GENERATIONAL TONE CHANGE
IN NORTH KYUNGSANG KOREAN
WITH A FOCUS ON ENGLISH LOANWORDS

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GENERATIONAL TONE CHANGE IN NORTH KYUNGSANG KOREAN WITH A FOCUS ON ENGLISH LOANWORDS

The primary goals of this dissertation are to document the intergenerational tone changes happening in English loanwords found in North Kyungsang (NK) Korean and to determine the linguistic and social factors that affect the changes. However, in order to discuss the linguistic factors of the change, the general loanword tone assignment system must be identified first. Thus, this study also provides an integrated analysis of the loanword tone assignment, presenting both descriptive statistical analysis and optimality-theoretic analysis, based on 3,384 English loanwords produced by six native speakers of NK Korean.

The loanword tonology of NK Korean is mora-sensitive and high tone is generally assigned to heavy syllables in English loanwords. However, recent studies, such as Kim (2018), report that vowel length is no longer distinctive among younger speakers. This indicates that bimoraicity is being lost from syllables that had a long vowel, and this moraic change may further influence their tone patterns.

The results of this study reveal that the moraic characteristics of English loanwords in NK Korean are being weakened, and intergenerational tone changes are happening from two distinct types of English loanwords: double high accented loanwords and final accented loanwords when accented suffixes are added to them. The results indicate that bimoraicity is being weakened not only from syllables with a long vowel but also from those with a coda consonant. According to Hayes (1989), a vowel length distinction is an important feature of moraic languages, and it is very rare that a language has a moraic distinction only with coda consonants. Based on this typological

background, we can assume that the loss of the vowel length distinction may undermine the moraic character of NK Korean generally.

Moreover, the two types of loanwords examined in this dissertation displayed similar changes in a very patterned way: namely, the intergenerational tone change is happening first in longer English loanwords that contain an accented open syllable while shorter loanwords are most resistant to change. These patterned tone changes documented in this dissertation support Labov's (2012:290) contention of the "breathtaking uniformities" found in cases of in-progress community language change.

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CHAPTER 1

INTRODUCTION

1.1. Motivation of the study

This dissertation study was motivated by my observation of an intergenerational tone change that is currently happening in North Kyungsang (NK) English loanwords. While reading previous literature on tone assignment of NK Korean, such as Kenstowicz & Sohn (2001) and Davis, Tsujimura & Tu (2012), I found that my own intuitions as a native speaker of NK Korean did not correspond with the traditionally described tone assignment pattern, especially for English loanwords; there seemed to be tone changes that I had in my own speech and that I had heard in other younger speakers' speech. In order to check if any tone change is actually in progress in NK loanwords, I conducted a couple of pilot studies with two different generations. The results of the pilot studies revealed that the production of younger NK speakers started to exhibit new tone assignment patterns in English loanwords that had not been reported in the previous literature, while the traditional tone assignment pattern was still reflected in the production of older speakers (more detailed information of the pilot studies will be provided in Chapters 5 and 6).

Previous studies have reported that NK Korean is a moraic language, and syllable weight plays an important role especially in tone assignment of English loanwords (M. Kim, 1997; Chung, 1998, 2000, 2002; Kenstowicz & Sohn, 2001; Kim, 2009; Davis, 2010; Kim, 2010). In NK English loanwords, one or two syllables of a word are assigned high tone, while other syllables are assigned low tone, and high tone is generally attracted by heavy syllables, which contain either a long vowel or a coda consonant. Among heavy syllables, those with a long vowel are considered to have a stronger tendency to attract high tone: Although syllables with a coda consonant are sometimes

considered monomoraic (light) and do not attract high tone in certain contexts (Chung, 2002; Kim, 2009), those with a long vowel never lose bimoraicity and thus are always assigned high tone.

Nevertheless, recent studies, such as Kim (2018), report that vowel length has been losing its phonemic status in NK Korean, and the vowel length distinction has already been lost in the production of younger NK speakers, whereas it is still maintained in the production of older speakers. The loss of long vowels in the production of younger generations indicates that the moraic structure of loanwords that had a long vowel in the past has been changed in accordance with their new vowel system. That is, syllables that were considered heavy (bimoraic) with a long vowel are now considered light (monomoraic) for younger NK speakers, and this may cause syllables that had a long vowel to no longer attract high tone. Since the moraic change caused by the loss of long vowels can also be assumed to affect tone patterns of loanwords, the intergenerational difference observed from the tone assignment pattern can be inferred to be stemming from the loss of long vowels in the production of younger speakers.

However, the intergenerational tone change was not observed only in loanwords that contained a long vowel, but also observed in loanwords that were not relevant to long vowels (see Chapters 5 and 6 for more information). Since a vowel length distinction is an important feature of moraic languages (Hayes, 1989), there is a possibility that the loss of long vowels may affect the general moraic characteristics of NK loanwords, weakening the coda moraicity as well. In order to determine if the loss of long vowels influences the moraic characteristics of NK English loanwords, it is necessary to analyze the pattern of the tone changes happening in the production of younger speakers.

Language change that involves pitch often shows quicker transition compared to segment changes because there is no written form in the orthography indicating tone that would reinforce a

conservative tendency. Since the changes are quick and probably not perceived well, very little research has been conducted on the tonal changes particularly on NK Korean. Since the tone change observed in this dissertation was not reported in the previous literature from 10-20 years ago, it seems that we are witnessing the beginning stage of the loanword tone change in NK Korean. Thus, this dissertation will examine the pattern of the intergenerational tone changes happening in NK English loanwords, figure out which factors have affected the tone changes, and attempt to anticipate the path of future tone changes.

1.2. Goals of this dissertation

The primary goal of this dissertation is to document the intergenerational tone change happening in NK English loanwords and to determine which linguistic and social factors affect the changes. However, in order to discuss the linguistic factors, the general tone assignment patterns of English loanwords must first be identified. Previous studies, such as Kenstowicz & Sohn (2001), Chung (2002), Kim (2009), and Kim (2010), have offered various tone adaptation rules (or constraints) that apply to NK English loanwords. Most of these studies, however, focus only on small pieces of the larger puzzle and provide partial explanations of the tone assignment, based on a relatively small amount of loanword data.

Thus, the second goal of this dissertation study is to provide an integrated analysis of the tone assignment patterns of NK English loanwords. In Chapter 3, this study will investigate the relationship between syllable composition and position of high tone through the collection of 3,384 English loanwords with two, three and four syllables and finding a representative tone pattern for each word based on the intuitions of six native speakers of NK Korean. In addition, in Chapter 4, an optimality-theoretical analysis will be provided to determine which phonological constraints

are active and how they interact to assign tone to NK loanwords. Even though the analysis that this dissertation provides of the NK loanword tone assignment system builds on previous studies, it will stand alone as a contribution that is independent of these previous works, offering different insights.

Next, the third goal of this dissertation is to investigate how the loss of long vowels affects the moraic characteristics of NK loanwords. Since the tone change is happening not only in loanwords that had a long vowel but also in loanwords that are not related to long vowels, it can be assumed that the loss of the vowel length distinction has influenced the moraic structure of English loanwords in general. If this study finds evidence that coda moraicity is being weakened in accordance with the loss of long vowels, this would not only support the assertion of Hayes (1989) that the vowel length distinction is an important element of moraic languages, but also provide an instance that losing the vowel length distinction can also weaken other moraic features of a language. Thus, this dissertation will also trace the moraic changes of NK loanwords by a systematic analysis of the pattern of tone changes in the production of younger speakers.

This dissertation will be organized in 7 chapters including this introduction chapter. Chapter 2 provides background information on NK Korean phonology that will be a basis to understand the analyses in the subsequent chapters. Chapter 3 discusses the detailed general tone assignment patterns of English loanwords in NK Korean. Chapter 4 provides a comprehensive analysis of the loanword tone assignment system in the framework of Optimality Theory. Based on the analysis in Chapters 3 and 4, Chapter 5 discusses the newly observed intergenerational tone changes on stem words recognizing the effect that the loss of the vowel length contrast has on the intergenerational loanword tone change. In Chapter 6, we will examine the intergenerational tone changes happening in English loanwords with single high accent when they are combined with

accented suffixes. Lastly, based on the pattern of the tone changes observed in Chapters 5 and 6, Chapter 7 provides general discussion and concludes this dissertation by discussing the changes in the moraic characteristics of NK loanwords.

CHAPTER 2

BACKGROUND

This chapter will provide some background information on North Kyungsang (NK) Korean phonology in order to situate this dissertation into a larger framework. The background information will be a basis for understanding the details in the following chapters. In this chapter, we will discuss specific issues that are relevant to the tone assignment of NK English loanwords. First, section 2.1. will show different tone assignment systems of NK native words and English loanwords that have been observed in the previous literature; section 2.1.1. will focus on tone patterns of NK native words, whereas section 2.1.2. will concentrate on tone patterns of NK English loanwords. Next, section 2.2. will provide basic information on the bimoraic trochee system, which plays an important role in the tone assignment of NK English loanwords. Then, section 2.3. will discuss different perspectives that previous studies have on the weight of coda consonants in NK English loanwords. Section 2.4. will talk about the characteristic of the epenthetic vowel [ɨ], which exhibits a tendency to shun high tone, and section 2.5. will provide information on the moraicity of geminate liquids in NK English loanwords. Lastly, in section 2.6., the loss of the vowel length contrast in the production of younger NK speakers and its possible impact on the loanword tone assignment will be discussed.

2.1. Tone assignment patterns of North Kyungsang Korean

NK Korean is a dialect spoken in the northern part of the southeast region of Korea, and it utilizes a completely different system from Standard Korean with respect to pitch. Standard Korean, which lost lexical pitch accent around the 17th century (Lee & Jongman, 2015; Ramsey, 1975; Lee

& Ramsey, 2000; Kenstowicz, Cho, & Kim, 2008), does not distinguish word meanings with pitch distinction and only uses phrase-level tones (Jun, 1993, 1998, 2000, 2006; Lee & Jongman, 2015; Lee, Zhang & Jongman, 2016). However, NK Korean, which has preserved a lexical pitch-accent system from Middle Korean (15-16 centuries) (Lee & Jongman, 2015; Ramsey, 1975; Lee & Ramsey, 2000; Kenstowicz, Cho, & Kim, 2008), uses (H)igh and (L)ow tones to distinguish words (Kim 1988; Chung 1991; N-J Kim 1997; Jun, Kim, Lee & Jun, 2006; Kenstowicz and Sohn 2001). Thus, words with the same segmental content can have different meanings due to distinct tone patterns as shown in the near minimal triplet in (1). In the example words, an accent mark indicates high tone, no accent mark indicates low tone, and period indicates a syllable boundary.

(1) Near minimal triplet in NK native words

Word	Tone Pattern	Meaning
[ká.tɕi]	HL	'type'
[ka.tɕí]	LH	'eggplant'
[ká:.tɕí]	HH	'branch'

In NK Korean, every freestanding lexical item must be assigned an accent, and accent indicates the number and position of a high tone. Previous studies on NK tone patterns (Kim, 1988; Chung, 1991; Kenstowicz & Sohn, 1997; N-J Kim, 1997) reveal that there are two different accent classes in NK Korean: double high accent (HH) and single high accent (H). Words of the double high accent class have high tone over the first two syllables, while words of the single high accent class have a high tone, which falls unpredictably on the antepenultimate, penultimate, or final syllable. Single high accent is further divided into a few separate accent groups according to the position of the high tone and each group is named after the high tone position. For instance, if high tone is assigned on the penultimate syllable of a word, it is called penultimate accent, and if high

tone is assigned on the final syllable, it is called final accent. NK Korean allows only one accent to a single prosodic word, and the end point of the accent is represented with a pitch fall (Lee, 2009). That is, once tone falls, it cannot rise again within a word. Consequently, even if high tone in double high accent is assigned to the first two syllables of a word, it is considered one accent that is realized on the two syllables.

Although the tone patterns shown in NK native words and English loanwords look similar, the way the accents are assigned to these two groups of words is very different. In the NK native vocabulary, the accents are assigned lexically, and syllable weight plays a minimal role in the tone assignment. That is, in NK native words, the position of the high tone is unpredictable except two specific cases (see section 2.1.1.). Yet, tone assignment of NK English loanwords is sensitive to the moraic structure, and thus the position of high tone is generally predictable in terms of syllable weight; heavy syllables attract high tone (see section 2.1.2.) (M. Kim, 1997; Chung, 1998, 2000, 2002; Kenstowicz & Sohn, 2001; Kim, 2009; Davis, 2010; Kim, 2010).

In addition, according to Chung (1998), NK native words and English loanwords exhibit moraic mismatches, having different moraic structures. In NK native words, only vowels can bear a mora and the domain of tone assignment is defined with respect to the syllable (N-J Kim 1997; Chung 1998). Yet, in NK English loanwords, both vowels and coda consonants can bear a mora, and the domain of tone assignment seems to be defined in terms of the mora (Kenstowicz and Sohn 2001; Chung 1998, 2002; Kim 2009). The different characteristics of NK native words and English loanwords observed from their tone assignment patterns will be discussed more in detail in the following subsections. Section 2.1.1. will focus on tone assignment of NK native words and section 2.1.2. will discuss tone assignment of NK English loanwords.

2.1.1. Tone patterns of NK native words

As discussed earlier, accent is assigned lexically in the NK native vocabulary, and thus the position of high tone is in general unpredictable. Table 1 shows the accent types found in mono-morphemic nouns of NK native words, and the accent types are classified in terms of the number and location of high tone. The display in Table 1 is compiled by Kim (2009) from research reported in the previous literature (Chung, 1991; Kim, 1988; N-J Kim, 1997; Kenstowicz & Sohn, 2001; Jun et al., 2006).

Table 1. Lexical tone patterns in North Kyungsang Korean

Lexical accent / Syllable number	Double high accent	Single high accent		
	Short or Long V (initial syllable)	Antepenult	Penult	Final
1 syllable	H(+H)			H(+L)
2 syllable	HH		HL	LH
3 syllable	HHL	HLL	LHL	LLH
4 syllable			LLHL	

NK native words exhibit both double high accent and single high accent. For double high accent, high tone is assigned to the first two syllables of a word and the position of high tone is always the same. However, for single high accent, high tone is assigned to a syllable and the position is unpredictable. In NK English loanwords, the distinction between double high accent and single high accent does not appear on monosyllabic words, while in the NK native vocabulary the distinction is exhibited even in monosyllabic words, displaying different tones on the suffix. If a monosyllabic native word is assigned single high accent and an accentless suffix is attached to the word, low tone appears on the suffix (e.g. [sán] H ‘mountain’ + [-i] ‘accentless nominative suffix’ → [sán-i] HL). However, if a monosyllabic native word falls into the double high accent

class and is combined with an accentless suffix, the first high tone appears on the stem word and the second high tone appears on the suffix (e.g. [tám] H(H) 'wall' + [-i] 'accentless nominative suffix' → [tám-í] HH). The two distinct suffixal tone patterns of NK monosyllabic native words are presented in Table 1, and the tone of the suffix is indicated in the parentheses.

Although tone assignment is generally not predictable in NK native words, there are two exceptional cases that NK native words exhibit consistent tone patterns. First, if a NK native word contains a long vowel in the initial syllable, the word must be assigned double high accent (Chung, 1991). Since coda consonants are not considered moraic in NK native words, syllables with a long vowel are the only heavy syllables (Chung 1998; 2002). In NK Korean, the placement of long vowels is restricted to word-initial position, and word-initial heavy syllables attract double high accent; this rule applies to both NK native words and loanwords.

However, while NK English loanwords allow double high accent only when the initial syllable is heavy, in the NK native vocabulary, words that contain a short vowel in the initial syllable can also be assigned double high accent, though in this case the accent is assigned lexically and thus is not predictable. The examples in (2) show double high accented native words that contain a long vowel in the initial syllable (predictable tone patterns), and the examples in (3) display double high accented native words that include a short vowel in the initial syllable (unpredictable lexical tone patterns). These example words were adopted from Kenstowicz & Sohn (2001).

(2) Double high accented NK native words with an initial long vowel

Word	Tone Pattern	Meaning
[sá:.ɾám]	HH	'person'
[ká:.má]	HH	'palanquin'
[hó:.ɾáŋ.i]	HHL	'tiger'

(3) Double high accented NK native words with an initial short vowel

Word	Tone Pattern	Meaning
[tɕá.gí]	HH	'self'
[kɨ́.ɾím]	HH	'picture'
[mú.tɕí.gɛ]	HHL	'rainbow'

Next, NK native words with four or more syllables also exhibit a predictable tone pattern. If a NK native word has four or more syllables, the word invariantly falls into the penultimate accent class regardless of the word structure (There do not seem to be four-syllable NK native monomorphemic words that begin with a long vowel.) Previous studies, such as Chung (1991) and N-J Kim (1997), observed this pattern and this helped them consider penultimate accent as the default accent of NK native words. The examples of four-syllable NK native words with penultimate accent are presented in (4).

(4) Four-syllable NK native words with penultimate accent

Word	Tone Pattern	Meaning
[i.s'u.ɕí.gɛ]	LLHL	'toothpick'
[mi.k'u.ɾá.tɕi]	LLHL	'mudfish'
[a.tɕi.ɾáŋ.i]	LLHL	'haze'

According to the previous studies, penultimate accent is considered as the default tone pattern of NK native words. Chung (1991) first made this argument, reporting that the number of accent patterns in NK native words with four or more syllables is severely restricted compared with the number of accent patterns in shorter native words, noting too that they consistently belong to the penultimate accent class. She also reports that NK native words, which allow more than one tone pattern, always include penultimate accent as one variant, as seen in [tók.s'u.ɾi] HLL or

[tok.s'ú.ɾi] LHL 'eagle.' N-J Kim (1997) supports Chung's argument as well, showing that penultimate accent is the most frequent type in polysyllabic native stems. In his native word samples, 133 out of 218 polysyllabic nouns (61%) and 52 out of 107 polysyllabic verbs (49%) have penultimate accent.

To summarize, in the NK native vocabulary, accent assignment is predictable in two certain cases: when a word has a long vowel in the initial syllable and when a word has four or more syllables. However, other than these two cases, the accent assignment is lexically determined, and the position of high tone is not predictable.

2.1.2. Tone patterns of NK English loanwords

When English words are adapted into NK Korean as loanwords, the stress pattern from the source language is disregarded, and they are assigned a new accent according to a tonal adaption procedure largely based on syllable structure (Chung, 1998; Kenstowicz & Sohn, 2001). The tone patterns of the example loanwords in (5) demonstrate that the stress-to-tone transfer does not occur in NK English loanwords.

(5) NK loanword tone adaptation of English words

Word	Tone Pattern	Meaning
[a.me.ɾí.kʰa]	LLHL	'America'
[pʰɨ.ɾo.gɨ.ɾém]	LLLH	'program'
[tʰá:.gét]	HH	'target'

The English word *America* has a stress on the antepenultimate syllable. However, when it becomes a loanword in NK Korean, it has a high tone on the penultimate syllable and the remaining syllables are assigned low tone. The English word *program* has a stress on the initial syllable but

has a high tone on the final syllable when borrowed into NK Korean. In *target*, the first syllable is stressed in English, but both syllables are assigned high tone in NK Korean. That is, as seen in the examples in (5), the position of high tone in NK English loanwords cannot be predicted based on the stress position in English. Instead, they are assigned a new accent according to an adaptation procedure, which is largely based on moraic structure (see Chapter 3 and Chapter 4 for more detailed information).

NK English loanwords also exhibit two types of accent just like NK native words: double high accent (HH) and single high accent (H). However, different from NK native words, which consider coda consonants non-moraic, coda consonants in NK English loanwords are generally considered moraic.[1] That is, syllables with a coda consonant and those with a long vowel are both considered heavy (bimoraic) in NK English loanwords (Chung, 1998, 2000, 2002; Kenstowicz & Sohn, 2001).

In NK English loanwords, high tone is generally attracted by heavy syllables, and among heavy syllables the ones in word-initial position have a stronger tendency to attract high tone. That is, if the initial syllable is heavy, double high accent is assigned in general, having a high tone over the first two syllables, as seen in [pín.tʰí.tɕi] HHL 'vintage' (Kenstowicz & Sohn, 2001); otherwise, if either the penultimate syllable or the final syllable is the only heavy syllable, a high tone falls on the heavy syllable, as in [ɾa.bén.dʌ] LHL 'lavender' and [ti.tɕa.ín] LLH 'design.'[2] When there is no heavy syllable in an English loanword, penultimate accent is assigned in general. Table 2

[1] Although previous studies on tone assignment of English loanwords agree that syllables with a long vowel are bimoraic, there is some disagreement on the weight of coda consonants. Although Kenstowicz & Sohn (2001) consider closed syllables heavy, Chung (2002) and Kim (2009) assert that the weight of closed syllables varies depending on context. More detailed information on this topic will be presented in section 2.3.

[2] Previous studies have different opinions on the assignment of single high accent when a loanword has more than one heavy syllable. The hierarchy between heavy syllables will be discussed in section 3.4.

displays the tone patterns that occur in NK English loanwords, and it is revised from a table presented in Kim (2009), which was compiled based on Kenstowicz & Sohn (2001).

Table 2. Loanword Tone Patterns in North Kyungsang Korean[3]

Loanword accent / Syllable number	Double high accent		Single high accent		
	CV (light initial syllable)	Long V or CVC (heavy initial syllable)	Antepenult	Penult	Final
1 syllable					H(+L)
2 syllable		HH		HL	LH
3 syllable		HHL	HLL	LHL	LLH
4 syllable		HHLL	LHLL	LLHL	LLLH

The shaded part in Table 2 shows differences between the lexical and loanword tone patterns. First, as discussed in 2.1.1., NK native words allow double high accent to both words with an initial heavy syllable and those with an initial light syllable. Yet, NK English loanwords are assigned double high accent only when the initial syllable is heavy, either with a long vowel or with a coda consonant.

The difference between the NK native words and English loanwords are further observed in their suffixal tone patterns. Although more detailed information on the suffixal tone patterns of NK native words and English loanwords will be presented and discussed in Chapter 6, here we will focus on the suffixal tone patterns of monosyllabic words. Since all freestanding lexical items in NK Korean must be assigned accent, NK monosyllabic words are always assigned high tone. However, in the NK native vocabulary, monosyllabic words exhibit tonal distinction between double high accent and single high accent, and the difference appears in their suffixal tone patterns,

[3] The database of this study contains a few four-syllable loanwords with HLLL tone pattern. However, the pattern is not included in the table because less than 0.3% of the English loanwords in this study exhibits this tone pattern.

as discussed in 2.1.1. Yet, unlike NK lexical tone patterns, the distinction between double high accent and single high accent is not exhibited in the suffixal tone patterns of NK monosyllabic English loanwords. In NK English loanwords, accent always falls within the stem and high tone never spreads to the following suffixes (Kenstowicz & Sohn, 2001; Kim 1997). That is, high tone never appears on the suffix even when there is a long vowel or a coda consonant in the monosyllabic loanword. The suffixal tone pattern of NK nomosyllabic loanwords is presented in Table 2, and the tone of the suffix is indicated in the parentheses.

Next, even if tone patterns of NK native words with four or more syllables are strictly limited to penultimate accent, NK English loanwords with four or more syllables display more diverse tone patterns than native words. That is, English loanwords with four or more syllables show double high accent, antepenultimate accent, and final accent as well as penultimate accent, and the tone assignment is mostly based on their moraic structure.

Although NK English loanwords display more varied tone patterns than NK native words, N-J Kim (1997) and Kenstowicz & Sohn (2001) assert that penultimate accent is the default tone pattern of NK English loanwords just like native words. They support this assertion by showing that loanwords that contain no heavy syllable are invariantly assigned penultimate accent if they have two or more syllables. In addition, they both report that penultimate accent is most frequently observed in their loanword corpus. That is, even if there is a tendency in NK English loanwords that heavy syllables attract high tone, when there is no heavy syllable, penultimate accent is assigned as the default accent.

2.2. Bimoraic trochee

In the tone assignment of NK English loanwords, the bimoraic trochee plays a crucial role,

as first proposed by Kenstowicz & Sohn (2001). According to Kenstowicz & Sohn, if a loanword does not contain an initial heavy syllable and thus does not fall into the double high accent class, it is assigned single high accent with a bimoraic trochaic foot that is aligned at the right edge of a word. For tone assignment of single high accent, Kenstowicz & Sohn assert that loanwords with a final closed syllable fall into the final accent class; otherwise, loanwords are assigned penultimate accent. The example words in (6) and (7) show how final accent and penultimate accent are assigned to English loanwords with a bimoraic trochaic foot, as discussed in Kenstowicz & Sohn (2001). In the example words below, parentheses indicate foot structure, the foot head is assumed to be realized with high tone, and a moraic coda is marked with the boldface type letter.

(6) Foot structure of final accented English loanwords

Foot structure	Word	Tone	Meaning
ɾe.(mó**n**)	[ɾe.món]	LH	‘lemon’
ti.tɕa.(í**n**)	[ti.tɕa.ín]	LLH	‘design’
kʰo.me.di.(ʌ́**n**)	[kʰo.me.di.ʌ́n]	LLLH	‘comedian’

(7) Foot structure of penultimate accented English loanwords

Foot structure	Word	Tone	Meaning
(ɾí.dʌ)	[ɾí.dʌ]	HL	‘leader’
kʰe.(ná.da)	[kʰe.ná.da]	LHL	‘Canada’
mi.sɨ.(tʰé.ɾi)	[mi.sɨ.tʰé.ɾi]	LLHL	‘mystery’

The final accented English loanwords in (6) have a heavy (bimoraic) final syllable with a coda consonant. Thus, a bimoraic trochaic foot is assigned on the final syllable. However, the penultimate accented loanwords in (7) have a light (monomoraic) final syllable. Therefore, both the penultimate and final syllables should be included in a foot to respect the bimoraic trochee.

Although Kenstowicz & Sohn (2001) propose the foot structure type of single high accent, they did not discuss the specific foot structure type for double high accent. Later, in a subsequent study, Kim (2009) analyzes tone assignment patterns of double high accented loanwords and suggests that double high accent is assigned with two consecutive trochaic feet. The foot structure type of double high accented loanwords proposed by Kim (2009) is presented in (8) with example words.

(8) Foot structure of double high accented English loanwords

Foot structure	Word	Tone	Meaning
(pá:).(gé**n**)	[pá:.gén]	HH	'bargain'
(ká:).(ɕí**p**)	[ká:.ɕíp]	HH	'gossip'
(ɾʌ́**n**).(dʌ́**n**)	[ɾʌ́n.dʌ́n]	HH	'London'
(é**n**).(tɕí**n**)	[én.tɕín]	HH	'engine'

In the example two-syllable English loanwords in (8), when both the initial syllable and the final syllable are heavy, each syllable is assigned a foot, and this explains how high tone is assigned to both syllables with the bimoraic trochee system. As seen in the foot structure types of the example loanwords in (6), (7), and (8), both Kenstowicz & Sohn (2001) and Kim (2009) suggest that the bimoraic trochee plays an important role in tone assignment of English loanwords. However, there are still some remaining gaps in their analyses. For instance, even if Kim (2009) proposes the foot structure type of double high accent, her analysis focuses only on foot assignment of bisyllabic loanwords and does not provide an analysis on foot assignment of loanwords with three or more syllables. In addition, Kenstowicz & Sohn (2001) failed to explain foot assignment of single high accented loanwords that exhibit unusual tone patterns. For instance, they do not explain how loanwords can be assigned antepenultimate accent with a bimoraic trochaic foot that

is aligned at the right edge of a word. In order to fill the remaining gaps in the previous literature, the foot assignment of NK English loanwords will be analyzed in detail in Chapter 3 and Chapter 4 of this dissertation.

2.3. Context-dependent weight of coda consonant

Within the framework of moraic theory, it is generally accepted that coda consonants can be either moraic or non-moraic (Sherer, 1994; Zec, 1995; Rosenthall & Van der Hulst, 1999; Moren, 2000), whereas vowels are considered moraic (Hyman, 1985; Hayes, 1989; Pulleyblank, 1994). For instance, in some languages, such as Latin, closed syllables (CVC) are considered heavy, while in other languages, such as Lardil, they are considered light. That is, languages can differ in their rules for moraic structure. In addition, the weight of coda consonants can vary even within a language depending on context. For example, the Pacific Yupik dialect of Chugach counts closed syllables heavy in word-initial position but counts them light in non-initial positions. Gordon (1999) also shows that syllable weight is sometimes not consistent within one language with respect to different processes. Since syllable weight plays an important role in the tone assignment of NK English loanwords, it is necessary to investigate the language-particular moraic structure to have a better understanding on how weight of each syllable structure is determined and how it affects the tone assignment.

Although the previous studies agree that syllable weight has a great influence on the tone assignment of NK loanwords, they show different perspectives on the analysis of syllable weight. Some studies, such as Kenstowicz & Sohn (2001), consider syllables heavy if the output has either a long vowel or a coda consonant. However, other studies, such as Chung (2000; 2002) and Kim (2009), offer an analysis of variable coda weight and claim that coda consonants in NK English

loanwords can be either moraic or non-moraic depending on context.

First, Kenstowicz & Sohn (2001) consider syllables with a long vowel or a coda consonant heavy and propose a foot structure type of single high accented English loanwords based on their observations. They assert that English loanwords with a heavy initial syllable (CVV or CVC) fall into the double high accent class, whereas those with a light initial syllable (CV) are assigned single high accent. Although Kenstowicz & Sohn did not discuss the foot structure type of double high accent, they claim that single high accent is assigned with a bimoraic trochaic foot that is aligned at the right edge of the word. Their generalizations explain the basic tone assignment patterns of single high accented NK English loanwords, as seen in (6) and (7) in section 2.2., but they fail to explain tone assignment patterns of certain word structures. For instance, most bisyllabic loanwords with the closed-open syllable combination, such as [tʰém.pʰo] HL 'tempo' and [mém.bʌ] HL 'member,' generally fall into the penultimate accent class. Given their generalizations, these words should be assigned double high accent as in [ɾʌ́n.dʌ́n] (HH) 'London' because the initial syllable is heavy with a coda consonant. That is, their generalizations cannot explain the distinct tone assignment patterns between the bisyllabic loanwords with the closed-open syllable composition and those with the closed-closed word structure.

Furthermore, Kenstowicz & Sohn (2001) do not provide a good explanation of the foot structure types of bisyllabic loanwords with the closed-open syllable composition and trisyllabic loanwords with an open-closed-open syllable combination. Loanwords with these syllable compositions mostly fall into the penultimate accent class, as seen in [tʰém.pʰo] HL 'tempo'; [mém.bʌ] HL 'member' and [o.ɾén.tɕi] LHL 'orange'; [ɾa.bén.dʌ] LHL 'lavender.' As mentioned earlier, Kenstowicz & Sohn suggest that single high accent is assigned with a bimoraic trochaic foot that is aligned at the right edge of a word. However, if syllables with a long vowel or final

consonant are heavy as they suggest, these loanwords violate the bimoraic trochee by having three moras in a foot as shown in (9) and (10).

(9) Penultimate accented loanwords with the closed-open syllable composition

Foot Structure	Word	Tone	Meaning
(tʰé**m**.pʰo)	[tʰém.pʰo]	HL	‘tempo’
(tʰé**k**.s’i)	[tʰék.s’i]	HL	‘taxi’
(mé**m**.bʌ)	[mém.bʌ]	HL	‘member’

(10) Penultimate accented loanwords with the open-closed-open syllable structure

Foot structure	Word	Tone	Meaning
o.(ɾé**n**.tɕi)	[o.ɾén.tɕi]	LHL	‘orange’
i.(bé**n**.tʰɨ)	[i.bén.tʰɨ]	LHL	‘event’
ɾa.(bé**n**.dʌ)	[ɾa.bén.dʌ]	LHL	‘lavender’

Since there are some tone assignment patterns that the generalizations of Kenstowicz & Sohn (2001) cannot explain, later studies, such as Chung (2002) and Kim (2009), consider context-dependent coda weight in tone assignment of NK English loanwords. First, Chung (2002) agrees with Kenstowicz & Sohn’s assertion that NK English loanwords are assigned an accent with a bimoraic trochaic foot at the right edge and initial heavy syllables trigger double high accent. However, her analysis differs in that she offers an explicit analysis of variable coda weight, suggesting that the weight of closed syllables in NK English loanwords varies depending on context. Chung asserts that closed syllables in loanwords behave as monomoraic (light) most of the time but become bimoraic (heavy) in word-initial or word-final position because these syllables are optimal positions for high tone. This analysis explains why loanwords with the open-closed-open syllable combination are generally assigned penultimate accent. For these loanwords, the

closed penultimate syllable is considered monomoraic (light) according to her analysis. Thus, if a bimoraic trochaic foot is assigned at the right edge, the foot head (high tone) is assigned on the penultimate syllable without violating the bimoraic trochee. The expected foot assignment pattern with the non-moraic coda consonant in the penultimate syllable is presented in (11).

(11) Penultimate accented loanwords with the open-closed-open syllable structure

Foot structure	Word	Tone	Meaning
o.(ɾén.tɕi)	[o.ɾén.tɕi]	LHL	'orange'
i.(bén.t^{h}ɨ)	[i.bén.t^{h}ɨ]	LHL	'event'
ɾa.(bén.dʌ)	[ɾa.bén.dʌ]	LHL	'lavender'

However, Chung's analysis still does not account for the differences between the tone assignment patterns of loanwords with the closed-open syllable structure (e.g. [t^{h}ém.p^{h}o] (HL) 'tempo'), which are assigned penultimate accent, and those with the closed-closed syllable structures (e.g. [ɾʌ́n.dʌ́n] (HH) 'London'), which are assigned double high accent. Since she claims that word-initial position is an optimal position of high tone, closed syllables in word-initial position are considered heavy and thus attract double high accent. That is, loanwords with both closed-open and closed-closed syllable structures should be assigned double high accent. However, loanwords with the closed-open syllable structure is assigned penultimate accent despite the initial heavy syllable, and this tone assignment pattern cannot be explained with her analysis.

In subsequent research, Kim (2009) provides an optimality-theoretic analysis of foot structure type of double high accent and other general tone assignment patterns of NK English loanwords with a focus on the role of contextual syllable weight. Although her view somewhat overlaps with Chung (2002) in that coda consonants in NK English loanwords are taken to have contextually varying moraicity, her analysis is different in that she focuses on the issue of

contextual syllable weight in the previously unaddressed context of bisyllabic loanwords. Kim asserts that a penultimate closed syllable is contextually light if followed by a light (open) syllable and contextually heavy if preceding a heavy (closed) syllable. Her analysis explains why English loanwords with the closed-open syllable composition are assigned penultimate accent, while those with the closed-closed syllable composition exhibit double high accent. The foot structure types of these two distinct syllable structures that Kim (2009) proposes are presented in (12) and (13) where moraic codas are indicated in bold.

(12) Two-syllable loanwords with the closed-open syllable composition

Foot Structure	Word	Tone	Meaning
(tʰém.pʰo)	[tʰém.pʰo]	HL	‘tempo’
(tʰék.s’i)	[tʰék.s’i]	HL	‘taxi’
(mém.bʌ)	[mém.bʌ]	HL	‘member’

(13) Two-syllable loanwords with the closed-closed syllable composition

Foot Structure	Word	Tone	Meaning
(ɾʌ́**n**).(dʌ́**n**)	[ɾʌ́n.dʌ́n]	HH	‘London’
(é**n**).(tɕí**n**)	[én.tɕín]	HH	‘engine’
(ɾé**ŋ**).(kʰí**ŋ**)	[ɾéŋ.kʰɨ́ŋ]	HH	‘ranking’

Although the analyses of Chung (2002) and Kim (2009) are somewhat different, they both agree with the analysis of Rosenthall & Van der Hulst (1999) that variable coda weight occurs as a result of the interaction between metrical constraints and constraints that determine moraicity of coda consonant. Chung (2002) and Kim (2009) both claim that the variability of the coda weight in NK English loanwords is observed because the metrical constraint (i.e. the bimoraic trochee) is ranked higher than the coda weight constraints. The analysis in the following chapters of this

dissertation will adopt the analysis of the context-dependent coda moraicity that Kim (2009) proposes.

2.4. Epenthetic vowel [ɨ]

Although English allows up to three onset consonants (e.g. [spɹɪŋ] 'spring'), three coda consonants (e.g. [tekst] 'text'), and diphthongs (e.g. [baɪt] 'bite'), the maximal syllable structure of Korean is CGVC, where G represents a glide—Korean scrupulously avoids complex onsets or codas. Therefore, if English words are introduced to Korean as loanwords, syllables with any consonant clusters or diphthongs must be broken into several syllables with epenthetic vowels. In Korean, the vowel [ɨ] is most frequently used as an epenthetic vowel. For example, when the monosyllabic English words 'guest' and 'sky' are adapted into Korean as loanwords, they become words with three light syllables as shown in [ke.sɨ.tʰɨ] 'guest' and [sɨ.kʰa.i] 'sky.'

