonority.

(10) Sonority Scale
Vowels > Liquids > Nasals > Fricatives > Stops

Overall, Mandarin speakers either delete illicit codas in Mandarin, or replace illicit /m/ codas with Mandarin codas /n, ŋ/, following Mandarin phonotactics (L1).

3.1.1.3 Glide Insertion

In the Kong-er corpus, there are 328 tokens of Korean alveolo-palatal affricates (/tɕ, tɕ^{h}, tɕ'/) in the onset position[5]. The glide /j/ was inserted in 125 out of 197 tokens (63.45%) during Kong-er adaptation. For instance, 'tɕa' in /nun.toŋ.tɕa/ '*the pupil of the eye*' is substituted with 'tɕja' as in [nu.toŋ.tɕja] (努東加). Other examples of glide insertion are shown in (11) below.

[5] 131 syllables from 328 syllables, where the vowel /i/ is followed after alveolo-palatal affricates, are excluded in the sum total of the number of glide insertion.

(11) Glide Insertion for the vowels /a, ʌ, e/

Korean source	Kong-er in Mandarin	Gloss
a. **tɕ**a.k'u	**tɕʰj**a.ku (恰古)	'repeatedly'
b. **tɕʰ**am	**tɕʰj**aŋ (嗆)	'truly'
c. ku.rɯm.**tɕʰ**ʌ.rʌm	kʰu.ləŋ.**tɕʰj**ou.loŋ (苦冷秋龍)	'as clouds'
d. **tɕ**e.pal	**tɕj**e.pa (皆巴)	'please'
e. **tɕʰ**e	**tɕʰj**e (切)	'just as it is'

In (11), the glide /j/ is inserted between the alveolar affricates /tɕ, tɕʰ/ and the vowels /a, ʌ, e/. /tɕa/ and /tɕʰa/ in (11ab) is replaced by [tɕʰja], implying that contrast of the [spread glottis] is not crucial in the adaptation. Glide insertion before the vowel /a/ accounts for the major part of the results (78.57%, 55/70). In (11c), the glide /j/ is inserted between alveolar affricates and the Korean vowel /ʌ/ (68.33%, 41/60) and mapped to [tɕʰjou]. Lastly, the glide /j/ in (11d-e) is inserted before the Korean vowel /e/ (84.21%, 16/19), inducing [tɕje] and [tɕʰje].

However, unlike case of the glide insertion, 56 tokens (28.43%) of the Korean alveolo-palatal affricates are adjusted into Mandarin retroflex/post-alveolar affricates [tʂ, tʂʰ]. For example, 'tɕo' from /tɕo.a/ '*to like*' is replaced by 'tʂou' as in [tʂou.a] (周阿). The result is categorized by the onset and rhyme sequence as shown in table (12).

(12) Statistics of glide insertion

Korean affricate onset + vowel	Kong-er in Mandarin substitution	Number	Total	Percentage
_a(C)[6]	**_j**a(C)	55	70	78.57%
	[retroflex] a(C)	15		21.43%
_e(C)	**_j**e	16	19	84.21%
	others (tsei, tɕi, ㄘㄟ[ts^{h}ei])	3		15.79%
_ʌ(C)	**_j**ou/**_j**oŋ	41	60	68.33%
	[retroflex] oŋ/ou	18		30%
	others (tsou)	1		1.67%
_o(C)	**_j**ou/**_j**oŋ	6	17	35.29%
	[retroflex] ou	8		47.56%
	others (tsou, tɕ^{h}y)	3		17.64%
_u(C)	**_j**ou	5	25	20%
	[retroflex] u(C)	16		64%
	others (ts^{h}u, tsun, tɕyn)	4		16%
_ɯ(C)	**_j**ou	2	6	33.33%
	[retroflex] ɤ(C)	1		16.67%
	others (tsɤ, ts^{h}u)	3		50%
Total	glide insertion	125	197	63.45%
	retroflex	56		28.43%
	others	16		8.12%

The rest of the tokens (16/197) are varied without any regularities and so they are categorized as ‘others’. Some are replaced by dental counterparts such as [ts] and [ts^{h}], and others are different in vowel from the source. Such tokens are irregular and scarce in the corpus; therefore, they are not discussed in this thesis.

[6] (C) here denotes the possibility of a coda.

The sequences, including the vowels /a/, /e/ and /ʌ/, take glide insertion as a dominant strategy. On the other hand, the sequences, including the vowels /o/, /u/ and /ɯ/, adopt other strategies, such as substitution into a retroflex (/tɕo/ → [tʂou]).

In the Korean phonology/phonetic system, the alveolo-palatal affricates [tɕ, tɕ^{h}, tɕ'] cannot appear with a following glide /j/ (Sin *et al.*, 2012). In contrast, in the Mandarin system, an alveolo-palatal affricate occurs only before the glides /j/, /ɥ/ (Lin, 2007). Thus, glide insertion in Kong-er indicates that Mandarin speakers follow the L1 phonology rather than follow the L2 phonology.

3.1.2 Vowel Adaptation

Two phonological patterns of the vowels are observed in the Kong-er corpus, which are related to lowering and diphthongization.

3.1.2.1 Lowering

A dominant strategy for the Korean high back vowel /ɯ/ is lowering. Since the high back vowel /ɯ/ does not exist in Mandarin, Mandarin speakers adjust every token of /ɯ/ to other vowels existing in the phonological system. The majority of the tokens of the /ɯ/ vowel are lowered (216/269, 80.30%), either into the mid back vowel [ɤ] or into the mid central vowel [ə][7]. For example, 'kɯ' from /kɯ.kʌn.man/ '*only for that*' is replaced by 'kɤ' as in [kɤ.kou.man] (哥勾曼). Other examples are shown in (13).

[7] In Mandarin, the mid central vowel /ə/ is an allophone of the vowel /ɤ/, which occurs in toneless syllable. In the corpus, 的 'tə' and 了 'lə' were used mostly.

(13) Vowel Lowering

Korean source	Kong-er in Mandarin	Gloss
a. k**ɯ**.njaŋ	k**ɤ**.njɑŋ (可娘)	'just'
b. kʌ.r**ɯ**m	k^{h}ou.l**ɤ**ŋ (叩冷)	'step'
c. na.m**ɯ**n	na.mən (哪悶)	'left over'

The rest of the tokens of the /ɯ/ are rounded (48/269, 17.84%) to [u]. For example, 'tɯ' in /pu.tɯ.rʌ.un/ '*soft*' is replaced by 'tu' as in [pu.tu.lou.wən] (不督嘍溫). Table (14) shows the overall statistics related to the high back vowel /ɯ/.

(14) Statistics of lowering

Korean combination	Kong-er in Mandarin substitution	Number	Total	Percentage
(C)ɯ(C)	(C)ɤ/ə(C)	216	269	80.30%
	(C)u(C)	48		17.84%
	Others (ɨ syllabic consonant)	5		1.86%

As shown in (14), lowering to the vowel [ɤ/ə] is the most selected strategy for the Korean /ɯ/ vowel (80.30%). Rounding to [u] is the second most used strategy (17.84%). Both [ɤ/ə] and [u] share the [+back] feature with the source /ɯ/ vowel. This implies that Mandarin speakers decide to preserve the [+back] feature of the source vowel, choosing vowels adjacent to /ɯ/ in figure 2. Again, Mandarin speakers follow the L1 phonology.

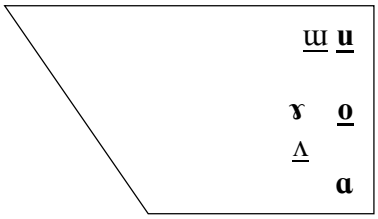


Figure 2. Back vowel chart of Korean (underlined) and Mandarin (bold)

3.1.2.2 Diphthongization

Three monophthongs /o, ʌ, e/ are discussed in this session. The vowels /o, e/ cannot occur as a single nucleus in Mandarin and /ʌ/ does not exist in the Mandarin phonetic inventory. For these three vowels, diphthongization is chosen to be the dominant strategy in the case of these three vowels during Korean adaptation. In the KM Kong-er corpus, there are 898 syllables that contain monophthongs /o, ʌ, e/ in total, of which 88.86% were diphthongized to either [ou] or [ei]. For example, 'kʌ' and 'to' in /tɕu.kʌ.to/ '*to die*' is replaced by 'kou' and 'tou' respectively as in [tɕjou.kou.tou] (揪勾兜). Other examples of each vowel are presented in (15).

(15) Diphthongization_

Korean source	Kong-er in Mandarin	Gloss
a. s**o**.ri	s**ou**.li (搜李)	'sound'
b. **ʌ**.tɕe	**ou**.tɕje (歐皆)	'yesterday'
c. tu.so.n**e**	tu.song.n**ei** (督宋內)	'in two hands'

As in (15a-b), /o/ and /ʌ/ are prone to be diphthongized to [ou], and /e/ is replaced by [ei] as in (15c). For the source vowel /ʌ/, other variants such as the lowered vowels [ɤ,

ə] occur as a second dominant strategy. The overall statistics of diphthongization are shown in (16).

(16) Statistics of Diphthongization

Korean (C)V(C) structure	Kong-er in Mandarin substitution	Number	Total	Percentage
(C)o(C)	_ou/wo(C)	277	285	97.19%
	_jou	8		2.81%
(C)e(C)	_ei/je	205	205	100%
(C)ʌ(C)	_ou/wo(C)	316	408	77.45%
	_ɤ/ə	92		22.55%
Total	Diphthongization	798	898	88.86%
	Lowering (o → ɤ/ə)	92		10.24%
	Glide insertion	8		0.89%

Generally, most of the monophthongs /o, ʌ, e/ are replaced by diphthongs [ou] and [ei] (88.86%). Some of the tokens of the input /ʌ/ use the lowered vowels [ɤ, ə] as the second most dominant strategy (10.24%). Some variants such as glide insertion account for 0.89% of the whole. Also, the vowel /e/ in input is never deleted in the output, inducing variation in either the on-glide [je] or off-glide [ei] insertion. Vowel diphthongization implies the importance of the L1 (Mandarin phonology) again in KM Kong-er adaptation.

3.2 Adaptations in Violation of Mandarin Phonotactics

The data shows that some syllables (168/2690) are written in other types of transcription such as Zhuyin, which is the alphabet system for Mandarin in Taiwan, and

English. Among such tokens, two types of grammar are observed: one following Korean grammar (L2), and the other an emerging interlanguage grammar.

3.2.1 Adaptations in Conformity to Korean Grammar

60.7% (102/168) of the Zhuyin/English tokens belong to the adaptations following Korean phonology. The specific sequences from the tokens are grouped into velars, labials, dental consonants, and some vowels, such as /i, ʌ, o/, in this section.

3.2.1.1 Velars /k, k^h, k', h/ + Vowel /i/

In Mandarin phonotactics, velar consonants such as /k/, /k^h/ and /h(x)[8]/ are not allowed before the [+high, -back] vocoids. In English-Mandarin loanword adaptation (Hall-Lew, 2002), the velar stop sounds are usually replaced by alveolar-palatal affricates such as /tɕ/, /$tɕ^h$/ and /ɕ/, which only allow [+high, -back] vocoids to follow in Mandarin. For example, the English word 'Canada /kǽ.nə.də/' is replaced with '加拿大 [tɕja.na.ta]' by way of the process of adaptation.

However, Mandarin speakers of KM Kong-ers tend to select other transcription methods to exclude any sound distant from that of the source word. This leads 100% (51/51) of the [velar+i(j)] sequences to follow Korean grammar, as in the examples shown in (17) below.

[8] The velar stop /x/ in Standard Chinese is mostly pronounced as the glottal stop /h/ to some degree in Taiwanese Mandarin (Peng, 1993).

(17) Velars /k, k^h, k', h/ + Vowel /i(j)/

Korean source	Kong-er in Mandarin	Gloss
a. nɯ.**k'im**	nə(呢).**kim**	'feeling'
b. **ki**.pun	**ki**.pən(噴)	'mood'
c. **hjaŋ**.he	**xjaŋ**.xei(黑)	'toward (somewhere)'

In (17), the velar consonants and the vowel /i/ are faithfully mapped to output as [kim], [ki] and [xjaŋ], without palatalization. All of the sequences that violate Mandarin phonotactics follow Korean grammar.

3.2.1.2 Labials /p, p^h, p'/ + Vowels /ʌ, o/

The next sequence to discuss is the labial stops /p, p^h, p'/ and the vowels /ʌ, o/. In KM Kong-er adaptation, the Korean vowels /ʌ, o/ are mostly diphthongized to either [ou] or [wo]. However, a sequence of labial stops /p, p^h, p'/ and /ʌ, o/ vowels also induce variation, using Zhuyin/English transcription following Korean grammar. 39.22% (20/51) tokens of the sequence show such adaptation, turning into [o] in the output. Examples are presented in (18) below.

(18) Labials /p, p^h, p'/ and vowels /ʌ, o/_

Korean source	Kong-er in Mandarin	Gloss
a. mat.**p'o**.ko	ma(馬).**po**.kou(勾)	'taste (it)+PAR'
b. **pok**.tɕa.p^he	**po**.tsa(炸).p^hei(配)	'complicated'
c. an.k'o.ɕi.**p^hʌ**	an(安).kou(勾).ɕi(西).**po**	'want to hug (you)'

In (18), the sequence of the labial stops /p, p^h, p'/ and the vowels /ʌ, o/ produce [po] in an English transcription, following the Korean grammar. The statistical results of the sequence are shown in (19) below.

(19) Labials /p, p^h, p'/ + vowels /o, ʌ/ + (CODA)

Korean onset-rhyme structure		Result of adaptation	Tokens	Percentage
/p, p^h, p'/	o (C), ʌ (C)	po, p^ho	(20/51)	39.22%
		pwo, p^hwo	(19/51)	37.25%
		others (pəŋ, paŋ, pu)	(12/51)	23.53%

Other variants such as [pwo]/[p^hwo] (diphthongization) are also chosen to substitute for the source sequence (37.25%, 19/51). The rest of the 12 tokens did not show any regularities.

3.2.1.3 Dental /n/ + Vowels /ʌ, o/

100% (31/31) of sequences of the dental /n/ and the vowels /ʌ, o/ are also replaced by [no] in English transcription. Examples are shown in (20) below.

(20) Dental /n/ + Vowels /ʌ, o/_

Korean source	Kong-er in Mandarin	Gloss
a. **nʌ**.man	**no**.man(慢)	'only you'
b. an.t^hi.**no**.mi	an(安).t^hi(踢).**no**.mi(咪)	'antinomy'

As in (20), /nʌ/ and /no/ are replaced by [no], following Korean grammar. Other dental sounds, such as /t, t^h, t'/ and /l/, did not incur any phonotactic violation with the [-high, +back] vowels; while the dental /n/ with [-high, +back] vowels showed 100% (31/31) tokens of phonotactic violation. The overall statistics of the adaptations following Korean grammar are shown in (21) below.

(21) Adaptations following Korean grammar

Korean CV sequence	Kong-er result	Number	Total	Percentage
/k, k^h, k', h/ + /i/	Korean grammar	51	51	100%
	Mandarin grammar	0		0%
/p, p^h, p'/ + /ʌ, o/	Korean grammar	20	51	39.22%
	Mandarin grammar	31		60.78%
/n/ + /ʌ, o/	Korean grammar	31	31	100%
	Mandarin grammar	0		0%

As shown in (21), the sequences with the velars /k, k^h, k', h/ + vowel /i/ all follow the Korean phonotactics while the sequences with labials /p, p^h, p'/ + vowels /ʌ, o/ show Korean and Mandarin phonotactics. Lastly, the dental /n/ + vowels /ʌ, o/ follows Korean phonotactics in all of the tokens (100%).

3.2.2 Adaptations in Conformity to an Emergent Interlanguage Grammar

Among the phonotactic violations found in the KM Kong-er corpus, there are also some sequences that follow neither Mandarin nor Korean grammar. This type of token occurs in 39.29% (66/168) of the tokens, using a Zhuyin/English form. The sequences are

grouped into non-coronal consonant and vowel /jʌ/, and the coronal alveolars /s, s'/ and the vowel /e/.

3.2.2.1 Non-coronal Consonants and Vowel /jʌ/

In the previous section, we observed that the combination of the velars /k, k^h, k', h/ with the vowel /i/ follows Korean phonology, mapping to [ki]/[k^h]/[xi]. However, when the [-high, +back] vowel /ʌ/ follows the [+high, -back] vowel /i/, the sequence follows neither Korean phonotactics nor Mandarin phonotactics. This condition arises because the vowel sequence [+high, -back][-high, +back] in Mandarin appears only in [jou], which is only allowed to occur after coronal consonants. Thus, the interlanguage phonology based on phonotactic violation is observed when non-coronal consonants, such as the velars /k, k^h, k', h/ and the labials /p, p^h, p', m/, combine with the vowel /jʌ/.

100% (19/19) of the syllables with the velars /k, k^h, k', h/ and the vowel /jʌ/ show outputs following interlanguage grammar. For example, 'kjʌ' in /kjʌ.wul/ '*winter*' is replaced by [kjou] in the Zhuyin transcription, which follows neither Korean phonology nor Mandarin phonology. Related examples follow in (22) below.

(22) Velars /k, k^h, k', h/ + vowel /jʌ/_

Korean source	Kong-er in Mandarin	Gloss
a. nɯ.**k'jʌ**	nə(呢).**kjou**	'feeling'
b. sam.**k^hjʌ**	saŋ(桑).**k^hjou**	'swallow'
c. **hjʌn**.ɕil	**xyŋ**.ɕi(西)	'reality'

The output of each of the examples, [kjou], [k^{h}jou] and [xyŋ], shown in (22) are not allowed in either Mandarin or Korean phonotactics.

55.56% (20/36) of the tokens with the labial consonants /p, p^{h}, p', m/ and the vowel /jʌ/ also show phonotactic violation which belongs to interlanguage phonology. Examples are shown in (23) below.

(23) Labials /p, p^{h}, p', m/ + Vowel /jʌ/_

Korean source	Kong-er in Mandarin	Gloss
a. **p^{h}jʌŋ**.seŋ	**p^{h}joŋ**.san(三)	'forever'
b. tɕ^{h}i.**mjʌŋ**	tɕ^{h}i(七).**mjoŋ**	'fatalness'

In (23), consonants are faithfully adopted. The rhyme part /jʌ/ is adopted into [joŋ], which is not allowed in either Korean or Mandarin. The statistics of the overall sequence of Labials and vowel /jʌ/ is shown in (24) below.

(24) Labials /p, p^{h}, p', m/ + vowel /jʌ/ + (CODA)

Korean onset-rhyme structure		Result of adaptation	Tokens	Percentage
/p, p^{h}, p'/	jʌ (C)	pjou, p^{h}jou, pjo(C)	(13/13)	100%
		others	(0/13)	0%
/m/		mjo(C) (16)	(7/23)	30.43%
		mjou	(16/23)	69.57%

100% of the labial stops /p, ph, p'/ are replaced with [pjou]/[p^{h}jou]/[pjo(C)], which is not allowed in either Korean or in Mandarin. 30.43% of the tokens of the labial nasal /m/ and

vowel /jʌ/ adopt interlanguage phonology, and the rest of the tokens of the sequence adopts [mjou] in Mandarin phonotactics.

3.2.2.2 Alveolars /s, s'/ + Vowel /e/

In Mandarin phonotactics, the vowel /e/ is not allowed to solely occur in rhyme. In the previous adaptations conforming to Mandarin phonotactics, most of the occurrences of the vowel /e/ are diphthongized to [ei]. When the alveolars /s, s'/ appear before the vowel /e/, however, 77.14% (27/35) of the tokens violate Mandarin phonotactics, following interlanguage grammar. Examples are presented in (25).