Typologically, it is well known that epenthetic vowels often exhibit a tendency to shun accent (Broselow, 1982). For instance, in the Dakota language (Alderete, 1999), accent is generally assigned on the second syllable. However, if the second syllable contains an epenthetic vowel, the accent moves to the initial syllable. The accent assignment of NK English loanwords also exhibits a similar tendency, and high tone is generally not assigned to syllables with an epenthetic vowel. Even though epenthetic vowels are considered moraic, they avoid becoming a foot head and being assigned high tone. This tendency was first reported by Kenstowicz & Sohn (2001) and later confirmed by Rhee & Kim (2003), which conducted a production experiment with 13 native speakers of NK Korean. The results of Lee & Kim's study show that more than 90% of syllables with an epenthetic vowel are not assigned high tone in NK English loanwords. The example English loanwords in (14) exhibit the high tone avoidance tendency of epenthetic vowels. Since

the example words do not have any heavy syllables, they are usually assumed to be assigned penultimate accent. However, their penultimate syllable contains an epenthetic vowel, so this makes them fall into either the final accent class or the antepenultimate accent class.

(14) Tone patterns of English loanwords that contain an epenthetic vowel

Word	Tone Pattern	Meaning
[sɨ.kʰí]	LH	‘ski’
[sɨ.pʰá]	LH	‘spa’
[sɨ.tʰá]	LH	‘star'
[tʰó.sɨ.tɨ]	HLL	‘toast’
[pé.sɨ.tɨ]	HLL	‘best’
[kí.pʰɨ.tɨ]	HLL	‘gift’

Although syllables with an epenthetic vowel usually avoid high tone, there is a certain case that syllables with an epenthetic vowel are assigned high tone. According to Kenstowicz & Sohn (2001), a syllable with an epenthetic vowel can be assigned high tone when it serves as the second member of double high accent. That is, if the initial syllable of an English loanword is heavy and thus the word falls into the double high accent class, the second syllable is assigned high tone even when it has an epenthetic vowel. Example double high accented English loanwords that have a syllable with an epenthetic vowel are presented in (15).

(15) Double high accented English loanwords that has a syllable with an epenthetic vowel

Word	Tone Pattern	Meaning
[kól.dɨ́]	HH	‘gold’
[wʌ́l.dɨ́]	HH	‘world’
[pó:.tʰɨ́]	HH	‘boat’
[nó:.tɕɨ́l]	HH	‘nozzle’
[sʌ́n.gɨ́l.la.sɨ]	HHLL	‘sunglasses’

2.5. Moraicity of geminate liquids

When English words are adapted into Korean as loanwords, it is necessary to apply some repair strategies because there is a lack of one-to-one phonemic correspondence between these two languages. Especially when it comes to liquids, the different phonological system between Korean and English causes English liquids to be adapted differently depending on the position of liquids in the syllable (Seo, 2014).

Korean has a single liquid phoneme /l/ that is realized with two allophones: it surfaces as a lateral [l] in coda position and as a flap [ɾ] in onset position (Ladefoged & Maddieson, 1996; Iverson & Sohn, 1994; Oh & Gick, 2002; Lee, 1996; Ahn, 2017; Gick, Campbell, Oh & Tambirri-Watt, 2006). Since Korean has only one liquid phoneme, when English words are adapted into Korean, two distinct English liquid phonemes /l/ and /r/ should be both mapped onto the Korean liquid phoneme /l/. However, the surface forms vary depending on the context. In word-initial onset position, as in (16), both English /l/ and /r/ surface as a flap [ɾ], whereas in word-final coda position, as in (17), /l/ is realized as [l], but /r/ is usually deleted. In intervocalic position, as in (18), English /l/ is generally borrowed as geminate [l], whereas English /r/ is adapted as [ɾ].

(16) Liquid adaptation in word-initial onset position

English word		English loanword	Meaning
[**l**aɪn]	→	[**ɾ**a.in]	'line'
[**l**ʌv]	→	[**ɾ**ʌ.bɨ]	'love'
[**r**ændəm]	→	[**ɾ**en.dʌm]	'random'
[**r**eɪl]	→	[**ɾ**e.il]	'rail'

(17) Liquid adaptation in word-final coda position

English word		English loanword	Meaning
[grɪ**l**]	→	[kɨ.ɾɨ**l**]	'grill'
[rɪkə**l**]	→	[ɾi.k^{h}o**l**]	'recall'
[dænsə**r**]	→	[ten.sʌ]	'dancer'
[levə**r**]	→	[ɾe.bʌ]	'lever'

(18) Liquid adaptation in intervocalic position

English word		English loanword	Meaning
[gæ**l**ən]	→	[ke**l**.**l**ʌn]	'gallon'
[di**l**ər]	→	[ti**l**.**l**ʌ]	'dealer'
[k^{h}æ**r**ət]	→	[k^{h}e.**ɾ**ot]	'carrot'
[kɔ**r**əl]	→	[k^{h}o.**ɾ**al]	'coral'

In NK English loanwords, closed syllables with a singleton [l] coda is considered heavy just like other closed syllables. Thus, when a word-final syllable includes singleton [l] in the coda position, it attracts final accent, as seen in (19).

(19) Final accented loanwords that have a coda [l] in the final syllable

Word	Tone Pattern	Meaning
[ti.tɕi.t^{h}ál]	LLH	'digital'
[pɨ.ɾa.tɕíl]	LLH	'Brazil'
[k^{h}ɨ.ɾi.sɨ.t^{h}ál]	LLLH	'crystal'
[i.sɨ.ɾa.él]	LLLH	'Israel'

However, unlike typical closed syllables in NK Korean, closed syllables with a geminate [l] coda are not considered heavy and thus do not attract high tone in general. Kenstowicz & Sohn (2001) report that loanwords that have a closed initial syllable where the coda is the first part of a geminate [l] never fall into the double high accent class. Instead, they are assigned either

penultimate or final accent. This provides evidence that closed syllables resulting from liquid gemination do not count as heavy. The examples in (20) and (21) display tone patterns of English loanwords that contain an initial closed syllable with the first part of a geminate [l] as the coda.

(20) Penultimate accented loanwords that have a closed initial syllable with liquid gemination

Word	Tone Pattern	Meaning
[ol.lím.pʰik]	LHL	'Olympic'
[dil.lé.ma]	LHL	'dilemma'
[kol.lo.ɾá.do]	LLHL	'Colorado'
[pal.le.ɾí.na]	LLHL	'ballerina'

(21) Final accented loanwords that have a closed initial syllable with liquid gemination

Word	Tone Pattern	Meaning
[hal.lo.gén]	LLH	'halogen'
[sil.li.kʰón]	LLH	'silicon'
[mel.la.tʰo.nín]	LLLH	'melatonin'
[tel.le.bi.tɕʌ́n]	LLLH	'television'

The exceptional moraic characteristic of geminate [l] coda is also discussed in loanword tone assignment of South Kyungsang Korean, another pitch-accent dialect of Korean spoken near the NK dialect region (Lee, 2009). In South Kyungsang English loanwords, closed syllables are considered moraic. However, according to Lee (2009), syllables closed by geminate [l] do not function as heavy syllables, and this makes loanwords with geminate [l] show exceptional tone patterns. Since the previous studies confirm the exceptional characteristic of syllables closed with the first part of a geminate [l] acting as light, those syllables will be considered light in the data classification of the following chapters in this dissertation.

2.6. Loss of vowel length contrast in NK Korean

Vowel length was traditionally contrastive in Korean (Choe 1959; Huh 1960; Lee 1956, Lee 1960, Lee 1993; Lee and Ramsey 2011; Martin 1992) and used to differentiate word meanings as illustrated in the vowel-length minimal pairs in (22).

(22) Vowel length minimal pairs in Korean

Short vowel		Long vowel	
[mal]	'horse'	[ma:l]	'speech'
[pam]	'night'	[pa:m]	'chestnut'
[nun]	'eye'	[nu:n]	'snow'
[pe]	'pear'	[pe:]	'double'
[sa.gwa]	'apple'	[sa:.gwa]	'apology'

However, recent studies on Seoul Korean have shown that long vowels have been shortened and that the vowel length distinction does not exist anymore especially among younger Seoul speakers (Lee, 1960; Han, 1964; Park, 1985; Magen & Blumstein, 1993; Sohn, 1999; Kang, Yoon & Han, 2015; Lee & Shin, 2016). Han (1964) already noticed that the vowel length contrast had been losing its phonemic status among younger speakers of Seoul Korean in their 20s and 30s. In addition, Han found a group of long vowels that were no longer produced long by most speakers. The results of Han's study show that a ratio between short vowels and long vowels was 1 to 2.51 when produced in vowel-length minimal pairs.

Later, Ko (1988) shows that the ratio between short and long vowels produced by Seoul speakers had decreased to 1 to 1.95 in minimal pairs, while the ratio of the same vowels in sentences was reduced into 1:1.41. More recently, Kim & Han (1998) conducted a production study with younger male Seoul speakers in their 20s, and show that the ratio between short and long vowels had reduced further and became 1 to 1.09. Lee & Shin (2016) also report that the

duration ratio between short and long vowels in Seoul Korean is 1 to 1.1 for both younger speakers in their 20s and older Seoul speakers in their 40s. The results of these previous studies show that the lenition of the vowel length contrast has been mostly completed in Seoul Korean and the vowel length is no longer distinctive especially among younger speakers.

In order to examine an age-dependent trend on the vowel length contrast in Seoul Korean, Park (1985) directly compares vowel length across different age groups and finds that the vowel length contrast is still somewhat maintained among older speakers. Park (1985) examined the duration of short and long vowels by 30 Seoul Korean speakers in six different age groups (10s, 20s, 30s, 40s, 50s, and 60s). The results show that speakers in their 40s or older produced more than 60% of long vowels at least 1.5 times longer than the corresponding short vowels, whereas the proportion was considerably lower for younger speakers (50% for 30s; 31% for 20s; and 17% for 10s). Note that the speakers in their 40s or older in this study would be at least 75 and older now.

Compared to Seoul Korean, NK Korean has been described to be more conservative to such sound changes and considered to maintain the vowel length contrast longer (Chung, 1991; Kim, 1997; Kenstowicz & Sohn, 2001). However, most studies that have reported the vowel length contrast in NK Korean are based on the author's intuitions, and there has been only one empirical study that is based on acoustic data. Kim (2018) examines the vowel length contrast in NK Korean with ten older speakers in their 60s or 70s (mean age=68) and ten younger speakers in their 20s, 30s, or 40s (mean age=30). The results of her study reveal that younger speakers of NK Korean produce long vowels as short as the corresponding short vowels and the ratio between the duration of short and long vowels is 1:1.02 in both fast and slow speech rates. That is, her study shows that the vowel length distinction has also lost its phonemic status in NK Korean especially among

younger speakers. Yet, the results of older NK speakers indicate that they still produce long vowels significantly longer than the corresponding short vowels. Although the vowel length distinction is statistically significant for older speakers, the ratios between short and long vowels in the speech of older speakers are 1:1.23 in fast speech rate and 1:1.25 in slow speech rate, which are much smaller than the ratio of 1:2.51 found in Han's (1964) study.

If Kyungsang Korean is considered in general, including both North and South Kyungsang Korean, there are two more acoustic studies that can be taken into account. Kim & Han (1998) conducted an acoustic analysis of vowel length on Kyungsang Korean with three male speakers in their 20s and report that a ratio between short and long vowels in Kyungsang Korean is 1:1.15 when produced in minimal pairs. Yang (2015) conducted a phonetic study on the vowel length contrast in South Kyungsang Korean with 30 younger speakers (mean age=22 for male; 19.7 for female). The results of his study show that the durations of short and long vowels are not distinctive by the younger South Kyungsang speakers, and a ratio between the average durations of short and long vowels is 1:1.02 when produced in sentences. All in all, the three previous acoustic studies that have examined the vowel length contrast in Kyungsang Korean (Kim, 2018; Kim & Han, 1998; Yang, 2015) are generally consistent with the findings that Kyungsang Korean also has lost the vowel length contrast especially among younger speakers.

NK Korean uses both tone and vowel length as distinctive features, and these two features are described to be closely related to each other especially in English loanwords. In NK Korean, long vowels mostly appear in the initial syllable of a word, and words with a long vowel in the initial syllable must be assigned double high accent (Chung, 1991; Kim, 1997; Lee & Ramsey, 2000; Kenstowicz & Sohn, 2001). That is, long vowels are used as a cue for double high accent in NK Korean. Although this rule applies to both NK native words and NK English loanwords, their

tone assignment rules for double high accent are not the same.

In the NK native vocabulary, since syllable weight has a minimal influence on tone assignment, double high accent can also be assigned lexically to NK native words with an initial light syllable with a short vowel (CV). That is, shortening of the word initial long vowels does not create any violation of tone assignment rules of the NK native vocabulary. Yet, in NK English loanwords, double high accent is only able to be assigned to words with an initial heavy syllable, which has either a long vowel (CVV) or a coda consonant (CVC). If double high accent is assigned to words with an initial light syllable (CV), it violates the tone assignment rules.

The recent acoustic study of Kim (2018) reveals that long vowels have disappeared in NK Korean especially among younger speakers, and this means that younger speakers have lost a cue that assigns double high accent to words. Although her study focuses on the vowel length contrast in NK native words, if it also applies to NK English loanwords, it means that English loanwords that historically had a heavy initial syllable with a long vowel no longer retain bimoraicity in the initial syllable. Since NK English loanwords allow double high accent only on words with a heavy initial syllable, the loss of the vowel length distinction in NK Korean may be influencing the tone assignment of English loanwords.

That is, it can be assumed that English loanwords that had a long vowel in the initial syllable now may be assigned a different tone pattern. Otherwise, if double high accent is still retained in English loanwords with no noticeable tone change, there is a possibility that long vowels, which are cues for double high accent, might be still maintained in English loanwords, at least phonologically, since English loanwords are more sensitive to syllable weight than NK native words. Alternatively, double high accent in loanwords may be lexical now. Chapter 5 and Chapter 6 will examine the intergenerational tone change that may be caused by the loss of the vowel length

distinction in the production of younger NK speakers.

Having discussed various background issues in this chapter, in Chapter 3 I will turn to the detailed assignment of tones to NK English loanwords and Chapter 4 will offer an optimality-theoretic analysis of the patterns.

CHAPTER 3

DESCRIPTIVE STATISTICAL ANALYSIS ON THE TONE ASSIGNMENT OF ENGLISH LOANWORDS IN NORTH KYUNGSANG KOREAN

3.1. Introduction

Previous studies, such as N-J Kim (1997), Kenstowicz & Sohn (2001), Chung (2000, 2002), Kim (2009), Kim (2010), and Davis et al (2012), have offered various tone adaptation rules or constraints that apply to NK English loanwords. Most of these studies, however, focus only on small pieces of the larger puzzle and provide partial explanations of the tone assignment. In addition, they rely upon a relatively small amount of loanword data to inform their generalizations and thus did not discover tone assignment patterns of loanwords with less frequent syllable composition. That is, there has been little research that systematically classifies a sufficiently sized corpus into number of syllables, syllable structure, and tone pattern to grasp the relationship comprehensively.

Kenstowicz & Sohn (2001), which examined the tone patterns of 600 English loanwords, so far remains the most extensive study conducted on the tone assignment of NK English loanwords. They propose a few basic generalizations based on their observations: (1) NK English loanwords generally fall into one of the three accent classes, which are double high, final, and penultimate; (2) Syllables either with a long vowel or a coda consonant are considered heavy, and the assignment of accent on NK English loanwords is based on the weight of the relevant syllable (i.e. if the initial syllable is heavy, double high accent is assigned; if the final syllable is heavy, final accent is assigned; if the penultimate syllable is heavy, penultimate accent is assigned); (3) When a loanword has no heavy syllable, penultimate accent is assigned as a default pattern; (4)

For loanwords with single high accent, high tone is assigned based on a bimoraic trochaic foot that is aligned at the right edge of the word; (5) Syllables with an epenthetic vowel are rarely assigned high tone (foot head).

Although Kenstowicz & Sohn's research has greatly advanced the understanding of the basic tone adaptation patterns of NK English loanwords, still there are a lot of questions remaining unsolved. One of the biggest gaps in their study results from the fact that they failed to consider differences among loanwords with a distinct number of syllables. For example, Kenstowicz & Sohn (2001) generalize that English loanwords with a heavy initial syllable fall into the double high accent class, having high tone on the first two syllables. Kenstowicz and Sohn's corpus, however, reveals that loanwords with a coda consonant in the initial syllable do not consistently display double high accent, unlike loanwords with an initial long vowel, which invariantly carry double high accent. They tried to explain this discrepancy with different levels of coda sonority but failed to come up with a clear solution.

In subsequent research, Kim (2009) and Kim (2010) point out a reason of the discrepancy by discovering an unusual accent assignment pattern of two-syllable loanwords. They both assert that unlike three- and four-syllable loanwords, the initial closed syllable of two-syllable loanwords does not guarantee double high accent; instead, the weight of the final syllable has a great influence on their tone pattern. That is, according to them, two-syllable loanwords with an initial closed syllable fall into the double high accent class only when the final syllable is heavy. Otherwise, two-syllable loanwords are assigned penultimate accent. Their analyses explain why two-syllable loanwords with the closed-open syllabic structure are generally assigned penultimate accent, as seen in [tʰém.pʰo] 'tempo' and [tʰɛ́k.s'i] 'taxi', while those with the closed-closed syllable composition are assigned double high accent, as presented in [ɾʌ́n.dʌ́n] 'London' and [én.tɕín]

‘engine’.

Next, although Kenstowicz & Sohn (2001) propose the foot structure type of single high accent (i.e. a bimoraic trochaic foot that is aligned at the right edge of a word), they do not provide foot structure types of double high accented loanwords. Later, Kim (2009) suggests the foot structure type of double high accented loanwords and proposes that double high accent is composed of two consecutive bimoraic trochaic feet and the foot head, which is realized with high tone, is assigned to each of the first two syllables of a loanword, as seen in (ɾʌ́**n**).(dʌ́**n**) ‘London’ and (é**n**).(tɕí**n**) ‘engine’. However, her analysis focuses only on two-syllable loanwords and does not provide the foot structure types of double high accented loanwords with three or more syllables.

In addition, Kenstowicz & Sohn (2001) overlook the possible context-dependent variation of coda weight. In terms of syllable weight, they consider a syllable heavy if it contains either a long vowel of a coda consonant. Yet, this system cannot explain the accentuation of some loanwords that do not follow the bimoraic trochee system. For instance, loanwords that contain a penultimate closed syllable and a final open syllable—such as [tʰém.pʰo] (HL) ‘tempo’ and [o.ɾén.tɕi] (LHL) ‘orange’—generally fall into the penultimate accent class. However, if all closed syllables are heavy, assigning penultimate accent to these words violates the bimoraic trochee, having three moras in a foot as in (tʰé**m**.pʰo) (HL) ‘tempo’ and o.(ɾé**n**.tɕi) (LHL) ‘orange’ (i.e. two moras in the closed penultimate syllable and one in the open final syllable).

In order to solve this problem, later studies such as Chung (2000; 2002) and Kim (2009) propose analyses of variable coda weight, which suggest that the weight of coda consonants in NK English loanwords is determined contextually, and thus can be either moraic or non-moraic. They both assert that coda consonants become non-moraic in certain contexts to respect foot binarity. Each of their analyses, however, primarily focuses on loanwords with certain syllabic structures.

Chung's analysis focuses on the tone assignment of three-syllable loanwords with the open-closed-open syllable structure but fails to explain the tone assignment pattern of two-syllable loanwords with the closed-open syllable composition. Later, Kim presents a new analysis that focuses on the tone assignment of two-syllable loanwords but does not show whether the analysis can be applied to loanwords with three or more syllables or not. Therefore, an analysis that can explain the tone assignment pattern of all two-, three-, and four-syllable loanwords should be considered.

Lastly, in NK loanwords syllables with an epenthetic vowel tend to shun high tone (Kenstowicz & Sohn, 2001). That is, if a word has an epenthetic vowel in the original foot head position, the foot head (high tone) moves to the preceding or following syllable so as to avoid assigning high tone on the epenthetic vowel, as seen in [sɨ.pʰá] LH 'spa' and [tʰó.sɨ.tɨ] HLL 'toast.' Although these loanwords violate the bimoraic trochee, the previous studies fail to discuss foot structure types of these exceptional loanwords.

To summarize, most previous studies of tone patterns of NK English loanwords have provided partial explanations of the accent assignment, and there has been little research that systematically classifies a sufficiently sized corpus into number of syllables, syllable structure type, and tone pattern, and analyzes the foot structure types to grasp the relationship comprehensively. Even though the analysis of Kenstowiz & Sohn (2001) was based on 600 English loanwords, the size of the corpus does not seem to be sufficient to classify them into groups of syllable number, accent, and syllable structure type for the detailed analyses. For instance, Lee (2009), a study that systematically analyzes the accent assignment patterns of English loanwords in South Kyungsang Korean, another pitch-accent dialect of Korea, utilizes a database composed of 2,265 English loanwords.

In addition, even if the previous literature has proposed various phonological constraints

that should be considered for the accent assignment of NK English loanwords, such as the bimoraic trochee (Kenstowicz & Sohn, 2001), foot alignment (Kenstowicz & Sohn, 2001; Kim, 2009), context-dependent coda moraicity (Chung, 2000, 2002; Kim, 2009), and no accented epenthetic vowel (Kenstowicz & Sohn, 2001), there has been little work which provides an integrated analysis on how these constraints interact with one another and what the rankings are. In order to fill the remaining gaps and see the complete picture, a bigger size corpus should be gathered and classified by number of syllables, tone pattern, and syllabic structure types. Once that is done then the nature of the foot structure types will be analyzed systematically.

Building upon previous studies, the main purpose of this chapter is to provide an integrated analysis of the tone assignment patterns that appear in NK English loanwords. With this in mind, the present study collected 3,384 English loanwords with two, three, and four syllables, and found a representative tone pattern for each word based on the intuitions of six native speakers of NK Korean. Then, their tone assignment rules were analyzed by subdividing the loanwords in terms of accent type, syllable number, and syllabic structure type.

In order to have a comprehensive understanding of the loanword tone assignment in NK Korean, the English loanwords collected in this study will be analyzed from two different points of view. For the first point of view, the loanwords will be initially divided according to their accent type to check the frequency of each accent in English loanwords. Next, the loanwords in each accent group will also be divided by number of syllables to see if there is any difference in the accent frequency among the two-, three-, and four-syllable groups. Then, each division in a group is subdivided according to syllable composition to determine which word structures are preferred in each accent group.

However, since more than 91% of the English loanwords collected in this study contain

either no heavy syllable or only one, words with more than one heavy syllable generally do not appear to be one of the frequently observed word structures in this classification. That is, the results from the first point of view provide little information on how the tone assignment works for English loanwords that have more than one heavy syllable. Therefore, the direct reverse analysis will be conducted to examine the results from another angle.

That is, for the second point of view, the English loanwords will be initially divided according to word structure to check the frequency of each syllable composition in each of two-, three-, and four-syllable groups. Then, each division in a group will be subdivided by accent type to determine which accent is closely related to each syllable composition. This analysis provides information on frequency of each syllable composition observed in English loanwords as well as which syllables are preferred to be assigned high tone when a word has more than one heavy syllable and there is a competition between heavy syllables for the high tone assignment.

The following section 3.2. provides the research methods used for the analyses. Section 3.3. shows the results from the first point of view, providing the general information on the relationship between syllable weight and position of high tone. Section 3.4. presents the results from the second point of view, proposing the hierarchy amongst the heavy syllables for high tone assignment.

3.2. Methods

3.2.1. Database

The present study utilizes a database composed of 3,384 English loanwords, which consists of 961 two-syllable words, 1,408 three-syllable words, and 1,015 four-syllable words. Since every freestanding lexical item in NK Korean must be assigned an accent, monosyllabic loanwords are

always realized with high tone regardless of the syllable weight. The corpus in this study, therefore, does not include monosyllabic words. Most of the English loanwords in the database are nouns collected from *Korean Loanword Dictionary* published by Orient Books in Kyunggi-do, Korea in 2009, and the database used in Lee (2002), which was collected from *Minjung's Essence Korean-English Dictionary 3rd edition* published by Minjung Seorim in Seoul, Korea in 1997.

3.2.2. Production task

Six native speakers of NK Korean, three younger and three older speakers, were asked to participate in a production task. The three younger speakers were in their late teens and early 20s (born in 1994, 1998, and 2000) and the three older speakers were in their late 50s and early 60s (born in 1958, 1960, and 1962) at the time of the task. Both younger and older speakers consist of one male and two female speakers. All of the younger speakers were born and raised in Daegu (the biggest city in the NK dialect region), and none of them had lived in other dialect regions or outside of Korea. For the older speakers, one of them was born and raised in Daegu, and the other two were born and raised in NK regions (Goryeong and Gumi) and moved to Daegu in their early 20s. No participant had lived in other dialect regions or outside of Korea for more than one year. All six participants had NK dialect-speaking parents who were born and raised in NK regions.

To test the tone patterns of the English loanwords, all 3,384 words were randomly arranged on PowerPoint slides (one word per slide) and presented to each participant individually. Participants were asked to pronounce the words naturally in their dialect and their productions were recorded with a Zoom H4nSP digital voice recorder using the internal microphone. Due to the large number of tokens collected for this study, the words were divided into seven groups (around 500 words per group) and participants were given a short break between groups. In total,

20,304 words were recorded (3,384 words * 6 participants).

3.2.3. Annotation task

After the production task, the author listened to the recordings and annotated the tone patterns of each token to extract the data used for this study. The author was in her late 20s, born and raised in the city of Daegu and had NK dialect-speaking parents. Then a representative tone pattern was selected for each word by determining the most frequent pattern given in the productions of all six speakers. When two different tone patterns are equally preferred by the participants, the author's native intuition was used to choose one of them as the representative tone pattern. The resulting representative tone patterns will be used in the following sections to classify words based on tone pattern, syllable number, and syllabic structure.

3.2.4. Classification

After determining the representative tone pattern of each word, the English loanwords in the database were classified into several groups for the analysis. The words were first divided into three groups by syllable number: Group 1 contains two-syllable words, Group 2 consists of three-syllable words, and Group 3 includes four-syllable words. Then, each group was classified by tone patterns. After the author grouped the words by syllable number and tone patterns, each group was further subdivided by syllabic structure. For example, two-syllable words were divided into four syllabic structures: closed-closed, closed-open, open-closed, and open-open.

In this classification, two phonological observations that Kenstowicz & Sohn (2001) noted were considered: (a) A geminate [l] in the coda does not contribute to syllable weight in NK English loanwords and thus a syllable closed with a geminate [l] is considered light; and (b) If an

initial syllable of an English loanword contains a long vowel (bimoraic), the word must be assigned double high accent. Because syllables with a geminate [l] coda act as light syllables, the author classified them as open (light) syllables for the word classification used in this study. The vowel length distinction in NK Korean, however, has been losing its phonemic status for younger speakers (Kim 2018), and the author's native intuition also does not distinguish the vowel length contrast. Thus, in this study, every syllable lacking a coda consonant was classified as an open (light) syllable regardless of whether it has a historical long vowel or a short vowel. The classifications used in this study will assist in understanding the relationship between the tone patterns and word structures.

3.3. Relationship between tone patterns and word structures

In this section, the English loanwords in the corpus of this study were first divided by accent type to examine the frequency of each accent in NK English loanwords. Among the 3,384 English loanwords, 1,939 (57%) possessed penultimate accent, 762 (23%) words had final accent, 554 (16%) words fell into the double high accent class, and 119 (4%) had antepenultimate accent. The results reveal that penultimate accent is most frequently assigned to NK English loanwords in general, and this corresponds with the results of N-J Kim (1997) and Kenstowicz & Sohn (2001), which show that penultimate accent is the most frequent type in NK English loanwords. Especially, Kenstowicz & Sohn (2001) report that around 60% of tokens out of 600 English loanwords in their database, almost all nouns, exhibit penultimate accent, and the result is comparable to the result of this present study (57%). However, different from the results of Kenstowicz & Sohn (2001), which assert that double high accent and final accent are equally preferred in their data and each accent was observed in around 20% of their loanword items, the corpus of this present study contained

more final accented loanwords (23%) than double high accented loanwords (16%). After the initial classification, the author further divided the words of each accent group by syllable number to check whether the order of the general accent frequency also appears the same in each syllable group. The results are shown in Table 1.

Table 1. Frequency of the accents in each syllable group

Accents	2 syllable loanwords (961 words)	3 syllable loanwords (1408 words)	4 syllable loanwords (1015 words)	Total (3384 words)
Penultimate	516 (54%)	762 (54%)	661 (65%)	1939 (57%)
Final	242 (25%)	356 (25%)	164 (16%)	762 (23%)
Double high	203 (21%)	217 (16%)	134 (13%)	554 (16%)
Antepenultimate	-	73 (5%)	46 (5%)	119 (4%)

The results in Table 1 show that the order of the accent frequency remains the same for all groups of two-, three-, and four-syllable English loanwords. That is, penultimate accent is most frequent, final accent is second most frequent, and double high accent is third most frequent in all syllable groups. Antepenultimate accent rarely appears, in general. Then, each division in the two-, three-, and four-syllable groups is subdivided according to syllable composition to check which word structures are preferred in each tone pattern. The classification results of each syllable group are presented separately in sections 3.3.1., 3.3.2., and 3.3.3. below.

3.3.1. Two-syllable English loanwords

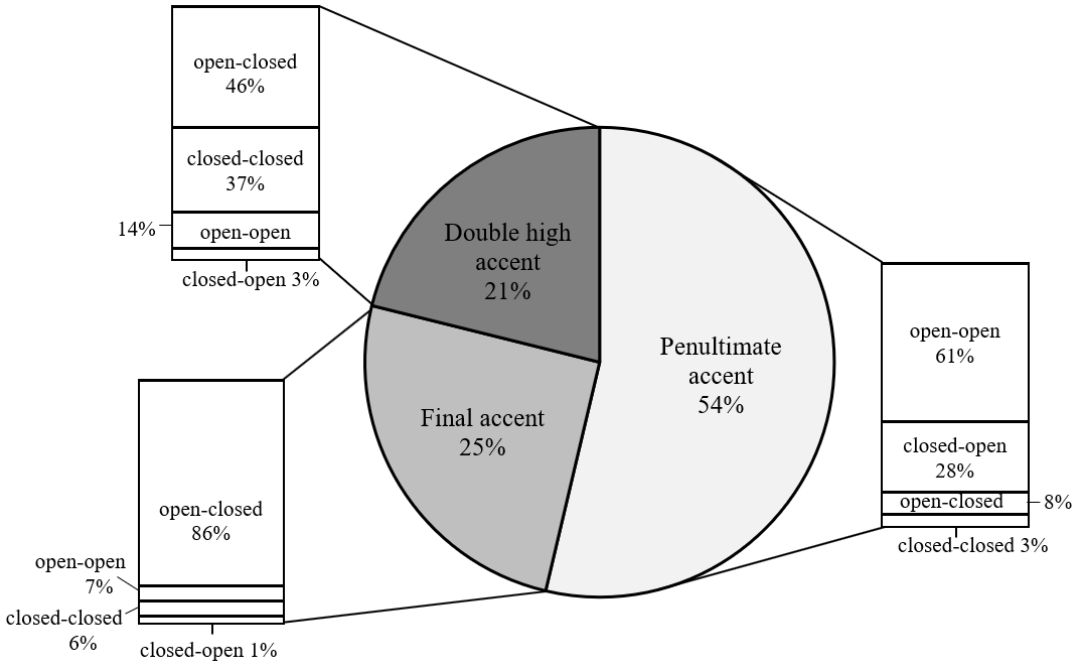
First, let us look at the results of two-syllable English loanwords. As seen in Table 1, among 961 two-syllable loanwords, 516 (54%) have penultimate accent, 242 (25%) include final accent, and 203 (21%) exhibit double high accent. After the classification, words in each accent class were

further subdivided by syllable structure type to investigate which word structures are preferred in each accent group, and the results are presented in Table 2 and Figure 1. The classification results of each accent group will be described separately in sections 3.3.1.1., 3.3.1.2, and 3.3.1.3.

Table 2. Frequent syllable compositions of each accent in NK two-syllable loanwords

Accents	Most frequent word structure		Second most frequent word structure	
Penultimate (HL) 516/961 (54%)	open-open [ɾʌ́.bi] 'love'	317/516 (61%)	closed-open [pák.s'i] 'box'	142/516 (28%)
Final (LH) 242/961 (25%)	open-closed [wa.ín] 'wine'	209/242 (86%)	open-open [si.k^{h}í] 'ski'	16/242 (7%)
Double high (HH) 203/961 (21%)	open-closed [njú.jók] 'New York'	94/203 (46%)	closed-closed [s'ém.p^{h}íl] 'sample'	75/203 (37 %)

Figure 1. Frequent syllabic structures of each accent in NK two-syllable loanwords



3.3.1.1. Penultimate accent

Among the 516 two-syllable English loanwords in the penultimate accent class, the most frequently observed syllable composition was open-open (61%). This supports an assertion of previous literature, such as Kenstowicz & Sohn (2001) and Chung (2002), that NK English loanwords with no heavy syllable are generally assigned penultimate accent as the default accent. The results also support the idea of Kenstowicz & Sohn (2001) that NK English loanwords with single high accent is accented based on a bimoraic trochaic foot at its right edge. A few example words with the open-open syllable composition and the expected foot structure are presented in (1). In this study, an accent mark indicates a high tone; no accent mark indicates a low tone; parentheses indicate foot structure; foot head is assumed to be realized with high tone; a period indicates a syllable boundary; a moraic coda is marked with the boldface type letter.

(1) Penultimate accented words with open-open syllabic structure

Foot structure	Word	Tone	Meaning
(kʰó.tʰɨ)	[kʰó.tʰɨ]	HL	'coat'
(ɾí.dʌ)	[ɾí.dʌ]	HL	'leader'
(kʰá.dɨ)	[kʰá.dɨ]	HL	'card'

Next, the second most frequently observed syllable composition for the two-syllable English loanwords with penultimate accent was closed-open (28%). Previous studies such as Kenstowicz & Sohn (2001) and Chung (2002) claimed that loanwords with an initial heavy syllable, either with a coda consonant or a long vowel, must be assigned double high accent. However, the data here suggest something different: most two-syllable words with the closed-open syllabic structure are closely related to penultimate accent. Then, one can ask why two-syllable words with an initial closed syllable display an exceptional pattern when the final syllable is light,

having penultimate accent instead of double high accent. This demonstrates that the previous studies missed a possibility of contextually variable syllable weight particularly for two-syllable loanwords. Kenstowicz & Sohn and Chung's claim was later modified and compensated by the analysis of Kim (2009), which argues that an initial closed syllable of two-syllable English loanwords is contextually light if followed by a light syllable. Her assertion reveals that constraints that assign mora to coda consonants can be violated to respect a higher-ranked metrical constraint.

In NK English loanwords, double high accent is assigned based on two consecutive bimoraic trochaic feet (Kim, 2009), and it requires at least four moras in a word to not violate the bimoraic trochaic structure (e.g. (μ́μ)(μ́μ)). Although loanwords with three or more syllables always have more than three moras when the initial syllable is heavy, two-syllable words with the closed-open syllable combination have only three moras, two on each vowel and one on the coda consonant of the initial syllable, and thus the bimoraic trochee is violated if double high accent is assigned (e.g. (μ́μ)(μ́)). However, according to Chung (2002) and Kim (2009), NK English loanwords have a context-dependent coda weight system; closed syllables of NK English loanwords are generally considered heavy but sometimes behave as a light syllable to satisfy a higher-ranked metrical constraint (i.e. the bimoraic trochee). The closed-open words seem to utilize the context-dependent coda moraicity to respect the bimoraic trochee. That is, the coda consonant in the initial syllable becomes non-moraic so that penultimate accent can be assigned without violating the bimoraic trochee (Kim 2009). The example words and proposed foot structure type are presented in (2).

(2) Penultimate accented words with the closed-open syllabic structure

Foot Structure	Word	Tone	Meaning
(tʰém.pʰo)	[tʰém.pʰo]	HL	‘tempo’
(tʰék.ɛi)	[tʰék.ɛi]	HL	‘taxi’
(mém.bʌ)	[mém.bʌ]	HL	‘member’

If the assertion of Kim (2009) is applied to the results of the present study, 89% of two-syllable loanwords with penultimate accent, which include loanwords with both the open-open and closed-open syllable compositions, can be considered contextually light-light. This also supports the assertion that NK English loanwords with a single high accent are accented based on a bimoraic trochaic foot at the right edge of the words, as proposed by Kenstowicz & Sohn (2001).