(25) Alveolars /s, s'/ + Vowel /e/_

Korean source	Kong-er in Mandarin	Gloss
a. tɕu.**se**.jo	ts^hu(醋).**sei**.jou(優桑)	'give (me)'
d. **se**.saŋ	**sei**.saŋ(桑)	'a sprout-PAR'

The output [sei] is mostly written in English transcription, which is not allowed in present Mandarin phonology[9] and Korean phonology. In the rest of the tokens, /se, s'e/ are replaced by the retroflexed [ʂei] and [se], following both Mandarin and Korean phonology.

[9] There is a historical gap between Middle Mandarin and present Mandarin. The combination of alveolar fricative /s/ and /ei/ are not allowed in the present Mandarin phonological system while they are allowed in Middle Mandarin.

(26) Alveolars /s, s'/ + vowel /e/ + (CODA)

Korean onset-rhyme structure		Result of adaptation	Tokens	Percentage
/s, s'/	e (C)	sei	(27/35)	77.14%
		ʂei	(7/35)	20%
		se	(1/35)	2.86%

An overall statistics of the interlanguage grammar is shown below.

(27) Adaptation following interlanguage grammar

Korean CV sequence	Kong-er	Number	Total	Percentage
/k, k^h, k', h/ + /jʌ/	Interlanguage grammar	19	19	100%
	Mandarin grammar	0		0%
/p, p^h, p', m/ + /jʌ/	Interlanguage grammar	20	36	55.56%
	Mandarin grammar	16		44.44%
/s, s'/ + /e/	Interlanguage grammar	27	35	77.14%
	Mandarin grammar	8		22.86%

As shown in (27), the sequences with the velars /k, k^h, k', h/ and the vowel /jʌ/ shows that result follow the interlanguage phonotactics in every case (100%), while the sequence with the labials /p, p^h, p', m/ + vowel /jʌ/ shows variants following both interlanguage and Mandarin phonotactics. Lastly, alveolar /s/ + vowel /e/ shows 77.14% of the tokens following interlanguage phonology and 22.86% of the tokens following Mandarin phonotactics.

3.3 Summary

There are two kinds of adaptations found in KM Kong-ers: one is where the data conform to Mandarin phonotactics and the other is where the data violate Mandarin phonotactics. In the former adaptation, five apparent phonological patterns are observed. In the latter adaptation, two types of sequences following Korean grammar and following interlanguage grammar were observed.

In Korean, tensed obstruents are allowed to occur in the onset position. However, Mandarin phonotactic system only has aspiration contrast. In KM Kong-er adaptation, 100% of the tensed obstruents are mapped to unaspirated counterparts, following Mandarin phonotactics.

The Korean codas /p, k, t, m, l/ are illicit in Mandarin phonotactics, and they are dominantly deleted 48.73% (422/866), conforming to Mandarin phonotactics. Also, some are replaced by the licit Mandarin coda [n, ŋ] (20.90%, 181/866).

In Korean, the alveolo-palatal affricates /tɕ, tɕ^{h}, tɕ'/ are not allowed to occur before the glide /j/. Opposite to Korean, the Mandarin alveolo-palatal affricates /tɕ, tɕ^{h}, tɕ'/ only occur before [+high, -back] vocoids. In KM Kong-er, 125 tokens of alveolo-palatals show glide insertion after an alveolo-palatal affricate (63.45%, 125/197). The alveolo-palatal affricates are also replaced by a retroflex counterpart of Mandarin in some tokens (28.43%, 56/197).

The Korean high back unrounded vowel /ɯ/ is mostly replaced by the Mandarin mid back unrounded vowel [ɤ/ə] (80.30%, 216/269), which also mapped to the Mandarin mid back rounded vowel /u/ (17.84%, 48/269).

Lastly, a large amount number of the Korean monophthongs /o, ʌ, e/ are diphthongized to either the Mandarin [ou] or [ei] (88.86%, 798/898). It is because /o/ and

/e/ are not allowed to solely occur, and /ʌ/ does not exist in Mandarin. And thus dominant tokens are diphthongized to follow Mandarin phonotactics.

There are also specific sequences that violate Mandarin phonotactics in Zhuyin/English transcription.

For the adaptations following Korean phonology, the most apparent result occurs in the combination of the velar consonant with [+high, -back] vocoids 'j, i'. When the Korean velar /k, k^h, k', h/ and [+high, -back] vocoids are combined, 100% of the tokens follow Korean phonotactics and preserve both features. However, phonotactic violation occurs when the labials /p, p^h, p'/ and the dental /n/, and the [-high, +back] vowels /ʌ, o/ are combined.

For the adaptations following the interlanguage phonology, the rhyme /jʌ/ plays a main role. When the velar consonants /k, k^h, k', h/ and the rhyme /jʌ/ are combined, outputs which are not allowed by either of the languages, such as [kjou], [kjoŋ] etc., surface. Also, the alveolars /s, s'/ before the [-high, -back] vowel /e/ violate Mandarin phonotactics, such as [sei].

Chapter 4

An Optimality Theory Analysis

This chapter presents a theoretical analysis based on Optimality Theory (Prince and Smolensky, 1993/2004; McCarthy, 2008) to find the overall patterns arising in Korean-Mandarin Kong-er adaptation. The ROE model (Coetzee, 2006) under the OT framework is used to analyze the variations in the KM Kong-er adaptations. According to the model, the position of the rank-ordering decides the accessibility of a candidate. The violation by a constraint from below the cut-off line is selected as a variation to be allowed in the outputs, while the violation by a candidate of a constraint from above the cut-off line is regarded as a severe violation to be eliminated from the outputs.

As the previous chapter described, Mandarin speakers use various strategies when adapting Korean song lyrics, mostly following their native grammar (92.97%). For consonant adaptation, obstruent tensed consonants in the onset position are de-tensed during the adaptation, adapting with the adaptation of unaspirated counterparts (100%). For Korean codas, some of tokens are deleted (48.73%), and some are replaced with Mandarin codas (20.90%). Also, codas /n/ and /ŋ/ are retained as in the original source (30.37%). Also, alveolar-palatal affricates trigger the insertion of the glide /j/ before vowels. A major part of the alveolar-palatal affricates induces glide insertion (63.45%), and also retroflexed variation (28.43%). For vowel adaptation, the vowel /ɯ/ is mainly lowered to [ɤ/ə] (80.30%) and partially rounded to [u] (17.84%). Additionally, the monophthongs /o, e, ʌ/ are diphthongized to [ou] or [ei] (88.86%), and also show lowering (10.24%).

On the other hand, some of tokens violate Mandarin phonotactics (L1) rather follow such types of grammar: Korean phonology (L2) and an interlanguage phonology. The specific CV sequences that follow each of the Korean phonology and the interlanguage phonology are analyzed in this chapter.

The constraints in Korean, Mandarin and KM Kong-er are compared. First of all, constraints for adaptations conforming to Mandarin phonology are presented (4.1). Then, the marked adaptations that follow Korean phonology or an interlanguage phonology are analyzed by different constraint rankings in (4.2). 4.3 summarizes chapter 4.

4.1 Adaptations in Conformity to Mandarin Phonotactics

Mandarin speakers allow variations when they adopt Korean consonants in KM Kong-er. In this case, a consonant in the onset position can be preserved. The constraint MAX-S_{ONSET} is proposed to avoid onset deletion.

(1) MAX-S_{ONSET}:

Assign one violation mark for every input onset segment that does not have a correspondence in the output.

Since there is no variation form such as deleted onset, MAX-S_{ONSET} is located above the cut-off line, eliminating the redundant candidates.

4.1.1 Consonant Adaptation

4.1.1.1 Obstruent De-tensing

The corpus shows that tensed consonants are only substituted by unaspirated obsturents regardless of the form of the substitution (100%, 260/260). It is because the Korean tensed obstruent has a [-spread glottis] feature, which is perceived by Mandarin speakers as an alternative form during KM Kong-er adaptation. The markedness constraint *TENSE(C) is proposed to prevent the tensed Korean obstruents from occurring. To preserve the [-spread glottis] feature inherent in the Korean tensed obstruents, the local conjunction of constraint IDENT[tense]&*[+aspirated] is proposed.

(2) *TENSE(C):

Assign one violation mark for every [tense] consonant in the output.

(3) $[\text{IDENT[tense]\&*[+aspirated]}]_{\text{ONSET}}$:

Assign one violation mark for every onset that violates both IDENT[tense] and *[+aspirated].

The tensed consonant inputs are only mapped to the unaspirated outputs. This marked result leads to the proposal of a local conjunction constraint $[\text{IDENT[tense]\&*[+aspirated]}]_{\text{ONSET}}$. In the domain of the onset consonant, IDENT[tense] and *[+aspirated] are locally conjoined. The markedness constraint *[+aspirated] is inactive individually. It is activated when the faithful constraint IDENT[tense] is violated (Łubowicz, 2002; Hsiao, 2015). The conjunct constraint is higher-ranked than each of IDENT[tense] and *[+aspirated] than either IDENT[tense] or *[+aspirated]. It functions to eliminate aspirated output when the input is a tensed consonant. For the aspiration

contrast in other type of adaptations, a faithfulness constraint IDENT[aspirated] allows variations of aspiration contrasts below the cut-off line.

Korean tensed obstruents are divided into two groups: one for tensed stops /p', t', k'/ and the other for tensed affricates and fricatives /tɕ', s'/. These two groups are in different tableau due to the variations: /p', t', k'/ are only mapped to [p, t, k] and /tɕ', s'/ are possibly mapped to either unaspirated counterparts [tɕ, s] or retroflexed counterparts [tʂ, ʂ].

Three constraints appear above the cut-off line in tableau (4). The constraints below the cut-off line are omitted. There is no ranking between the constraints since a domination relation does not decide the optimal candidate.

(4) /nun.**p'i**.tɕʰi/ → [nəŋ.**pi**.tɕʰi] (能逼七) 'the color of the eyes-SUBJ'

Input: /**p'**i/	MAX-S$_{ONSET}$	*TENSE(C)	[IDENT[tense]&*[+aspirated]]$_{ONSET}$
☞ a. **p**i			
b. **p**^{h}i			*!
c. **p'**i		*!	
d. i	*!		

In the tableau (4), (4b) is ruled out by [IDENT[tense]&*[+aspirated]]$_{ONSET}$. (4c) is also eliminated because tensed obstruents are banned by the markedness constraint *TENSE(C) in KM Kong-er. Lastly, candidate (4d) is ruled out by the constraint MAX-S$_{ONSET}$ due to the deletion of the onset consonant.

Let us examine the adaptation of the tensed affricate and tensed fricative. In the corpus, variants such as the retroflex post alveolars [tʂ] and [ʂ] also appear. This thesis employs the idea of cue constraint (Boersma, 1997). Boersma (1997) uses natural class to find out the roles of articulation and perception in phonology, and the constraints such as [+REPLACE] and [+GESTURE] are suggested. Hsiao (2011) also uses [+RETROFLEX] to discuss accent formation. We borrow the concept of the neutral feature [RETROFLEX] to propose the constraint *[retroflex]. It is used below the cut-off line to induce retroflex variants.

(5) *[retroflex]:

Assign one violation mark for every retroflex consonant.

In tableau (6), a syllable /s'a/ is given as an example for illustration.

(6) /tɕʰʌt.**s'**a.raŋ/ → [tɕʰjou.**s**a.laŋ] (求撒朗) ~ [tɕʰjou.**ʂ**a.laŋ] (求莎朗) ' first love'

Input: /**s'**a/	MAX-S_{ONSET}	*TENSE(C)	[IDENT[tense]& *[+aspirated]]$_{ONSET}$	*[retroflex]
☞$_1$ a. **s**a				
☞$_2$ b. **ʂ**a				*
c. **s'**a		*!		
d. a	*!			

In the tableau (6), previously proposed constraints are placed above the cut-off line to rule out the ill-formed candidates. They eliminate candidates (6c) and (6d). In this case,

constraint [IDENT[tense]&*[+aspirated]]$_{ONSET}$ is irrelevant since there is no aspirated /s/ in Mandarin. The constraint would rule out the aspirated affricate [tɕ^{h}] if an input is the tensed affricate /tɕ'/. At the same time, the retroflexed candidate (6b) is preserved as a variation by the cue constraint *[retroflex] below the cut-off line. As a result, the tensed fricative /s'/ in the output is mapped to two outputs [sa] (6a) and [ʂa] (6b).

4.1.1.2 Coda Deletion

Except for the codas /n/ and /ŋ/, other Korean consonants in the coda position are all illicit in Mandarin phonotactics. Accordingly, five consonants /p, t, k, m, l/ in the Korean coda position are disallowed by CODA CONDITION.

(7) CODA CONDITION:

Assign one violation mark for every coda segment that is not an alveolar nasal /n/, nor a velar nasal /ŋ/.

In KM Kong-er adaptation, there are two dominant strategies for illicit codas, deletion (48.73%) or replacement (20.90%), and one dominant strategy for licit codas: retainment (30.37%). Let us first examine the adaptation of the illicit codas /p, t, k, m, l/. The majority of the tokens are deleted, and are also replaced by variants such as /n, ŋ/. In order to generate these variations, the faithfulness constraints MAX-S$_{CODA}$ and IDENT[nasal]$_{CODA}$ are proposed below the cut-off line.

(8) MAX-S_{CODA}:

Assign one violation mark for every input coda segment that does not have a correspondence in the output.

(9) IDENT[nasal]$_{CODA}$:

Assign one violation mark for every input-output disparity of the [nasal] feature in the coda position.

The constraint MAX-S_{CODA} is positioned below the cut-off line to let a candidate without a coda be mapped as a variant. Adjacent to MAX-S_{CODA}, IDENT[nasal]$_{CODA}$ is positioned below the cut-off line to preserve the candidates replaced by the licit codas (n, ŋ). IDENT[nasal]$_{CODA}$ dominates MAX-S_{CODA} since the frequency of the variant with coda-deletion is higher than one with replacement. Tableau (10) illustrates an adaptation the result of an adaptation with the stop coda /p/.

(10) /pʰa**p**.kʰon/ → [pʰa.kʰoŋ] (怕空) 'pop-corn'

Input: pʰa**p**	CODA CONDITION	IDENT[nasal]$_{CODA}$	MAX-S_{CODA}
☞$_1$ a. pʰa			*
☞$_2$ b. pʰa**n**		*	
☞$_2$ c. pʰa**ŋ**		*	
d. pʰa**p**	*!		

CODA CONDITION functions to rule out illicit codas (10d). The low ranking of MAX-S_{CODA} preserves the candidate with coda deletion (10a). IDENT[nasal]$_{CODA}$ ensures (10b-

c), which occur as the result of replacement, to be selected as variations. A solid line demonstrates the ranking of the constraints, indicating IDENT[nasal]$_{CODA}$ >> MAX-S$_{CODA}$ based on the frequency of the variants.

Next, tableau (11) illustrates the adaptation of the lateral coda /l/. In the same way as the illustration with obstruent codas in (10), the lateral coda /l/ in (11d) is eliminated by the CODA CONDITION, and the deletion strategy (11a) and replacement strategy (11b-c) are chosen to be variations by the constraints below the cut-off line. The hierarchical relationship between IDENT[nasal]$_{CODA}$ and MAX-S$_{CODA}$ successfully induces the ranking of the outputs.

(11) /sa**l**.tɕ'ak/ → [ʂa.tʂa] (沙炸) 'lightly'

Input: sa**l**	CODA CONDITION	IDENT[nasal]$_{CODA}$	MAX-S$_{CODA}$
☞$_1$ a. sa			*
☞$_2$ b. sa**n**		*	
☞$_2$ c. sa**ŋ**		*	
d. sa**l**	*!		
e. sa**p**	*!		

In the case of the coda /m/, identical constraint ranking leads to a different candidate ranking because of the nasality. In the KM Kong-er corpus, the replacement of the coda /m/ by [n] or [ŋ] (80.43%) appears more than deletion (19.57%). With the previously proposed two constraints, a coda deletion strategy becomes the second frequent result

during the EVAL. A syllable /pam/ is given as an example for illustration in tableau (12) below.

(12) /pam/ → [p^{h}aŋ (旁) ~n ~∅] 'night'

Input: pa**m**	CODA CONDITION	IDENT[nasal]$_{CODA}$	MAX-S$_{CODA}$
☞$_1$ a. pa**n**			
☞$_1$ b. pa**ŋ**			
☞$_2$ c. pa			*
d. pa**m**	*!		
e. pa**l**	*!	*	
f. pa**p**	*!	*	

In (12), candidates with illicit codas (12d-f) are ruled out by the CODA CONDITION. IDENT[nasal]$_{CODA}$ and MAX-S$_{CODA}$ below the cut-off line lead the candidate (12ab) to be selected as an optimal result (replacement) and the candidate (12c) to be a second-most frequent variation (deletion).

Lastly, let us examine the strategy for the licit codas /n, ŋ/: retainment (30.37%). The result shows that two codas are mostly retained, also showing replacement and deletion in order. To make achieve the result, the faithfulness constraint IDENT[anterior]$_{CODA}$ is placed below MAX-S$_{CODA}$ with a solid line (MAX-S$_{CODA}$ >> IDENT[anterior]$_{CODA}$). IDENT[anterior]$_{CODA}$ ensures the frequency hierarchy among the candidates since the codas /n/ and /ŋ/ can be differentiated by the [anterior] feature. Tableau (14) illustrates the adaptation of the syllable /saŋ/ below.

(13) IDENT[anterior]$_{CODA}$:

Assign one violation mark for every input-output disparity of the [anterior] feature in a coda position.

(14) /haŋ.saŋ/ → [xaŋ.saŋ] (夯桑) 'always'

Input: saŋ	CODA CON	ID[nasal] $_{CODA}$	MAX-S$_{CODA}$	ID[anterior]$_{CODA}$
☞$_1$ a. saŋ				
☞$_2$ b. san				*
☞$_3$ c. sa			*	
d. sam	*!			*
e. sal	*!	*		*
f. sap	*!	*		*

As in (14), when the input is /ŋ/, a candidate with the coda /ŋ/ (14a) is not fatal according to any constraint, and thus becomes the most optimal and frequent output (retainment). The coda /n/ is fatal by IDENT[anterior]$_{CODA}$ (14b), and so is the second-most frequent variation (replacement). Lastly, the deletion of the input /ŋ/ (14c) is fatal by MAX-S$_{CODA}$, and so it the least frequent variant, but it is still possible for it to be an output (deletion).

4.1.1.3 Glide Insertion

When there is a syllable with the Korean post-alveolar affricates /tɕ, tɕ^h, tɕ'/ in the source, glide insertion appears in the Kong-er adaptation (63.45%). /tɕ, tɕ^h, tɕ'/ is also

replaced by the retroflex counterparts [tʂ, tʂ^{h}] (28.43%). Thus, [+high, -back]$_{CX}$ is proposed to adjust the Korean affricates into Mandarin affricates with the on-glide /j/. Also, IDENT[anterior]$_{ONSET}$ is proposed to prevent any alveolar affricate mapping with the dental sound [ts, ts^{h}, s] in this section. Lastly, IDENT[aspirated] and DEP-S are proposed to allow for aspiration and segment insertion.

(15) [+high, -back]$_{CX}$:

Assign one violation mark for every CX sequence where C and X do not agree in [+high, -back] (X=G or V)

(16) IDENT[anterior]$_{ONSET}$:

Assign one violation mark for every input-output disparity of the [anterior] feature in the onset position.

(17) IDENT[aspirated]:

Assign one violation mark for every input-output disparity of the [aspirated] feature.

(18) DEP-S:

Assign one violation for each segment in the output that does not appear in the input.

[+high, -back]$_{CX}$ is proposed above the cut-off line to eliminate ill-formedness. The constraint eliminates the disparity between CX in the [+high, -back] feature regardless of the left-right or right-left directions. This constraint is borrowed from the idea of the locus of violation (McCarthy, 2003; Hsiao, 2015), which is related to the OCP (obligatory contour principle) effect. Unlike the idea originally purposed to ban adjacent identical elements, [+high, -back]$_{CX}$ is proposed to allow an element to follow the other adjacent

element. Regarding the constraint, thus, a [+high, -back] consonant such as an alveolar-palatal affricate is obligatory adjacent to a [+high, -back] vocoid such as /i(j), y(ɥ)/.