Among the remaining 57 (11%) penultimate accented words, 39 (8%) are open-closed and 18 (3%) are closed-closed. If we consider coda consonants to be moraic, their tone pattern is exceptional and cannot be explained with the bimoraic trochaic system proposed by Kenstowicz & Sohn (2001). However, it was noticed that there are two phonological patterns commonly exhibited from these words. First, some of these penultimate accented loanwords with a final closed syllable had an epenthetic vowel in the final syllable. According to Kenstowicz & Sohn (2001), syllables with an epenthetic vowel do not take high tone (foot head), except when they serve as the second member of double high accent. The results of this study support the analysis, revealing that high tone fails to land on the final syllable when it contains an epenthetic vowel. Instead, high tone tends to target the preceding syllable, even if the final syllable has a coda consonant. Although the tone patterns are somewhat exceptional, foot binarity still can be respected if it interacts with the context-dependent coda moraicity. The example words and the expected foot structure type are presented in (3) and (4).

(3) Penultimate accented words with open-closed syllable composition

Foot structure	Word	Tone	Meaning
(ɾé.s'ɨn)	[ɾé.s'ɨn]	HL	'lesson'
(ó.pʰɨn)	[ó.pʰɨn]	HL	'open'
(pʰí.pʰɨl)	[pʰí.pʰɨl]	HL	'people'

(4) Penultimate accented words with closed-closed syllable composition

Foot structure	Word	Tone	Meaning
(kʰén.s'ɨl)	[kʰén.s'ɨl]	HL	'cancel'
(éŋ.kʰɨl)	[éŋ.kʰɨl]	HL	'ankle'
(pʌ́n.dɨl)	[pʌ́n.dɨl]	HL	'bundle'

Second, the corpus in this study shows that NK English loanwords whose final syllable is [ɕjʌn] (as in English 'mission' or 'motion') are always assigned penultimate accent with no exception. This rule invariantly applies to all two-, three-, and four-syllable loanwords in the corpus of this study. It seems that [ɕjʌn] is pre-accenting, which always assigns high tone to the preceding syllable. This also explains why some two-syllable loanwords with a final closed syllable show penultimate accent. The example loanwords and the expected foot structure are shown in following (5) and (6). Again, the coda consonant in the final syllable is assumed to be non-moraic to respect foot binarity.

(5) Penultimate accented words with open-closed syllable composition

Foot structure	Word	Tone	Meaning
(mí.ɕjʌn)	[mí.ɕjʌn]	HL	'mission'
(mó.ɕjʌn)	[mó.ɕjʌn]	HL	'motion'
(kʰú.ɕjʌn)	[kʰú.ɕjʌn]	HL	'cushion'

(6) Penultimate accented words with closed-closed syllable composition

Foot structure	Word	Tone	Meaning
(pʰík.ɛjʌn)	[pʰík.ɛjʌn]	HL	‘fiction’
(óp.ɛjʌn)	[óp.ɛjʌn]	HL	‘option’

3.3.1.2. Final accent

Then, let us look at the results of the two-syllable English loanwords with final accent. Out of the 242 loanwords, the most frequently observed syllabic structure was open-closed (86%), and this indicates that final accent is typically assigned to loanwords with a final heavy syllable. This also supports the claim of Kenstowicz & Sohn (2001) that NK accent is assigned with a bimoraic trochaic foot at the right edge of a word. The example final accented loanwords and the expected foot structure are seen in (7).

(7) Final accented words with open-closed syllabic structure

Foot structure	Word	Tone	Meaning
ɾe.(mó**n**)	[ɾe.món]	LH	‘lemon’
ne.(í**m**)	[ne.ím]	LH	‘name’
tʰi.(kʰé**t**)	[tʰi.kʰét]	LH	‘ticket’

The second most frequent word structure for two-syllable loanwords with final accent was open-open (7%). This tone assignment is exceptional and cannot be explained by the bimoraic trochee. Interestingly, many of the words had an epenthetic vowel in the initial syllable as in [sɨ.kʰí] ‘ski’ and [sɨ.tʰá] ‘star’, which supports the observation made by Kenstowicz & Sohn (2001) that high tone has a tendency not to be assigned to syllables with an epenthetic vowel. None of the previous literature, however, has discussed the foot structure of these words. Although the bimoraic

trochee plays an important role in NK accent, based on the exceptional tone assignment pattern, this study suggests the possibility that the bimoraic trochee could be violated when interacting with other phonological constraints. That is, the constraint that prevents a foot head from being assigned on an epenthetic vowel ranks higher than the constraint foot binarity. Thus, it seems that these words have a monomoraic foot on the final syllable in order to avoid having a foot head on the syllable with an epenthetic vowel. The ranking argument among the constraints will be discussed in more detail in Chapter 4 with an optimality-theoretic analysis. A few examples of final accented loanwords with open-open syllable composition and the expected foot structure are presented in (8).

(8) Final accented words with open-open syllabic structure

Foot Structure	Word	Tone Pattern	Meaning
sɨ.(kʰí)	[sɨ.kʰí]	LH	'ski'
sɨ.(tʰá)	[sɨ.tʰá]	LH	'star'
pʰɨ.(ɾó)	[pʰɨ.ɾó]	LH	'pro (professional)'

3.3.1.3. Double high accent

For two-syllable English loanwords with double high accent, the most frequently observed syllabic structures were open-closed (46%). Previous literature (Kenstowicz & Sohn, 2001; Chung, 2002; Kim, 2009) agrees that NK English loanwords are assigned double high accent when the initial syllable has a long vowel. Although vowel length distinction was not considered in the present study and all syllables with no coda consonant were classified as open, a reasonable explanation for the predominance of open-closed syllabic structures for double high accented words is that the words have a phonologically long vowel in the initial syllable. According to Kim (2009), English loanwords with double high accent consist of two trochaic feet. Based on her

analysis, for double high accented words with the open-closed syllable combination, it is assumed that a foot is assigned to each syllable. The example loanwords with the open-closed syllabic structure and the expected foot structure are shown in (9).

(9) Double high accented words with the open-closed syllabic structure

Foot Structure	Word	Tone	Meaning
(pá:).(gé**n**)	[pá:.gén]	HH	'bargain'
(ká:).(ɕí**p**)	[ká:.ɕíp]	HH	'gossip'
(jú:).(ɾʌ́**p**)	[jú:.ɾʌ́p]	HH	'Europe'

The second most frequent syllable structure type for two-syllable loanwords with double high accent was closed-closed (37%). Similar to the foot structure in (9), we can assume that two consecutive bimoraic trochaic feet are assigned to the words with closed-closed syllable composition, as proposed by Kim (2009). The example words and the expected foot structure are presented in (10).

(10) Double high accented words with the closed-closed syllabic structure

Foot Structure	Word	Tone	Meaning
(ɾʌ́**n**).(dʌ́**n**)	[ɾʌ́n.dʌ́n]	HH	'London'
(é**n**).(tɕí**n**)	[én.tɕín]	HH	'engine'
(ɾé**ŋ**).(kʰí**ŋ**)	[ɾéŋ.kʰíŋ]	HH	'ranking'

So far, we have checked which word structures are preferred for each accent group of two-syllable English loanwords to examine the relationship between the syllabic structure and tone assignment in NK English loanwords. From the results of two-syllable English loanwords, we can notice that high tone has a strong tendency to be realized on heavy syllables. We turn now to the

results of the three-syllable English loanwords.

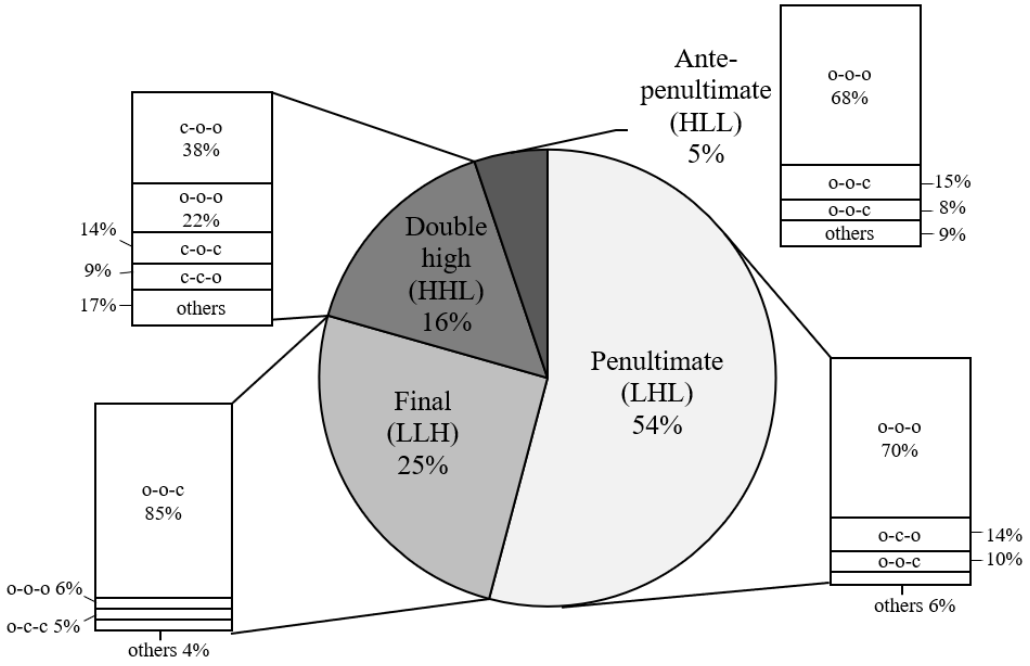
3.3.2. Three-syllable English loanwords

For three-syllable English loanwords, four distinct tone patterns were observed: of the 1,408 three-syllable words, 762 (54%) were penultimate accented, 356 (25%) were final accented, 217 (16%) were double high accented, and 73 (5%) were antepenultimate accented. After sorting them by accent type, words of each group were subdivided by syllabic structure so as to discover which word structures are commonly observed in each accent group. The classification results are displayed in Table 3 and Figure 2. The description will be provided separately by each accent group from section 3.3.2.1 through section 3.3.2.4. Since eight distinct word structures appeared in three-syllable loanwords, the description centers upon the key word structures that comprise about 85% of each accent group.

Table 3. Frequent syllable composition of each accent in NK three-syllable loanwords

Accents	Most frequent word structure		Second most frequent word structure	
Penultimate (LHL) 762/1408 (54%)	open-open-open [ke.í.tʰɨ] ‘gate’	535/762 (70%)	open-closed-open [sɨ.tʰém.pʰɨ] ‘stamp’	106/762 (14%)
Final (LLH) 356/1408 (25%)	open-open-closed [ti.tɕa.ín] ‘design’	302/356 (85%)	open-open-open [pa.na.ná] ‘banana’	21/356 (6%)
Double high (HHL) 217/1408 (16%)	closed-open-open [kʰém.pʰʌ́.s’ɨ] ‘campus’	83/217 (38%)	open-open-open [pó.nʌ́.s’ɨ] ‘bonus’	47/217 (22%)
Antepenultimate (HLL) 73/1408 (5%)	open-open-open [kó.sɨ.tʰɨ] ‘ghost’	50/73 (68%)	open-open-closed [í.bɨ.niŋ] ‘evening’	11/73 (15%)

Figure 2. Frequent syllabic structure of each accent in NK three-syllable loanwords



3.3.2.1. Penultimate accent

First, of the 762 three-syllable loanwords with penultimate accent, 535 (70%) were open-open-open. This result shows that penultimate accent is frequently assigned to English loanwords with no heavy syllable, and this also supports the idea that penultimate accent is the default accent in NK English loanwords and the accent assignment is based on a bimoraic trochaic foot at the right edge of the word (Kenstowicz & Sohn, 2001). A few examples and the expected foot structure type for penultimate accented loanwords with the open-open-open syllabic structure are in (11).

(11) Penultimate accented words with open-open-open syllabic structure

Foot structure	Word	Tone	Meaning
k^{h}e.(ná.da)	[k^{h}e.ná.da]	LHL	‘Canada’
mo.(ní.t^{h}ʌ)	[mo.ní.t^{h}ʌ]	LHL	‘monitor’
o.(dí.o)	[o.dí.o]	LHL	‘audio’

The second most frequently observed word structure for the three-syllable English loanwords with penultimate accent was open-closed-open and 106 (14%) loanwords showed this word structure. It seems that the analysis of Kim (2009)—which asserts that closed penultimate syllables followed by a light final syllable are contextually light in two-syllable loanwords—can be extended to three-syllable loanwords, though one more restriction is needed. In order for three-syllable English loanwords with a closed penultimate syllable to fall into the penultimate accent class, the initial syllable as well as the final syllable must be light, otherwise the word would be assigned a different accent. If the coda consonant of the penultimate syllable in the open-closed-open syllable combination is considered non-moraic, 84% of the penultimate accented words, including words with both the open-open-open and open-closed-open syllable compositions, can be considered to have three consecutive light syllables. This also corroborates the bimoraic trochee system proposed by Kenstowicz & Sohn (2001). The examples of loanwords with the open-closed-open syllable composition and the expected foot structure are presented in (12).

(12) Penultimate accented words with open-closed-open syllabic structure

Foot structure	Word	Tone	Meaning
ɾa.(bén.dʌ)	[ɾa.bén.dʌ]	LHL	'lavender'
sɨ.(tʰém.pʰɨ)	[sɨ.tʰém.pʰɨ]	LHL	'stamp'
o.(ɾén.tɕi)	[o.ɾén.tɕi]	LHL	'orange'

3.3.2.2. Final accent

Next, for three-syllable loanwords with final accent, 302 (85%) out of 356 words were open-open-closed. This result shows that the weight of the final syllable has a crucial role in attracting final accent. This tone assignment pattern also can be explained with a bimoraic trochaic

foot aligned at the right edge of the word. Since the last syllable is heavy, having two moras, a foot is assigned on the final syllable, assigning high tone on the final syllable. The example words and the expected foot structure type are seen in (13).

(13) Final accented words with open-open-closed syllabic structure

Foot structure	Word	Tone	Meaning
ti.tɕa.(ín**n**)	[ti.tɕa.ín]	LLH	'design'
ɕi.na.(món**n**)	[ɕi.na.món]	LLH	'cinnamon'
ɕi.sɨ.(tʰém**m**)	[ɕi.sɨ.tʰém]	LLH	'system'

The second most frequent word structure for three-syllable English loanwords with final accent was open-open-open (6%). Although these open-open-open words exhibit a tone pattern that violates the bimoraic trochee, there seems to be no consistent phonological pattern that causes this violation. The example words—[kʰa.me.ɾá] 'camera', [pʰi.a.nó] 'piano', [pa.na.ná] 'banana', and [o.pʰe.ɾá] 'opera'—exhibit totally unexpected tone patterns, and it could be assumed that their tone patterns may be related to the time and route of their first introduction to Korea. Kenstowicz & Sohn (2001) suggest that these words may be early loanwords from French that have been integrated into the native system. In French, if a word is produced in isolation, stress is on the final syllable.

To check if tone patterns of early loanwords exhibit similar patterns like this, the author of the present study investigated a corpus of English loanwords that came into Korea in the 1880s, which is presented in Park (1997), and found out that many of the loanwords with unexplainable tone patterns are included in the corpus. It is noted that some of the tone patterns described for loanwords based on data reflecting that of the 1880s are quite different from the accent assignment patterns found in the loanwords collected in the present study (nearly 140 years later). The different

tone patterns suggest that the accentuation pattern of early English loanwords might be different either because of another language's influence or because of a different accentuation system in earlier NK Korean.

3.3.2.3. Double high accent

Among the 217 three-syllable loanwords with double high accent, 83 (38%) were closed-open-open, 47 (22%) were open-open-open, 30 (14%) were closed-open-closed, and 20 (9%) were closed-closed-open. The overall results reveal that 137 (63%) out of the 217 double high accented loanwords have an initial closed syllable, while the other 80 (37%) have an initial open syllable. Although it looks like double high accent is more attracted to words with an initial closed syllable in three-syllable English loanwords, Kenstowicz & Sohn (2001) and Chung (2002) assert that double high accent is assigned to English loanwords with an initial heavy syllable, either with a coda consonant or a long vowel. (At the time of these two studies, vowel length would have been phonemic in NK Korean.) Therefore, one could assume that the double high accented words with an initial open syllable also have an initial heavy syllable with a phonologically long vowel, though the vowel length distinction was not considered in this study for the classification. In addition, the words in this group show that their second and third syllables exhibit various types of syllabic structure. It seems that when the initial syllable is heavy in three-syllable English loanwords, the weight of the second and third syllables is disregarded, and the words are assigned double high accent.

Then, what would be the expected foot structure for the three-syllable loanwords with double high accent? According to Kim (2009), double high accent consists of two consecutive bimoraic trochaic feet and the first mora of each foot is realized with high tone as a foot head. This

means that in order for a three-syllable English loanword to be assigned double high accent, the word must contain two consecutive bimoraic trochaic foot and the head of each foot has to be assigned on each of the first and second syllables. Also, to align the right edges of the feet and the word (Kenstowicz & Sohn, 2001), the second and third syllables must be included in the second foot, as seen in (σ́)(σ́σ). In order to follow the foot structure type without violating the bimoraic trhchee, the initial syllable must be heavy, having two moras in the syllable, while the second and third syllables have to be light, having one mora in each syllable. Thus, the contextual heaviness of closed syllables, which is discussed in Kim (2009) and Chung (2000, 2002), should be considered to make these loanwords respect foot binarity. Therefore, this study proposes that when the initial syllable of a three-syllable loanword is heavy and the word falls into the double high accent class, any coda consonant in the second and third syllables must be considered non-moraic so that they can respect both the bimoraic trochee and the right alignment constraints. The expected foot structure type for the double high accented loanwords with three-syllable is presented in (14) and (15) with some example words.

(14) Three-syllable Double high accented words with an initial closed syllable

Foot structure	Word	Tone	Meaning
(pí**n**).(tʰí.tɕi)	[pín.tʰí.tɕi]	HHL	‘vintage’
(ɕjá**m**).(pʰé.in)	[ɕjám.pʰé.in]	HHL	‘Champagne’
(á**ŋ**).(saŋ.bɨl)	[aŋ.saŋ.bɨl]	HHL	‘ensemble’

(15) Three-syllable Double high accented words with an initial open syllable

Foot structure	Word	Tone	Meaning
(pó:).(nʌ́.s’ɨ)	[pó:.nʌ́.s’ɨ]	HHL	‘bonus’
(há:).(bʌ́.dɨ)	[há:.bʌ́.dɨ]	HHL	‘Harvard’
(pó:).(dɨ́.kʰa)	[pó:.dɨ́.kʰa]	HHL	‘vodka’

3.3.2.4. Antepenultimate accent

Lastly, among the 73 antepenultimate accented English loanwords, 50 (68%) were open-open-open, and they were mostly English words with a coda cluster (e.g. *guest, test, best*, etc). Since Korean does not allow complex onsets or codas, English consonant clusters are broken up by inserting epenthetic vowels when the English words are adopted into Korean as loanwords. As previously mentioned in section 2.4., high tone generally refuses to land on syllables with an epenthetic vowel and tends to target another syllable in the accentuation of NK English loanwords (Kenstowicz & Sohn 2001). That is, when a three-syllable English loanword has an epenthetic vowel in both the penultimate and final syllables, the accent moves to the initial syllable to avoid landing on the epenthetic vowel.

Then what would be the expected foot structure for these words? We have already exhibited in the examples in (8) that the bimoraic trochee can be violated to avoid assigning high tone to the syllable with an epenthetic vowel. However, there have been no examples which violate the constraint that aligns the right edge of a foot to the right edge of a word. Thus, it can be assumed that the three-syllable Enlish loanwords with antepenultimate accent are other examples that violate the bimoraic trochee but respect the right alignment. For the three-syllable English loanwords with antepenultimate accent, a trimoraic foot is assumed to be assigned, having a foot head on the initial syllable (i.e. (σ́σσ)). The example loanwords and the expected foot structure are presented in (16). This unusual tone assignment pattern will be discussed further in the following chapter in the framework of Optimality Theory.

(16) Antepenultimate accented words with open-open-open syllabic structure

Foot structure	Word	Tone	Meaning
(ké.si.tʰɨ)	[ké.si.tʰɨ]	HLL	‘guest’
(tʰó.si.tʰɨ)	[tʰó.si.tʰɨ]	HLL	‘toast’
(kí.pʰɨ.tʰɨ)	[kí.pʰɨ.tʰɨ]	HLL	‘gift’

The accentuation of the remaining 23 (32%) loanwords with antepenultimate accent fails to show any consistent phonological patterns, but it seems to be somewhat affected by English stress. Although previous studies have claimed that the stress patterns of English are disregarded when words are adopted into NK Korean as loanwords, the accent pattern of these words coincides with the stress pattern of English as seen in the examples in (17).

(17) Antepenultimate accented words affected by English stress

Word	Tone	Meaning
[wín.do.u]	HLL	‘window’
[pʰék.tʰo.ɾi]	HLL	‘factory’
[s’é.kʰʌn.dɨ]	HLL	‘second’
[ɾí.dʌ.ɕip]	HLL	‘leadership’

Since loanwords are generated by the contact of two languages, there is a possibility that tone patterns of some NK Korean loanwords are influenced by the stress patterns of English; however, the number is extremely small (23 out of 1408 three-syllable loanwords) and does not significantly influence the general accentuation patterns.

3.3.3. Four-syllable English loanwords

Now we turn to the results of the four-syllable English loanwords. Among the 1,015 four-syllable English loanwords, 661 (65%) were assigned penultimate accent, 164 (16%) were given

final accent, 134 (13%) fell into the double high accent class, 46 (5%) had antepenultimate accent, and 10 (1%) were assigned high tone on the initial syllable. Similar to the results of two- and three-syllable loanwords in this study, penultimate accent appears most frequently in four-syllable loanwords, but the proportion of penultimate accent is much higher for four-syllable loanwords (65%) than two-syllable (54%) and three-syllable (54%) loanwords. In NK native words, words with four or more syllables are invariantly assigned penultimate accent regardless of the weight of the individual syllables, and the higher proportion of penultimate accent observed in the four-syllable English loanwords might be assumed to be somewhat related to the patterns observed in NK native words.

However, a more appealing assumption is that four-syllable English loanwords might have a higher proportion of words with syllable compositions that attract penultimate accent (i.e. words that either have no heavy syllable or have only one heavy syllable in the penultimate position). When English words are adopted into Korean and become loanwords, diphthongs and consonant clusters in English are split up into separate syllables since the maximum syllable structure of Korean is CGVC, where G represents a glide. That is, English words that originally had diphthongs or consonant clusters have a possibility to become a longer loanword and to have more open syllables. The classification results in the following section 3.4. show that four-syllable loanwords have a higher proportion of the words that have either no closed syllable or only one heavy syllable in the penultimate position (59%), compared to the proportions in the two-syllable (53%) and three-syllable (55%) loanwords. The relationship between the proportion of the syllable compositions and accent will be further discussed in section 3.4.

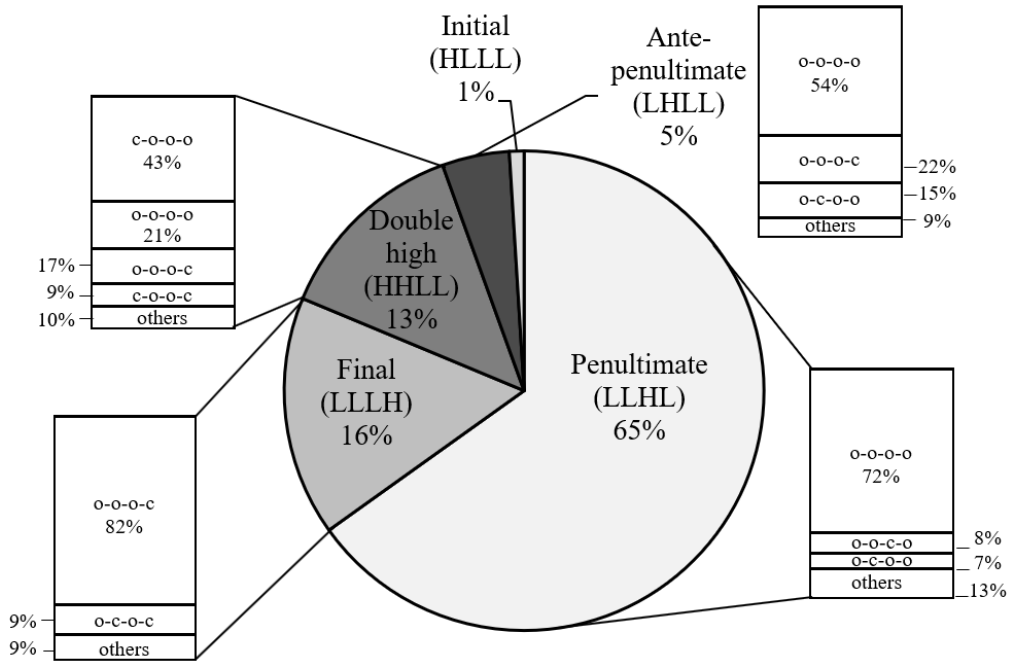
In order to examine which word structures are closely related to each tone pattern, four-syllable English loanwords of each accent were subdivided by syllable composition. The results

are shown below in Table 4 and Figure 3. The descriptions will be provided separately by each accent group in the following subsections. Since four-syllable English loanwords display ten distinct word structures, the descriptions will focus on a few most frequent syllabic structures for each accent group, which comprise around 80-90% of each accent type.

Table 4. Frequent syllable composition of each accent in NK four-syllable loanwords

Accents	Most frequent word structure		Second most frequent word structure	
Penultimate (LLHL) 661/1015 (65%)	open-open-open-open [mi.sɨ.tʰé.ɾi] ‘mystery’	477/661 (72%)	open-open-closed-open [sɨ.kʰɨ.ɾíp.tʰɨ] ‘script’	55/661 (8%)
Final (LLLH) 164/1015 (16%)	open-open-open-closed [sɨ.tʰa.di.úm] ‘stadium’	134/164 (82%)	open-closed-open-closed [sɨ.pʰek.tʰɨ.ɾʌ́m] ‘spectrum’	14/164 (9%)
Double high (HHLL) 134/1015 (13%)	closed-open-open-open [kʰón.tʰé.sɨ.tʰɨ] ‘contest’	58/134 (43%)	open-open-open-open [ɾí.ʌ́l.li.tʰi] ‘reality’	28/134 (21%)
Antepenultimate (LHLL) 46/1015 (5%)	open-open-open-open [tʰe.í.sɨ.tʰɨ] ‘taste’	25/46 (54%)	open-open-open-closed [me.í.kʰɨ.ʌp] ‘make-up’	10/46 (22%)
Initial (HLLL) 10/1015 (1%)	open-open-open-closed [pʰé.ɾʌ.da.im] ‘paradigm’	5/10 (50%)	open-open-open-open [pʰí.ɾi.ʌ.dɨ] ‘period’	3/10 (30%)

Figure 3. Frequent syllabic structure of each accent in NK four-syllable loanwords



3.3.3.1. Penultimate accent

First, of the 661 four-syllable loanwords with penultimate accent, the most frequently observed syllable combination was open-open-open-open and 477 (72%) words had this word structure. This again shows that penultimate accent is closely related to loanwords that only contain open syllables. The second most frequent word structure for four-syllable loanwords with penultimate accent was open-open-closed-open and 55 (8%) words were in this group. Here we can assume that the analysis of Kim (2009), which proposes that closed penultimate syllables in two-syllable English loanwords are considered light when followed by a light syllable, can also be expanded to four-syllable English loanwords. As mentioned before regarding three-syllable loanwords, however, to make the four-syllable loanwords fall into the penultimate accent class, the initial syllable must be light as well. Otherwise, the words would be assigned double high accent. Since around 80% of the penultimate accented loanwords, including both open-open-open-

open and open-open-closed-open, are considered to have four light syllables, this again supports the notion that the NK tone assignment for single high accent bases itself upon a bimoraic trochaic foot at the right edge of the words, as suggested by Kenstowicz & Sohn (2001). The example four-syllable loanwords and suggested foot structure types for the two most frequently observed syllable compositions are displayed in (18) and (19).

(18) Penultimate accented loanwords with open-open-open-open syllabic structure

Foot Structure	Word	Tone	Meaning
mi.sɨ.(tʰé.ɾi)	[mi.sɨ.tʰé.ɾi]	LLHL	'mystery'
ma.i.(nʌ́.sɨ)	[ma.i.nʌ́.sɨ]	LLHL	'minus'
ta.i.(ʌ́.ɾi)	[ta.i.ʌ́.ɾi]	LLHL	'diary'

(19) Penultimate accented loanwords with open-open-closed-open syllabic structure

Foot Structure	Word	Tone	Meaning
s'a.i.(ʌ́n.sɨ)	[s'a.i.ʌ́n.sɨ]	LLHL	'science'
a.na.(wún.sʌ)	[a.na.wún.sʌ]	LLHL	'announcer'
sɨ.kʰɨ.(ɾíp.tʰɨ)	[sɨ.kʰɨ.ɾíp.tʰɨ]	LLHL	'script'

3.3.3.2. Final accent

Among the 164 four-syllable English loanwords with final accent, 134 (82%) were open-open-open-closed and 14 (9%) were open-closed-open-closed. The results show that over 90% of the final accented four-syllable loanwords possess a closed final syllable, and this suggests that the weight of the final syllable plays an important role in the assignment of final accent. In addition to the weight of the final syllable, the weight of the initial and penultimate syllables also seems to have an influence on the accentuation because most of the final accented four-syllable words have open initial and penultimate syllables. The weight of the antepenultimate syllable does not seem

to greatly affect the accentuation. The relationship between syllable weight and high tone assignment will be discussed more in detail in section 3.4. Examples of the two most frequently observed syllable compositions for the final accented four-syllable loanwords and the expected foot structure types are shown below in (20) and (21).

(20) Final accented loanwords with open-open-open-closed syllabic structure

Foot Structure	Word	Tone	Meaning
ma.gɨ.ne.(ɕjú**m**)	[ma.gɨ.ne.ɕjúm]	LLLH	'magnesium'
kʰo.me.di.(ʌ́**n**)	[kʰo.me.di.ʌ́n]	LLLH	'comedian'
a.sɨ.pʰi.(ɾí**n**)	[a.sɨ.pʰi.ɾín]	LLLH	'aspirin'

(21) Final accented loanwords with open-closed-open-closed syllabic structure

Foot Structure	Word	Tone	Meaning
pʰɨl.laŋ.kʰɨ.(tʰó**n**)	[pʰɨl.laŋ.kʰɨ.tʰón]	LLLH	'plankton'
sɨ.pʰek.tʰɨ.(ɾʌ́**m**)	[sɨ.pʰek.tʰɨ.ɾʌ́m]	LLLH	'spectrum'
il.lek.tʰɨ.(ɾó**n**)	[il.lek.tʰɨ.ɾón]	LLLH	'electron'

3.3.3.3. Double high accent

The classification results of the four-syllable loanwords with double high accent exhibit that 62 (46%) of them have an initial open syllable and the other 72 (54%) contain an initial closed syllable. Since Kenstowicz & Sohn (2001) claim that loanwords are assigned double high accent when the initial syllable is heavy, either with a coda consonant or a long vowel, one can assume that the double high accented loanwords with an initial open syllable in this study include a phonologically long vowel in their initial syllable.

Although Kim (2009) discusses the foot structure type of two-syllable English loanwords with double high accent, the foot structure type of four-syllable words has not been discussed yet.

Kim (2009) proposes that the foot structure type of double high accented words consists of two consecutive trochaic feet and the foot heads (high tone) are placed on each of the first and second syllables. If that assertion is applied to the foot structure of the four-syllable loanwords, there are two possible foot structure types, (σ́)(σ́σσ) and (σ́)(σ́σ)σ, and both options violate one of the constraints proposed by Kenstowicz & Sohn (2001) and Kim (2009).

For the first option (i.e. (σ́)(σ́σσ)), the second foot contains all the second, third, and fourth syllables in order to respect the right alignment constraint, but it violates the foot binarity constraint by having more than two moras in a foot. For the second option (i.e. (σ́)(σ́σ)σ), the second foot contains the second and third syllables to respect the foot binarity constraint, but the right edge of the second foot is not aligned with the right edge of the word and it violates the right alignment constraint. Since we have already observed that the foot binarity constraint can be violated in certain contexts, for example with an epenthetic vowel as seen in (8) and (16), this study proposes that the foot binarity constraint is ranked lower than the right alignment constraint, and thus is violated again to assign double high accent to four-syllable English loanwords. That is, for the four-syllable loanwords with double high accent, the first foot is assigned to the initial heavy syllable and the second foot is assigned to the three remaining syllables to respect the right alignment constraint (i.e. (σ́)(σ́σσ)).

Even if the foot binarity constraint is assumed to be violated for the foot assignment, context-dependent moraicity should be considered to reduce the amount of violation. As discussed in (14) and (15) regarding three-syllable loanwords with double high accent, if the initial syllable is heavy in loanwords with three or more syllables, the following closed syllables should be considered contextually light so that they minimally violate the foot binarity constraint. The ranking argument between the constraints will be presented in Chapter 4 with the optimality

theoretic analysis. Example words and the expected foot structure types of the four-syllable loanwords with double high accent are presented in (22) and (23).

(22) Double high accented four-syllable words with an initial open syllable

Foot Structure	Word	Tone	Meaning
(kʰjú:).(ɾé.i.tʰʌ)	[kʰjú:.ɾé.i.tʰʌ]	HHLL	‘curator’
(ɾú:).(má.ni.a)	[ɾú:.má.ni.a]	HHLL	‘Romania’
(ɾí:).(ʌ́l.li.tɕim)	[ɾí:.ʌ́l.li.tɕim]	HHLL	‘realism’

(23) Double high accented four-syllable words with an initial closed syllable

Foot Structure	Word	Tone	Meaning
(kʰó**n**).(kʰɨ́.ɾi.tʰɨ)	[kʰón.kʰɨ́.ɾi.tʰɨ]	HHLL	‘concrete’
(kʰó**n**).(tʰé.sɨ.tʰɨ)	[kʰón.tʰé.sɨ.tʰɨ]	HHLL	‘contest’
(sé**n**).(dɨ́.wi.tɕi)	[sén.dɨ́.wi.tɕi]	HHLL	‘sandwich’

3.3.3.4. Antepenultimate accent

Next, the observations regarding the four-syllable English loanwords with antepenultimate accent (46 out of 1,015 in this corpus) reveal that most of the words in this group have an epenthetic vowel in both the penultimate and final syllables. Since high tone is typically not assigned on an epenthetic vowel for single high accented loanwords (Kenstowicz & Sohn, 2001), high tone (foot head) seems to be moved to the antepenultimate syllables for these words. Again, as seen in the examples in (16), foot binarity is assumed to be violated to avoid assigning high tone on the epenthetic vowel. The example words and possible foot structure type are seen in (24).

(24) Antepenultimate accented four-syllable words

Foot structure	Word	Tone	Meaning
a.(tʰí.sɨ.tʰɨ)	[a.tʰí.sɨ.tʰɨ]	LHLL	‘artist’
tʰɨ.(wí.sɨ.tʰɨ)	[tʰɨ.wí.sɨ.tʰɨ]	LHLL	‘twist’
ʌ.(ɕ’í.sɨ.tʰɨ)	[ʌ.ɕ’í.sɨ.tʰɨ]	LHLL	‘assist’

3.3.3.5. Initial accent

Finally, 1% of the four-syllable English loanwords exhibited an exceptional tone pattern: a high tone on the initial syllable as in (25). This tone pattern seems to be influenced by English stress as discussed in (17). These words, however, are very few and do not affect the general accentuation patterns.

(25) Initial accented four-syllable words

Word	Tone	Meaning
[pʰé.ɾʌ.da.im]	HLLL	‘paradigm’
[tɕʰél.li.sɨ.tʰɨ]	HLLL	‘cellist’
[pʰí.ɾi.ʌ.dɨ]	HLLL	‘period’

3.3.4. Summary and discussion

Section 3.3. provides a detailed descriptive analysis on the tone assignment patterns of NK English loanwords by dividing the loanword corpus into number of syllables, tone pattern, and syllabic structure. The results provide general information on the frequency of each accent on two-, three-, and four-syllable English loanwords; which word structures appear frequently in each accent group; and the similarities and differences in the tone assignment patterns among loanwords with distinct syllable numbers. In addition, based on the phonological constraints presented in the previous literature, such as the bimoraic trochee (Kenstowicz & Sohn, 2001), foot alignment

(Kenstowicz & Sohn, 2001; Kim, 2009), context-dependent coda moraicity (Chung, 2000, 2002; Kim, 2009), and no accented epenthetic vowel (Kenstowicz & Sohn, 2001), this chapter proposed foot structure types of each syllable composition, including those that have not been discussed before. For instance, this section proposes foot structure types of double high accented loanwords with three and four syllables and loanwords that exhibit exceptional tone patterns with epenthetic vowels. The analysis also provides some basic information on how the phonological constraints interact with one another and what the constraint rankings are. The details will be presented in Chapter 4 with the optimality-theoretic analysis.