IDENT[anterior]$_{ONSET}$ is also placed above the cut-off line to eliminate ill-formedness, and it is neither mapped to glide insertion nor to a retroflex counterpart. Also, IDENT[aspirated] and DEP-S are positioned below the cut-off line since the aspiration contrast and segment insertion are not fatal in the adaptation but induce variations. A syllable /tɕa/ is given as an example in (19).

(19) /tɕa.k'u/ → [tɕ^{h}**j**a.ku] (恰古) 'incessantly'

Input: tɕa	[+high, -back]$_{CX}$	ID[anterior]$_{ONSET}$	*[retroflex]	DEP-S
☞$_1$ a. tɕja				*
☞$_1$ b. tɕ^{h}ja				*
☞$_2$ c. tʂa			*	
d. tsa		*!		
e. tɕa	*!			
f. tʂja	*!		*	*

In tableau (19), the input /tɕa/ is mapped to three variations: candidates (19a-b), in which glide insertion arises but differ in whether the output is aspirated or not, and candidate (19c), which is a retroflexed post-alveolar counterpart. IDENT[anterior]$_{ONSET}$ functions to eliminate the dental [tsa] in (19d). [+high, -back]$_{CX}$ rules out both of (19e) and (19f) due to the disparity of the [+high, -back] feature in CX (X=glide or vowel).

IDENT[anterior]$_{CODA}$ dominates DEP-S below the cut-off line with a solid line since glide insertion is the most frequent output (63.45%), and retroflex is the second-most frequent variant (28.43 %).

In the case of glide insertion before the either vowel /o/ or /e/, markedness constraints are required due to the fact that Mandarin phonotactics does not allow the single nucleus /o/ or /e/ in a syllable. Thus, the markedness constraints *C[o], *C[e] are proposed here.

(20) *C[o]: Assign one violation mark for every syllable with the single nucleus /o/.

(21) *C[e]: Assign one violation mark for every syllable with the single nucleus /e/.

Since the violation of *C[o] and *C[e] is fatal in the KM Kong-er adaptation, the constraints are placed above the cut-off line. A syllable /tɕe/ is given as an example for the illustration in (22). Since constraints are not ranked with a dotted line, the exclamation mark in parenthesis indicates that either violation is fatal.

(22) /tɕe.pal/ → [tɕ**j**e.pa] (皆巴) 'please'

Input: tɕe	*C[e]	[+high, -back]$_{CX}$	ID [anterior]$_{ONSET}$	*[retroflex]	DEP-S
☞$_1$ a. tɕ**j**e					*
☞$_1$ b. tɕ^h**j**e					*
c. tʂe	*!			*	
d. tɕe	*!	*(!)			
e. tse	*!		*(!)		

In tableau (22), candidates (22a-b) are selected as optimal variations and the retroflexed candidate (22c) is eliminated by the constraint *C[e] in this case. A possible candidate [tʂei] is omitted in this tableau since [tʂei] does not appear in Mandarin, and it can be simply eliminated by a phonotactic constraint like *tʂei.

Lastly, glide insertion also appears before the vowel /ʌ/. Also, the retroflexed counterpart is the second-most frequent candidate. Related to the vowel /ʌ/, diphthongization mapping [ʌ]-to-[ou] is analyzed in the next section.[1] Since [ʌ] is not allowed in Mandarin phonotactics, a related constraint is proposed in (23).

(23) *[ʌ]: Assign one violation mark for every output [ʌ].

*[ʌ] is placed above the cut-off line to rule out any candidates with the illicit vowel [ʌ]. A syllable /tɕʰʌ/ is given as an example in (24).

[1] The Korean vowels /ʌ/ and /ɯ/ do not have corresponding vowels in Mandarin, which leads to the employment of other strategies, such as vowel lowering and vowel diphthongization, the use of which are described in the following sections. In this subsection, we will focus on glide insertion.

(24) /tɕʰʌ.ɯm/ → [tɕʰ**j**ou.ən] (秋恩) ‘first time’

Input: tɕʰʌ	*[ʌ]	*C[o]	ID-V[+back]	[+hi, -bk]$_{CX}$	ID [ant]$_{ONSET}$	*[retroflex]	DEP-S
a. tɕʰo		*!		*(!)			
b. tɕʰjo		*!					*
☞$_1$ c. tɕʰjou							*
☞$_1$ d. tɕjou							*
☞$_2$ e. tʂʰou						*	*
☞$_2$ f. tʂou						*	*
g. tɕʰa				*!			
h. tsʰa					*!		
i. tɕʰʌ	*!			*(!)			
j. tɕje			*!				

In tableau (24), the faithful output [tɕʰʌ] (24i) is fatal due to the constraint *[ʌ]. *C[o] also successfully defeats the candidates (24a-b) since they have single nucleus [o] in the output. As a result, the outputs with glide insertion [tɕʰjou]/[tɕjou] (24c-d) are selected as the most optimal variants, and the outputs with retroflexation [tʂʰou]/[tʂou] (24e-f) become secondary optimal outputs. To disallow [ʌ]-to-[e] mapping from appearing, IDENT-V[+back] is used and prevents the candidate [tɕje] (24j).

(25) IDENT-V[back]:

Assign one violation mark for every input-output disparity of the [back] feature.

IDENT-V[+back] is also used in the later section related to the vowel adaptations.

4.1.2 Vowel Adaptation

4.1.2.1 Vowel Lowering

The Korean high back vowel /ɯ/ does not exist in the Mandarin phonetic system. The strategy that Mandarin speakers mainly use for adapting the vowel is lowering (80.30%). They also use rounding (17.84%) for variation. IDENT-V[back], previously proposed, cannot rule out any candidate above the cut-off line since both lowering and rounding arise with the [back] vowels /ɤ/ and /u/. Therefore, OT analysis requires new constraints: *[ɯ], IDENT-V[round], IDENT-V[-low] and IDENT-V[high] as shown below.

(26) *[ɯ]: Assign one violation mark for every output including the vowel [ɯ].

(27) IDENT-V[round]:

Assign one violation mark for every input-output disparity of the [round] feature in a vowel.

(28) IDENT-V[-low]:

Assign one violation mark for every input-output disparity of the [-low] feature in a vowel.

(29) IDENT-V[high]:

Assign one violation mark for every input-output disparity of the [high] feature in a vowel.

The constraint *[ɯ] is proposed to eliminate the faithful output [ɯ], which is absent in Mandarin phonotactics. IDENT-V[-low] is proposed to rule out the mapping [ɯ]-to-[a]. Lastly, IDENT-V[round] and IDENT-V[high] preserve the variation below the cut-off line. A syllable /kɯ/ is analyzed in tableau (30).

(30) /k**ɯ**.kʌ/ → [k^{h}**ɤ**.kou] (可勾) 'that one'

Input: kɯ	*[ɯ]	*C[o]	IDENT-V[-low]	IDENT-V[round]	IDENT-V[high]
☞$_1$ a. kɤ					*
☞$_1$ b. k^{h}ɤ					*
☞$_2$ c. ku				*	
☞$_2$ d. k^{h}u				*	
e. ko		*!		*	
f. ka			*!		*
g. kɯ	*!				

In tableau (30), the faithful output (30g) is eliminated by the Mandarin phonotactics constraint *[ɯ]. IDENT-V[back] above the cut-off line (omitted in the tableau) ensures adjustment for [ɤ] (31a-b) and [u] (30c-d). IDENT-V[-low] eliminates [kɯ]-to-[ka] mapping in (30f). Since lowering the output [ɤ] is more frequent than rounding the output [u] in the corpus, IDENT-V[round] dominates IDENT-V[high], inducing the candidate ranking. (30a-b) are optimally selected and (30c-d) are selected as a variation in the adaptation.

4.1.2.2 Diphthongization

Diphthongization is correlated with the Korean vowels /o, e, ʌ/. Since /o/ and /e/ cannot occur as a single nucleus in Mandarin, diphthongization along with either an on-glide or an off-glide is the main strategy for these two source vowels in adaptation. Also, those three vowels share both [-low] and [-high] features. Lastly, the results show that

neither /o/ nor /e/ are ever deleted in the process of adaptation, and thus, the constraints related to the result are introduced as in (31)-(33).

(31) IDENT-V[-high]:

Assign one violation mark for every input-output disparity of the [-high] feature in vowels.

(32) MAX[o]:

Assign one violation mark for every vowel /o/ in the input that does not have a correspondence in the output.

(33) MAX[e]:

Assign one violation mark for every vowel /e/ in the input that does not have a correspondence in the output.

IDENT-V[-high] functions to preserve mid vowels as well as IDENT-V[-low] works vowels. Especially for the three vowels which follow the pattern of diphthongization, these two constraints rule out both [o/e/ʌ]-to-[u] and [o/e/ʌ]-to-[a]. On the other hand, MAX[o] and MAX[e] can be proposed since both vowels are retained in the result (100%). A syllable /mo/ is taken as an example in (34). Only the diphthongized output [mou] and [mwo] are chosen.

(34) /m**o**.tu/ → [m**ou**.tu] (某度) ～ [m**wo**.tu] (摸賭) 'everybody'

Input: mo	*C[o]	*C[e]	IDENT-V[-low]	IDENT-V[-high]	MAX[o]	IDENT-V[round]	DEP-S
☞1 a. mou							*
☞1 b. mwo							*
c. mo	*!						
d. me		*!			*(!)	*	
e. ma			*!		*(!)	*	
f. mɤ					*!	*	
g. mu				*!	*(!)		

Previously proposed constraints successfully eliminate ill-formed candidates (34c-g). Since the ranking of the constraints of IDENT[round] and DEP-S does not conflict or induce frequent ranking, no domination relation is constructed in tableau (34).

Next, let us examine the Korean vowel /e/. In KM Kong-er adaptation, it is possibly mapped to both /je/ and /ei/ (100%). Thus, MAX[e] is posited above the cut-off line to prevent the deletion of vowel /e/ and to eliminate any mapping without [e]. An example is illustrated in (35).

(35) /o.r**e**/ → [ou.l**je**] (偶勒) ‘for a long time’

Input: re	*C[e]	IDENT-V[-low]	IDENT-V[-high]	MAX[o]	IDENT-V[round]	DEP-S
☞1 a. lei						*
☞1 b. lje						*
c. le	*!			*(!)		
d. la		*!		*(!)		
e. lɤ				*!		
f. lu			*!	*(!)	*	

In the tableau (35), the input /re/ is possibly mapped to both [lei] (35a) and [lje] (35b). The faithful candidate [le] (35c) is ruled out by *C[e], and the other candidates [la], [lɤ] and [u] (35d-f) are also ruled out by previously proposed constraints.

Lastly, the vowel /ʌ/ is diphthongized to [ou/wo] in most part of the whole (77.45%). Also, some tokens also adapt [ɤ] (22.55%). To produce the result, IDENT-V[-high] is activated. The input /kʌl/ is chosen as an example for the illustration in (36).

(36) /mo.tɯn.k**ʌ**l/ → [mou.tɤŋ.k**ou**] (某等勾) 'everything-OBJ'

Input: k**ʌ**l	*[ʌ]	*C[o]	IDENT-V[-low]	IDENT-V[-high]	IDENT-V[round]	DEP-S
☞2 a. kou					*	*
☞2 b. kwo					*	*
☞1 c. kɤ						
d. ko		*!			*	
e. kʌ	*!					
f. ka			*!			
g. ku				*!		

In tableau (36), the faithful candidate [kʌ] (36e) is ruled out by *[ʌ]. IDENT-V[-low] and IDENT-V[-high] ensure that the source vowel /ʌ/ to undergoes a process of diphthongization to become [kou] (36a) and [kwo] (36b), but it is not mapped to either [ka] (36f) or [ku] (36g) at the same time. Also, the constraint ranking indicates that [kʌ]-to-[kɤ] (36c) is possible mapping.

Even though the tableau successfully demonstrates that neither diphthongized output (36a-b) nor lowered output (36c) are fatal, the frequency based on the ranking below the cut-off line is not identical with the actual result. According to the tableau, (36c) must be the most optimal and frequent output, and (36a-b) should be the second most frequent variation. McCarthy (2008) once noted that OT grammar emphasizes the possible outputs instead of the actual outputs. Thus, we conclude that output such as [kɤ] in (36c) is predicted to be the most optimal output if more data is collected.

The constructed constraint ranking of the adaptations conforming to the Mandarin phonotactics is presented in (37).

(37) Ranking of Adaptation Conforming to Mandarin Phonology

MAX-S_{ONSET},
TENSE(C), [IDENT[tense]&[+aspirated]],
CODA CONDITION,
[+high, -back]$_{CX}$, IDENT[anterior]$_{ONSET}$,
*C[e], *C[o], *[ʌ], *[ɯ]
IDENT-V[back], IDENT-V[-low], IDENT-V[-high],
MAX[o], MAX[e]

Cut-off

IDENT[nasal]$_{CODA}$
|
MAX-S_{CODA}
|
IDENT[anterior]$_{CODA}$, *[retroflex]
|
IDENT-V[round], DEP-S
|
IDENT-V[high], IDENT[aspirated]

Above the cut-off line, the constraints are not ranked since they do not conflict with each other. They only rule out ill-formed candidates. *C[o], *C[e], CODA CONDITION, [+high, -back]$_{CX}$ are proposed to eliminate a candidate in violation of Mandarin phonotactics. *[ʌ], *[ɯ], *TENSE(C) function to rule out faithful candidates which Mandarin phonotactics does not have. MAX-S_{ONSET}, MAX[o], MAX[e] are proposed since Kong-er adaptation does not allow onset deletion and or vowel [o]/[e] deletion. Lastly,

[IDENT[tense]&*[+aspirated]], IDENT[anterior]$_{ONSET}$, IDENT-V[back], IDENT-V[-low] and IDENT-V[-high] functions to rule out wrongly mapped outputs.

Below the cut-off line, the constraints are hierarchized as IDENT[nasal]$_{CODA}$ >> MAX-S$_{CODA}$ >> IDENT[anterior]$_{CODA}$ for coda adaptation, which is successful in inducing adaptation result according to the coda types. Also, *[retroflex] ensures retroflexed counterpart in the tense de-tensing and the glide insertion. Under the constraints, IDENT-V[round], DEP-S are placed for the vowel adaptation, to allow [ɯ]-to-[u] adaptation and diphthongization. IDENT-V[high] is dominated at the bottom to ensure the result that vowel lowering [ɯ]-to-[ɤ] is more frequent than vowel rounding [ɯ]-to-[u]. Lastly, IDENT[aspirated] is also dominated at the bottom since KM Kong-er does not allow for aspiration contrast.

4.2 Adaptations in Violation of Mandarin Phonotactics

Since the purpose of KM Kong-er is to transliterate Korean pronunciation in a precise way, Mandarin speakers rather choose to use phonograms such as Zhuyin (Chinese transliteration for Taiwan Mandarin) and English during the adaptation process. 6.25% (168/2690) of the tokens in the Kong-er corpus are written in Zhuyin or English, showing some phonotactic violation. The patterns of violations are divided into two types, one following Korean phonology, and the other following an interlanguage phonology. The rankings of the OT constraints vary for each of the two types of phonotactic violation.

4.2.1 Phonotactic Violation: Following Korean Phonology

In Mandarin phonotactics, the velars /k/, /k^h/, /x/ never occur before [+high, -back] vocoids so that velars are usually adapted by alveolar-palatal affricates and fricatives in

many other loanword adaptation processes. In KM Kong-er, however, 100% (55/55) of the [velar + i] sequences follow Korean grammar. This result preserves the similarity of the sound without the replacement of the velar consonant or vowel.

To ban the consonant replacement, IDENT[strident]$_{ONSET}$ is proposed. Since Korean velar and Mandarin alveolar-palatals are different in feature [strident], the constraint can prevent [k]-to-[tɕ] mapping. Also, IDENT-V[back] and *[y] above the cut-off line disallow vowel replacement. Newly proposed constraints are shown in (38) and (39).

(38) IDENT[strident]$_{ONSET}$:
Assign one violation mark for every input-output disparity of the [strident] feature in an onset position.

(39) *[y]: Assign one violation mark for every output including the vowel [y].

In tableau (40), the input /ki/ is mapped to the candidate [ki] (40a) in Zhuyin or English form. In this mapping, the alveolar-palatal onset in candidate (40b) is ruled out by IDENT[strident]$_{ONSET}$. The mid unrounded back vowel in candidate (40c) and the high unrounded front vowel in candidate (40d) are eliminated by IDENT-V[back] and *[y].

(40) /**ki**.pun/ → [**ki**.pən(噴)] ‘mood’

Input: /ki/	IDENT-V[back]	*[y]	IDENT[strident]$_{ONSET}$
☞ a. ki			
b. tɕi			*!
c. kɤ	*!		
d. ky		*!	

Tableaux (41) and (43) show similar patterns of the velar /h/ and the [+high, +back] vowel. Since variants such as [li] and [ni] in Mandarin may also be chosen to be the variation, IDENT[strident]$_{ONSET}$ functions again above the cut-off line to rule out the [+strident] feature such as /tɕ/, /tɕ^{h}/, /ɕ/. Also, MAX-S$_{CODA}$ placed below the cut-off line to preserves the coda-deleted candidates.

(41) /**him**/ → [**xim**]~[li] (里), [ni] (尼) ‘power’

Input: /him/	IDENT[strident]$_{ONSET}$	IDENT-V[back]	MAX-S$_{CODA}$
☞$_{1}$ a. xim			
☞$_{2}$ b. li			*
☞$_{2}$ c. ni			*
d. ɕi	*!		*
e. xɤ		*!	*

In tableau (41), the input /him/ is mapped to [xim], but also mapped to [li] and [ni] with a low probability. The [l] and [n] in candidate (41b-c) are not in violation of

IDENT[strident]$_{ONSET}$ and IDENT-V[back] so they are not ruled out. The candidates (41d-e) are eliminated by the constraints above the cut-off line.

When /h/ and the [+high, +back] glide are combined, a new constraint is needed since a glide is classified as a consonant in this thesis. MAX[+high]$_{ONSET}$ is proposed to preserve the glide /j/ in the onset position. The definition of the constraint and the related tableau is presented in (42).

(42) MAX[+high]$_{ONSET}$:
Assign one violation mark for every [+high] in the input onset position that that does not have a correspondence in the output.

(43) /**hjaŋ**.he/ → [**xjaŋ**.hei] (ㄏㄧㄤ黑) 'toward'

Input: /hjaŋ/	IDENT[strident]$_{ONSET}$	MAX[+high]$_{ONSET}$	MAX-S$_{CODA}$
☞ a. xjaŋ			
b. xaŋ		*!	
c. ɕia	*!		*

In tableau (43), the input /hjaŋ/ is faithfully mapped to [xjaŋ] in the form of a phonotactic violation as in (43a). /j/-deletion (43b) and [x]-to-[ɕ] adaptation (43c) are banned by MAX[+high]$_{ONSET}$ and IDENT[strident]$_{ONSET}$, respectively.

The next sequence to be discussed is that of dental consonants and the [-high, +back] vowels /ʌ, o/. In the corpus, the Korean vowels /ʌ, o/ mostly follow Mandarin

phonotactics, and are diphthongized into [ou]. However, 100% (31/31) of the dental /n/ and the [-high, +back] vowels /o, ʌ/ sequence show phonotactic violation, all mapped to [no]. To induce this result, two constraints previously established are used again: IDENT-V[-low] and IDENT-V[-high]. They preserve the [-high, +back] vowel and eliminate [ʌ/o]-to-[a] and [ʌ/o]-to-[u] mapping. Also, *C[o] is replaced to be below the cut-off line in the adaptation following Korean grammar. Tableau (44) illustrates the mapping of [nʌ]-to-[no].

(44) /**nʌ**.mu/ → [**no**.mu] (NO 目) 'very'

Input: nʌ	IDENT-V[-low]	IDENT-V[-high]	*C[o]
☞1 a. no			*
b. nu		*!	
(☞1) c. nə			
d. nao	*!		
e. nou		*!	
f. nuo		*!	
g. na	*!		