Although the analysis in this present section investigated how the phonological constraints interact with one another to assign accent to NK English loanwords, the classification results in this section provide little information on how frequently each syllable combination appears in NK English loanwords and how the high tone assignment works on loanwords with two or more heavy syllables. English loanwords that have more than one heavy syllable have been generally excluded from the analysis in this section since such loanwords are not considered as a main word structure type due to their limited numbers. Therefore, in order to see the complete picture of the accent adaptation patterns in NK English loanwords, it is necessary to go one step beyond the perspective of this section and analyze the classification results from a different angle.

Therefore, in the following section 3.4., the direct reverse classification will be conducted to examine the relationship between the syllable weight and high tone assignment. That is, the English loanwords will be first divided according to their syllable composition in order to check which syllable combinations appear frequently in each syllable group. Then, each division in a group will be subdivided according to tone patterns to check which accents are preferably assigned to each syllable composition. This will also provide information on which syllables are preferred

for the high tone assignment when a word has more than one heavy syllables. By analyzing the new classification results and investigating the relevant foot structure types, we can also figure out which constraints play an important role in determining the hierarchy between heavy syllables for the high tone assignment. Since the analyses on the hierarchy between heavy syllables have been somewhat controversial in the previous literature, the analysis in this study will help to solve the disagreement and to facilitate a broader understanding of the accentuation system of NK Korean.

3.4. Hierarchy between heavy syllables in high tone assignment

In the previous section, the English loanwords were first classified by accent and then subdivided by word structure to analyze which syllable compositions are preferred for each accent group in NK English loanwords. In this section, the classification is conducted in the reverse order. That is, the English loanwords are initially classified according to word structure to check the frequency of each syllable composition in NK English loanwords, and then each group is subdivided by tone pattern to find out which accents are preferably assigned to each syllable composition.

The results of the initial classification in this section show that more than 91% of English loanwords contain either no closed syllable or only one closed syllable: 853 out of 961 two-syllable words (89%), 1287 out of 1408 three-syllable words (91%), and 945 out of 1015 four-syllable words (93%) belong to these syllable compositions. That is, less than 9% of the words in the corpus of this study contain more than one closed syllable: 108 out of 961 two-syllable words (11%), 121 out of 1408 three-syllable words (9%), and 70 out of 1015 four-syllable words (7%) have two or three closed syllables.

According to Lee (2006), which investigates the syllable structure types of 220 English

loanwords in Korean, 119 (54%) out of 220 English words in her corpus increase the number of syllables when they are adopted to Korean. She reported that the average number of syllables in the English words was 1.92, but the number increased to 2.65 when they became English loanwords in Korean. The results of this present study also show that the syllable structures of English words are changed when they are adopted into Korean as loanwords. That is, if an English word is introduced to Korean as a loanword, each syllable with either a consonant cluster or diphthong must be divided into several syllables with epenthetic vowels, as discussed in section 2.4. This seems to make English loanwords have more light syllables.

In order to further examine the relationship between the syllabic structure and tone pattern, the results of two-, three-, and four-syllable loanwords will be presented separately in the following sections 3.4.1., 3.4.2., and 3.4.3. The analysis of this study will focus on the most frequently observed tone pattern of each syllable composition type without considering the variation that is found with each type. Based on the main tone patterns, this study will also provide a more accurate analysis of the hierarchy between heavy syllables when high tone is assigned to English loanwords with two or more heavy syllables.

Previous studies on the accentuation of NK English loanwords, such as Chung (2000), Kenstowicz & Sohn (2001), and Kim (2010), generally agree on two points: (1) penultimate accent is the default accent for NK English loanwords, and thus words with no heavy syllable are generally assigned penultimate accent; and (2) if an English loanword contains only one heavy syllable, high tone is generally assigned on the heavy syllable. However, these studies have different opinions on which syllable high tone is assigned when an English loanword has more than one heavy syllable.

First, Chung (2000) argues that “a word-initial heavy syllable is preferred to other heavy

syllables as the position for high tone. If there is no word-initial heavy syllable, then a penultimate heavy syllable attracts a high tone over others. If the penultimate is also not heavy, then a high tone occurs on a word-final heavy syllable." That is, the hierarchy between heavy syllables is: *initial heavy syllable >> penultimate heavy syllable >> final heavy syllable*. Yet, Kenstowicz & Sohn (2001) propose a different generalization: "If the initial syllable of the output is heavy, then the word falls into the double high accent class. Otherwise, if the final syllable is heavy, the word falls into the final-accented class. Otherwise, the word falls into the penultimate class." That is, the hierarchy suggested by them is: *initial heavy syllable >> final heavy syllable >> penultimate heavy syllable*. Although Chung (2000) and Kenstowicz & Sohn (2001) agree that the initial heavy syllable is the most preferred position for high tone, their opinions on the hierarchy between the penultimate heavy syllable and final heavy syllable are different.

Later, Kim (2010) presents a more detailed analysis of the high tone assignment of English loanwords, based on the analysis of Chung (2000) and Kenstowicz & Sohn (2001). While she agrees with Chung (2000) for the hierarchy between the penultimate and final syllables (i.e. *penultimate heavy syllable >> final heavy syllable*), her study mainly focuses on the different tone assignment pattern of two-syllable English loanwords, which was not mentioned in Chung (2000) and Kenstowicz & Sohn (2001). According to Kim (2010), unlike three- and four-syllable loanwords, two-syllable loanwords with a closed initial syllable do not always have double high accent, and their accent assignment is determined by the weight of the final syllable: If the final syllable is heavy, they are assigned double high accent (e.g. [ɾéŋ.kʰíŋ] HH 'ranking'); however, if the final syllable is light, they fall into the penultimate accent class (e.g. [tʰék.si] HL 'taxi'). The description of the more detailed classification of the syllable hierarchy presented by Kim (2010) is shown in (26).

(26) Kim's analysis (2010; p31)

a. If a word has an initial long vowel, the initial syllable attracts high tone and double high accent is assigned.
b. If a word has an initial closed syllable,
   (i) for two-syllable words with a final light syllable, penultimate accent is assigned.
   (ii) otherwise, the initial syllable attracts high tone and double high accent is assigned.
c. If there is no initial heavy syllable, a penultimate heavy syllable attracts high tone.
d. If the penultimate is also not heavy, then high tone is assigned on a final heavy syllable.
e. If a word has no heavy syllable, penultimate accent is assigned.

Although Kim (2010) presents a more detailed analysis of the high tone assignment of NK English loanwords, her study mainly focuses on the exceptional tone assignment pattern of two-syllable English loanwords and does not provide enough concrete evidence on why penultimate syllables generally have priority over final syllables on the high tone assignment.

One of the main reasons that the previous studies have different analyses of the high tone assignment for loanwords with more than one heavy syllable seems to be due to their small data sets. The analysis of Chung (2000) is based on her native intuitions and presents six English loanwords as the examples. Kenstowicz & Sohn (2001) mention that the number of items in their corpus in which both the penultimate and final syllables are heavy is limited. Since the analysis of Kim (2010) is based on Chung (2000) and Kenstowicz & Sohn (2001), her study is based on a small number of words as well. Therefore, in order to present more accurate and objective evidence, this present study utilizes a database of 3,384 English loanwords, and tone patterns of each word were assigned based on the productions of six native speakers of NK Korean.

In addition, even if it has been argued that the assignment of high tone on NK English

loanwords is based on the bimoraic trochaic structure in relation to the other constraints, such as the bimoraic trochee (Kenstowicz & Sohn, 2001), foot alignment (Kenstowicz & Sohn, 2001; Kim, 2009), context-dependent coda moraicity (Chung, 2000, 2002; Kim, 2009), and no accented epenthetic vowel (Kenstowicz & Sohn, 2001), none of the previous studies (Chung 2000; Kenstowicz & Sohn 2001; Kim 2010) investigates how the bimoraic trochee system interacts with other constraints to assign an accent to words with more than one heavy syllable, except for the two-syllable loanwords with the closed-closed syllable composition. That is, they fail to analyze the foot structure types of these loanwords based on the bimoraic trochee. Therefore, this study will analyze which constraints interact with one another to create the hierarchy between heavy syllables in high tone assignment and will provide the expected foot structure types of each syllable composition. Based on a larger database, the results of this study will provide a better understanding of the relationship between the syllabic structure and tone assignment in NK English loanwords.

3.4.1. Two-syllable English loanwords

In order to see the relationship between syllabic structure and tone pattern in more detail, 961 two-syllable English loanwords were first divided into four groups based on their word structures. Then, each group was sorted by tone pattern. Table 5 presents the most frequently observed tone patterns, example words, and expected foot structure types of each syllable composition, based on the analysis in section 3.3.

Table 5. Most frequent tone pattern of NK two-syllable English loanwords

Syllable Composition	Most frequent tone patterns		Example word	Expected foot structure
Open-open 360/961 (37%)	HL	317/360 (88%)	[ká.s'ɨ] 'gas'	(ká.s'ɨ)
Open-closed 342/961 (36%)	LH	209/342 (61%)	[me.ín] 'main'	me.(í**n**)
Closed-open 151/961 (16%)	HL	142/151 (94%)	[kól.p^{h}ɨ] 'golf'	(kól.p^{h}ɨ)
Closed-closed 108/961 (11%)	HH	79/108 (73%)	[mén.t^{h}ál] 'mental'	(mé**n**).(t^{h}á**l**)

Out of the 961 two-syllable English loanwords, 360 (37%) are open-open, 342 (36%) are open-closed, 151 (16%) are closed-open, and 108 (11%) are closed-closed. For loanwords with no closed syllable (i.e. open-open), penultimate accent (HL) occurs most frequently and this corresponds to the observation of previous studies (Chung 2000; Kenstowicz & Sohn 2001; Kim 2010), which consider that penultimate accent is the default accent of NK English loanwords when there is no heavy syllable in a word. For loanwords with one closed syllable (i.e. open-closed; closed-open), high tone is most frequently assigned to the closed syllable. That is, final accent (LH) is observed most frequently for the open-closed loanwords, and penultimate accent (HL) is most frequent for the closed-open loanwords. Lastly, when both syllables of a two-syllable loanword are heavy (i.e. closed-closed), the initial syllable attracts high tone and double high accent (HH) occurs most frequently. This result of the double high accented loanwords provides evidence that the initial heavy syllable has a stronger tendency to attract high tone when there is a competition for the high tone assignment between the initial heavy syllable and the final heavy syllable (initial heavy syllable >> final heavy syllable). The expected foot structure types for each syllable composition are presented in Table 5, and the detailed descriptions for the foot structure types can

be found in section 3.3.1.

Although previous literature on the accentuation of NK English loanwords (e.g. Kenstowicz & Sohn 2001; Chung 2002) has generally agreed that NK English loanwords have a strong tendency to be assigned double high accent when the initial syllable is heavy with a coda consonant. However, Kim (2009) and Kim (2010) reveal that a group of two-syllable words exhibits an exceptional pattern. Unlike three and four syllable loanwords, the tone patterns of two-syllable loanwords with a closed initial syllable are determined based on the weight of the final syllable. That is, two-syllable loanwords with a closed initial syllable fall into the double high accent class only when the final syllable is heavy. Otherwise, if the final syllable is light, the loanwords are assigned penultimate accent. The results of the present section also match up with the observations of Kim (2009) and Kim (2010).

3.4.2. Three-syllable English loanwords

Next, to see the results of NK three-syllable English loanwords, 1408 words are divided into eight groups according to syllable combination. After sorting them by syllable combination, each group is subdivided by tone pattern to examine which accent is most frequently assigned to loanwords in each syllable composition. The classification results and the expected foot structure types for the most frequent tone patterns are shown in Table 6.

Table 6. Most frequent accent of NK three-syllable English loanwords

Syllable Composition	Most frequent tone patterns		Example word	Expected foot structure
open-open-open 653/1408 (46%)	LHL	535/653 (82%)	[ka.í.dɨ] ‘guide’	ka.(í.dɨ)
open-open-closed 402/1408 (29%)	LLH	302/402 (75%)	[pe.i.tɕík] ‘basic’	pe.i.(tɕí**k**)
open-closed-open 117/1408 (8%)	LHL	106/117 (91%)	[o.ɾén.tɕi] ‘orange’	o.(ɾén.tɕi)
closed-open-open 115/1408 (8%)	HHL	83/115 (72%)	[kʰém.pʰʌ́.s’ɨ] ‘campus’	(kʰé**m**).(pʰʌ́.s’ɨ)
closed-open-closed 52/1408 (4%)	HHL	30/52 (58%)	[kʰák.tʰé.il] ‘cocktail’	(kʰá**k**).(tʰé.il)
open-closed-closed 42/1408 (3%)	LHL	17/42 (40%)	[ɾi.s’ép.ɕjʌn] ‘reception’	ɾi.(s’ép.ɕjʌn)
closed-closed-open 21/1408 (1%)	HHL	20/21 (95%)	[tɕʰím.pʰén.tɕi] ‘chimpanzee’	(tɕʰí**m**).(pʰén.tɕi)
closed-closed-closed 6/1408 (1%)	HHL	5/8 (63%)	[áŋ.sáŋ.bɨl] ‘ensemble’	(á**ŋ**).(sáŋ.bɨl)

For three-syllable loanwords with no closed syllable (i.e. open-open-open), penultimate accent (LHL) is assigned most frequently. For three-syllable loanwords with one closed syllable, the relationship between the syllable weight and high tone assignment is clear: high tone is most frequently realized on the closed syllable. That is, if the initial syllable is the only heavy syllable (i.e. closed-open-open), the word most frequently has double high accent (HHL); if the penultimate syllable is the only heavy syllable (i.e. open-closed-open), penultimate accent is assigned (LHL) most frequently; if the final syllable is the only heavy syllable in a word (i.e. open-open-closed), final accent (LLH) occurs.

Yet, for English loanwords with more than one closed syllable, not every heavy syllable is realized with high tone and it seems that there is a hierarchy between heavy syllables for the high

tone assignment. For loanwords with an initial closed syllable (i.e. closed-open-closed; closed-closed-open; closed-closed-closed), double high accent (HHL), which has a high tone over the first two syllables of the words, is assigned. This pattern is shown regardless of the existence of any other heavy syllables in the words, and this indicates that the initial heavy syllables take priority over the penultimate and final heavy syllables in the competition of the high tone assignment in NK English loanwords (initial heavy syllable >> penultimate heavy syllable, final heavy syllable).

When both the penultimate and final syllables are heavy (i.e. open-closed-closed), penultimate accent (LHL) appears most frequently. Moreover, when all three syllables are heavy (i.e. closed-closed-closed), even if double high accent (HHL) occurs most frequently, the second most frequent tone pattern appears to be penultimate accent. The results provide evidence that penultimate syllable is preferred to final syllable for the high tone assignment (penultimate heavy syllable >> final heavy syllable), and this supports the analysis by Chung (2002) and Kim (2010). The expected foot structure types of each syllable combination are presented in Table 6, and more detailed descriptions on how the phonological constraints interact to assign the accent on three-syllable English loanwords can be found in section 3.3.2 and section 4.4.

3.4.3. Four-syllable English loanwords

The 1,015 four-syllable English loanwords were also first divided by syllable composition. After the initial classification, loanwords in each group were subdivided by tone pattern to observe which tone patterns are preferably assigned to each syllable combination in NK four-syllable English loanwords. The classification results and the expected foot structure types for the most frequently observed tone patterns are shown in Table 7.

Table 7. Most frequent accent of NK four-syllable English loanwords

Syllable Composition	Most frequent tone patterns		Example word	Expected foot structure
open-open-open-open 534/1015 (53%)	LLHL	477/534 (89%)	[a.i.dí.ʌ] ‘idea’	a.i.(dí.ʌ)
open-open-open-closed 199/1015 (20%)	LLLH	134/199 (67%)	[kʰo.mi.di.ʌ́n] ‘comedian’	kʰo.mi.di.(ʌ́**n**)
closed-open-open-open 104/1015 (10%)	HHLL	58/104 (56%)	[kʰón.tʰé.sɨ.tʰɨ] ‘contest’	(kʰó**n**).(tʰé.sɨ.tʰɨ)
open-open-closed-open 63/1015 (6%)	LLHL	55/63 (87%)	[hel.li.kʰóp.tʰʌ] ‘helicopter’	hel.li.(kʰóp.tʰʌ)
open-closed-open-open 45/1015 (4%)	LLHL	34/45 (76%)	[pʰɨ.ɾin.s’é.s’ɨ] ‘princess’	pʰɨ.ɾin.(s’é.s’ɨ)
closed-open-open-closed 26/1015 (3%)	HHLL	12/26 (46%)	[én.dó.ɾɨ.pʰin] ‘endorphin’	(é**n**).(dó.ɾɨ.pʰin)
open-closed-open-closed 19/1015 (2%)	LLLH	14/19 (74%)	[sɨ.pʰek.tʰɨ.ɾʌ́m] ‘spectrum’	sɨ.pʰek.tʰɨ.(ɾʌ́**m**)
open-open-closed-closed 14/1015 (1%)	LLHL	8/14 (57%)	[pe.dɨ.mín.tʰʌn] ‘badminton’	pe.dɨ.(mín.tʰʌn)
closed-open-closed-open 7/1015 (1%)	LLHL	5/7 (71%)	[in.sɨ.tʰʌn.tʰɨ] ‘instant’	in.sɨ.(tʰʌ́n.tʰɨ)
open-closed-closed-open 4/1015 (0%)	LLHL	4/4 (100%)	[sɨ.tʰon.hén.tɕi] ‘Stonehenge’	sɨ.tʰon.(hén.tɕi)

For four-syllable English loanwords with no closed syllable (i.e. open-open-open-open), penultimate accent is most frequently assigned in line with the results of two- and three-syllable words. Four-syllable loanwords with only one closed syllable also generally exhibit similar tone assignment patterns with two- and three-syllable loanwords: high tone falls on the heavy syllables. That is, loanwords with an initial closed syllable (i.e. closed-open-open-open) mainly have double high accent (HHLL); loanwords with a penultimate closed syllable (i.e. open-open-closed-open) are assigned penultimate accent (LLHL); and loanwords with a final closed syllable (i.e. open-

open-open-closed) are assigned final accent (LLLH) most frequently. However, one exception is observed: loanwords with an antepenultimate closed syllable (i.e. open-closed-open-open) most frequently exhibit penultimate accent (LLHL) instead of antepenultimate accent (LHLL). From the result, it can be assumed that the weight of the antepenultimate syllable does not contribute the high tone assignment of NK English loanwords. (This will be analyzed in Chapter 4.)

With the results of four-syllable loanwords with two or more closed syllables, the hierarchy between the heavy syllables in the high tone assignment becomes clearer. When a loanword has an initial heavy syllable and it competes with other heavy syllables for the high tone assignment, the loanword falls into the double high accent class. For instance, for the closed-open-open-closed syllable combination, the initial closed syllable is preferred to the final closed syllable for the high tone assignment (initial heavy syllable >> final heavy syllable), having double high accent (HHLL) most frequently. When the antepenultimate syllable is heavy and it competes with other heavy syllables for the high tone assignment (i.e. open-closed-open-closed; open-closed-closed-open), the other heavy syllable has priority over the antepenultimate syllable (penultimate heavy syllable, final heavy syllable >> antepenultimate heavy syllable). If both the penultimate syllable and the final syllable are heavy in four-syllable words (i.e. open-open-closed-closed), penultimate accent (LLHL) appears most frequently, and thus we can consider that the penultimate syllable is a more preferred position than the final syllable for the high tone assignment (penultimate heavy syllable >> final heavy syllable).

Yet, one of the syllable combinations of four-syllable loanwords displays an exceptional pattern: loanwords with the closed-open-closed-open syllable composition have penultimate accent (LLHL) as the main accent, though the initial syllable is heavy. However, the result is based on the tone patterns of seven loanwords out of 1015 four-syllable words (less than 1%). Since the

number of the loanwords is not considered to be enough to reflect a regular accentuation pattern, the result of this syllable combination is excluded from the analysis of this study. All in all, the general syllable hierarchy observed from the results of this study is: initial heavy syllable >> penultimate heavy syllable >> final heavy syllable >> antepenultimate syllable. This supports the analyses of Chung (2000) and Kim (2010). In addition, based on the most frequently observed tone pattern, the foot structure types for each syllable composition are proposed in Table 7. Detailed descriptions on which constraints interact with one another can be found in section 3.3.3 and section 4.4.

3.4.4. Discussion

Based on the 3,384 English loanword items, the results of section 3.4. first present more objective and concrete evidence on the hierarchy between heavy syllables of English loanwords in high tone assignment. The results are mostly similar to the description of Kim (2010), which is presented in (26). That is, if the initial syllable is heavy with a coda consonant, the word attracts double high accent regardless of whether or not there is another heavy syllable within the word; however, for two-syllable words with a final light syllable, penultimate accent is assigned. Moreover, if the penultimate syllable is heavy and the initial syllable is light, the word attracts penultimate accent regardless of the existence of other heavy syllables. Otherwise, if a final syllable is heavy and both initial and penultimate syllables are light, the word attracts final accent. The weight of antepenultimate syllables does not seem to attract high tone in four-syllable words. That is, except for the antepenultimate heavy syllable, preceding heavy syllables are preferred for the high tone assignment (i.e. initial heavy syllable >> penultimate heavy syllable >> final heavy syllable >> antepenultimate syllable).

In addition to the hierarchy observed from the surface form, this study further proposes the foot structure types of each syllable combination based on the main tone pattern in order to find out the constraints that influence the hierarchy. The classification results of this study show that if there is more than one heavy syllable in an English loanword, high tone is generally realized on the first heavy syllable. Since syllables with the foot head are realized with high tone, it can be assumed that the preceding heavy syllable is a preferred position for the foot head. From the observation, this study proposes that there is a constraint that forces closed syllables to be parsed into a foot. NK English loanwords, which are assigned an accent based on one or two bimoraic trochaic feet, have a constraint that the right edge of the foot must be aligned with the right edge of a word (Kenstowicz & Sohn 2001; Kim 2009). Thus, if a preceding syllable is parsed in a foot, the following syllables are naturally incorporated in a foot. That is, when an English loanword has more than one heavy syllable, the preceding heavy syllable is preferred to be assigned high tone (foot head) because then all the other heavy syllables can be parsed in a foot, respecting the constraint that forces closed syllables to be parsed in a foot.

Then, why do the antepenultimate heavy syllables exhibit an exceptional pattern? This seems to be related to the violation of the bimoraic trochee (Kenstowicz & Sohn 2001; Kim 2009). For loanwords with two and three syllables, by using the context-dependent coda moraicity (Chung 2002; Kim 2009) they can respect the bimoraic trochee as well as the constraint that forces heavy syllables to be parsed in a foot, regardless of the number of heavy syllables they have. For instance, for three-syllable loanwords with the closed-closed-open syllable combination, they are assigned double high accent based on two consecutive bimoraic trochaic feet in order to make all heavy syllables be parsed in a foot (e.g. [tɕʰím.pʰén.tɕi] HHL ‘chimpanzee’ → (tɕʰím).(pʰén.tɕi)). Since the foot heads of double high accent must be placed on the first and second syllables, the second

foot must include the second and third syllables to respect the foot alignment. Thus, the coda consonant of the second syllable becomes non-moraic to respect the bimoraic trochee. For three-syllable loanwords with the open-closed-closed syllable combination, penultimate accent is assigned to parse both the second and third syllables in a foot (e.g. [ɾi.s'ép.ɕjʌn] LHL 'reception' → ɾi.(s'ép.ɕjʌn)). For these words, both coda consonants of the second and third syllables become non-moraic to respect the bimoraic trochee as well as to parse both heavy syllables in a foot. That is, for two- and three-syllable English loanwords, regardless of how many closed syllables there are, all closed syllables can be parsed in a foot without violating the bimoraic trochee when it interacts with the context-dependent coda moraicity.

Yet, the situation is different for four-syllable English loanwords. When four-syllable loanwords with a heavy antepenultimate syllable do not have a heavy initial syllable, the words must fall into the single high accent class. When we consider the constraint that the right edge of a foot must be aligned with the right edge of the word, there are two possible options for loanwords with a heavy antepenultimate syllable to be assigned a foot: they can either have a foot structure type that violates the bimoraic trochee but parses the heavy antepenultimate syllable in a foot (i.e. σ(σ́σσ) LHLL) or have a foot structure type that respects the bimoraic trochee but does not parse the heavy antepenultimate syllable in a foot (i.e. σσ(σ́σ) LLHL or σσσ(σ́) LLLH).

From the classification results for the loanwords with a heavy antepenultimate syllable, it is noted that the second option is preferred and this exhibits the ranking between the bimoraic trochee constraint and the constraint that forces heavy syllables to be parsed in a foot (i.e. the bimoraic trochee is ranked higher). The classification results shown in Table 7 display three types of syllable combinations with a heavy antepenultimate syllable: open-closed-open-open, open-closed-closed-open, and open-closed-open-closed. In Table 8, two most valid foot structure types

for each syllable combination are presented with example loanwords to show the ranking argument between the two constraints.

Table 8. Possible foot structure types for four-syllable words with a heavy antepenultimate syllable

	open-closed-open-open	open-closed-closed-open	open-closed-open-closed
Example word	[pʰɨ.ɾin.s'e.s'ɨ] 'princess'	[sɨ.tʰon.hen.tɕi] 'Stonehenge'	[sɨ.pʰek.tʰɨ.ɾʌm] 'spectrum'
Candidate 1	pʰɨ.(ɾín.s'e.s'ɨ) LHLL	sɨ.(tʰón.hen.tɕi) LHLL	sɨ.(pʰék.tʰɨ.ɾʌm) LHLL
☞ Candidate 2	pʰɨ.ɾin.(s'é.s'ɨ) LLHL	sɨ.tʰon.(hén.tɕi) LLHL	sɨ.pʰek.tʰɨ.(ɾʌ́**m**) LLLH

For each example word in Table 8, Candidate 1 parses all the heavy syllables in a foot, including the antepenultimate syllable, but violates the bimoraic trochee by having three syllables in a foot. Candidate 2 respects the bimoraic trochee, but it does not parse the heavy antepenultimate syllable in a foot. For both candidates, the context-dependent coda moraicity is applied to reduce the amount of violation. According to the classification results presented in Table 7, Candidate 2 is preferred to Candidate 1 for all these syllable combinations. This provides evidence that the constraint that respects the bimoraic trochee is ranked higher than the constraint that parses closed syllables in a foot. However, there is a possibility that the foot structure types might be determined by other constraints such as the context-dependent coda moraicity. In Table 8, the examples presented in Candidate 1 violate the coda moraicity constraint one or two times more than those in Candidate 2, having one or two more non-moraic codas in a foot. One certain thing is that the constraint for the bimoraic trochee cannot be ranked lower than the constraint that parses heavy syllables in a foot.

However, unlike the tone assignment pattern observed from the four-syllable loanwords with a heavy antepenultimate syllable in Table 8, the results of four-syllable loanwords with a heavy initial syllable reveal that bimoraic trochee can be violated when the word-initial syllable is heavy. The results in Table 7 show that four-syllable English loanwords with an initial heavy syllable (i.e. closed-open-open-open; closed-open-open-closed) are most frequently assigned double high accent (i.e. (σ́)(σ́σσ) HHLL), violating the bimoraic trochee with a three-moraic foot but parsing the initial heavy syllable in a foot. Example loanwords with two most valid foot structure types for each syllable combination are presented in Table 9.

Table 9. Two most valid foot structure types for four-syllable words with a heavy initial syllable

Syllable combination	closed-open-open-open	closed-open-open-closed
Example word	[kʰon.tʰe.sɨ.tʰɨ] 'contest'	[en.do.ɾɨ.pʰin] 'endorphin'
☞ Candidate 1	(kʰó**n**).(tʰé.sɨ.tʰɨ) HHLL	(é**n**).(dó.ɾɨ.pʰin) HHLL
Candidate 2	kʰon.tʰe.(sí.tʰɨ) LLHL	en.do.ɾɨ.(pʰí**n**) LLLH

For the example four-syllable English loanwords with a heavy initial syllable in Table 9, Candidate 1 parses the initial heavy syllable in a foot but violates the bimoraic trochee by incorporating three syllables in the second foot. Candidate 2 respects the bimoraic trochee, but it does not parse the initial heavy syllable in a foot. For both syllable combinations, Candidate 1, which violates the bimoraic trochee but parses the initial heavy syllable in a foot, is the winning candidate. In Table 8, it is noticed that antepenultimate heavy syllables (non-initial position) are not parsed in a foot if the bimoraic trochee is violated. Yet, if a word-initial syllable is heavy, it must be parsed in a foot regardless of the violation of the bimoraic trochee. From the results, it can

be inferred that heavy syllables in word-initial position have a special salience, and the constraint that parses the initial heavy syllable is ranked higher than the constraint that respects the bimoraic trochee. This also means that parsing the initial heavy syllable is ranked higher than parsing the other heavy syllables.

This explains why English loanwords with an initial heavy syllable display an unusual tone assignment pattern, falling into the double high accent class. In the accentuation of NK loanwords, assigning a foot head on the initial syllable sometimes violates the bimoraic trochee (e.g. *(pín.tʰi.tɕi) HLL 'vintage'; *(pó:.nʌ.s'ɨ) HLL 'bonus'). However, the constraint that parses word-initial heavy syllables in a foot is ranked higher than the bimoraic trochee constraint, and thus the initial heavy syllable do not yield a foot head to the following syllables to respect the bimoraic trochee (e.g. *pin.(tʰí.tɕi) LHL 'vintage'; *po:.(nʌ́.s'ɨ) LHL 'bonus'). Nonetheless, the bimoraic trochee is a high-ranked constraint, so the violation is not preferred in NK loanwords. Thus, in order to minimize the violation of the bimoraic trochee, an additional foot seems to be added to the following syllables (e.g. (pí**n**).(tʰí.tɕi) HHL 'vintage'; (pó:).(nʌ́.s'ɨ) HHL 'bonus'). That is, a special salience of word-initial heavy syllables seems to play an important role in assigning double high accent to loanwords.

The results of this chapter reveal that the constraints that parse closed syllables in a foot has an important role in relation to the bimoraic trochee and context-dependent coda moraicity to form the hierarchy between heavy syllables of NK English loanwords in high tone assignment. The analysis of this chapter also proposes that parsing word-initial heavy syllables in a foot is ranked higher than other constraints such as the bimoraic trochee and parsing the other heavy syllables in a foot. Although antepenultimate heavy syllables can be unparsed when they compete with the bimoraic trochee, word-initial heavy syllables must be parsed in a foot regardless of the

violation of the bimoraic trochee, and this constraint plays an important role in assigning double high accent.

Even though this chapter partially examined which constraints are crucial to form the hierarchy between heavy syllables in high tone assignment, an integrated analysis is necessary to figure out the rankings between the constraints. Therefore, for the following Chapter 4, an explicit analysis of the NK tone patterns will be conducted in the framework of Optimality Theory in order to investigate how the phonological constraints interact for the tone assignment of NK English loanwords.

CHAPTER 4

OPTIMALITY-THEORETIC ANALYSIS ON TONE ASSIGNMENT OF NK ENGLISH LOANWORDS

4.1. Introduction

In the previous chapter, in order to understand the tone assignment system of NK English loanwords, 3,384 English loanwords were collected and classified based on syllable number, syllable composition, and accent, and then the relationship between the syllabic structure type and high tone assignment was analyzed. Although some discussion has been made in Chapter 3 about the ranking and interaction of the phonological constraints proposed by previous literature—such as the bimoraic trochee (Kenstowicz & Sohn, 2001), foot alignment (Kenstowicz & Sohn, 2001; Kim, 2009), context-dependent coda moraicity (Chung, 2000, 2002; Kim, 2009), and no accented epenthetic vowel (Kenstowicz & Sohn, 2001), in order to have a more comprehensive and clear analysis, this chapter will analyze their relationship in the framework of Optimality Theory.

The analysis in this chapter will be based on the most frequently observed tone pattern of each syllable combination, which is presented in section 3.4. Also, in this chapter, the syllable combinations will be grouped by number of closed syllables in a word, and the results will be presented separately. That is, in section 4.2., we will analyze the constraint interaction on the tone assignment of English loanwords with no closed syllable. Then, section 4.3. will examine the tone assignment of English loanwords with one closed syllable, and section 4.4. will analyze tone patterns of English loanwords with two or more closed syllables. In section 4.5., the constraint interaction on the exceptional tone assignment patterns of English loanwords will be discussed, and lastly section 4.6. will conclude the chapter.

4.2. English loanwords with no closed syllable

First, this section will focus on which constraints play a role to assign penultimate accent to two-, three-, and four-syllable English loanwords that contain no closed syllable. Previous studies (Kenstowicz & Sohn, 2001; Kim, 2009) agree on that the high tone assignment of NK English loanwords is based on the bimoraic trochee system. That is, single high accented English loanwords are assigned high tone based on a bimoraic trochaic foot that is aligned at the right edge of a word (Kenstowicz & Sohn, 2001). Based on the assertion, two relevant constraints can be suggested as shown in (1).

(1) **FOOT BINARITY [Moraic Trochee] (FT-BIN)**: (**L**L), (**H**) > (**L**) > (**L**LL), (**H**L)
(Revised from Kager 1999)
(where L = light syllable and H = closed syllable)
Prosodic feet are binary and left-headed under moraic analysis.

ALIGN-R (Wd, Ft) (Kager 1999)
The right edge of the word is aligned with the right edge of a foot.

The constraint FOOT BINARITY [Moraic Trochee] indicates that the foot types (**L**L) and (**H**) with two moras (i.e. (μ́μ)) are preferred to the foot type (**L**) with one mora (i.e. (μ́)), and then the foot type (**L**) with one mora (i.e. (μ́)) is preferred to the foot types (**L**LL) and (**H**L) with three moras (i.e. (μ́μμ)). Evidence that the monomoraic foot is preferred to the trimoraic foot is given in Tableau (23) in 4.5.1. All these foot types are left-headed and it is assumed that the foot head is realized with high tone. The constraint ALIGN-R (Wd, Ft) shows that the right edge of the word must be aligned with the right edge of a foot. The interaction of these two constraints exhibits how penultimate accent appears as the default accent for NK English loanwords with no closed syllable.

First, let us look at how these two constraints interact to assign penultimate accent to two-

syllable loanwords with the open-open syllable composition. Tableau (1) presents the possible output candidates for the input /mi.ni/ 'mini.' In this and subsequent tableaus, the winning candidate is marked with the symbol '☞'; an accent mark indicates high tone; no accent mark indicates low tone; a moraic coda is marked with the boldface type letter; parentheses indicate foot structure; a period indicates a syllable boundary; and candidates with iambic foot structure will not be considered.

Tableau (1) /mi.ni/ → [mí.ni] HL 'mini' (open-open)

Input: /mi.ni/	FT-BIN [Moraic Troch]	ALIGN-R (Wd, Ft)
☞ a. (mí.ni)		
b. (mí).ni	*(L)!	*
c. mi.(ní)	*(L)!	

Candidate (1a) is assigned penultimate accent with a bimoraic trochaic foot that is aligned at the right edge of the word. It respects both constraints FT-BIN [Moraic Troch] and ALIGN-R (Wd, Ft), and thus becomes the optimal output. Candidate (1b) loses because it violates both constraints, having a mono-moraic foot in the initial syllable. Candidate (1c) is ruled out because it has a mono-moraic foot on the final syllable, violating the constraint FT-BIN [Moraic Troch] that the winning candidate respects. There has been no ranking argument observed between the two constraints, and it is indicated by the dashed line in Tableau (1).

As seen in Tableau (1), when a two-syllable loanword has no closed syllable, the word contains two moras, one in each vowel, and the winning candidate parses both syllables in a bimoraic foot. Yet, unlike the two-syllable words, three-syllable English loanwords with the open-open-open syllable combination have three moras, and thus one of the syllables cannot be parsed

in a foot in order to respect the bimoraic foot structure. To account for the unparsed syllable, a new constraint is presented in (2).

(2) **PARSE-SYL** (Kager 1999)
Syllables are parsed by feet.