In tableau (44), *C[o], previously posited above the cut-off line, is re-posited below the cut-off line. This allows the input /nʌ/ to be mapped to [no] (44a). The candidates (44b,e,f) are ruled out by IDENT-V[-high], and candidates (44d-g) are ruled out by IDENT-V[-low]. Also, the constraint ranking predicts the output [nə] (44c) if more data is collected to allow for further analysis.

4.2.2 Phonotactic Violation: Following Interlanguage Phonology

39.29% (66/168) of the tokens in the Zhuyin/English transcription belong to interlanguage phonology. The sequences are grouped by velar, labial, and alveolar consonants and some certain vowels, such as /jʌ, e/ in Chapter 3.

The sequence of the velar /k, k^h, k', h/ and the vowel /i/ follows Korean phonology, mapping to [ki], [xi]. However, when the rhyme is /jʌ/, 100% (19/19) of the outputs follow neither Korean phonology nor Mandarin phonology, inducing [k^hjou]. An analysis is shown in tableau (45).

(45) /sam.**k^hjʌ**/ → [saŋ**.k^hjou**] (桑ㄎㄧㄡ) 'swallow'

Input: /**k^hjʌ**/	IDENT[strident]$_{ONSET}$	IDENT-V[back]	MAX[+high]$_{ONSET}$
☞$_1$ a. k^hjou			
b. k^hi		*!	*(!)
c. tɕjou	*!	*(!)	
d. tɕi	*!	*(!)	*(!)
e. k^hɤ			*!

In tableau (45), [k^h]-to-[tɕ] mapping is successfully eliminated by IDENT[strident]$_{ONSET}$ (45c-d). Also, [k^hi] in (45b) is ruled out by IDENT-V[back] because of the disparity in the back vowel, and [k^hɤ] in (45e) is ruled out by MAX[+high]$_{ONSET}$ since the input /j/ is deleted in the output. In the end, (45a) is chosen to be the most optimal output without other variants.

In the case of the labial /p, p^h, p', m/ and the vowel /jʌ/ sequence, 55.56% (20/36) of the tokens show a phonotactic violation which belongs to interlanguage grammar. An analysis is shown in (46) below.

(46) /**p^hjʌŋ**.seŋ/ → [**p^hjoŋ**.san] (ㄅㄩㄥㄙ) 'for life'

Input: /p^hjʌŋ /	IDENT-V[back]	MAX[+high]$_{ONSET}$	MAX-S$_{CODA}$
☞$_1$ a. p^hjoŋ			
b. p^hi	*!	*(!)	*
c. p^hən	*!	*(!)	
d. p^hu		*!	*

Previously proposed constraints successfully rule out wrong outputs. In tableau (46), the deletion of the [-high, +back] vowel /ʌ/ is banned by IDENT-V[back] as in (46b-c). Also, the deletion of the glide /j/ is ruled out by MAX[+high]$_{ONSET}$ (46d). Lastly, (46a) does not violate any constraints and becomes the most optimal output following the interlanguage phonology.

Lastly, a phonotactic violation appears when an alveolar sound and the vowel /e/ are combined (77.14%, 27/35), following the interlanguage phonology. In the corpus, the input /se/ is mostly mapped to the output [sei], and partially mapped to [ʂei] and [se]. The source vowel /e/ is retained in all of the variations. In Mandarin phonotactics, the alveolar /s/ is not allowed before the vowel /e/. Therefore, MAX[e] is used above the cut-off line to preserve the vowel /e/, and to eliminate unfaithful vowels. *C[e] and

IDENT[anterior]$_{ONSET}$ below the cut-off line ensure the variation. A syllable /se/ is given as an example in tableau (47).

(47) /**se**.ro/ → [**sei**.lou] (SAY 樓) 'newly'

Input: se	MAX[e]	*C[e]	IDENT[anterior]$_{ONSET}$
☞$_1$ a. sei			
☞$_2$ b. ʂei			*
☞$_3$ c. se		*	
d. su	*!		
e. sa	*!		
f. sɤ	*!		

In tableau (47), the deletion of the vowel /e/ are all ruled out in (47d-f). Also, *C[e] and IDENT[anterior]$_{ONSET}$, previously posited above the cut-off line, are re-posited to be below the cut-off line to preserve the [se] variation as in (47c). Lastly, IDENT[anterior]$_{ONSET}$ is dominated by *C[e]. Thus, [ʂei] (47b) became the second most frequent variants when [se] (47c) is third most frequent variant.

The constraints related to the ranking of adaptations in violation of Mandarin phonotactics are illustrated (48):

(48) Adaptation Violating Mandarin Phonotactics

IDENT[strident]$_{ONSET}$, *[y], IDENT-V[back], MAX[+high]$_{ONSET}$,
IDENT-V[-low], IDENT-V[-high], MAX[e]

.....

Cut-off

MAX-S$_{CODA}$, *C[o], *C[e]
|
IDENT[anterior]$_{ONSET}$

Compared to the constraint ranking of the adaptations in conformity to Mandarin phonotactics, there are two changes in (48). First, the constraints IDENT[strident]$_{ONSET}$, *[y] and MAX[+high]$_{ONSET}$ are added in the ranking above the cut-off line. IDENT[strident]$_{ONSET}$ is proposed to preserve the velar sound and to ban palatalization. *[y] is proposed to eliminate the [+high, -back] vowel /y/, which is not allowed in the Korean grammar. MAX[+high]$_{ONSET}$ is proposed to prevent the deletion of /j/.

Second, *C[o], *C[e], and IDENT[anterior]$_{ONSET}$ are dominated below the cut-off line in the ranking. The majority of the occurrences of /o, e/ are diphthongized and banned to solely occur after a consonant in the adaptation in conformity to Mandarin phonotactics. However, the inputs /no/ and /se/ are faithfully mapped to [no] and [se] in violation of Mandarin phonotactics. Thus, *C[o], *C[e] cannot function to eliminate the ill-formedness of Mandarin phonotactics. IDENT[anterior]$_{ONSET}$ rules out [s]-to-[ʂ] mapping.

4.3 Summary

In the previous section, the OT analysis of KM Kong-er adaptation was done in two parts: an analysis of the unmarked phonology which conforms to Mandarin phonotactics and of the marked phonology which is in violation of Mandarin phonotactics.

The marked phonology is also divided into two kinds of adaptations, the adaptation following Korean phonology and that following interlanguage phonology. Under the frame of the ROE, a constraint above the cut-off line eliminates fatal candidates, and a constraint below the cut-off line preserves variations.

In unmarked KM Kong-er adaptation, illicit consonants and vowels in Mandarin are ruled out by the constraints above the cut-off line, such as *C[e], *C[o], *[ʌ], *[ɯ], *TENSE(C), CODA CONDITION. Other constraints above the cut-off line such as [+high, -back]$_{CX}$, [IDENT[tense]&*[+aspirated]]$_{ONSET}$, MAX-S$_{ONSET}$, MAX[e], IDENT-V[back], IDENT[anterior]$_{ONSET}$ are proposed to delete undesirable mapping, following the Mandarin phonotactics again. Candidates who survive those constraints become the output as either optimal or possible variations. Since the constraints do not conflict with each other, no hierarchy is observed above the cut-off line.

The constraints below the cut-off line decide the candidate ranking. The more a candidate violates high-ranked constraints, the more low-ranked it is in the candidate hierarchy. In the unmarked phonology, the conflict between the constraints above the cut-off line does not decide the rank of the constraint, but the frequency of the variation below the cut-off line does decide the hierarchy between the constraints.

In coda deletion, the dominant relation IDENT[nasal]$_{CODA}$ >> MAX-S$_{CODA}$ >> IDENT[anterior]$_{CODA}$ successfully generate the candidate ranking for each coda type. IDENT[nasal]$_{CODA}$ >> MAX-S$_{CODA}$ results in ‘coda deletion >> coda replacement’ for /p, t, k, l/, and ‘coda replacement >> coda deletion’ for /m/. IDENT[anterior]$_{CODA}$ regulates unfaithful output from /n, ŋ/ so that a ‘retainment >> replacement >> coda deletion’ hierarchy is generated.

In glide insertion, *[retroflex] >> DEP-S leads the glide insertion to be the most optimal output, and lead retroflexation to be a possible variant. In vowel lowering, a rounded vowel violates IDENT-V[round] so that 'vowel lowering >> vowel rounding' is generated.

For marked phonology which is in violation of Mandarin phonotactics, three constraints above the cut-off line are proposed: namely IDENT[strident]$_{ONSET}$, MAX[+high]$_{ONSET}$ and *[y]. IDENT[strident]$_{ONSET}$ functions to rule out [kj]-to-[tɕj] mapping, which is highly ranked in Mandarin phonotactics. Since the velar stop /k/ and the alveolar affricate /tɕ/ are different in the [strident] feature, IDENT[strident]$_{ONSET}$ can delete the mapping. Also, IDENT-V[-low] and IDENT-V[-high] are used to preserve /o, ʌ/ and to prevent [nʌ]-to-[na] or [nʌ]-to-[nu] mapping. *[y] is activated in the adaptation following Korean phonology since Mandarin vowel /y/ is illicit in Korean phonotactics.

Lastly, *C[e] and *C[o] are dominated below the cut-off line since the marked phonology allows the vowels /o, e/ to solely occur and allows [+high, -back] vowels after a [+high, +back] consonant. The Hasse diagram of the two types of adaptations is presented in (52).

4.3.1 Theoretical implication

The roles of Mandarin phonology (L1) and Korean phonology (L2) in each type of KM Kong-er adaptation are arranged in (49) and (50) below.

(49) KM Kong-er following Mandarin phonology

a. The markedness constraints CODA CONDITION, *TENSE(C), *C[e], *C[o], *[ʌ] and *[ɯ], which are dominated in Korean (L2), are promoted in KM Kong-er.

b. The top-ranking constraint [+high, -back]$_{CX}$ in Mandarin (L1) is preserved in KM Kong-er, while the top-ranking constraint *[+high, -back]$_{CX}$ in Korean (L2) is demoted to the bottom in KM Kong-er.

c. The top-ranking constraint IDENT[aspirated] in both Mandarin (L1) and Korean (L2) is demoted to the bottom in KM Kong-er.