The constraint PARSE-SYL counts against syllables that are not incorporated in a foot. The ranking of the constraint and how the constraint interacts with other constraints to assign penultimate accent on the three-syllable English loanwords are presented in the following Tableau (2), which shows possible output candidates of a loanword /ɾa.di.o/ 'radio.'

Tableau (2) /ɾa.di.o/ → [ɾa.dí.o] LHL 'radio' (open-open-open)

Input: /ɾa.di.o/	FT-BIN [Moraic Troch]	ALIGN-R (Wd, Ft)	PARSE-SYL
☞ a. ɾa.(dí.o)			*
b. (ɾá.di).o		*!	*
c. (ɾá).(dí.o)	*!(L)		

The winning candidate (2a) violates the constraint PARSE-SYL but survives because it respects both the constraints FT-BIN [Moraic Troch] and ALIGN-R (Wd, Ft). Candidate (2b) loses because it violates the constraint ALIGN-R (Wd, Ft) that the winning candidate respects, having the final syllable unparsed in a foot. Although Tableau (2) does not provide evidence for the ranking between PARSE-SYL and ALIGN-R (Wd, Ft), it is assumed that the latter is undominated and thus ranked higher as discussed in 3.3.3.3. The candidate in (2c) is ruled out because it does not respect the constraint FT-BIN [Moraic Troch] with a mono-moraic foot in the initial syllable. This provides a ranking argument that FT-BIN [Moraic Troch] outranks PARSE-SYL since the reverse ranking

would wrongly result in candidate (2c) being the winner. The ranking of the three constraints is presented in (3). There has been no ranking argument observed between FOOT BINARITY [Moraic Trochee] and ALIGN-R (Wd, Ft).

(3) FOOT BINARITY [Moraic Trochee], ALIGN-R (Wd, Ft) >> PARSE-SYL

As we observed in Tableaus (1) and (2), two- and three-syllable English loanwords with no closed syllable possess either two or three moras, and thus only one bimoraic foot was allowed to respect the bimoraic trochee. Yet, four-syllable words with no closed syllable have four moras, and thus two bimoraic feet can be assigned without violating the bimoraic trochee. However, in NK Korean, there is a strict restriction that a prosodic word cannot have two pitch falls (Lee, 2009). That is, within a word, there can be only one place where a high tone is followed by a low tone. To account for the restriction, one more constraint is introduced in (4).

(4) ***FALLRISE**
Once a tone falls, it does not rise again in a prosodic word.

The constraint *FALLRISE indicates that NK Korean allows only one pitch fall within a word. Since no NK word exhibits more than one pitch fall, the constraint is considered inviolable, and thus it must be ranked highest. An argument for the crucial ranking of *FALLRISE above PARSE-SYL is demonstrated in Tableau (3), providing possible output candidates for the input /a.i.di.ʌ/ 'idea,' which is an example of loanwords with the open-open-open-open syllable combination.

Tableau (3) /a.i.di.ʌ/ → [a.i.dí.ʌ] LLHL ‘idea’ (open-open-open-open)

Input: /a.i.di.ʌ/	*FALLRISE	PARSE-SYL
☞ a. a.i.(dí.ʌ)		**
b. (á.i).(dí.ʌ)	*!	

Even if candidate (3a) violates the constraint PARSE-SYL twice with two unparsed syllables, it becomes the optimal output since it respects the constraint *FALLRISE. Candidate (3b), which does not violate the constraint PARSE-SYL, is ruled out because it violates the undominated constraint *FALLRISE. Although it has been observed that the constraint PARSE-SYL is ranked lower than the other constraints, there has been no ranking argument among the higher-ranked constraints. The ranking of the constraints so far is presented in (5).

(5) *FALLRISE, FOOT BINARITY [Moraic Trochee], ALIGN-R (Wd, Ft) >> PARSE-SYL

The constraint interactions in Tableau (1), (2), and (3) demonstrate how penultimate accent appears as the default accent in NK English loanwords when there is no closed syllable in a word. Next, in the following section, we will examine how English loanwords that contain a closed syllable are assigned accent and which constraints are additionally used.

4.3. English loanwords with one closed syllable

When an English loanword has one closed syllable, high tone is generally realized on the closed syllable in NK Korean (Kenstowicz & Sohn, 2001; Chung, 2002). That is, if the word-initial syllable is the only closed syllable in a word, double high accent, which assigns high tone over the first two syllables, is commonly assigned; If the penultimate syllable is the only closed

syllable, high tone falls on the penultimate syllable; If the final syllable is the only closed syllable, high tone is generally assigned on the final syllable. Although the previous studies found out that high tone realization is closely related to the position of closed syllables, the foot structure types and phonological constraints that interact to assign the foot have not been fully investigated. This section will examine which constraint interaction causes the closed syllables to attract high tone for NK English loanwords with one closed syllable.

4.3.1. Words with an initial closed syllable

First, when an English loanword has a closed syllable in word-initial position, double high accent is generally assigned, having a high tone over the first two syllables. However, as we observed in Chapter 3, two-syllable English loanwords exhibit an exceptional pattern: if the initial syllable is the only closed syllable in a two-syllable word, penultimate accent is assigned instead of double high accent. According to Kim (2009), double high accent is assigned based on two consecutive bimoraic trochaic feet. This indicates that four moras are required for a loanword to be assigned double high accent without violating the bimoraic trochaic foot structure (i.e. (μ́μ)(μ́μ)). Yet, two-syllable words with the closed-open syllable composition have only three moras: one mora on each of the vowels and one mora on the coda consonant of the first syllable. Thus, loanwords with the closed-open syllable composition are not eligible for double high accent. The high tone assignment rule for the closed-open English loanwords will be discussed in 4.4.2. with other penultimate accented loanwords.

Unlike two-syllable loanwords, three- and four-syllable English loanwords are assigned double high accent when they have a closed syllable in word-initial position. This indicates that the closed initial syllable must be parsed in a foot and assigned high tone as a foot head. In section

3.4.4., we discussed that closed syllables in word-initial position work differently from closed syllables in the other positions in terms of the foot assignment. Although closed syllables in the other positions are parsed in a foot only when the bimoraic trochee is respected (see Table 8 in 3.4.4.), closed syllables in word-initial position are always parsed in a foot and this sometimes causes violation of the bimoraic trochee (see Table 9 in 3.4.4.). This means that the constraint that parses word-initial closed syllable is ranked higher than the constraint FOOT BINARITY [Moraic Trochee], whereas the ranking of the constraint that parses the other closed syllable is either lower than or tied with the constraint FOOT BINARITY [Moraic Trochee]. It seems that word-initial closed syllables exhibit special positional faithfulness as suggested by Beckman (1997). Therefore, this chapter will present two distinct constraints for closed syllables in word-initial position and closed syllables in the other positions. The constraint that forces to parse word-initial closed syllables is introduced first in (6) and can be seen as reflecting the salience of word-initial position (Beckman, 1997).

(6) **PARSE-SYL (Closed Initial)** (Revised from Kager 1999)
Word-initial closed syllables are parsed by feet.

The constraint PARSE-SYL (Closed Initial) counts against unparsed word-initial closed syllables in NK English loanwords. Since the constraint is not violated in the main tone patterns, it should be considered undominated. To show how this constraint works to assign double high accent to three-syllable loanwords with an initial closed syllable, Tableau (4) first displays possible output candidates for the input [kʰem.pʌ.sɨ] ‘campus,’ which is an example loanword for the closed-open-open syllable combination.

Tableau (4) /kʰem.pʌ.sɨ/ → [kʰém.pʌ́.sɨ] HHL ‘campus’ (closed-open-open)

Input: /kʰem.pʌ.sɨ/	ALIGN-R (Wd, Ft)	PARSE-SYL (CI)	PARSE-SYL
☞ a. (kʰé**m**).(pʌ́.sɨ)			
b. kʰem.(pʌ́.sɨ)		*!	*
c. (kʰé**m**).pʌ.sɨ	*!		**

Candidate (4a) does not violate any of the constraints, and thus becomes the winning candidate. Candidate (4b) loses because it does not parse the initial closed syllable in a foot, violating the constraints PARSE-SYL (CI) and PARSE-SYL. Candidate (4c) is ruled out because it does not respect the constraints ALIGN-R (Wd, Ft) and PARSE-SYL, leaving the last two syllables unparsed. Although the new constraint PARSE-SYL (CI) is not violable and ranked higher than the constraint PARSE-SYL, no ranking argument was observed among the higher ranked constraints in Tableau (4).

However, a new ranking argument is displayed when the constraints interact to assign double high accent to four-syllable loanwords with a word-initial heavy syllable. If a four-syllable English loanword falls into the double high accent class and high tone (foot head) is assigned on each of the first two syllables, it either violates the constraint FOOT BINARITY [Moraic Trochee] by incorporating three syllables in the second foot (i.e. (σ́)(σ́σσ)) or violates the constraint ALIGN-R (Wd, Ft) by leaving the last syllable unparsed (i.e. (σ́)(σ́σ)σ). Even if the bimoraic trochee is generally respected in the accent assignment of NK English loanwords, we noted in the previous chapter that the bimoraic trochee could be violated in certain contexts. For instance, the word /sɨ.ki/ ‘ski’ is assigned final accent (i.e. [sɨ.kí]; sɨ.(kí) LH) instead of penultimate accent in order to avoid assigning high tone on the epenthetic vowel [ɨ] (see (8), (16), and (24) in Chapter 3 for more information). Yet, there has been no evidence for ALIGN-R (Wd, Ft) to be violable. Therefore, this study suggests that the constraint ALIGN-R (Wd, Ft) is undominated, while the constraint FOOT

BINARITY [Moraic Trochee] can be violated when it interacts with other undominated constraints. Tableau (5) below demonstrates the new ranking of the constraint FOOT BINARITY [Moraic Trochee] with the possible output candidates of the input /am.mo.ni.a/ 'ammonia,' an example word for the closed-open-open-open syllable composition.

Tableau (5) /am.mo.ni.a/ → [ám.mó.ni.a] 'ammonia' HHLL (closed-open-open-open)

Input: /am.mo.ni.a/	*FALLRISE	ALIGN-R (Wd, Ft)	PARSE-SYL (CI)	FT-BIN [Moraic Troch]	PARSE-SYL
☞ a. (á**m**).(mó.ni.a)				*(LLL)	
b. am.mo.(ní.a)			*!		**
c. (á**m**.mo).(ní.a)	*!			*(HL)	
d. (á**m**).(mó.ni).a		*!			*

Candidate (5a) becomes the optimal output, though it violates the constraint FT-BIN [Moraic Troch], incorporating three syllables (three moras) in the second foot. This shows that the constraint FT-BIN [Moraic Troch] is violable and thus ranked lower than the inviolable constraints. Candidate (5b) is ruled out because it violates PARSE-SYL (CI) and PARSE-SYL that the winning candidate respects, having the first two syllables unparsed in a foot. Candidate (5c) loses due to the violation of the undominated constraint *FALLRISE, and the other losing candidate (5d) violates another undominated constraint ALIGN-R (Wd, Ft), having the unparsed last syllable. The new ranking for the constraints so far is presented in (7).

(7) *FALLRISE, ALIGN-R (Wd, Ft), PARSE-SYL (CI) >> FT-BIN [Moraic Troch] >> PARSE-SYL

So far, we have analyzed how double high accent is assigned to English loanwords that have

a word-initial closed syllable. Although it was turned out that the constraint FT-BIN [Moraic Troch] can be violated when it interacts with undominated constraints, it should be noted that the constraint is still ranked high and plays an important role in the NK accent assignment. That is, the violation occurs only in a few unavoidable contexts and the constraint should be highly respected. Now we turn to the tone assignment patterns of English loanwords that have a closed syllable in the penultimate position.

4.3.2. Words with a penultimate closed syllable

If the penultimate syllable is the only closed syllable in an English loanword, high tone generally falls on the penultimate syllable, and this means that the foot head is assigned on the penultimate syllable. Since the constraint ALIGN-R (Wd, Ft) is undominated, this shows that both the closed penultimate syllable, which possesses two moras, and open final syllable, which contains one mora, are parsed in a foot. However, having three moras in a foot violates the constraint FT-BIN [Moraic Troch]. Even if the constraint FT-BIN [Moraic Troch] can be violated when it interacts with undominated constraints such as ALIGN-R (Wd, Ft), the violation occurs only in inevitable conditions.

As discussed in Chapter 3, in order for loanwords with a penultimate closed syllable not to violate the constraint FT-BIN [Moraic Troch], the contextual heaviness of the closed syllable should be considered. Chung (2002) and Kim (2009) claim that NK English loanwords use a context-dependent coda weight system. That is, closed syllables of NK English loanwords are generally considered heavy but sometimes behave light to satisfy a higher-ranked metrical constraint (i.e. the bimoraic trochee). Thus, if a loanword has a penultimate closed syllable and the final syllable is light, the coda consonant of the penultimate syllable becomes non-moraic so that penultimate

accent can be assigned without violating the bimoraic trochee (Kim 2009). In order to account for the context-dependent coda moraicity, two new constraints are proposed in (8).

(8) **WEIGHT-BY-POSITION (W-BY-P)** (Kager 1999)
Coda consonants are moraic.

DEP-μC (Kim 2009, Revised from Kager 1999)
An output mora on a consonant has an input moraic correspondent.

The constraint WEIGHT-BY-POSITION militates against a non-moraic coda, and DEP-μC counteracts a moraic coda. These constraints will only be evaluated for coda consonants that are footed. Since the context-dependent coda moraicity is proposed in order to satisfy the bimoraic trochee, the new constraints must be ranked lower than the constraint FT-BIN [Moraic Troch]. To check how these constraints interact with other constraints to assign penultimate accent to two-syllable English loanwords with the closed-open syllable composition, Tableau (6) shows possible output candidates for the input /mem.bʌ/ 'member.'

Tableau (6) /mem.bʌ/ → [mém.bʌ] HL 'member' (closed-open)

Input: /mem.bʌ/	ALIGN-R (Wd, Ft)	FT-BIN [Moraic Troch]	PARSE-SYL	W-BY-P	DEP-μC
☞ a. (mém.bʌ)				*	
b. (mé**m**).bʌ	*!		*		*
c. (mé**m**.bʌ)		*!(HL)			*
d. (mé**m)**.(bʌ́)		*!(L)			*

Candidate (6a), which has a non-moraic coda consonant in the initial syllable, violates the constraint WEIGHT-BY-POSITION but survives as the winning candidate because it respects all the

other higher-ranked constraints including the constraint FT-BIN [Moraic Troch]. The candidate in (6b) loses because it does not have its final syllable incorporated in a foot, violating the constraints ALIGN-R(Wd, Ft) and PARSE-SYL. It also violates the constraint DEP-μC with a moraic coda. The losing candidate (6c) violates the constraint FT-BIN [Moraic Troch] incorporating three moras in a foot, and it also violates DEP-μC having a moraic coda in the initial syllable. Candidate (6d) is also ruled out because it has a mono-moraic foot on the final syllable violating the constraint FT-BIN [Moraic Troch]. Although the new constraints are ranked lower than the constraint FT-BIN [Moraic Troch], no ranking argument was exhibited between the new constraints and the constraint PARSE-SYL. The ranking argument of the new constraints will be presented in the following section 4.3.3. and 4.4.1. The ranking of the constraints so far is shown in (9).

(9) *FALLRISE, ALIGN-R (Wd, Ft), PARSE-SYL (CI) >> FT-BIN [Moraic Troch] >> PARSE-SYL, W-BY-P, DEP-μC

Next, Tableau (7) shows possible output candidates for a three-syllable loanword input /o.ɾen.tɕi/ 'orange,' which is an example word of the open-closed-open syllable combination.

Tableau (7) /o.ɾen.tɕi/ → [o.ɾén.tɕi] LHL 'orange' (open-closed-open)

Input: /o.ɾen.tɕi/	ALIGN-R (Wd, Ft)	FT-BIN [Moraic Troch]	PARSE-SYL	W-BY-P	DEP-μC
☞ a. o.(ɾén.tɕi)			*	*	
b. o.(ɾé**n**).tɕi	*!		**		*
c. (ó).(ɾén.tɕi)		*!(L)		*	

Candidate (7a) survives as the optimal output, though it violates the constraints PARSE-SYL and WEIGHT-BY-POSITION with an unparsed initial syllable and a non-moraic coda in the

penultimate syllable. The losing candidate (7b) is ruled out because the final syllable is not incorporated in a foot, violating the undominated constraint ALIGN-R (Wd, Ft). It also violates the lower-ranked constraints PARSE-SYL and DEP-μC with two unparsed syllables and a moraic coda. Candidate (7c) is also ruled out since it violates the higher-ranked constraint FT-BIN [Moraic Troch] having a mono-moraic foot in the initial syllable. The candidate violates the constraint WEIGHT-BY-POSITION as well with a non-moraic coda in the penultimate syllable.

Tableau (8) displays possible output candidates for a four-syllable word with the open-open-closed-open syllable combination.

Tableau (8) /pʰi.ɾo.tɕek.tʰi/ → [pʰi.ɾo.tɕék.tʰi] LLHL 'project' (open-open-closed-open)

Input: /pʰi.ɾo.tɕek.tʰi/	*FALLRISE	ALIGN-R (Wd, Ft)	FT-BIN [Moraic Troch]	PARSE-SYL	W-BY-P	DEP-μC
☞ a. pʰi.ɾo.(tɕék.tʰi)				**	*	
b. pʰi.ɾo.(tɕé**k**).tʰi		*!		***		*
c. pʰi.ɾo.(tɕé**k**.tʰi)			*!(HL)	**		*
d. (pʰí.ɾo).(tɕék.tʰi)	*!				*	

Candidate (8a), which violates the constraints PARSE-SYL and WEIGHT-BY-POSITION, survives because it respects all the higher-ranked constraints. Candidate (8b) is ruled out since it violates the undominated constraint ALIGN-R (Wd, Ft). Candidate (8c) loses due to the violation of the constraint FT-BIN [Moraic Troch] having three moras in a foot. The losing candidate (8d) violates the constraint *FALLRISE. There is no new ranking argument observed among the constraints.

So far, we have looked at which constraint interaction assigns penultimate accent to English loanwords that has a closed syllable in the penultimate position. This section examined

how the constraints for the context-dependent coda moraicity reported by Kim (2009) and Chung (2002) play a role to respect the bimoraic trochee. Next, in the following section, we will investigate how English loanwords with a final closed syllable are assigned final accent.

4.3.3. Words with a final closed syllable

If the final syllable is the only closed syllable in an English loanword, the word is assigned final accent. Although the accent assignment does not require new constraints, a new ranking argument is presented among the existing constraints. Tableau (9) demonstrates an argument for the crucial ranking of WEIGHT-BY-POSITION above PARSE-SYL and DEP-μC by providing possible output candidates for the two-syllable loanword input /me.in/ 'main.'

Tableau (9) /me.in/ → [me.ín] LH 'main' (open-closed)

Input: /me.in/	FT-BIN [Moraic Troch]	W-BY-P	PARSE-SYL	DEP-μC
☞ a. me (í**n**)			*	*
b. (mé)(í**n**)	*!(L)			*
c. (mé.in)		*!		

Candidate (9a) violates the constraints PARSE-SYL and DEP-μC due to the unparsed initial syllable and the moraic coda in the final syllable, but it becomes the winning candidate. The losing candidate (9b) is ruled out because it has a mono-moraic foot comprising the first syllable, and it violates the constraint FT-BIN [Moraic Troch]. Candidate (9c) respects all the other constraints that the winning candidate violates but does not survive because it violates WEIGHT-BY-POSITION, having a non-moraic coda in the final syllable. This provides evidence that the constraint WEIGHT-BY-POSITION is ranked higher the constraints PARSE-SYL and DEP-μC. The new ranking

demonstrates that moraic codas are preferred to non-moraic codas in NK English loanwords. The new constraint ranking is presented in (10).

(10) *FALLRISE, ALIGN-R (Wd, Ft), PARSE-SYL (CI) >> FT-BIN [Moraic Troch] >> W-BY-P >> PARSE-SYL, DEP-μC

The new constraint ranking between WEIGHT-BY-POSITION and PARSE-SYL is also observed in the tone assignment of three-syllable loanwords with final accent. Tableau (10) displays possible output candidates for an example word /pe.i.tɕik/ 'basic,' which exhibits the open-open-closed syllable combination, to show how final accent is assigned to three-syllable loanwords with a final closed syllable.

Tableau (10) /pe.i.tɕik/ → [pe.i.tɕík] LLH 'basic' (open-open-closed)

Input: /pe.i.tɕik/	*FALLRISE	W-BY-P	PARSE-SYL	DEP-μC
☞ a. pe.i.(tɕí**k**)			**	*
b. (pé.i).(tɕí**k**)	*!			*
c. pe.(í.tɕik)		*!	*	

The winning candidate (10a) violates both PARSE-SYL and DEP-μC with two unparsed syllables and a moraic coda but becomes the optimal output since it respects all the other higher-ranked constraints. Candidate (10b) loses because it does not respect the undominated constraint *FALLRISE having high tone on two syllables that are not adjacent. The candidate also violates the constraint DEP-μC with a moraic coda. Candidate (10c) is ruled out because it does not respect the constraints WEIGHT-BY-POSITION and PARSE-SYL with a non-moraic final coda and an unparsed initial syllable. Although candidate (10c) violates the constraint PARSE-SYL one time less than the

winning candidate, it loses because it violates the constraint WEIGHT-BY-POSITION that the winning candidate respects.

Next, NK four-syllable loanwords with the open-open-open-closed syllable composition is also most frequently assigned final accent, and Tableau (11) shows possible output candidates for the input /kʰo.mi.di.ʌn/ 'comedian.'

Tableau (11) /kʰo.mi.di.ʌn/ → [kʰo.mi.di.ʌ́n] LLLH 'comedian'(open-open-open-closed)

Input: /kʰo.mi.di.ʌn/	*FALLRISE	W-BY-P	PARSE-SYL	DEP-μC
☞ a. kʰo.mi.di.(ʌ́**n**)			***	*
b. kʰo.(mí.di).(ʌ́**n**)	*!		*	*
c. kʰo.mi.(dí.ʌn)		*!	**	

Although candidate (11a) violates the constraint PARSE-SYL more than candidates (11b) and (11c), it becomes the optimal output since it does not violate any of the higher-ranked constraints. Candidates (11b) and (11c) are ruled out because (11b) does not respect the undominated constraint *FALLRISE and (11c) violates the higher-ranked constraint WEIGHT-BY-POSITION. This again shows that the constraint WEIGHT-BY-POSITION is ranked higher than PARSE-SYL and DEP-μC because the reverse ranking would wrongly result in candidate (11c) being the winner.

4.3.4. Words with an antepenultimate closed syllable

From the classification results presented in Chapter 3, it is noticed that high tone is generally attracted by closed syllables. However, there was an exception: the antepenultimate syllable in four-syllable loanwords does not attract high tone, even when it is the only closed syllable. If the antepenultimate syllable is the only closed syllable in a four-syllable loanword, the word is most

frequently assigned penultimate accent instead of antepenultimate accent. To account for the tone assignment pattern, one more constraint should be provided as in (11).

(11) **ALIGN-L (HH, Wd)** (Revised from Kager 1999)
Adjacent high tones are aligned with the left edge of a prosodic word.

The constraint ALIGN-L (HH, Wd) indicates that the left edge of two consecutive feet must be aligned with the left edge of a word. This is an undominated constraint, so should be ranked highest. Tableau (12) shows the possible output candidates for the input /pʰɨ.ɾin.s'e.s'ɨ/ 'princess,' which is an example word for the open-closed-open-open syllable combination.

Tableau (12) /pʰɨ.ɾin.s'e.s'ɨ/ → [pʰɨ.ɾin.s'é.s'ɨ] LLHL 'princess' (open-closed-open-open)

Input: /pʰɨ.ɾin.s'e.s'ɨ/	*FALLRISE	ALIGN-L (HH, Wd)	FT-BIN [Moraic Troch]	W-BY-P	PARSE-SYL	DEP-μC
☞ a. pʰɨ.ɾin.(s'é.s'ɨ)					**	
b. pʰɨ.(ɾí**n**).(s'é.s'ɨ)		*!			*	*
c. (pʰɨ́.ɾin).(s'é.s'ɨ)	*!			*		
d. pʰɨ.(ɾín.s'e.s'ɨ)			*!(LLL)	*	*	

Candidate (12a) is the optimal output even though it violates the constraint PARSE-SYL two times. Candidate (12b) is ruled out because it does not respect the inviolable constraint ALIGN-L (HH, Wd), having two foot heads on the second and third syllables. Candidate (6c) does not survive because it violates the undominated constraint *FALLRISE. The losing candidate (12d) violates the higher-ranked constraints FT-BIN [Moraic Troch] and W-BY-P, having three moras in a foot. The ranking of the new constraint is shown in (12).

(12) *FALLRISE, ALIGN-R (Wd, Ft), PARSE-SYL (CI), ALIGN-L (HH, Wd) >> FT-BIN [Moraic Troch] >> W-BY-P >> PARSE-SYL, DEP-μC

So far, we have examined how constraints interact to assign high tone to English loanwords with one closed syllable. In the following section, we will investigate how high tone is assigned to English loanwords with more than one closed syllable.

4.4. English loanwords with two or more closed syllables

If an English loanword has two or more closed syllables, one of the closed syllables must have a priority over the others in the high tone assignment. In section 3.4., the classification results reveal that there is a tendency that the preceding closed syllables are preferred to be assigned high tone, though the antepenultimate syllable shows some exceptional patterns. The observed hierarchy between the closed syllables in the high tone assignment is: *initial closed syllable* >> *penultimate closed syllable* >> *final closed syllable* >> *antepenultimate closed syllable*. In this section, we will examine how constraints interact to assign high tone to English loanwords that contain more than one closed syllable.

For the optimality-theoretic analysis, in the following subsections the loanwords are grouped by the position of the closed syllable presented in the hierarchy. That is, 4.4.1. will look at the tone assignment patterns of loanwords that have a word-initial closed syllable. These words are assigned double high accent regardless of the existence of other closed syllables. 4.4.2. will focus on the loanwords that have an open word-initial and closed penultimate syllables. If penultimate syllable is closed when the initial syllable is open, the words fall into the penultimate accent class. In 4.4.3., we will examine the tone assignment of English loanwords that have a closed final syllable with open word-initial and penultimate syllables. These words generally fall

into the final accent class. As discussed in section 3.4., closed antepenultimate syllables do not attract high tone in general, and thus the accent assignment of words with a closed antepenultimate syllable is affected by the position of other closed syllables.

4.4.1. Words with an initial closed syllable

If an English loanword has two or more closed syllables and one of them is in word-initial position, the loanword generally falls into the double high accent class. First, for two-syllable words, there is one syllable composition that has more than one closed syllable: closed-closed. Tableau (13) shows how double high accent is assigned to these loanwords with an example input /men.tʰal/ 'mental.'

Tableau (13) /men.tʰal/ → [mén.tʰál] HH 'mental' (closed-closed)

Input: /men.tʰal/	PARSE-SYL (CI)	W-BY-P	DEP-μC
☞ a. (mé**n**).(tʰá**l**)			**
b. (mén.tʰal)		*!*	
c. men.(tʰá**l**)	*!		*

The winning candidate (13a) violates DEP-μC two times with two moraic codas but survives since it respects all the other higher-ranked constraints. Candidate (13b) is ruled out because it has two non-moraic codas, violating the constraint WEIGHT-BY-POSITION twice. Although candidate (13c) violates the constraint DEP-μC less than the winning candidate (13a), it is ruled out due to the violation the constraint PARSE-SYL (CI) with an unparsed closed initial syllable. This tableau critically shows that WEIGHT-BY-POSITION must outrank DEP-μC.

For three-syllable English loanwords with two or more closed syllables, the classification results display three distinct syllable combinations that contain a closed syllable in word-initial

position: closed-open-closed, closed-closed-open, and closed-closed-closed. English loanwords in these compositions are assigned double high accent and the constraint interaction for the high tone assignment will be presented in the following Tableaus. Tableau (14) first shows possible output candidates for the input /kʰak.tʰe.il/ 'cocktail,' which is an example word for the closed-open-closed syllable combination.

Tableau (14) /kʰak.tʰe.il/ → [kʰák.tʰé.il] HHL 'cocktail' (closed-open-closed)

Input: /kʰak.tʰe.il/	*FALLRISE	PARSE-SYL (CI)	W-BY-P	PARSE-SYL	DEP-μC
☞ a. (kʰá**k**)(tʰé.il)			*		*
b. (kʰák.tʰe)(í**l**)	*!		*		*
c. kʰak.(tʰé.il)		*!	*	*	
d. kʰak.tʰe.(í**l**)		*!		**	*

Candidate (14a) survives even though it does not respect the constraints W-BY-P and DEP-μC since it respects all the undominated constraints. However, candidate (14b) loses since it violates the undominated constraint *FALLRISE, having two syllables with high tone that are not adjacent to each other. The losing candidates (14c) and (14d) are ruled out due to the violation of the higher-ranked constraint PARSE-SYL (CI), having an unparsed closed initial syllable. Notice that the winning candidate (14a) has one coda consonant that is moraic and one that is nonmoraic. This gives evidence to the view that coda weight is determined by what makes for the best parse given the overall constraint ranking.

Tableau (15) shows how double high accent is assigned to three-syllable loanwords with the closed-closed-open syllable combination. Possible output candidates of the input /tɕʰim.pʰen.tɕi/ 'chimpanzee' are provided to show the constraint interaction.

Tableau (15) /tɕʰim.pʰen.tɕi/ → [tɕʰím.pʰén.tɕi] HHL ‘chimpanzee’ (closed-closed-open)

Input: /tɕʰim.pʰen.tɕi/	ALIGN-R (Wd, Ft)	PARSE-SYL (CI)	W-BY-P	PARSE-SYL	DEP-μC
☞ a. (tɕʰí**m**).(pʰén.tɕi)			*		*
b. (tɕʰí**m**).(pʰé**n**).tɕi	*!				**
c. tɕʰim.(pʰén.tɕi)		*!	*	*	

The winning candidate (15a) violates the constraints W-BY-P and DEP-μC but survives since it respects all the higher-ranked constraints. Candidate (15b) respects the constraint W-BY-P that the winning candidate violates but loses due to the violation of the higher-ranked constraint ALIGN-R (Wd, Ft). The losing candidate (15c) is ruled out because it does not incorporate the heavy initial syllable in a foot, violating the constraint PARSE-SYL (CI). No new ranking argument has been observed in Tableaus (14) and (15).

Unlike three-syllable loanwords with the closed-open-closed and closed-closed-open syllable compositions, which contain five moras, words with the closed-closed-closed syllable composition consist of six moras, and thus three bimoraic feet can fit into these loanwords. However, in NK Korean, high tone can be assigned up to a maximum of two syllables per word. In order to explain the restriction, one more inviolable constraint should be provided as in (13).

(13) ***HHH** (Lee, 2009)
No consecutive three high tones.

The undominated constraint *HHH militates against three consecutive syllables with high tone. With the new constraint, Tableau (16) demonstrates how English loanwords with the closed-closed-closed syllable composition are assigned double high accent. The possible output candidates for the input /aŋ.saŋ.bil/ ‘ensemble’ are presented in the Tableau (16).

Tableau (16) /aŋ.saŋ.bɨl/ → [áŋ.sáŋ.bɨl] HHL ‘ensemble’ (closed-closed-closed)

Input: /aŋ.saŋ.bɨl/	*HHH	ALIGN-R (Wd, Ft)	PARSE -SYL (CI)	ALIGN-L (HH, Wd)	W-BY-P	PARSE -SYL	DEP-μC
☞ a. (á**ŋ**)(sáŋ.bɨl)					**		*
b. (á**ŋ**)(sá**ŋ**)(bɨ́**l**)	*!						***
c. aŋ.(sá**ŋ**)(bɨ́**l**)			*!	*		*	**
d. (á**ŋ**)(sá**ŋ**).bɨl		*!				*	**
e. aŋ.saŋ.(bɨ́**l**)			*!			**	*

Candidate (16a) is the optimal output, though it violates the constraints WEIGHT-BY-POSITION and DEP-μC. Candidate (16b), which respects the constraint WEIGHT-BY-POSITION that the winning candidate violates, is ruled out because it does not respect the undominated constraint *HHH. This crucially shows that *HHH outranks WEIGHT-BY-POSITION. The losing candidates in (16c) and (16e) are ruled out since they do not incorporate the initial closed syllable in a foot and violate the higher-ranked constraint PARSE-SYL (CI). Candidate (16c) also violates another higher-ranked constraint ALIGN-L (HH, Wd), having two consecutive feet not aligned with the left edge of the word. Candidate (16d) loses because it violates the higher-ranked constraint ALIGN-R (Wd, Ft) with an unparsed last syllable. The new constraint ranking with the undominated constraint *HHH is shown in (14).

(14) *HHH, *FALLRISE, ALIGN-R (Wd, Ft), PARSE-SYL (CI), ALIGN-L (HH, Wd) >> FT-BIN [Moraic Troch] >> W-BY-P >> PARSE-SYL, DEP-μC

Next, to check how the tone assignment works on four-syllable English loanwords with an initial closed syllable, it was examined how the constraints interact to assign double high accent on words with the closed-open-open-closed syllable combination. In order to assign double high

accent to four-syllable English loanwords, a foot head must be assigned to each of the first two syllables. This causes the violation of the constraint FT-BIN [Moraic Troch] making the second foot contain three moras, even when the context-dependent moraicity plays a role. Tableau (17) presents possible output candidates of the input /ɕim.pʰo.tɕi.ʌm/ 'symposium.'

Tableau (17) /ɕim.pʰo.tɕi.ʌm/ → [ɕím.pʰó.tɕi.ʌm] HHLL 'symposium' (c-o-o-c)

Input: /ɕim.pʰo.tɕi.ʌm/	*FALL RISE	PARSE-SYL (CI)	ALIGN-R (Wd, Ft)	FT-BIN [Moraic Troch]	W-BY-P	PARSE-SYL	DEP-μC
☞ a. (ɕí**m**).(pʰó.tɕi.ʌm)				*(LLL)	*		*
b. ɕim.(pʰó.tɕi.ʌm)		*!		*(LLL)	*	*	
c. (ɕím.pʰo).(tɕí.ʌm)	*!				**		
d. ɕim.pʰo.tɕi.(ʌ́**m**)		*!				***	*
e. (ɕí**m**).(pʰó.tɕi).ʌm			*!			*	*

The winning candidate (17a) violates the constraints FT-BIN [Moraic Troch], WEIGHT-BY-POSITION, and DEP-μC, but survives since it respects all the inviolable constraints. Candidates (17b) and (17d) are ruled out because they both violate the higher-ranked constraint PARSE-SYL (CI), unparsing the initial syllable in a foot. Candidate (17c) respects the constraint FT-BIN [Moraic Troch] but still loses since it violates the undominated constraint *FALLRISE presenting two pitch falls in a word. The losing candidate (17e) is ruled out because the right edge of the feet is not aligned with the right edge of the word, violating the constraint ALIGN-R (Wd, Ft).

So far, we have looked at how the phonological constraints interact to assign double high accent to English loanwords that have a word-initial closed syllable. This current section shows how the word-initial closed syllable has a priority over the other closed syllables within a word for the high tone assignment. Now, we turn to check how the closed penultimate syllable has a priority over the closed antepenultimate and final syllables for the high tone assignment.

4.4.2. Words with a penultimate closed syllable

When the penultimate syllable is closed and the initial syllable is open (light), high tone is generally assigned to the penultimate syllable regardless of the existence of other closed syllables. That is, the penultimate closed syllable is preferred to the antepenultimate and final closed syllables in the high tone assignment. First, we will focus on the tone assignment when both penultimate and final syllables are closed. In order to explain how the penultimate closed syllable has a priority over the final closed syllables for the high tone assignment, a constraint is newly introduced in (15).

(15) **PARSE-SYL (Closed)** (Revised from Kager 1999)
Closed syllables are parsed by feet.

The constraint PARSE-SYL (Closed) counts against closed syllables that are not incorporated in a foot. As we discussed in 4.3.1., this constraint is ranked lower than the constraint PARSE-SYL (Closed Initial), which militates against unparsed word-initial closed syllables. Tableau (18) displays how this constraint interacts with other constraints to assign penultimate accent to a word /ri.sep.ɛjʌn/ 'reception,' an example word for the open-closed-closed syllable combination. Tableau (18) also provides evidence that the new constraint PARSE-SYL (Closed) ranks higher than the constraint WEIGHT-BY-POSITION.

Tableau (18) /ri.sep.ɛjʌn/ → [ri.sép.ɛjʌn] LHL ‘reception’(open-closed-closed)

Input: /ri.sep.ɛjʌn/	ALIGN-R (Wd, Ft)	ALIGN-L (HH, Wd)	FT-BIN [Moraic Troch]	PARSE-SYL (Closed)	W-BY-P	PARSE-SYL	DEP-μC
☞ a. ri.(sép.ɛjʌn)					**	*	
b. ri.sep.(ɛjʌ́**n**)				*!		**	*
c. ri.(sé**p**).(ɛjʌ́**n**)		*!				*	**
d. ri.(sé**p**).ɛjʌn	*!			*		**	*
e. (rí).(sép.ɛjʌn)			*!(L)		**		

The winning candidate (18a) violates the constraints WEIGHT-BY-POSITION and PARSE-SYL with two non-moraic codas and the unparsed initial syllable but becomes the optimal output because it respects all the other higher-ranked constraints. Candidate (18b), which does not violate the constraint WEIGHT-BY-POSITION that the winning candidate violates, is ruled out because it does not respect the constraint PARSE-SYL (Closed) by unparsing the penultimate closed syllable. Candidate (18c) loses because it violates the undominated constraint ALIGN-L (HH, Wd) having high tone on the last two syllables. Candidate (18d) is ruled out due to the violation of the constraint ALIGN-R (Wd, Ft) and PARSE-SYL (Closed) having the unparsed final syllable. Candidate (18e) is also ruled out since it violates the constraint FT-BIN [Moraic Troch] having a monomoraic foot on the initial syllable.

The ranking argument between the constraints (18a) and (18b) shows that the new constraint PARSE-SYL (Closed) is ranked over the constraint WEIGHT-BY-POSITION. However, no direct ranking argument is observed between the constraint PARSE-SYL (Closed) and the other higher-ranked constraints. According to the classification results observed in Chapter 3, English loanwords with a closed antepenultimate syllable generally fall into the penultimate accent class. This means that the closed antepenultimate syllable is not incorporated in a foot, and this provides

evidence that the constraint PARSE-SYL (Closed) is violable especially when the antepenultimate syllable is closed (see 3.4. for more information). That is, the constraint PARSE-SYL (Closed) must be placed lower than the inviolable constraints, and the evidence will be further presented in Tableau (20). Although the new constraint PARSE-SYL (Closed) is ranked higher than the constraint W-BY-P and lower than the undominated constraints, no ranking argument has been observed with the constraint FT-BIN [Moraic Troch]. The new ranking for the constraints is shown in (16).

(16) *HHH, *FALLRISE, ALIGN-R (Wd, Ft), PARSE-SYL (CI), ALIGN-L (HH, Wd) >> FT-BIN [Moraic Troch], PARSE-SYL (Closed) >> W-BY-P >> PARSE-SYL, DEP-μC

Four-syllable English loanwords also show that high tone is preferred to be assigned on the penultimate syllable if a word has two closed syllables on the penultimate and final positions. Tableau (19) demonstrates how the constraints interact to assign penultimate accent on a four-syllable English loanword /pe.di.min.tʰʌn/ 'badminton,' an example word of the open-open-closed-closed syllable combination.

Tableau (19) /pe.di.min.tʰʌn/ → [pe.di.mín.tʰʌn] LLHL 'badminton' (o-o-c-c)

Input: /pe.di.min.tʰʌn/	*FALLRISE	ALIGN-L (HH, Wd)	PARSE-SYL (Closed)	W-BY-P	PARSE-SYL	DEP-μC
☞ a. pe.di.(mín.tʰʌn)				**	**	
b. pe.di.min.(tʰʌ́**n**)			*!		***	*
c. pe.di.(mí**n**).(tʰʌ́**n**)		*!			**	**
d. (pé.di).(mín.tʰʌn)	*!			**		

Candidate (19a) becomes the optimal output, though it violates the constraints WEIGHT-BY-POSITION and PARSE-SYL. Candidate (19b) loses because it violates the higher-ranked constraint

PARSE-SYL (Closed) that the winning candidate respects. Candidate (19c) violates the constraint ALIGN-L (HH, Wd), having high tone on the last two syllables. Candidate (19d), which exhibits two pitch falls, is also ruled out since it does not respect the constraint *FALLRISE.

Next, we will examine how the high tone assignment works when four-syllable English loanwords have two closed syllables in the antepenultimate and penultimate positions. When both the antepenultimate and penultimate syllables are closed and the other syllables are open (light), high tone is assigned on the penultimate syllable. Tableau (20) shows how the penultimate syllable is preferred to the antepenultimate syllable in high tone assignment with an input /si.tʰon.hen.tɕi/ 'stonhenge,' which is an example of the open-closed-closed-open syllable combination.

Tableau (20) /si.tʰon.hen.tɕi/ → [si.tʰon.hén.tɕi] LLHL 'stonhenge' (o-c-c-o)

Input: /si.tʰon.hen.tɕi/	ALIGN-R (Wd, Ft)	ALIGN-L (HH, Wd)	FT-BIN [Moraic Troch]	PARSE-SYL (Closed)	W-BY-P	PARSE-SYL	DEP-μC
☞ a. si.tʰon.(hén.tɕi)				*	*	**	
b. si.(tʰó**n**).(hén.tɕi)		*!			*	*	*
c. si.(tʰón.hen).tɕi	*!				**	**	
d. si.(tʰón.hen.tɕi)			*(LLL)		*!*	*	

Candidate (20a), which does not incorporate the heavy antepenultimate syllable in a foot, violates the constraint PARSE-SYL (Closed) but becomes the winning candidate. This shows that the constraint PARSE-SYL (Closed) is violable. Although candidates (20b) and (20c) respect the constraint PARSE-SYL (Closed) that the winning constraint violates, they do not survive since they violate one of the undominated constraints ALIGN-L (HH, Wd) and ALIGN-R (Wd, Ft), respectively. Candidate (20d) also respects the constraint PARSE-SYL (Closed), but it is ruled out due to the violation of the constraint FT-BIN [Moraic Troch] having three light syllables in a foot. This might be considered to demonstrate the crucial ranking of FT-BIN [Moraic Troch] over PARSE-SYL

(Closed). However, since candidate (20d) violates the constraint WEIGHT-BY-POSITION one more time than candidate (20a), it is hard to say that the constraint FT-BIN [Moraic Troch] is ranked higher than the constraint PARSE-SYL (Closed). Given that candidate (20a) better satisfies WEIGHT-BY-POSITION, candidate (20a) would still be the winning candidate if FT-BIN [Moraic Troch] and PARSE-SYL (Closed) had a tied ranking.

In this section, we investigated how penultimate syllables have a priority over antepenultimate and final syllables for the high tone assignment. In the following section, we will investigate how final syllables are preferred to antepenultimate syllables in the assignment of high tone in NK English loanwords.

4.4.3. Words with a final closed syllable

When an English loanword has closed antepenultimate and final syllables and both the initial and penultimate syllables are open (light), the word falls into the final accent class. That is, the final closed syllable is preferred to the antepenultimate closed syllable in the high tone assignment. The following Tableau (21) shows the possible output candidates for the input /kʰo.pʰen.ha.gen/ 'Copenhagen' to present how the constraints interact to assign final accent to words with the open-closed-open-closed syllable combination.

Tableau (21) /kʰo.pʰen.ha.gen/ → [kʰo.pʰen.ha.gén] LLLH ‘Copenhagen’ (o-c-o-c)

Input: /kʰo.pʰen.ha.gen/	*FALL RISE	ALIGN-L (HH, Wd)	FT-BIN [Moraic Troch]	PARSE-SYL (Closed)	W-BY-P	PARSE -SYL	DEP -μC
☞ a. kʰo.pʰen.ha.(gé**n**)				*		***	*
b. kʰo.pʰen.(há.gen)				*	*!	**	
c. (kʰó.pʰen)(há.gen)	*!				**		
d. kʰo.(pʰén.ha.gen)			*(LLL)		*!*	*	
e. kʰo.(pʰé**n**).(há.gen)		*!			*	*	*

The winning candidate (21a) violates the constraints PARSE-SYL (Closed), PARSE-SYL and DEP-μC with three unparsed syllables and a moraic coda but survives because it respects all the higher-ranked constraints. Candidate (21b), which respects all the higher-ranked constraints, is ruled out since it violates the constraint WEIGHT-BY-POSITION that the winning candidate respects. Since (21b) better respects PARSE-SYL, this provides further evidence that WEIGHT-BY-POSITION must outrank PARSE-SYL. Candidate (21c) loses due to the violation of the inviolable constraint *FALLRISE, having high tone on both the first and third syllables. The losing candidate (21d) respects the constraint PARSE-SYL (Closed) that the winning candidate violates, but it violates the constraint FT-BIN [Moraic Troch] that the winning candidate respects. However, this does not show that the constraint FT-BIN [Moraic Troch] is ranked lower than the constraint PARSE-SYL (Closed). The losing candidate (21d) also violates the constraint WEIGHT-BY-POSITION that the winning candidate respects and this seems to make candidate (21d) lose. Candidate (21e) violates the undominated constraint ALIGN-L (HH, Wd), having high tone on the second and third syllables. There is no new ranking argument observed in Tableau (21).

So far, the English loanwords collected in this study were classified according to the number of closed syllables and the accent assignment patterns were analyzed separately for words

that have no closed syllable (section 4.2.), words that have one closed syllable (section 4.3.), and words that have two or more closed syllable (section 4.4.) in the framework of Optimality Analysis. Although we have seen that the accent assignments of NK English loanwords are quite patterned and mostly predictable by the syllabic structure types, the classification results in Chapter 3 also display that there are some words that exhibit exceptional tone patterns. However, some common features have also been found in English loanwords that show exceptional tone patterns. In the following section 4.5., we will focus on the exceptional tone patterns observed from words that contain either the epenthetic vowel [ɨ] or a word-initial long vowel and will analyze which constraint interactions assign the exceptional tone patterns to these words.

4.5. Exceptional tone assignment patterns

Although tone patterns of NK loanwords are mostly predictable by the interaction of the constraints provided so far, a few exceptional patterns were also found in Chapter 3 from words that contains either the epenthetic vowel [ɨ] or a word-initial long vowel. First, in NK English loanwords, a foot head is not preferred to be assigned on a syllable with the epenthetic vowel [ɨ] (Kenstowicz & Sohn 2001). Thus, if the epenthetic vowel is in the syllable where the foot head was initially targeted to be placed, the foot head moves either to the preceding syllable or to the following syllable depending on the context. Second, if there is a long vowel in the initial syllable, the word must fall into the double high accent class regardless of the structure of the following syllables. This pattern sounds similar to the pattern observed from loanwords with a word-initial closed syllable, but they actually exhibit different tone assignment patterns and double high accent appears more strictly on words with a long vowel in the initial syllable. The differences will be discussed more in 4.5.2. To explain these exceptional tone patterns, more constraints need to be

considered.

4.5.1. Epenthetic vowel [ɨ]

First, in order to describe the exceptional tone patterns caused by the epenthetic vowel [ɨ], a new constraint should be introduced as shown in (17).

(17) ***Accented-ɨ**
Foot head cannot be assigned on syllables with the epenthetic vowel [ɨ].

The constraint *Accented-ɨ militates against the epenthetic vowels that are assigned a foot head. NK English loanwords with the open-open syllable combination usually fall into the penultimate accent class, having a foot head on the initial syllable as in Tableau (1). However, they exceptionally show final accent when the initial syllable contains the epenthetic vowel [ɨ] (see the examples in (8) in Chapter 3). To account for the exceptional tone assignment pattern, the constraints *Accented-ɨ and FT-BIN [Moraic Troch] must interact with each other, and the ranking of these constraints is illustrated in Tableau (22), which displays possible output candidates of the input /sɨ.kʰi/ 'ski.'

Tableau (22) /sɨ.kʰi/ → [sɨ.kʰí] LH 'ski' (open-open)

Input: /sɨ.kʰi/	*Accented-ɨ	FT-BIN [Moraic Troch]	PARSE-SYL
☞ a. sɨ.(kʰí)		*(L)	*
b. (sɨ́.kʰi)	*!		

Candidate (22a) violates the constraints FT-BIN [Moraic Troch] and PARSE-SYL with a

monomoraic foot in the final syllable and an unparsed initial syllable, but becomes the optimal output since it respects the constraint *Accented-i̵. The losing candidate (22b), which violates the constraint *Accented-i̵ having the foot head on the initial syllable, is ruled out, though it respects all the other constraints. This shows that the newly introduced constraint *Accented-i̵ is ranked higher than the constraint FT-BIN [Moraic Troch]. However, there has been no ranking argument observed between the constraint *Accented-i̵ and the other undominated constraints. Therefore, the new constraint *Accented-i̵ is placed highest with the other undominated constraints. The new raking of the constraints so far is shown in (18).

(18) *HHH, *FALLRISE, ALIGN-R (Wd, Ft), PARSE-SYL (CI), ALIGN-L (HH, Wd), *Accented-i̵ >> FT-BIN [Moraic Troch], PARSE-SYL (Closed) >> W-BY-P >> PARSE-SYL, DEP-μC

The new constraint can also explain an exceptional tone pattern of three-syllable loanwords. English loanwords with the open-open-open syllable combination usually have penultimate accent with a bimoraic trochaic foot at the right edge of the word as seen in Tableau (2) in section 4.2. However, if the penultimate syllable contains an epenthetic vowel, the foot head moves to the final syllable. This observation seems to provide evidence that the mono-moraic foot is preferred to the tri-moraic foot in NK English loanwords. Tableau (23) shows the ranking argument between the mono-moraic foot and tri-moraic foot with possible output candidates for the input /me.ti̵.ɾo/ ‘metro.’

Tableau (23) /me.ti̵.ɾo/ → [me.ti̵.ɾó] LLH ‘metro’ (open-open-open)

Input: /me.ti̵.ɾo/	*Accented-i̵	Ft-Bin [Moraic Troch]	Parse-Syl
☞ a. me.ti̵.(ɾó)		*(L)	**
b. me.(tí.ɾo)	*!		*
c. (mé.ti̵.ɾo)		*(LLL)!	

Candidate (23a) survives as the optimal output, even if it violates the constraint Parse-Syl as well as the constraint Ft-Bin [Moraic Troch] with a mono-moraic foot. This is because it respects the higher-ranked constraint *Accented-i̵. Candidate (23b) loses since it violates the higher-ranked constraint *Accented-i̵, having the foot head on the epenthetic vowel. The candidate in (23c) respects the constraint Parse-Syl that the winning candidate violates but is ruled out due to the violation of the constraint Ft-Bin [Moraic Troch] with a tri-moraic foot. This provides evidence that the mono-moraic foot is preferred to the tri-moraic foot in the expansion of the bimoraic trochee.

If a three-syllable English loanword contains the epenthetic vowel in both the penultimate and final syllables, the words are assigned antepenultimate accent to avoid assigning high tone on the syllables with the epenthetic vowel. Tableau (24) shows possible output candidates for the input /ko.si̵.tʰi̵/ ‘ghost.’

Tableau (24) /ko.si̵.tʰi̵/ → [kó.si̵.tʰi̵] HLL ‘ghost’ (open-open-open)

Input: /ko.si̵.tʰi̵/	Align-R (Wd, Ft)	*Accented-i̵	Ft-Bin [Moraic Troch]	Parse-Syl
☞ a. (kó.si̵.tʰi̵)			*(LLL)	
b. ko.(sí.tʰi̵)		*!		*
c. (kó.si̵).tʰi̵	*!			*
d. ko.si̵.(tʰí)		*!	*!(L)	**

The winning candidate (24a) has antepenultimate accent having the foot head in the initial syllable. Although it violates the constraint FT-BIN [Moraic Troch] having three moras in a foot, it becomes the optimal output because it respects all the other constraints. The losing candidate (24b) has penultimate accent having the foot head in the penultimate syllable. It respects the constraint FT-BIN [Moraic Troch] having two moras in a foot but does not survive due to the violation of the higher-ranked constraint *Accented-ɨ, having a foot head on the epenthetic vowel. Candidate (24c) is ruled out since it violates the constraints ALIGN-R (Wd, Ft) and PARSE-SYL with the unparsed final syllable. The losing candidate (24d) does not respect *Accented-ɨ nor FT-BIN [Moraic Troch], and thus it does not survive.

4.5.2. Long vowels

In addition to English loanwords with the epenthetic vowel [ɨ], words with an initial long vowel also exhibit exceptional tone patterns. According to Kenstowicz & Sohn (2001) and Chung (2002), NK English loanwords must be assigned double high accent when the initial syllable has a long vowel. Although this rule seems to be similar to the tone assignment pattern observed from English loanwords that have a closed syllable in the initial position, they actually differ in their accent assignment rules. For instance, English loanwords with an initial closed syllable fall into the double high accent class only when the word contains more than three moras. That is, two-syllable loanwords with the closed-open syllable composition, which contain three moras in total, cannot be assigned double high accent and thus are assigned penultimate accent as observed in Table 5 in 3.4.1. and Tableau (6) in 4.3.2. Yet, English loanwords that contain a word-initial long vowel always fall into the double high accent class regardless of the number of moras in the words. In addition, English loanwords with a word-initial long vowel are assigned double high accent

even when the second syllable contains the epenthetic vowel [ɨ]. That is, a syllable with the epenthetic vowel [ɨ] can be assigned a foot head when it is preceded by a word-initial syllable that contains a long vowel. Although the vowel length distinction has disappeared among the younger generation of NK speakers (Kim 2018), the distinction is still retained in the production of older speakers and younger speakers seem to retain the historical tone patterns. In order to explain the exceptional tone assignment patterns observed from words with an initial long vowel, a new constraint is proposed in (19).

(19) **LONGVFOOTMS**
A syllable with a long vowel forms a mono-syllabic foot.

The constraint LONGVFOOTMS shows that a syllable with a long vowel must be assigned a mono-syllabic foot and no other syllables can be included in the foot. This can be seen as an instance of the FOOT BINARITY constraint. First, an argument for the crucial ranking of the constraint LONGVFOOTMS above the constraint *Accented-ɨ is displayed in the following Tableau (25). If an English loanword contains a word-initial long vowel, double high accent is assigned even when the second syllable contains the epenthetic vowel [ɨ]. That is, a syllable with the epenthetic vowel [ɨ] can be assigned a foot head when it follows a syllable with a long vowel, and this demonstrates that the constraint LONGVFOOTMS outranks the constraint *Accented-ɨ. Tableau (25) displays the possible output candidates for the input /ha:.dɨ/ ‘hard’ to demonstrate how a syllable with the epenthetic vowel [ɨ] is assigned the second high tone of double high accent.

Tableau (25) /ha:.dɨ/ → [há:.dɨ́] HH ‘hard’

Input: /ha:.dɨ/	ALIGN-R (Wd, Ft)	LONG V FOOT MS	*Accented-ɨ	FT-BIN [Moraic Troch]	PARSE-SYL
☞ a. (há:).(dɨ́)			*	*(L)	
b. (há:.dɨ)		*!		*(HL)	
c. ha:.(dɨ́)		*!	*	*(L)	*
d. (há:).dɨ	*!				*

The winning candidate (25a) violates both the constraints *Accented-ɨ and FT-BIN [Moraic Troch] but becomes the optimal output. This reveals that the constraint *Accented-ɨ can be violated and thus ranked lower than the other undominated constraints. Candidates (25b) and (25c) are ruled out because they violate the constraint LONGVFOOTMS. If the constraint LONGVFOOTMS were not present, candidate (25b) would be the optimal output since it respects the constraint *Accented-ɨ. This provides evidence that the constraint LONGVFOOTMS is ranked higher than the constraint *Accented-ɨ. Candidate (25d) loses because it violates the undominated constraint ALIGN-R (Wd, Ft) with an unparsed final syllable. The new constraint ranking, which shows that the constraint LONGVFOOTMS is ranked above the constraint *Accented-ɨ, is presented in (20).

(20) *HHH, *FALLRISE, ALIGN-R (Wd, Ft), PARSE-SYL (CI), ALIGN-L (HH, Wd), LONGVFOOTMS >> *Accented-ɨ >> FT-BIN [Moraic Troch], PARSE-SYL (Closed) >> W-BY-P >> PARSE-SYL, DEP-μC

The following Tableau (26) shows another crucial ranking argument that the constraint LONGVFOOTMS outranks the constraint FT-BIN [Moraic Troch]. Tableau (26) demonstrates how double high accent is preferred to be assigned to the input /mo:.dʌ.ni.tɕɨm / ‘modernism,’ which has a long vowel in the initial syllable. This shows how the constraint LONGVFOOTMS applies to words without the epenthetic vowel [ɨ].

Tableau (26) /mo:.dʌ.ni.tɕɨm/ → [mó:.dʌ́.ni.tɕɨm] ‘modernism’

Input: /mo:.dʌ.ni.tɕɨm/ ‘modernism’	ALIGN-R (Wd, Ft)	LONG V FOOT MS	FT-BIN [Moraic Troch]	W-BY-P	PARSE-SYL	DEP-μC
☞ a. (mó:)(dʌ́.ni.tɕɨm)			*(LLL)	*		
b. (mó:)(dʌ́.ni).tɕɨm	*!				*	
c. mo:.dʌ(ní.tɕɨm)		*!		*	**	
d. mo:.dʌ́.ni.(tɕɨ**m**)		*!			***	*

The winning candidate (26a) survives, though it violates the constraint FT-BIN [Moraic Troch] having three moras in the second foot. Candidate (26b), which has an unparsed final syllable, is ruled out because it violates the undominated constraint ALIGN-R (Wd, Ft). Candidates (26c) and (26d) lose because the heavy initial syllable with a long vowel is not incorporated in a foot, violating the constraint LONGVFOOTMS and PARSE-SYL. However, these two candidates respect the constraint FT-BIN [Moraic Troch] that the winning candidate violates. Without the constraint LONGVFOOTMS, candidate (26d) would be the winning candidate.

The following Tableau (27) and (28) reveal that the constraint ranking we have established in Tableaus (25) and (26) apply consistently. Tableau (27) provides another example that shows how double high accent is applied to words with an initial long vowel regardless of the structure of the following syllables. The tableau displays the possible output candidates of the input /pʰa:.tʰi/ ‘party.’ The input word displays the open-open syllable composition, but the initial open syllable is considered heavy since it contains a long vowel. Thus, the word contains three moras.

Tableau (27) /pʰa:.tʰi/ → [pʰá:.tʰí] HH ‘party’

Input: /pʰa:.tʰi/	ALIGN-R (Wd, Ft)	LONG V FOOT MS	FT-BIN [Moraic Troch]	PARSE-SYL
☞ a. (pʰá:).(tʰí)			*(L)	
b. (pʰá:.tʰi)		*!	*(HL)!	
c. (pʰá:).tʰi	*!			*
d. pʰa:.(tʰí)		*!		*

Candidate (27a), which violated the constraint FT-BIN [Moraic Troch], becomes the winning candidate by respecting all other constraints. Candidates (27b) and (27d) are ruled out because they violate the newly introduced constraint LONGVFOOTMS. Candidate (27c) respects the constraint LONGVFOOTMS but is ruled out because it does not respect the undominated constraint ALIGN-R (Wd, Ft) having an unparsed final syllable.

Tableau (28) exhibits the possible output candidates for the input /po:.dɨ.kʰa/ ‘vodka,’ and the result is also consistent with the established ranking.

Tableau (28) /po:.dɨ.kʰa/ → [pó:.dɨ́.kʰa] HHL ‘vodka’

Input: /po:.dɨ.kʰa/	LONG V FOOT MS	*Accented-ɨ	FT-BIN [Moraic Troch]	PARSE-SYL
☞ a. (pó:).(dɨ́.kʰa)		*		
b. po:.(dɨ́.kʰa)	*!	*		*
c. (pó:.dɨ.kʰa)	*!		*(HLL)	

Candidate (28a) violates the constraint *Accented-ɨ by assigning a foot head on the epenthetic vowel [ɨ] but survives as the winning candidate since it respects the higher-ranked constraint LONGVFOOTMS. Candidates (28b) and (28c) are ruled out due to the violation of the constraint LONGVFOOTMS that the winning candidate respects. The reverse ranking between the

constraints LONGVFOOTMS and *Accented-ɨ would wrongly result in candidate (28c) being the winner. This provides additional evidence of the crucial ranking of the constraint LONGVFOOTMS above the constraint *Accented-ɨ.

4.6. Conclusion

In this chapter, based on the classification results observed in Chapter 3, the tone assignment rules in NK English loanwords have been analyzed in the framework of Optimality Theory by providing various phonological constraints and the ranking arguments. Although the analysis in this chapter was based on a large database and provides a more comprehensive and clear understanding on the NK tone assignment patterns, generational differences were not considered. In the following chapter, we will discuss the generational differences on the NK tone assignment patterns observed between the three younger speakers in their 20s and the three older speakers in their 50s or 60s.

CHAPTER 5

EFFECT OF THE LOSS OF VOWEL LENGTH CONTRAST ON TONE ASSIGNMENT OF NORTH KYUNGSANG ENGLISH LOANWORDS

5.1. Introduction

The analyses in Chapter 3 and Chapter 4 revealed that the high tone assignment of NK English loanwords is sensitive to moraic structure and high tone is generally attracted by heavy syllables, which contain either a coda consonant or a long vowel. Among heavy syllables, those in word-initial position have a special salience and they have a stronger tendency to attract high tone over other heavy syllables (Chung, 2000; Kenstowicz & Sohn, 2001; Kim, 2010). The salience of the word-initial syllables is demonstrated in tone patterns. If NK English loanwords contain a heavy initial syllable, they are assigned double high accent in general, having high tone over the first two syllables. Double high accent is assigned only to English loanwords with an initial heavy syllable, and English loanwords with an initial light syllable are assigned single high accent. In single high accented loanwords, the bimoraic trochee, a key foot structure in assigning high tone to NK English loanwords, is rarely violated. Yet, the violation is allowed when a word with an initial heavy syllable is assigned double high accent. This also shows that word-initial heavy syllables have a stronger tendency to attract high tone, compared to other heavy syllables.

Although word-initial heavy syllables in NK English loanwords share a common feature that they must be assigned high tone, there are two different types of heavy syllables—syllables with a long vowel (CVV) and syllables with a coda consonant (CVC))—and their tone assignment patterns are not the same. In NK Korean, long vowels have a unique characteristic that they mostly appear in word-initial syllables. This gives special salience to syllables with a long vowel so that English loanwords with a long vowel in the initial syllable always fall into the double high accent

class, having a monosyllabic foot in the initial syllable (see 4.5.2. for more information). However, unlike syllables with a long vowel, syllables with a coda consonant can appear in any syllable position, and the salience of word-initial closed syllables seems to be weaker than the salience observed from word-initial syllables with a long vowel. Although word-initial closed syllables also have the special salience and must be assigned high tone, they do not require double high accent. That is, if the initial syllable is guaranteed to be assigned high tone, they make a choice that minimizes the violation of the bimoraic trochee system. For instance, if a two-syllable English loanword contains a closed initial syllable followed by a light final syllable, assigning double high accent to the word violates the bimoraic trochee, having a monomoraic foot on the last syllable, as in *(tʰé**m**).(pʰó) HH 'tempo' and *(tʰé**k**).(ɕí) HH 'taxi.' In this case, the coda consonant in the initial syllable is considered non-moraic, and single high accent is assigned to prevent the violation of the bimoraic trochee, as in (tʰém.pʰo) HL 'tempo' and (tʰék.ɕi) HL 'taxi' (see 3.3.1.1. and 4.3.2. for more information). That is, although the two different types of word-initial heavy syllables both strongly attract high tone, English loanwords with an initial long vowel always fall into the double high accent class regardless of the violation of the bimoraic trochee, as in (pʰá:).(tʰí) HH 'party,' whereas those with a closed initial syllable are sometimes assigned single high accent to minimize the violation. This shows that vowel length is the most crucial cue for double high accent in NK Korean.

Although vowel length is an important cue for double high accent, recent studies, such as Kim (2018), have shown that NK Korean has been losing the vowel length distinction and that the vowel length has already lost its phonemic status among younger NK speakers (see 2.6. for more information). That is, words that traditionally had a long vowel are no longer considered to contain a long vowel for younger NK speakers, whereas the vowel length distinction is still maintained

among older NK speakers. This means that younger NK speakers have lost an important cue that assigns double high accent.

In NK native words, syllable weight plays a less significant role and double high accent is allowed for both words with an initial heavy syllable and those with an initial light syllable (see Table 1 in Chapter 2). That is, shortening of the word-initial long vowels does not create any violation on the accentuation system of NK native words. Yet, unlike NK native words, NK English loanwords are sensitive to moraic structure and double high accent is only able to be assigned to words with an initial heavy syllable, either with a long vowel or a coda consonant (see Table 2 in Chapter 2). That is, assigning double high accent to English loanwords that contain a light initial syllable (open syllable with a short vowel) creates a violation to the loanword accentuation rules. Since long vowels have a close relationship with double high accent specifically in NK English loanwords, it is assumed that the loss of long vowels from the younger generations, which changes the moraic structure of the English loanwords, may have an impact on their tone patterns. For instance, English loanwords that traditionally had double high accent with a word-initial long vowel now may fall into the single high accent class for younger speakers because they no longer have the long vowel in the initial syllable.

To check if there is any tone change occurring in the production of younger speakers, I conducted a pilot study with five female NK speakers in their 20s. The participants were presented with a list of double high accented English loanwords, which were presented in Kenstowicz & Sohn (2001) as examples of loanwords that include a long vowel in the initial syllable. Then they were asked to pronounce the words naturally in their dialect. The examples of double high accented words that Kenstowicz & Sohn (2001) present are shown in (1).

(1)	Word	Tone	Meaning
	[ó:.tʰó]	HH	‘auto’
	[pjú:.tʰí]	HH	‘beauty’
	[ɾó:.má]	HH	‘Rome’
	[pá:.gén]	HH	‘bargain’
	[tʰá:.gét]	HH	‘target’
	[pʰá:.kʰíŋ]	HH	‘parking’
	[ká:.dɨ́n]	HH	‘garden’
	[tɕú:.s’ɨ́]	HH	‘juice’
	[kʰá:.dɨ́]	HH	‘card’
	[há:.mó.ni]	HHL	‘harmony’
	[pí:.nʌ́.s’ɨ]	HHL	‘Venus’
	[má:.gá.ɾin]	HHL	‘margarine’
	[jú:.tʰó.pʰi.a]	HHLL	‘utopia’
	[má:.mál.le.i.dɨ]	HHLLL	‘marmalade’

The results of the pilot study revealed that the double high accented English loanwords, which contain a long vowel in the initial syllable, have been undergoing an accent change among the younger speakers. Kenstowicz & Sohn (2001) assert that NK English loanwords must be assigned double high accent when they contain a long vowel in the initial syllable. However, their observation is based on NK Korean as spoken in the 1990s and earlier, by now an older generation of speakers. According to the results of the author’s pilot study, more than half of the loanwords are now assigned either penultimate accent or final accent by the younger speakers. In particular, the words with three or more syllables all displayed the tonal change. Although more than half of the words were produced with single high accent by the younger speakers, a few two-syllable words were still produced with double high accent, and for some words, participants reported that both double high accent and single high accent are equally preferred. That is, some variation was exhibited in their tone patterns. From the results of the pilot study, it is assumed that the process of modifying the tone patterns of English loanwords is in progress among younger NK speakers

especially on English loanwords that had double high accent with a long vowel in the initial syllable. However, the pilot study included only a few double high accented loanwords presented in the previous literature, and thus it was hard to analyze the changing patterns or track the path of the change accurately. Thus, a larger study is needed to be conducted with a bigger database.

Although there have been several studies conducted on the tone assignment patterns of NK English loanwords (N-J Kim, 1997; Kenstowicz & Sohn, 2001; Chung, 2000, 2002; Kim, 2009; Kim, 2010; Davis et al., 2012), little research has investigated the generational differences on the tone patterns caused by the loss of vowel length distinction. Therefore, the aim of this chapter is to examine if the loss of long vowels in the production of younger NK speakers (Kim, 2018) has any influence on their tone assignment patterns of English loanwords, creating generational differences. If the results of this study find any generational differences in the tone patterns, the direction of the changes will also be investigated by looking at how syllable number and word structure affect the changes in the tone patterns. With the research aims, this study suggests four hypotheses based on the observations of the pilot study: (1) Younger speakers will produce less double high accent than older speakers in English loanwords with an open initial syllable since they no longer have long vowels, which are crucial cues to attract double high accent; (2) Polysyllabic English loanwords are more affected by the tone change because they may be less frequent and thus less influenced by the production of older speakers; (3) The newly assigned tone patterns will follow the general tone assignment rules observed from words that have a short vowel in the initial syllable; (4) The generational tone change (disappearing double high accent) will be observed only from English loanwords with an initial open syllable, and will not be exhibited from those with an initial closed syllable since the loss of vowel length contrast does not affect their moraic structures.

5.2. Research Methods

In Chapter 3, in order to examine the tone assignment patterns of NK English loanwords, 3,384 English loanwords were collected and produced by six native speakers of NK Korean. Then, the tone patterns were annotated by the author of this study. The annotated results were analyzed again in this chapter to investigate if there is any generational tone change occurring in NK English loanwords. However, unlike Chapter 3, which considered all six participants as a group, this chapter divided the results into two age groups, younger and older, and the results of each group were analyzed separately. The younger group consisted of three speakers in their late teens or early 20s (Mean age: 21.7) and the older group included three speakers in their late 50s or early 60s (Mean age: 59). Each age group consisted of one male and two female speakers. More detailed information on the participants and data collection is presented in 3.2.

After dividing the annotation results into two distinct age groups, the consistency of tone patterns among participants in each group was analyzed in order to exclude words that show inconsistent tone pattern production as they would not allow for easy comparison between generations. In the younger group, out of 3384 total words, 2476 words (73.2%) were produced with identical tone patterns by the three younger speakers. In 852 words (25.1%) there was one speaker who displayed a different tone pattern from the other two, and in 56 words (1.7%) no two speakers produced the same pattern. In the older group, all three participants showed the same tone patterns in 2115 words (62.5%), while in 1147 words (33.9%) there was one speaker who displayed a different tone pattern from the other two, and in 122 words (3.6%) all three speakers produced different tone patterns. In total, 178 words (56+122) were found to have inconsistent tone patterns among the participants of each group, and thus were excluded from the analysis of the generational

tone change.[4]

The tone patterns of the remaining words were compared between the younger and older groups. For each word, a representative tone pattern was chosen for each group (younger and older)—where two out of three participants of a group agreed on a tone pattern, the tone pattern was selected as representative for this analysis, otherwise the consensus tone pattern was chosen. When the representative tone patterns of each group are compared to the most frequent tone patterns of all six speakers that were presented in Chapter 3, there was 91.6% overlap (3,049 out of 3,328 words) with the younger group and 91.1% overlap (2973 words out of 3,262 words) with the older group in the tone patterns. The representative tone patterns derived from each group will be used for the analysis in this chapter by classifying the results based on tone pattern, syllable number, and syllable composition.

5.3. Results and discussion

Comparing the representative tone patterns, the two distinct age groups exhibited the same tone pattern for 2,666 words out of 3,206 words (83.2%). When the results of each group were divided by number of syllables, the tone patterns of the two groups matched in 816 out of 944 two-syllable words (86.4%), 1121 out of 1338 three-syllable words (83.8%), and 729 out of 924 four-syllable words (78.9%). The results show that the difference in the tone patterns between the younger and older groups becomes larger as the number of syllables increases. To see the generational difference in more detail, the annotation results of the two-, three-, and four-syllable words in each age group were further divided by tone pattern. Table 1 below presents the tone patterns used by the younger and older speakers in order of frequency, sorted by syllable number.

[4] 17 two-syllable, 70 three-syllable, 91 four-syllable loanwords were excluded.