(50) KM Kong-er violating Mandarin phonology

a. The markedness constraints *C[e], *C[o], which are dominated in Korean (L2), remain to be dominated below the cut-line.

b. The bottom-ranking constraint *[y] in Korean (L2) is promoted to the top.

c. The constraint [IDENT[tense]&*[+aspirated]], originally irrelevant and inactive in both Mandarin (L1) and Korean (L2) is promoted to the top in KM Kong-er.

The table (49) describes the unmarked phonology which follows Mandarin phonotactics. In (49a), the markedness constraints that are dominated in Korean phonology are promoted in Mandarin phonology to prevent illicit output in Mandarin phonotactics. (49b) illustrates how the Mandarin phonotactics constraint ([+high, -back]$_{CX}$) wins over the Korean phonotactics constraint (*[+high, -back]$_{CX}$), with the former above the cut-off line and the latter below the cut-off line. As in (49c), a constraint which is bottom-ranked in both languages is promoted in Kong-er adaptation.

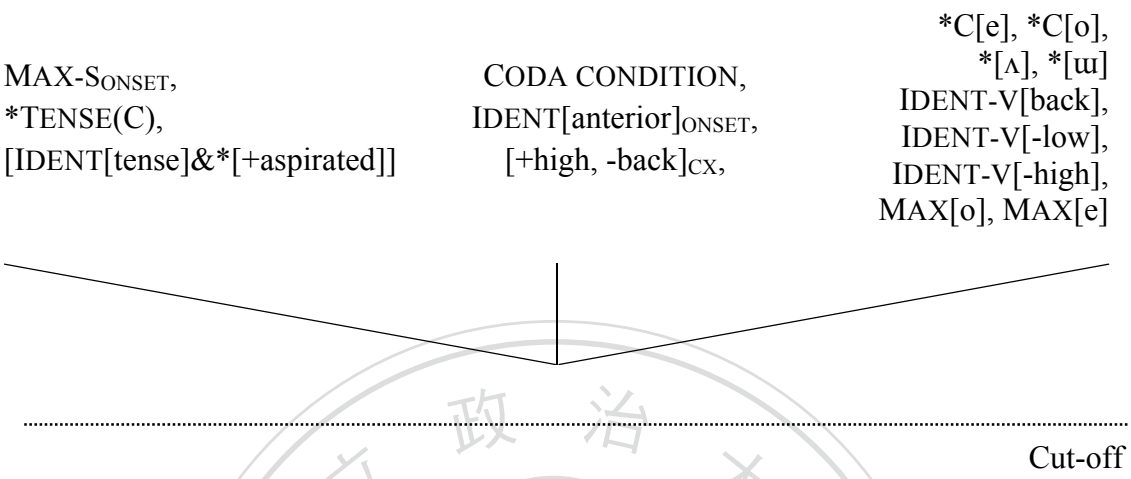
On the other hand, (50) describes a marked phonology which is in violation of Mandarin phonotactics. In (50a), the markedness constraints *C[e], *C[o] are dominated below the cut-line to induce variations which follow Korean phonotactics. Also in (50b), the bottom-ranking constraint *[y] in Korean phonology is high-ranked because of the faithful mapping of the velar and /j/ sequences. Lastly, [IDENT[tense]&*[+aspirated]],

which is originally irrelevant and inactive in both of Mandarin (L1) and Korean (L2), is activated to be moved to the top in KM Kong-er.

To sum up the theoretical implications, the fact that the Korean top-ranked constraints are demoted in the adaptation supports the notion that Mandarin phonology plays a more important role in the KM Kong-er adaptations. However, some adaptations are in violation of Mandarin phonology to preserve a sound similar to that of the source word. Thus, such type of adaptation reflects that Korean phonology and the emergence of an interlanguage partially influences KM Kong-er adaptation.

(51) Hasse diagram

a. Adaptations in conformity to Mandarin Phonotactics



IDENT[nasal]CODA

|

MAX-SCODA

|

IDENT[anterior]CODA, *[retroflex]

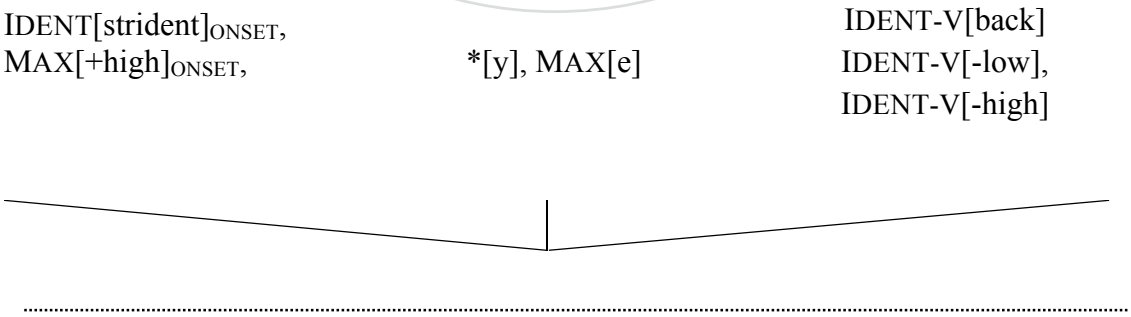
|

IDENT-V[round], DEP-S

|

IDENT[high], IDENT[aspirated]

b. Adaptations in violation of Mandarin Phonotactics



MAX-SCODA, *C[o], *C[e]

|

IDENT[anterior]ONSET

Chapter 5

Conclusion

5.1 Thesis Summary

This thesis investigates Korean-Mandarin Kong-er in Taiwan. A KM Kong-er lyric corpus is constructed, including 955 phonological words and 2690 syllables from 11 songs. The major part of the corpus shows that Korean lyrics are adapted to the Mandarin phonotactic system, while 8.07% of the whole of the corpus shows phonotactic violation using Zhuyin (Chinese transliteration for Taiwan Mandarin) and English. The phonotactic violation also can be divided into two groups: one following Korean grammar and the other following an interlanguage grammar.

The statistical analysis of the KM Kong-er corpus shows that the majority of the patterns of adaptation conform to Mandarin phonotactics. Tensed obstruents are de-tensed and replaced by unaspirated counterparts in Mandarin. Illicit codas such as /p, t, k, m, l/ in Korean are deleted or replaced by the Mandarin licit codas /n, ŋ/. The glide /j/ is prone to be inserted after the alveolar-palatal affricates /tɕ, tɕ^{h}, tɕ'/, which follows the Mandarin phonotactics. The Korean /ɯ/ vowel is prone to being lowered to /ɤ, ə/, and the monophthongs /o, ʌ/ and /e/ are diphthongized as [ou] and [ei].

Apart from the adaptations following Mandarin phonotactics, this thesis also observes CV sequences that follow Korean phonotactics and that follow an interlanguage phonology. The sequences following Korean (L2) are the velars /k, k^{h}, k', h/ and the [+high, -back] vowel /i/, and the dental /n/ and the [-high, +back] vowels /ʌ, o/. These two sequences are prone to preserving CV manners and features. On the other hand, non-coronal consonants such as the velars /k, k^{h}, k', h/ and the labials /p, p^{h}, p', m/ mostly

induce phonotactic violation following the interlanguage phonology before /jʌ/. Also, the alveolars /s, s'/ and /e/ induce interlanguage output, which is not allowed in either L1 or L2.

The patterns and sequences are analyzed based on the Optimality Theory. The Rank Ordering Model of EVAL, a sub-theory of OT, is used to account for the variations of the Kong-er. ROE separates the constraints into two parts with the concept of the cut-off line. The cut-off line decides whether the constraints are ill-formed and thus are to be eliminated or if they are to be preserved as variations of the input.

Two grammars are analyzed: for the adaptation one that conforms to Mandarin phonotactics, and one in which there are violations of Mandarin phonotactics. For the former, illicit consonants and vowels in Mandarin are ruled out by the constraints above the cut-off line. The markedness constraints *C[e], *C[o], *[ʌ], *[ɯ], *TENSE(C), CODA CONDITION, [+high, -back]$_{CX}$ function to let the output conform to Mandarin phonotactics. [IDENT[tense]&*[+aspirated]]$_{ONSET}$, MAX-S$_{ONSET}$, MAX[e], IDENT-V[back], IDENT[anterior]$_{ONSET}$ are proposed above the cut-off line to preserve the actual outputs, while preventing explicit mapping such as [tense]-to-[aspirated], onset deletion, vowel [e] deletion, etc. Candidates which survive those constraints become the output as either optimal or possible variations.

Other constraints below the cut-off line decide the optimality/frequency of the variations. For coda adaptation, the hierarchy between IDENT[nasal]$_{CODA}$, MAX-S$_{CODA}$, IDENT[anterior] successfully shows the candidate ranking for each of the coda types. For glide insertion, IDENT[anterior] and DEP-S decide the glide insertion to be the most optimal output, and retroflexation to be a possible variant. In vowel lowering, IDENT-V[round] induces the [u] variation.

For the adaptations in violation of Mandarin phonotactics, IDENT[strident]$_{ONSET}$, *[y] and MAX[+high]$_{ONSET}$ are proposed above the cut-off line. The constraints function to prevent the mapping from following Mandarin phonotactics, such as [ki]-to-[tɕi] mapping, the retainment of the vowel /y/ and the deletion of /j/ after the velar. Lastly, *C[e] and *C[o] are dominated below the cut-off line to follow Korean phonology and interlanguage phonology.

To sum up, KM Kong-er demonstrates three kinds of adaptation processes, those following the grammar of the L1, L2 and interlanguage. This result supports both Miao (2005) and Broselow (2004). Miao emphasized the predominance of the phonological system of the L1. As she said, Mandarin (L1) has an extensive influence on Kong-er adaptation. Also, the establishment of an interlanguage grammar (Broselow, 2004) is supported by the specific patterns which follow an interlanguage phonology in KM Kong-er. Lastly, Korean grammar also plays a part in KM Konger, which demonstrates the possibility of the influence of the L2.

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