Table 1. Frequent accents by different number of syllables for each group

		Most frequent tone pattern	2nd most frequent tone pattern	3rd most frequent tone pattern	4th most frequent tone pattern	5th most frequent tone pattern
2 syllable words	O	HL 506/951 (53%)	LH 239/951 (25%)	HH 206/951 (22%)		
	Y	HL 512/954 (54%)	LH 243/954 (25%)	HH 199/954 (21%)		
3 syllable words	O	LHL 772/1363 (57%)	LLH 284/1363 (21%)	HHL 211/1363 (15%)	HLL 96/1363 (7%)	
	Y	LHL 726/1383 (52%)	LLH 355/1383 (26%)	HHL 239/1383 (17%)	HLL 63/1383 (5%)	
4 syllable words	O	LLHL 626/948 (66%)	HHLL 164/948 (17%)	LLLH 79/948 (8%)	LHLL 64/948 (7%)	HLLL 15/948 (2%)
	Y	LLHL 707/991 (71%)	LLLH 183/991 (18%)	HHLL 58/991 (6%)	LHLL 32/991 (3%)	HLLL 11/991 (1%)

The results in Table 1 reveal that for two- and three-syllable English loanwords there is no difference between the younger and older groups in the order of accent frequency. For two-syllable English loanwords, penultimate accent appears most frequently in both groups, followed by final accent and double high accent. In three-syllable English loanwords, penultimate accent appears most frequently, followed by final accent, then double high accent, then antepenultimate accent in both groups. Yet, the results of four-syllable English loanwords exhibit differences between the two age groups in the order of accent frequency. The shaded part indicates the differences between the younger and older groups. For both groups, the most frequent tone pattern was the same for four-syllable words. However, the second-most frequent tone pattern appears to be final accent for the younger group, whereas double high accent appears second-most frequently for the older group. The results of the four-syllable English loanwords reveal that the older group displays almost three times as many double high accented words than the younger group. Instead, younger speakers

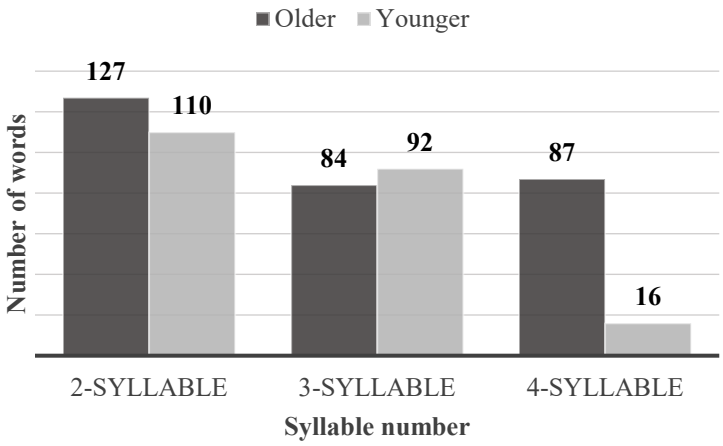
exhibit more penultimate and final accented words than older speakers. Since previously long vowels are considered short for younger NK speakers (Kim, 2018), double high accented words in the past or in the production of older speakers seem to be undergoing an accent change and now fall into the single high accent class.

Since the aim of this chapter is to examine how the loss of long vowels in the production of younger speakers affects their tone patterns in NK English loanwords, the analyses of the following sections will focus on the changes happening on English loanwords with double high accent, which are closely related to long vowels. Section 5.3.1. will focus on the changes happening in double high accented words with an initial open syllable, and section 5.3.2. will focus on the changes in double high accented words with an initial closed syllable.

5.3.1. Double high accented English loanwords with an open initial syllable

In order to have more detailed analysis on how the loss of long vowels affects the tone patterns of younger NK speakers, English loanwords that were assigned double high accent with an open initial syllable were collected from each age group and classified by syllable number. Figure 1 presents the number of two-, three-, and four-syllable double high accented words with an initial open syllable observed from each age group.

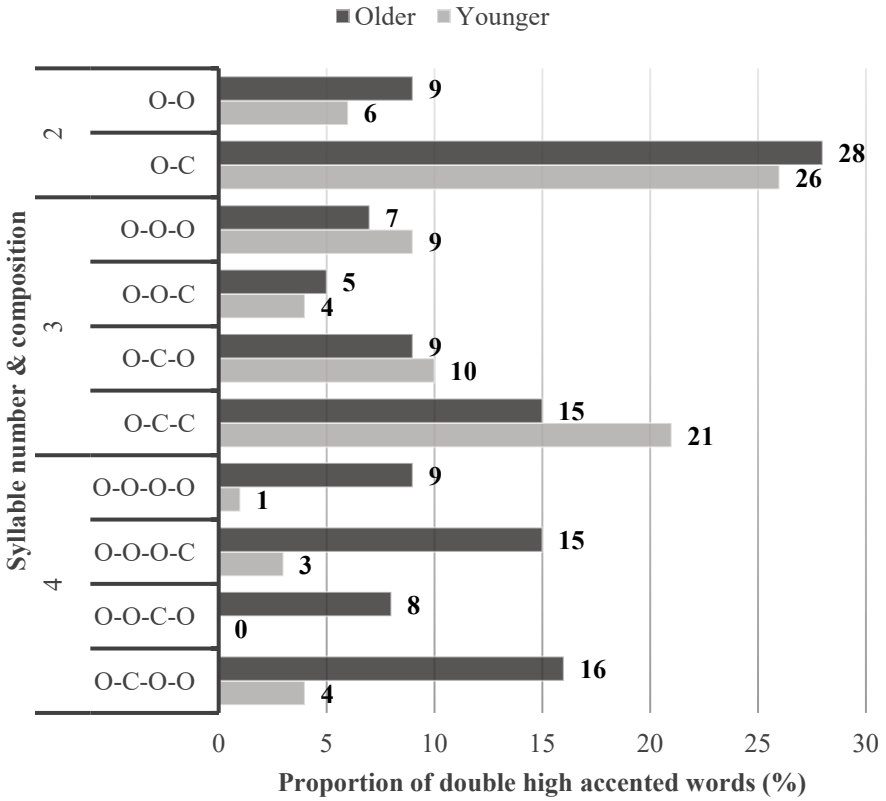
Figure 1. Number of double high accented words with an open initial syllable in each age group



The results in Figure 1 reveal that the number of double high accented loanwords with an open initial syllable do not differ greatly between the two age groups in two- and three-syllable English loanwords. It seems that double high accent is still maintained in two- and three-syllable English loanwords for both younger and older speakers, even if vowel length is no longer phonemically contrastive for younger NK speakers (Kim, 2018). Yet, a dramatic difference is observed between the two different generations in the results of four-syllable English loanwords. For the older group, double high accent is still well maintained in four-syllable English loanwords just like two- and three-syllable English loanwords. In the younger group, however, double high accent is retained only in a small number of four-syllable English loanwords. The results indicate that double high accent is being lost especially from four-syllable English loanwords in the production of younger speakers.

To check whether the pace of the tone change differs among distinct syllable combinations or not, the annotation results of the two-, three- and four-syllable English loanwords of each age group were subdivided by syllable composition. Figure 2 presents the proportion of double high accented words in each syllable composition.

Figure 2. Proportion of double high accented words in each syllable composition that contains an open initial syllable (O = open syllable, C = closed syllable)



The results in Figure 2 show that similar changes are happening for words with the same number of syllables regardless of the syllable combinations. In the results of two- and three-syllable English loanwords, there was no big difference between the older and younger groups. However, the proportions of double high accented words were much smaller for the younger group than the older group in the results of four-syllable English loanwords. Although the generational tone change was observed only from four-syllable English loanwords, the results prove that the loss of long vowels in the production of younger speakers has started to modify the moraic structures of English loanwords and change their tone assignment patterns. Since the tone changes

are happening first from four-syllable English loanwords, it can be inferred that polysyllabic loanwords are more affected by the moraic changes.

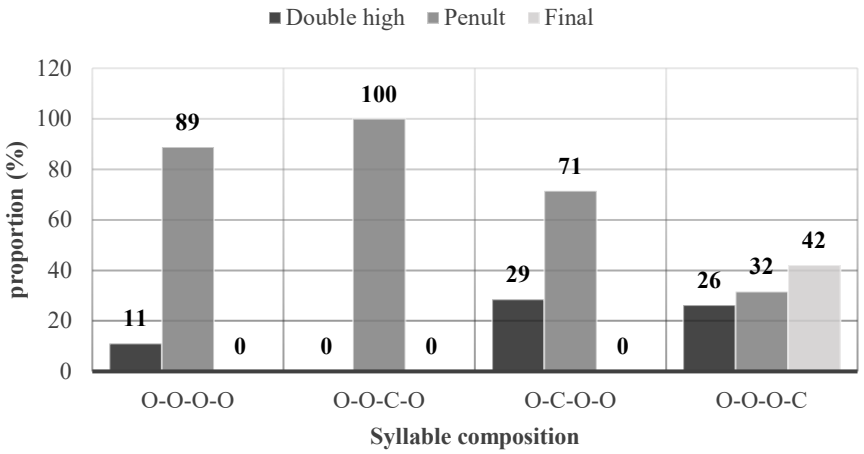
Then, to determine if the new tone patterns that younger speakers assign to English loanwords that had double high accent in the past are predictable, this study analyzed how the four-syllable English loanwords that older speakers show double high accent are assigned new tone patterns by younger speakers. In four-syllable English loanwords, there were seven distinct syllable compositions that contain an open initial syllable. Among them, four compositions displayed the generational tone changes: open-open-open-open, open-open-open-closed, open-open-closed-open, and open-closed-open-open. Table 2 shows the number of double high accented words observed from the older group in each syllable composition and the distribution of their new tone patterns observed from the younger group. For better understanding, Figure 3 presents the proportion of each tone pattern observed from the younger group in each syllable composition.

Table 2. Number of double high accented words from the older group and the distribution of new tone patterns from the younger group in each syllable composition

Syllable composition	Older	Younger			
	Double high	Double high	Penultimate	Final	Deleted tokens[5]
open-open-open-open	48	5	40	0	3
open-open-closed-open	5	0	5	0	0
open-closed-open-open	7	2	5	0	0
open-open-open-closed	24	5	6	8	5

[5] These tokens were excluded from the analyses of this chapter because each younger speaker assigned different accent to these words so that the representative tone pattern could not be generated.

Figure 3. Proportions of the younger group's tone patterns in each syllable composition



The results in Table 2 and Figure 3 reveal that the newly assigned tone patterns of younger speakers are closely related to the moraic structure of the words and thus largely predictable. That is, high tone is generally assigned according to the tone assignment rules of NK English loanwords that we discussed in Chapter 3 and Chapter 4, based on the assumption that the open initial syllables are light (monomoraic). First, for four-syllable English loanwords with the open-open-open-open syllable combination, the older group displayed 48 double high accented words. Among them, only five (11%) retained double high accent in the younger group, and all the other words (89%), except for the deleted ones, were assigned penultimate accent. The example words that displayed the generational difference on the tone pattern are presented in (2) with the expected foot structures.

(2) Generational difference on words with the open-open-open-open syllable composition

English word	Older group	Younger group
Virginia	HHLL (pʌ́:).(dɕí.ni.a)	LLHL pʌ.dɕi.(ní.a)
rosemary	HHLL (ɾó:).(dɕɨ́.ma.ɾi)	LLHL ɾo.dɕɨ.(má.ɾi)
utopia	HHLL (jú:).(tʰó.pʰi.a)	LLHL ju.tʰo.(pʰí.a)

Next, four-syllable English loanwords with the open-open-closed-open and open-closed-open-open syllable compositions also exhibited similar tone changes. For words with the open-open-closed-open syllable combination, the older group assigned double high accent to five words, but all these words (100%) fell into the penultimate accent class for the younger group. For words with the open-closed-open-open syllable composition, seven words were assigned double high accent in the older group, but only two (29%) showed the same tone pattern in the younger group and the other five words (71%) were assigned penultimate accent instead. That is, in both the syllable compositions, younger speakers generally assigned penultimate accent to the words that older speakers assigned double high accent. The example words that displayed the generational difference are presented in (3) and (4) with the expected foot structures.

(3) Generational difference on words with the open-open-closed-open syllable composition

English word	Older group	Younger group
Roosevelt	HHLL (ɾú:).(dɕɨ́.bel.tʰɨ́)	LLHL ɾu.dɕɨ.(bél.tʰɨ́)
Portland	HHLL (pʰó:).(tʰɨ́l.len.dɨ)	LLHL pʰo.tʰɨ́l.(lén.dɨ)
tournament	HHLL (tʰó:).(nʌ́.mʌn.tʰɨ́)	LLHL tʰo.nʌ.(mʌ́n.tʰɨ́)

(4) Generational difference on words with the open-closed-open-open syllable composition

English word	Older group	Younger group
raincoat	HHLL (ɾé:).(ín.kʰo.tʰɨ)	LLHL ɾe.in.(kʰó.tʰɨ)
percentage	HHLL (pʰʌ́:).(sén.tʰi.dɕɨ)	LLHL pʰʌ.sen.(tʰí.dɕɨ)

The new tone patterns of the younger group observed from the three distinct syllable compositions mentioned above did not show much variation. Except for the seven words that maintained double high accent, all the other words fell into the penultimate accent class. Yet, words with the open-open-open-closed syllable composition displayed more variation on the tone assignment. Among the 24 English loanwords that the older group assigned double high accent, five (26%) were assigned double high accent, six (32%) had penultimate accent, and eight (42%) fell into the final accent class. The example words that the younger group exhibited final accent are presented in (5) with the expected foot structures.

(5) Generational difference on words with the open-open-open-closed syllable composition

English word	Older group	Younger group
layout	HHLL (ɾé:).(í.a.ut)	LLLH ɾe.i.a.(ú**t**)
humanism	HHLL (hjú:).(mʌ́.ni.dɕɨm)	LLLH hju.mʌ.ni.(dɕɨ**m**)
hurricane	HHLL (hʌ́:).(ɾí.kʰe.in)	LLLH hʌ.ɾi.kʰe.(í**n**)

Although final accent seems to be the main tone pattern for the younger group in the open-open-open-closed syllable composition, there were a few words that unexpectedly fell into the penultimate accent class. To find out which factors affected the variation of the tone patterns, the words that were assigned penultimate accent were examined, and it was noticed that most of them end with [ɕjʌn]. The examples of the words that end with [ɕjʌn], which exhibited the generational

difference on the tone patterns, are presented in (6) with the expected foot structure.

(6) Generational difference on the tone patterns of English loanwords that end with [ɛjʌn]

English word	Older group	Younger group
rotation	HHLL (ɾó:).(tʰé.i.ɛjʌn)	LLHL ɾo:.tʰe.(í.ɛjʌn)
formation	HHLL (pʰó:).(mé.i.ɛjʌn)	LLHL pʰo.me.(í.ɛjʌn)
carnation	HHLL (kʰá:).(né.i.ɛjʌn)	LLHL kʰa.ne.(í.ɛjʌn)

In Chapter 3, it was reported that NK English loanwords that end with [ɛjʌn] (as in English ‘mission’ or ‘motion’) are always assigned penultimate accent and this rule applies without exception (see (5) in 3.3.1.1. for more detailed information). The annotation results of the younger group exhibited the exact same tone pattern as observed in Chapter 3, assigning penultimate accent to words that end with [ɛjʌn]. However, the annotation results of the older group reveal that if the initial syllable contains a long vowel, older speakers assign double high accent even to English loanwords that end with [ɛjʌn]. The tone patterns of older speakers on the English loanwords that end with [ɛjʌn] again show that word-initial syllables with a long vowel have a strong tendency to attract double high accent in NK English loanwords. In addition, the generational difference observed from the tone patterns of the English loanwords that end with [ɛjʌn] provides additional evidence that long vowels do not exist anymore in the production of younger speakers especially in four-syllable English loanwords.

All in all, the results in this section support the first three hypotheses of this chapter. First, the results show that the generational tone change is happening among younger speakers and they produce double high accent less frequently than older speakers in English loanwords with an open initial syllable. Second, the tone change is happening first from four-syllable English loanwords,

and thus it can be assumed that polysyllabic loanwords are more affected by the loss of the vowel length distinction. Third, four-syllable English loanwords that had a long vowel in the past or in the production of older NK speakers now seem to be considered to have a light initial syllable for younger NK speakers. Thus, the newly assigned tone patterns observed from the younger group mostly follow the general tone assignment rules of single high accent and are largely predictable.

In the past when there was a clear vowel length distinction, it would not be confusing for NK speakers to assign double high accent to English loanwords with an open initial syllable because words that had a long vowel in the initial syllable always attracted double high accent, whereas words that contained a short vowel in the initial syllable never fell into the double high accent class. However, as long vowels have disappeared from the production of younger NK speakers, younger speakers have lost cues to assign double high accent, and thus they are no longer able to figure out which English loanwords should be assigned double high accent if their initial syllable is open. This seems to cause the tone changes happening among the younger generation in order to make the accentuation of NK loanwords more predictable in their new vowel system.

However, even if younger speakers lost cues to assign double high accent to words with a long vowel, they still retain the historical tone patterns (double high accent) especially in two- and three-syllable English loanwords. This seems to be influenced by the tone patterns of older speakers since older speakers still differentiate English loanwords with an initial long vowel from those with an initial short vowel by different tone patterns. Even if the results of this study showed that English loanwords with an initial open syllable exhibited some variation on the tone patterns from the younger speakers, in the future these loanwords may no longer maintain double high accent so that their tone patterns become predictable in the new short vowel system.

5.3.2. Double high accented English loanwords with a closed initial syllable

In the previous section 5.3.1., it has been observed that double high accent has become less frequent in the production of younger speakers especially in four-syllable English loanwords that contain an open initial syllable. In order to check if the tone change is happening only in loanwords with an open initial syllable, the annotation results of English loanwords with a closed initial syllable were collected and analyzed in this section. First, to see if there is any age difference on the tone patterns of loanwords with a closed initial syllable, the most frequent tone pattern of each syllable composition was discovered from the annotation results of each age group. The results are presented in Table 3.

Table 3. Most frequent tone pattern of each syllable composition in two different age group [6]

Syllable number	Syllable composition	Most frequent tone pattern	
		Older group	Younger group
2-syllable	closed-closed	double high HH	double high HH
3-syllable	closed-open-open	double high HHL	double high HHL
	closed-open-closed	double high HHL	double high HHL
	closed-closed-open	double high HHL	double high HHL
4-syllable	closed-open-open-open	double high HHLL	penultimate LLHL
	closed-open-open-closed	double high HHLL	final LLLH

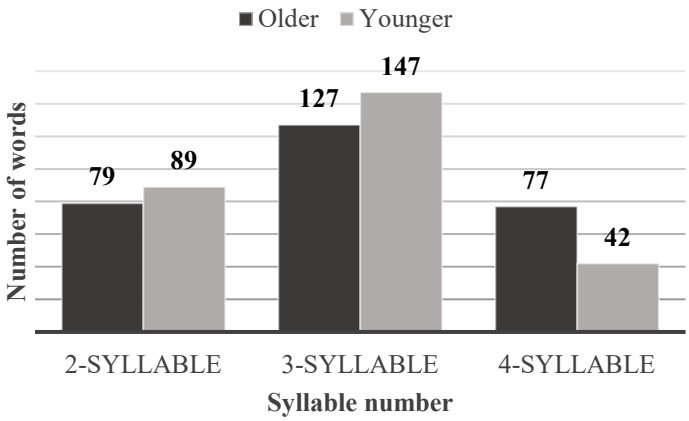
In Chapter 3, it has been noticed that NK English loanwords with a closed initial syllable exhibit double high accent most frequently regardless of the number of syllables (see Tables 5, 6,

[6] There were seven words with the closed-open-closed-open syllable composition, but they were excluded from the analysis because the number is too small to generalize their tone assignment pattern.

7 in Chapter 3). However, when the annotation results were divided by age group, different results were observed in four-syllable English loanwords between the younger and older groups. For two- and three-syllable English loanwords in Table 3, both the younger and older groups displayed double high accent most frequently in every syllable composition. Yet, in four-syllable English loanwords the two age groups exhibit different tone patterns. The shaded part in Table 3 indicates the differences between the younger and older groups. In four-syllable English loanwords, there were two distinct syllable compositions that had a closed initial syllable: closed-open-open-open and closed-open-open-closed. Although the older group displayed double high accent most frequently in both syllable compositions as they did in two- and three-syllable English loanwords, the younger group exhibited either penultimate accent or final accent most frequently. The generational difference observed from four-syllable English loanwords suggests that the tone change observed in English loanwords with an initial open syllable (see section 5.3.1.) is also similarly happening in the English loanwords with an initial closed syllable.

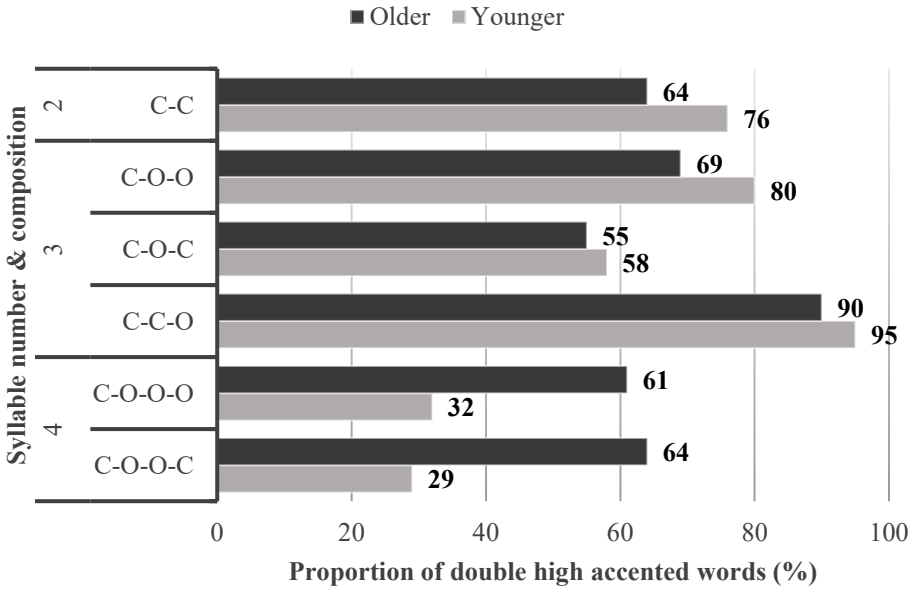
In order to have more detailed analysis on the tone change happening in the production of younger speakers, the number of double high accented words in two-, three-, and four-syllable English loanwords was analyzed separately by each age group, and the results are presented in Figure 4.

Figure 4. Number of double high accented words with a closed initial syllable in each age group



In two- and three-syllable English loanwords, double high accent seems to be well maintained in both age groups. Yet, in four-syllable English loanwords, the number of double high accented words observed in the younger group was much smaller than the older group, though the difference between the two age groups is not as great as the difference observed in four-syllable English loanwords with an open initial syllable (see Figure 1 in section 5.3.1.). This demonstrates that double high accent is also disappearing from four-syllable English loanwords with a closed initial syllable especially in the production of younger speakers. However, the change is slower, and more words still retain double high accent, compared to the results of English loanwords with an open initial syllable, as seen in section 5.3.1. To see the generational difference more clearly and to check if different syllable compositions show different pace of the change, the proportion of double high accented words was calculated separately in each syllable composition, and the results are presented in Figure 5.

Figure 5. Proportion of double high accented words in each syllable composition with a closed initial syllable (O = open syllable, C = closed syllable)



The results in Figure 5 reveal that differences in syllable composition do not affect the pace of the tone change. Every syllable composition of two- and three-syllable English loanwords did not show a noticeable generational difference in the proportions of double high accented words, whereas the proportions exhibited a big difference between the two age groups in four-syllable English loanwords. The proportions observed from the younger group were much smaller than those observed from the older group in the results of four-syllable English loanwords. Though it was unexpected, the results of this section exhibit that double high accent is also being lost from four-syllable English loanwords with a closed initial syllable.

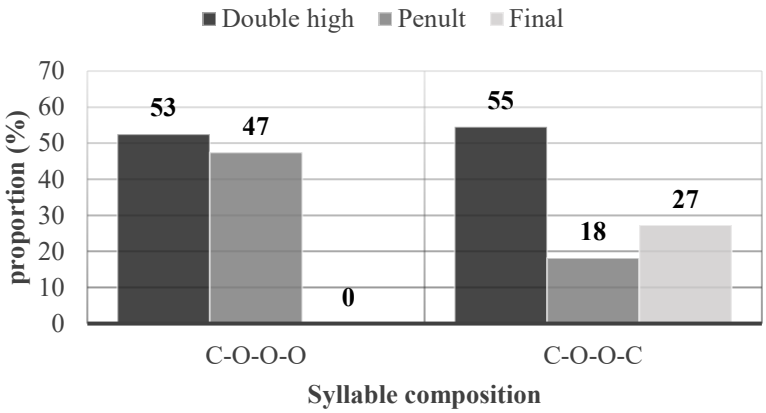
Then, in order to check if the tone assignment patterns newly observed in the production of younger speakers are predictable, the tone patterns of the younger generation were analyzed from the four-syllable English loanwords that the older generation assigned double high accent. Table 4 shows the number of double high accented words observed from the older group in each

syllable combination and the distribution of their tone patterns observed from the younger group. For better understanding, the proportions of the younger group's new tone patterns in each syllable combination were calculated and presented in Figure 6.

Table 4. Number of double high accented words from the older group and the distribution of new tone patterns from the younger group in each syllable composition

Syllable composition	Older	Younger			
	Double high	Double high	Penultimate	Final	Deleted tokens[7]
closed-open-open-open	61	31	28	0	2
closed-open-open-closed	14	6	2	3	3

Figure 6. Proportions of the younger group's new tone patterns in each syllable composition



For English loanwords with the closed-open-open-open syllable composition, the older group assigned double high accent to 61 words. Among them, 31 (53%) retained double high accent and the rest (47%) fell into the penultimate accent class in the production of the younger group, except for the deleted tokens. This shows that penultimate accent is the new tone pattern

[7] These tokens were excluded from the analyses of this chapter because each younger speaker assigned different accent to these words so that the representative tone pattern could not be generated.

that younger speakers generally assign to words with the closed-open-open-open syllable composition. For words with the closed-open-open-closed syllable composition, out of 14 words that older speakers assigned double high accent, 6 (55%) maintained double high accent, 2 (18%) were assigned penultimate accent, and 3 (27%) showed final accent in the younger group. Since the penultimate accented words ended with [ɕjʌn] (e.g. 'sensation'), it is assumed that final accent is the new tone pattern that is generally assigned by the younger group. The example words of each syllable composition that displayed the generational difference are presented in (7) and (8) with the expected foot structures.

(7) Generational difference on words with the closed-open-open-open syllable composition

English word	Older group	Younger group
Victoria	HHLL (bí**k**).(tʰó.ɾi.a)	LLHL bik.tʰo.(ɾí.a)
sandwich	HHLL (sé**n**).(dɬ.wi.tɕʰi)	LLHL sen.dɨ.(wí.tɕʰi)
Indiana	HHLL (í**n**).(dí.e.na)	LLHL in.di.(é.na)

(8) Generational difference on words with the closed-open-open-closed syllable composition

English word	Older group	Younger group
endorphin	HHLL (é**n**).(dó.ɾɨ.pʰin)	LLLH en.do.ɾɨ.(pʰí**n**)
androgen	HHLL (á**n**).(dɬ.ɾo.gen)	LLLH an.dɨ.ɾo.(gé**n**)
antipyrine	HHLL (á**n**).(tʰí.pʰi.ɾin)	LLLH an.tʰi.pʰi.(ɾí**n**)

As observed from the newly assigned tone patterns in four-syllable English loanwords with an open initial syllable in section 5.3.1., the changing tone patterns in four-syllable English loanwords with a closed initial syllable are also patterned and predictable. That is, the new tone assignment of four-syllable English loanwords that have a closed initial syllable follows the

general tone assignment rules observed from English loanwords that have a light initial syllable. This provides evidence that the special salience of word-initial closed syllables is being lost from younger speakers, even though the salience is still retained by older speakers.

Though it was not expected, it seems that the tone changes caused by the loss of long vowels have also influenced the tone patterns of English loanwords with a closed initial syllable. The results of this section reject the fourth hypothesis of this chapter, showing that the generational tone change is not only happening in English loanwords with an open initial syllable, but also occurring in those with a closed initial syllable. However, the pace of the change seems to be slower in English loanwords with a closed initial syllable, maintaining double high accent more conservatively.

5.4. General discussion

The results of this chapter reveal that the loss of the vowel length contrast has an impact on tone patterns of English loanwords and double high accent is becoming less frequent in the production of younger speakers. Although this study hypothesized that the generational tone change would appear only in English loanwords with an initial open syllable, those with an initial closed syllable also exhibited the generational tone change. The change observed from English loanwords with a closed initial syllable was unexpected because the loss of long vowels does not affect their moraic structures. Then why are English loanwords with a closed initial syllable also experiencing the tone change? From the results of this chapter, it can be inferred that the loss of long vowels causes the salience of the word-initial heavy syllables to be weakened in the production of younger NK speakers.

In Chapter 4, two inviolable constraints were proposed to explain the salience of the word-

initial heavy syllables: LONGVFOOTMS for word-initial heavy syllables with a long vowel and PARSE-SYL (Closed Initial) for word-initial heavy syllables with a coda consonant. The constraint LONGVFOOTMS makes syllables with a long vowel form a monosyllabic foot, and the constraint PARSE-SYL (Closed Initial) makes word-initial closed syllables be assigned high tone. Since older NK speakers still retain long vowels, these two constraints are still active and double high accent is assigned to English loanwords with a heavy initial syllable in the production of older speakers. That is, the salience of word-initial heavy syllables is still maintained in their production. Yet, for younger NK speakers, the constraint LONGVFOOTMS becomes inactive as long vowels have been lost in their production, and with the loss of long vowels, the salience of the word-initial closed syllables also seems to be affected. That is, the constraint PARSE-SYL (Closed Initial), which accords the salience to initial closed syllables, has been weakened as well, and this change makes double high accent less frequent even in English loanwords with a closed initial syllable in the production of younger speakers. This provides evidence that the salience of word-initial heavy syllables in NK English loanwords stems from the unique characteristic of long vowels that they mostly appear in word-initial syllables.

However, the results of this chapter showed that not all English loanwords that had double high accent are experiencing the tone changes in the production of younger NK speakers. Although double high accent is being lost from four-syllable English loanwords in the production of younger speakers, two- and three-syllable English loanwords have not exhibited any noticeable generational difference in their tone patterns. This shows that bimoraicity in initial syllables is being lost in longer words before shorter words. Then why does the change occur first from four-syllable English loanwords? To answer this question, English loanwords with an initial long vowel and those with a closed initial syllable should be considered separately since they are experiencing

the tone change for different reasons and the expected path of their tone change is also different.

First, for English loanwords that had an initial long vowel, the tone change seems to be happening due to the loss of long vowels. Since the vowel length contrast has been lost from the production of younger NK speakers (Kim, 2018), all their English loanwords that had a long vowel in the initial syllable have lost their long vowel, and thus no longer retain a cue to assign double high accent. However, the results in section 5.3.1. revealed that double high accent is being lost only in four-syllable English loanwords and is still maintained in two- and three-syllable English loanwords in the production of younger NK speakers. Since younger NK speakers no longer have the cues (long vowels) to assign double high accent to loanwords with an open initial syllable, double high accent observed from their two- and three-syllable loanwords seems to be a historical tone pattern that is influenced by the production of older NK speakers.

Then why do the historical tone patterns (double high accent) last longer in two- and three-syllable English loanwords in the production of younger NK speakers? For English loanwords with an open initial syllable, there can be two possible answers for the question. First, the two- and three-syllable loanwords may have a lexical double high accent in the input just like NK native words, due to the frequency effect. In NK native words, there is an assumption that they have tones in the underlying form. It seems that the highest ranked constraint in NK native words is IDENT(TONE) and it makes the words to be faithful to the underlying tone. That is, the tone in the input must be realized in the output in NK native words, even if it violates other constraints. Yet, for NK loanwords, they do not have underlying tone in the input, so the IDENT(TONE) constraint cannot be active. Instead, other constraints play the role to assign tone as discussed in Chapter 4.

However, the tone patterns of two- and three-syllable English loanwords, which exhibit double high accent in the production of younger speakers, do not seem to follow the general

loanword accentuation rules. According to the tone assignment rules of NK English loanwords, every loanword with an open initial syllable produced by younger NK speakers must not fall into the double high accent class since they have already lost long vowels, which are crucial cues for double high accent. However, the results of this chapter displayed that the expected tone change (losing double high accent) has been occurring only in four-syllable loanwords, and double high accent has been still maintained in shorter loanwords in the production of younger NK speakers. From the results, it can be inferred that for two- and three-syllable English loanwords, the tone becomes part of the underlying representation since they are more frequent than four-syllable English loanwords.

Haspelmath & Sims (2010) assert that irregularities exist mostly in frequent words since frequent words are more easily remembered and are retrieved faster than rare words. The frequency effects might help explain the unexpected tone patterns (retaining double high accent) of two- and three-syllable loanwords in the results of this chapter. According to Haspelmath & Sims (2010), there is a correlation between frequency and shortness of a word. That is, frequent words are usually shorter than rare words. Since shorter words are more frequent than longer words, it can be assumed that the younger generation may hear the two- and three-syllable loanwords more frequently than four-syllable loanwords and this may help their tones become part of the lexical representation. Yet, four-syllable English loanwords are likely to be less frequent than two- and three-syllable loanwords, and thus they may be less influenced by the production of older speakers. Since words with low frequency are more subject to analogical levelling (Haspelmath and Sims, 2010), this makes them to follow the regular tone assignment patterns, experiencing the tone change as expected. With the assumption, it can be further inferred that newly adapted English loanwords and low frequency English loanwords may be the first targets of the tone change and

rarely assigned double high accent in the production of younger speakers since they are less influenced by the historical tone patterns produced by older speakers.

Second, the other way of explaining the differences between the tone patterns of shorter and longer loanwords is that the tones are not part of the underlying representation, but the initial syllables of two- and three-syllable English loanwords may still have covert long vowels. Although long vowels have been lost in the production of younger NK speakers phonetically (Kim, 2018), the length distinction may still exist phonologically. That is, the initial syllables that had a long vowel in the past may be still phonologically bimoraic, though speakers do not perceive the length difference since they are not phonetically long. The discrepancy between phonology and phonetic representations are often found in languages. For instance, in Hungarian (Vago, 1973), there is a vowel harmony with front vowels and back vowels. In this language, the high front vowel [i] generally behaves as a front vowel. However, for some words it behaves as a back vowel triggering back harmony, and this has a historical reason: those words where the high front vowel triggers back harmony originally had the high central vowel [i]. That is, Hungarian originally had two different vowels [i] and [i], but they were neutralized and fell together as [i]. Nonetheless, phonologically the difference still has an effect and those words that historically had the vowel [i] exhibit back harmony. That is, phonetically it is just one vowel [i], but phonologically it acts as two different types of vowels.

As seen in the Hungarian example, even if the vowel length is no longer phonetically contrastive in the production of younger NK speakers, their two- and three-syllable English loanwords that had an initial long vowel in the past still act as they have a bimoraic initial syllable, falling into the double high accent class. Then, why has the bimoraicity been lost from four-syllable English loanwords, exhibiting the tone change? This could be due to a word length effect, but this

is highly controversial. There is an assertion that vowel length in longer words may be shorter than vowel length in shorter words. Since an initial long vowel in a four-syllable English loanword may be inherently short, this might cause four-syllable loanwords to lose the bimoraicity before shorter loanwords.

However, even though the results of this chapter revealed that double high accent is still maintained in shorter loanwords, the tone change has already been started in four-syllable loanwords and this could be the beginning of the change in progress. Younger speakers are losing their vowel length contrast and it seems to affect the loanword accentuation system in patterned way with respect to double high accent. Since the tone change has already been started from longer loanwords, this study expects that the tone change will be continued and, in the future, double high accent will also become less frequent in two- and three-syllable English loanwords. That is, ultimately English loanwords with an initial open syllable will not retain double high accent. The expected tone change on English loanwords with an open initial syllable can be explained with the optimality-theoretical analysis. In Chapter 4, the optimality-theoretical constraints for the high tone assignment in NK English loanwords and the ranking were presented. This chapter will also use them to explain the reason of the generational tone change and the expected path of the change. The constraints and their final ranking presented in Chapter 4 are shown in (9) below.

(9) Constraint ranking for high tone assignment in NK English loanwords

LONGVFOOTMS, PARSE-SYL (Closed Initial), *HHH, *FALLRISE, ALIGN-R (Wd, Ft), ALIGN-L (HH, Wd) >> *Accented-ɨ >> FT-BIN [Moraic Troch], PARSE-SYL (Closed) >> WEIGHT-BY-POSITION >> PARSE-SYL, DEP-μC

As seen in (9), the constraint that represents the salience of word-initial heavy syllables with a long vowel (i.e. LONGVFOOTMS) is ranked highest. For older NK speakers, those who still retain the vowel length distinction, the constraint is still active. However, the constraint LONGVFOOTMS is not active for younger NK speakers because long vowels have already been lost in their production. The tableaus (1) and (2) below show how the different vowel length systems of the older and younger NK speakers assign different tone patterns to the English word 'utopia' when it becomes a loanword in NK Korean. Since older and younger NK speakers are considered to have different vowel systems in the analysis of this study, the difference is exhibited in their inputs. For older NK speakers, the input contains a long vowel in the initial syllable, as in /ju:.tʰo.pʰi.a/. Yet, for younger NK speakers, the input include only short vowels, as in /ju.tʰo.pʰi.a/.[8]

Tableau (1) Older speakers /ju:.tʰo.pʰi.a/ → [jú:.tʰó.pʰi.a] HHLL 'utopia'

Input: /ju:.tʰo.pʰi.a/ 'utopia'	LONG V FOOT MS	FT-BIN [Moraic Troch]	PARSE-SYL
☞ a. (jú:).(tʰó.pʰi.a)		*(LLL)	
e. ju:.tʰo.(pʰí.a)	*!		**

Tableau (2) Younger speakers /ju.tʰo.pʰi.a/ → [ju.tʰo.pʰí.a] LLHL 'utopia'

Input: /ju.tʰo.pʰi.a/ 'utopia'	FT-BIN [Moraic Troch]	PARSE-SYL
a. (jú).(tʰó.pʰi.a)	*(LLL)!	
☞ b. ju.tʰo.(pʰí.a)		**

[8] Given the concept of richness of the base (e.g. Kager, 1999), one should consider a long vowel in the underlying representation of the younger generation. If younger speakers have an input with a long vowel, they would also have a high-ranked *V: constraint that would have the effect of preventing a long vowel from being realized on the surface. The constraint *V: would be low-ranked for the older generation. We do not consider the analyses with *V: constraint in the presentation of the OT analysis.

For older NK speakers, since long vowels are still maintained in their production, the constraint LONGVFOOTMS, which assigns a monosyllabic foot to the syllable with a long vowel, plays a crucial role. Thus, in their production, Candidate (1a), which respects the inviolable constraint LONGVFOOTMS, becomes the winning candidate, though it violates the constraint FT-BIN [Moraic Troch], having three moras in the second foot. Candidate (1b) respects the constraint FT-BIN [Moraic Troch], but it is ruled out because it does not assign a monosyllabic foot to the initial syllable, violating the constraint LONGVFOOTMS.

However, for younger speakers, the input does not contain a long vowel, and thus the constraint LONGVFOOTMS cannot be active. Consequently, Candidate (2a), corresponding to the winning candidate for older speakers, is ruled out in the production of younger speakers since it does not respect the constraint FT-BIN [Moraic Troch]. Instead, Candidate (2b), which is assigned penultimate accent, turns out to be the optimal output because it respects the higher-ranked constraint FT-BIN [Moraic Troch] that Candidate (2a) violates.

Tableaus (1) and (2) display how the loss of long vowels has changed younger speakers' tone assignment pattern in a four-syllable English loanword. Although the tone change is exhibited only from four-syllable English loanwords in the results of this chapter, this study predicts that the change will also be happening in two- and three-syllable English loanwords. The expected generational tone change on two-syllable English loanwords is demonstrated in Tableaus (3) and (4) with the example English word 'juice.' Although Kenstowicz & Sohn (2001) assert that this word assigns double high accent with a long vowel in the initial syllable as in [tɕú:.s'í] HH 'juice,' younger speakers in this current study exhibited penultimate accent as in [tɕú.s'i] HL 'juice.'

Tableau (3) Older speakers /tɕu:.s'ɨ/ → [tɕú:.s'ɨ́] HH 'juice'

Input: /tɕu:.s'ɨ/ 'juice'	LONG V FOOT MS	*Accented-ɨ	FT-BIN [Moraic Troch]
☞ a. (tɕú:).(s'ɨ́)		*	*(L)
b. (tɕú:.s'ɨ)	*!		*(HL)

Tableau (4) Younger speakers /tɕu.s'ɨ/ → [tɕú.s'ɨ] HL 'juice'

Input: /tɕu.s'ɨ/ 'juice'	*Accented-ɨ	FT-BIN [Moraic Troch]
a. (tɕú).(s'ɨ́)	*!	*(L)(L)
☞ b. (tɕú.s'ɨ)		

For older speakers, who maintain a long vowel in the input, Candidate (3a), which falls into the double high accent class, becomes the winning candidate because it respects the inviolable constraint LONGVFOOTMS, assigning a monosyllabic foot to the syllable with a long vowel. Yet, for younger speakers, the input does not contain a long vowel, and thus the constraint LONGVFOOTMS is not active. Thus, Candidate (4a), which violates both the constraints *Accented-ɨ and FT-BIN [Moraic Troch], is ruled out, and Candidate (4b), which respect all the constraints that Candidate (4a) violates, becomes the optimal output. The analysis in Tableaus (3) and (4) shows why the tone change is expected to happen in two-syllable English loanwords in the production of younger NK speakers as their long vowels have been lost.

Next, Tableaus (5) and (6) present similar generational tone change expected in three-syllable English loanwords with the example English word 'Venus.' Again, it is assumed that older and younger NK speakers have different vowel systems. That is, older speakers are considered to have a long vowel in the initial syllable, whereas younger speakers are considered to have a short vowel in the initial syllable. Even if Kenstowicz & Sohn (2001) claim that the English word 'Venus' assigns double high accent with an initial long vowel as in [pí:.nʌ́.s'ɨ] HHL 'Venus,' younger

speakers in this current study displayed penultimate accent as in [pi.nʌ́.s'ɨ] LHL 'Venus.'

Tableau (5) Older speakers /pi:.nʌ.s'ɨ/ → [pí:.nʌ́.s'ɨ] HHL 'Venus'

Input: /pi:.nʌ.s'ɨ/	LONG V FOOT MS	FT-BIN [Moraic Troch]	PARSE-SYL
☞ a. (pí:).(nʌ́.s'ɨ)			
d. pi:.(nʌ́.s'ɨ)	*!		*

Tableau (6) Younger speakers /pi.nʌ.s'ɨ/ → [pi.nʌ́.s'ɨ] LHL 'Venus'

Input: /pi.nʌ.s'ɨ/	FT-BIN [Moraic Troch]	PARSE-SYL
a. (pí).(nʌ́.s'ɨ)	*(L)!	
☞ b. pi.(nʌ́.s'ɨ)		*

As seen in previous Tableaus, the winning candidate for older speakers is (5a), the one with double high accent, because it respects the inviolable candidate LONGVFOOTMS. However, for younger speakers, Candidate (6b), the one with penultimate accent, becomes the optimal output. Since younger speakers do not retain long vowels, the open initial syllable of the input should be considered monomoraic, and thus assigning a monosyllabic foot to the initial syllable violates the constraint FT-BIN [Moraic Troch] as seen in (6a). Thus, Candidate (6b), which respects the higher-ranked constraint FT-BIN [Moraic Troch], becomes the optimal output.

Tableaus (1) through (6) exhibit how the loss of long vowels makes the inviolable constraint LONGVFOOTMS inactive and changes the tone assignment patterns in the production of younger speakers. Although the tone changes happening in the production of younger speakers in English loanwords with an open initial syllable have been observed only from four-syllable words so far, the changes are expected to continue and affect the tone patterns of all two-, three-, and

four-syllable English loanwords, as discussed in Tableaus (1) through (6).

Next, unlike English loanwords with an initial open syllable, which are expected to lose double high accent completely in the future, the tonal change that is happening in English loanwords with a closed initial syllable is not predicted to continue. For English loanwords with a closed initial syllable, double high accent is anticipated to be lost only from four-syllable words. As discussed earlier, the loss of long vowels also has an influence on the salience of the word-initial closed syllables, and thus the inviolable constraint PARSE-SYL (Closed Initial), which assigns high tone to word-initial closed syllables, is no longer active for younger NK speakers.

However, different from syllables with a long vowel, which mostly appear in word-initial position, closed syllables can appear in any position of a word. Although the word-initial closed syllables have lost the special salience, closed syllables are still generally considered heavy and high tone is attracted by heavy syllables in NK English loanwords. That is, the lower-ranked constraint PARSE-SYL (Closed), which is not related to the salience of word-initial syllables but plays an important role to assign high tone to closed syllables, is still active, and this constraint is expected to play a role in maintaining double high accent in two- and three-syllable English loanwords.

As seen in Chapter 3 and 4, in two- and three-syllable English loanwords with a closed initial syllable, assigning double high accent does not cause a violation of the bimoraic trochee system when it interacts with the context-dependent coda moraicity. If the constraint for the bimoraic trochee (FT-BIN [Moraic Troch]) is not violated, the inviolable constraints PARSE-SYL (Closed Initial) and the lower-ranked constraint PARSE-SYL (Closed) play exactly the same role, supporting closed initial syllables of English loanwords to be parsed in a foot. That is, in two- and three-syllable English loanwords with a closed initial syllable, the loss of the constraint PARSE-

SYL (Closed Initial), which assigns high tone to word-initial closed syllables, does not affect the tone assignment because the lower-ranked constraint PARSE-SYL (Closed) substitutes for the role. Thus, both older and younger speakers assign double high accent to two- and three-syllable English loanwords with a closed initial syllable regardless of whether the constraint PARSE-SYL (Closed Initial) is active or not. Tableaus (7) and (8) present how the constraints interact to assign double high accent to the two-syllable English loanword /men.tʰal/ 'mental' in the production of older and younger speakers. In Tableaus below, the constraints WEIGHT-BY-POSITION and DEP-μC only apply to footed syllables.

Tableau (7) Older speakers /men.tʰal/ → [mén.tʰál] HH 'mental' (closed-closed)

Input: /men.tʰal/	PARSE-SYL (Closed Initial)	PARSE-SYL (Closed)	W-BY-P	DEP-μC
☞ a. (mé**n**).(tʰá**l**)				**
b. (mén.tʰal)			*!*	
c. men.(tʰá**l**)	*!	*		*
d. (mé**n**).tʰál		*!		*

Tableau (8) Younger speakers /men.tʰal/ → [mén.tʰál] HH 'mental' (closed-closed)

Input: /men.tʰal/	PARSE-SYL (Closed)	W-BY-P	DEP-μC
☞ a. (mé**n**).(tʰá**l**)			**
b. (mén.tʰal)		*!*	
c. men.(tʰá**l**)	*!		*
d. (mé**n**).tʰál	*!		*

The difference between the Tableau (7) and Tableau (8) is the existence of the inviolable constraint PARSE-SYL (Closed Initial). Although the constraint is active for older speakers, it is not for younger speakers. However, the existence of the constraint PARSE-SYL (Closed Initial) does not

affect their tone assignment patterns because the lower-ranked constraint PARSE-SYL (Closed) plays the same role with the inviolable constraint PARSE-SYL (Closed Initial). Thus, for both older and younger speakers, the candidate that is assigned double high accent becomes the optimal output.

The same tone assignment patterns are also observed from three-syllable English loanwords, and Tableau (9) and (10) below show how older and younger NK speakers assign double high accent to the three-syllable English loanword /kʰak.tʰe.il/ 'cocktail.'

Tableau (9) Older speakers /kʰak.tʰe.il/ → [kʰák.tʰé.il] HHL 'cocktail' (closed-open-closed)

Input: /kʰak.tʰe.il/	PARSE-SYL (Closed Initial)	PARSE-SYL (Closed)	W-BY-P	PARSE-SYL	DEP-μC
☞ a. (kʰá**k**)(tʰé.il)			*		*
b. kʰak.(tʰé.il)	*!	*	*	*	
c. kʰak.tʰe.(í**l**)	*!	*		**	*

Tableau (10) Younger speakers /kʰak.tʰe.il/ → [kʰák.tʰé.il] HHL 'cocktail' (closed-open-closed)

Input: /kʰak.tʰe.il/	PARSE-SYL (Closed)	W-BY-P	PARSE-SYL	DEP-μC
☞ a. (kʰá**k**)(tʰé.il)		*		*
b. kʰak.(tʰé.il)	*!	*	*	
c. kʰak.tʰe.(í**l**)	*!		**	*

Again, in Tableaus (9) and (10), the difference between the older and younger speakers is the existence of the undominated constraint PARSE-SYL (Closed Initial). Even if the constraint is not active for younger speakers, it does not change their tone assignment pattern because the lower-ranked constraint PARSE-SYL (Closed) substitutes for the role, eliminating the candidates that do not parse the initial closed syllable in a foot. That is, both older and younger speakers assign double high accent to the three-syllable English loanword that contains a heavy initial syllable, but for

different reasons.

Yet, for four-syllable English loanwords with a closed initial syllable, the inviolable constraint PARSE-SYL (Closed Initial) is necessary to assign double high accent because assigning double high accent to four-syllable English loanwords violates the constraint FT-BIN [Moraic Troch]. If a four-syllable loanword is assigned double high accent, the first foot is assigned to the initial heavy syllable and the second foot is assigned to the three remaining syllables as in (σ)(σσσ). Although the foot structure type respects the right alignment constraint by aligning the right edge of the foot to the right edge of the word, as discussed in Chapters 3 and 4, it violates the constraint FT-BIN [Moraic Troch] by having three moras in the second foot. If the inviolable constraint PARSE-SYL (Closed Initial) is active, English loanwords with a closed initial syllable are guaranteed to be assigned double high accent regardless of the violation of the constraint FT-BIN [Moraic Troch] since the constraint PARSE-SYL (Closed Initial), which assigns high tone to the word-initial syllable is ranked higher than the constraint FT-BIN [Moraic Troch]. However, as seen in the constraint ranking presented in (9), the constraints FT-BIN [Moraic Troch] and PARSE-SYL (Closed) have a tied ranking. Thus, without the inviolable constraint PARSE-SYL (Closed Initial), double high accent cannot be guaranteed for four-syllable English loanwords with a closed initial syllable.

Tableaus (11) and (12) below display how the loss of the higher-ranked constraint PARSE-SYL (Closed Initial) affects the tone assignment of the four-syllable English loanword /ɕim.pʰo.tɕi.ʌm/ ‘symposium’ in the production of younger speakers.

Tableau (11) Older speakers /ɕim.pʰo.tɕi.ʌm/ → [ɕím.pʰó.tɕi.ʌm] HHLL ‘symposium’ (c-o-o-c)

Input: /ɕim.pʰo.tɕi.ʌm/	PARSE-SYL (Closed Initial)	FT-BIN [Moraic Troch]	PARSE-SYL (Closed)	W-BY-P	PARSE-SYL	DEP-μC
☞ a. (ɕí**m**).(pʰó.tɕi.ʌm)		*(LLL)		*		*
b. ɕím.pʰo.(tɕí.ʌm)	*!		*	*	**	
c. ɕim.pʰo.tɕi.(ʌ́**m**)	*!		*		***	*

Tableau (12) Younger speakers /ɕim.pʰo.tɕi.ʌm/ → [ɕim.pʰo.tɕi.ʌ́m] LLLH ‘symposium’ (c-o-o-c)

Input: /ɕim.pʰo.tɕi.ʌm/	FT-BIN [Moraic Troch]	PARSE-SYL (Closed)	W-BY-P	PARSE-SYL	DEP-μC
a. (ɕí**m**).(pʰó.tɕi.ʌm)	*(LLL)		*!		*
b. ɕim.pʰo.(tɕí.ʌm)		*	*!	**	
☞ c. ɕim.pʰo.tɕi.(ʌ́**m**)		*		***	*

Since the inviolable constraint PARSE-SYL (Closed Initial) is ranked higher than the constraint FT-BIN [Moraic Troch], older speakers, who still retain the salience of the word-initial syllables with the constraint PARSE-SYL (Closed Initial), assign double high accent to four-syllable English loanwords with a closed initial syllable. That is, Candidate (11a) becomes the optimal output in the production of older speakers, though the constraint FT-BIN [Moraic Troch] is violated.

Yet, the salience of the word-initial heavy syllables has been lost from younger speakers with the loss of long vowels, and thus the constraint PARSE-SYL (Closed Initial) is no longer active in their tone assignment. That is, the candidates that do not parse the word-initial closed syllable in a foot do not have to be ruled out, and this makes younger speakers have different tone patterns from older speakers in four-syllable English loanwords with a closed initial syllable. In the tone assignment of younger speakers on four-syllable English loanwords, every candidate violates either the constraint FT-BIN [Moraic Troch] or the constraint PARSE-SYL (Closed) since they are

incompatible. However, the violation does not rule out any of the candidates because these two constraints have a tied ranking. Thus, the winning candidate is decided by a lower-ranked constraint. In Tableau (12), Candidate (12c), which is assigned final accent, becomes the optimal output since it respects the constraint WEIGHT-BY-POSITION that the other candidates violate.

The optimality-theoretical analysis in Tableaus (7) through (12) demonstrates that the tone changes that are expected to occur in English loanwords with a closed initial syllable differ from those in English loanwords with a long vowel in the initial syllable. That is, for English loanwords that had a long vowel in the past or in the production of older speakers, all of them are expected to lose double high accent regardless of syllable number since younger NK speakers no longer have cues to assign double high accent. Yet, for English loanwords with a closed initial syllable, even if the salience of the initial closed syllables is being lost in all English loanwords, double high accent is expected to be maintained in two- and three-syllable English loanwords since the constraint PARSE-SYL (Closed) still supports their initial closed syllables to be parsed in a foot.

The special salience of word-initial heavy syllables, which was demonstrated with the constraints LONGVFOOTMS and PARSE-SYL (Closed Initial), was one of the main reasons of the violation of the bimoraic trochee system, a key foot structure to assign high tone to NK English loanwords. Without the salience of word-initial heavy syllables, the bimoraic trochee system is expected to be applied more strictly, and thus the tone assignment in NK English loanwords will become more predictable and consistent.

5.5. Conclusion and future direction

The results of this study revealed that the loss of the vowel length contrast in the production of younger speakers has an impact on their tone patterns, and double high accent is becoming less

frequent in English loanwords with a closed initial syllable as well as those with an initial long vowel. However, the tone change was observed only from four-syllable English loanwords in the results of this study, and it is assumed that the change is in the initial stage. Thus, future research is necessary to track the progress of the tone change in NK English loanwords. There are several directions in which this study can be extended. The observation here is limited to two groups of generations with three participants in a group. Therefore, a further examination with younger and older generations of NK Korean would allow us to track the tonal change more clearly. In addition, with the loss of long vowel, NK Korean has lost an important element of a moraic language. This weakens the moraic characteristics of NK Korean, and thus it might cause another change in the tone assignment patterns of NK English loanwords in the future. Thus, future research should keep track the tone changes in NK Korean.

CHAPTER 6

PITCH-PATTERN DIFFUSION OF GENERATIONAL TONE CHANGE IN NORTH KYUNGSANG ENGLISH LOANWORDS

6.1. Introduction

In the previous Chapter 5, we discussed the intergenerational loanword tone changes on stem words. The results in Chapter 5 showed that the loss of vowel length contrast in the production of younger NK speakers has changed their tone patterns in English loanwords. Especially, the words that had double high accent in the past or in the production of older speakers displayed the tone change, and longer words were affected before shorter words. Although the tone changes on stem words were mostly observed from double high accented words, similar intergenerational tone change also seems to be happening in English loanwords with single high accent when suffixes are added. In Chapter 5, we examined generational tone change on loanwords without suffixes, but in this chapter, we will focus on generational tone change that seems to be happening on English loanwords with accented suffixes.

As mentioned in previous chapters, when English words are adapted into NK Korean, the stress patterns from the source language are disregarded, and the loanwords are assigned a new accent. That is, they must be assigned one or two pitch peaks (high tone) like NK native words (e.g. [le.món] LH ‘lemon’, [pʌ́.sɨ] HL ‘bus’, and [kó:l.tɨ́] HH ‘gold’). However, even if the newly assigned accents in NK English loanwords seem to be similar to those of NK native words, they show distinct characteristics. Unlike NK native words, which are assigned accents lexically (Kim 1988; Chung 1991; N-J Kim 1997), the tone assignment of English loanwords is sensitive to moraic structure and largely predictable in terms of syllable weight (M Kim 1997; Kenstowicz and Sohn 2001; Chung 2002; Kim 2009; Davis 2010), as discussed and analyzed in previous chapters.

The difference between the tone assignments of NK native words and English loanwords is observed more clearly especially when certain suffixes are added. IN NK Korean, only one accent (location of high tone) is allowed in a single prosodic word [stem+suffix]. Therefore, if an accented stem is combined with an accented suffix, one of the accents must be deleted. However, the deletion rule works differently in NK native words and in NK English loanwords. When the two underlyingly accented syllables are not adjacent to each other, NK native words and English loanwords both retain the stem accent (e.g. HL + HL → HL-LL). Yet, when the underlyingly accented syllables are placed next to each other and an accent clash occurs, NK native words and English loanwords exhibit distinct accentuation patterns: For NK native words, the stem loses its accent and the suffixal accent is maintained (e.g. [pa.ɾám] LH 'wind' + [-tɕʰÁ.ɾʌm] HL 'like' → [pa.ɾam-tɕʰÁ.ɾʌm] LL-HL 'like wind'), whereas the stem accent is retained for NK English loanwords (e.g. [le.món] LH 'lemon'+ [-tɕʰÁ.ɾʌm] HL 'like' → [le.món-tɕʰʌ.ɾʌm] LH-LL 'like a lemon'). That is, NK English loanwords differentiate themselves from NK native words showing that they always retain their stem accent (Kim, 1997; Kenstowicz & Sohn, 2001).

The following Table 1 and Table 2 exhibit more detailed description of the suffixal accent patterns in NK native words and English loanwords. In Table 1 and Table 2, the tone patterns of NK native words and English loanwords with single high accent are presented in three different conditions: (1) in isolation, (2) with an accentless nominative suffix [-i/ga],[9] and (3) with an accented suffix [-tɕʰÁ.ɾʌm] HL 'like.' Since the suffixal accents differ between NK native words and English loanwords only for words with single high accent, this chapter will focus on the tone patterns of single high accented words and not on double high accented words.[10] The different

[9] The shape of the nominative suffix *-i/ga* is determined phonologically. Following a vowel, the suffix becomes *-ga*; and following a consonant, it is pronounced as *-i* (I-S Lee & Ramsey, 2000).

[10] Since the second high tone of double high accent is considered unaccented (M Kim 1997), the underlying accent

suffixal tone patterns between NK native words and NK English loanwords are marked in gray in Table 1 and Table 2.

Table 1. Tone patterns of NK native words with accentless and accented suffixes

NK native words	(a) Monosyllabic words	Bisyllabic word	
		(b) Penultimate accent	(c) Final accent
Stem word	*súl* 'wine' H	*pá.dak* 'floor' HL	*pa.ɾám* 'wind' LH
Accentless suffix *-i/ga* (nominative)	*súl*-i H-L	*pá.dak-i* HL-L	*pa.ɾám-i* LH-L
Accented suffix *-tɕʰʌ́ɾʌm* (HL) 'like'	*sul-tɕʰʌ́.ɾʌm* L-HL	*pá.dak-tɕʰʌ.ɾʌm* HL-LL	*pa.ɾam-tɕʰʌ́.ɾʌm* LL-HL

Table 2. Tone patterns of NK English loanwords with an accentless and accented suffixes

NK English loanwords	(a) Monosyllabic words	Bisyllabic word	
		(b) Penultimate accent	(c) Final accent
Stem word	*kʰʌ́p* 'cup' H	*kʰí.tɕʰin* 'kitchen' HL	*kʰe.tɕʰáp* 'ketchap' LH
Accentless suffix *-i/ga* (nominative)	*kʰʌ́p-i* H-L	*kʰí.tɕʰin-i* HL-L	*kʰe.tɕʰáp-i* LH-L
Accented suffix *-tɕʰʌ́ɾʌm* (HL) 'like'	*kʰʌ́p-tɕʰʌ.ɾʌm* H-LL	*kʰí.tɕʰin-tɕʰʌ.ɾʌm* HL-LL	*kʰe.tɕʰáp-tɕʰʌ.ɾʌm* LH-LL

clash does not occur for double high accented words even when they are combined with an accented suffix. Therefore, double high accented words invariantly retain the stem accent.

For both NK native words (Table 1) and English loanwords (Table 2), when a stem word is pronounced in isolation or is combined with an accentless suffix, there is only one underlying accent in the prosodic word, which is the stem accent. Therefore, the stem accent appears on the surface in both NK native words and English loanwords regardless of the position of high tone in the stem words. The accentless tone patterns are presented in Table 1 and Table 2 with the accentless nominative suffix [-i/ga]. Yet, if a stem word is combined with an accented suffix, there are two underlying accents in the prosodic word, and thus one of the accents must be deleted. In this case, the position of high tone in the stem word affects the suffixal tone patterns, and NK native words and English loanwords also display different suffixal tone patterns. In order to explain how the location of high tone affects tone patterns of NK native words and English loanwords when they are combined with an accented suffix, each column in Table 1 and Table 2 will be discussed separately.

First, let us look at suffixal tone patterns of monosyllabic words with an accented suffix, which are presented in (1a) and (2a). Since nouns in NK Korean must be accented (Kim 1988; Chung 1991; N-J Kim 1997), NK monosyllabic words are always realized with high tone. When an accented suffix is attached to a monosyllabic word with single high accent, the underlyingly accented syllables of the stem and suffix are placed next to each other, and an accent clash occurs. In this case, accent clash occurs, and NK native words and English loanwords exhibit distinct tone patterns as shown in (1a) and (2a): NK monosyllabic native words yield the accent to the suffix to alleviate the accent clash (i.e. Ĥ + ĤL → L-ĤL), whereas NK monosyllabic English loanwords retain the accent on the stem (i.e. Ĥ + ĤL → Ĥ-LL).

Unlike monosyllabic words, NK bisyllabic words with single high accent exhibit two distinct tone patterns: penultimate accent and final accent. For words with penultimate accent,

which appear in (1b) and (2b), the accent is on the initial syllable and thus the final syllable is unaccented having low tone. That is, there is no underlying accent clash between the stem and suffix even when an accented suffix is attached. Thus, the stem accent survives in both NK native words and English loanwords (i.e. ĹHL + ĹHL → ĹHL-LL). Yet, for bisyllabic words with final accent, which are presented in (1c) and (2c), the accent is on the final syllable, and thus an underlying accent clash occurs when they are combined with an accented suffix. In this case, NK native words and NK English loanwords adopt different deletion rules as seen in the monosyllabic words: NK native words delete the stem accent (i.e. LĹH + ĹHL → LL-ĹHL), while NK English loanwords delete the suffixal accent (i.e. LĹH + ĹHL → LĹH-LL).

The suffixal tone patterns in Table 1 and Table 2 provide evidence that NK English loanwords have a strong tendency to retain their accent within the stem. This unique characteristic of English loanwords was reported by M Kim (1997) and examined further by Kenstowicz and Sohn (2001). However, their observations are based on NK Korean as spoken in the 1990s and earlier, by a now older generation of speakers. According to the author's recent observations, this unique tendency of NK English loanwords seems to be changing especially among younger generations, and this change has not been reported in the previous literature (although see Hwang & Davis, 2019).

The author's recent observation through a pilot study with three younger and three older speakers of NK Korean revealed that the traditionally observed loanword tone patterns are disappearing in final accented English loanwords and nativized patterns, which have not been previously reported, are observed. For instance, one of the examples Kenstowicz and Sohn (2001) propose is [kʰja.ɾa.mél] LLH 'caramel' plus an accented suffix [-tɕó.tɕʰa] HL 'even.' According to the traditional observation, the accent on the suffix must be deaccentuated as [kʰja.ɾa.mél-tɕo.tɕʰa]

LLH-LL ‘even caramel’. However, the results of the pilot study reveal that this word could be pronounced either with the accent on the stem or on the suffix. That is, both the stem accent [kʰja.ɾa.mél-tɕo.tɕʰa] LLH-LL and the suffixal accent [kʰja.ɾa.mel-tɕó.tɕʰa] LLL-HL are acceptable and it seems that the latter one, the nativized pattern, is even more preferred by younger speakers. In addition to the generational difference, the results of the pilot study exhibited that the nativized tone patterns are more frequently observed from longer English loanwords.

The following Table 3 shows how the newly observed suffixal tone patterns of NK English loanwords are different from those reported in the previous literature. Row (3a) shows final accented NK English loanwords in isolation, and (3b) shows their traditional tone patterns (stem accent) when they are combined with the accented suffix [-tɕʰʌ́.ɾʌm] HL ‘like.’ Row (3c) exhibits the nativized tone patterns newly observed from the pilot study.

Table 3. Expected change in suffixal tone patterns of final accented NK English loanwords

	1 syllable	2 syllables	3 syllables and more
(a) Stem word	*kʰʌ́p* ‘cup’ H	*kʰe.tɕʰáp* ‘ketchup’ LH	*al.pʰa.bét* ‘alphabet’ LLH
(b) Accented suffix *-tɕʰʌ́ɾʌm* (HL) ‘like’ (previous literature)	*kʰʌ́p-tɕʰʌ.ɾʌm* H-LL (stem accent)	*kʰe.tɕʰáp-tɕʰʌ.ɾʌm* LH-LL (stem accent)	*al.pʰa.bét-tɕʰʌ.ɾʌm* LLH-LL (stem accent)
(c) Accented suffix *-tɕʰʌ́ɾʌm* (HL) ‘like’ (recent observation)	*kʰʌ́p-tɕʰʌ.ɾʌm* H-LL (stem accent)	*kʰe.tɕʰáp-tɕʰʌ.ɾʌm* LH-LL or *kʰe.tɕʰap-tɕʰʌ́.ɾʌm* LL-HL (variation)	*al.pʰa.bét-tɕʰʌ.ɾʌm* LLH-LL or *al.pʰa.bet-tɕʰʌ́.ɾʌm* LLL-HL (variation)

For monosyllabic English loanwords, the traditional loanword tone pattern seems to be still mostly retained in production of both older and younger NK speakers. However, for words

with two or more syllables, some tone pattern change is happening especially among younger generations and the nativized tone patterns are observed along with the traditional tone patterns. For instance, as seen in the examples in (3c), the bisyllabic word [kʰe.tɕʰáp] LH 'ketchup' plus an accented suffix [-tɕʰÁ.ɾʌm] HL 'like' can be pronounced either with the stem accent, [kʰe.tɕʰáp-tɕʰʌ.ɾʌm] LH-LL, or with the suffixal accent, [kʰe.tɕʰap-tɕʰÁ.ɾʌm] LL-HL. Some speakers in the pilot study even reported that both the stem accent and the suffixal accent are equally acceptable according to their native intuitions. These newly observed nativized tone patterns appear more frequently on polysyllabic words. The results of the pilot study show that older speakers as well as younger speakers started exhibiting the nativized tone patterns for English loanwords with three or more syllables. However, the traditional loanword tone patterns were still observed quite frequently especially by older speakers. This variation differs from the traditional patterns reported in the previous literature (M Kim 1997; Kenstowicz and Sohn 2001), which only indicates the stem accent. The difference between the previous literature and the author's recent observations in the pilot study indicates that some tonal change may be in progress in NK English loanwords with final accent especially when accented suffixes are added.

Therefore, based on the results of the pilot study, the aim of this chapter is to track the changes in the suffixal tone patterns occurring in final accented NK English loanwords by answering the following three research questions: (1) Is the tone pattern change really in progress in NK English loanwords with final accent? (2) If it is, are there any social or linguistic factors that affect the degree of the change? (Two social factors, age and gender, and two linguistic factors, word length and structure of the final syllable, are considered in this study.) (3) Is the path of the change predictable?

6.2. Research methods

6.2.1. Participants of production task

Since one of the main purposes of this chapter is to examine the effects of age and gender on the degree of the suffixal tone pattern change, the current study includes two different generations of participants with the genders male and female. The younger group consisted of 13 native speakers of NK Korean in their 20s (five male (mean age=22.8, ranged from 20 to 25) and eight female (mean age=25.7, ranged from 21 to 28)), and the older group included 12 native speakers of NK Korean in their 50s or 60s (seven male (mean age=59.2, ranged from 57 to 64) and five female (mean age=56.2, ranged from 54 to 61)). These participants are different from the participants in the previous chapters. All participants were born and raised in the NK dialect region and none of them had lived in other dialect regions or outside of Korea for more than one year. They all had NK dialect-speaking parents who were born and raised in the NK region, and identified themselves as NK dialect speakers.

6.2.2. Stimuli

In order to investigate how the number of syllables and the structure of the final syllable affect the tone pattern change, the word stimuli in this chapter consisted of one-, two-, and three-syllable final accented NK native words and one-, two-, three-, and four-syllable final accented NK English loanwords that end with either a CV or CVC syllable structure. NK native words were included as a control group to verify the native tone patterns and to confirm that the tone pattern change is happening only in English loanwords. Although the one-, two-, and three-syllable groups included both NK native words and English loanwords with the final CV and CVC structures, the four-syllable group included only English loanwords with the final CVC structure. Four-syllable

native words were not included because NK native words with four or more syllables are consistently assigned penultimate accent (Chung 1991; N-J Kim 1997). For English loanwords, four-syllable words ending in an open syllable were not included because these words are invariably assigned either double high accent or penultimate accent (Kenstowicz and Sohn 2001). Both English loanwords and native words consist of high frequency words that would be familiar to the participants so that they would not be confused with the tone patterns. In total, English loanwords have seven, and native words have six categories with combinations of the syllable number and the structure of the final syllable. Three words were included in each category, and a total of 39 words (18 native words and 21 English loanwords) were selected for the production task. The list of stimuli words is shown below in Table 4.

In addition to these final accented words, one accentless suffix and two accented suffixes were selected to create two different accentual environments: where an accent clash occurs and where it does not. The following Table 5 shows the three suffixes used in this study.

When the final accented words in Table 4 are combined with the accentless suffix [-i/ga], no accent clash occurs. However, when the final accented words are combined with one of the accented suffixes, [-pó.da] or [-tɕʰÁ.ɾʌm], the accents of the stem and suffix are underlyingly placed next to each other, and one of the accents must be deleted.[11]

[11] Most bisyllabic suffixes in NK Korean seems to be accented, but there is at least one bisyllabic suffix that is not accented, which is [-ɾo.sʌ] 'as.' When the accentless bisyllabic suffix is added to a word, it always shows the accentless pattern, having high tone on the stem.

Table 4. Stimuli words (final-accented)

	English loanwords		Native words	
	Final CV	Final CVC	Final CV	Final CVC
1-syllable	*kʰa* 'car' *tʰi* 'tea' *pa* 'bar'	*pʰon* 'phone' *kʰʌp* 'cup' *tʰim* 'team'	*mu* 'daikon' *no* 'paddle' *mo* 'wool'	*tɕoŋ* 'bell' *sul* 'liquor' *mal* 'horse'
2-syllable	*sɨ.kʰi* 'ski' *sɨ.tʰa* 'star' *kʰa.ɾe* 'curry'	*le.mon* 'lemon' *kɨ.ɾup* 'group' *kʰe.tɕʰap* 'ketchup'	*k'o.ma* 'kid' *na.mu* 'tree' *koŋ.bu* 'study'	*ʌl.gul* 'face' *pʰa.ɾaŋ* 'blue' *t'u.k'ʌŋ* 'lid'
3-syllable	*sa.i.da* 'cider' *pʰi.a.no* 'piano' *pa.na.na* 'banana'	*tɕʰo.kʰol.let* 'chocolate' *al.pʰa.bet* 'alpabet' *ɾi.mo.kʰon* 'remote control'	*so.na.mu* 'pine tree' *tɕin.dal.le* 'azalea' *te.na.mu* 'bamboo'	*mun.tɕi.baŋ* 'threshold' *no.ɾe.baŋ* 'karaoke' *ma.ɾu.mun* 'floor door'
4-syllable	N/A	*pʰɨl.laŋ.kʰɨ.tʰon* 'plankton' *pa.i.ol.lin* 'violin' *pʰɨ.ɾo.gɨ.ɾam* 'program'	N/A	N/A

Table 5. Suffixes

Accent Type (tone pattern)	Suffix	Meaning
Accentless	*-i/ga*	nominative
Accented (HL)	*-pó.da*	more than
Accented (HL)	*-tɕʰʌ́.ɾʌm*	like

6.2.3. Production task

The combinations of the 39 final accented words and the three suffixes create 117 tokens. In order to attract natural production from participants, each token (a final accented word + a suffix) was provided in a sentence with a relevant adjective. For instance, a token with a combination of

the word [pʰi.a.no] ‘piano’ and the accented suffix [-bo.da] ‘more than’ was combined with an adjective [kʰɨ.da] ‘big’ to form a sentence: [pʰi.a.no-po.da-kʰɨ.da], piano-more than-big, ‘It’s bigger than a piano.’ Then, all sentences were randomized in order and printed on paper in Korean orthography. Participants were asked to read the provided sentences out loud naturally in NK Korean. Their productions were recorded in a quiet room with a Zoom H4nSP digital voice recorder using the internal microphone. In total, 2,925 sentences were recorded (39 words x 3 suffixes x 25 participants).

6.2.4. Annotation task

After the production task, two younger (in their 20s) and two older (in their 50s) native speakers of NK Korean, who did not participate in the production task, listened to the recordings and annotated the tone patterns of each token to extract the data used for this study. Since both younger and older speakers were included for the production task, the annotation task also included both younger and older speakers. The annotators were instructed to listen to each sentence one by one and to choose whether the accent of each token is on the stem or on the suffix. In order for the participants (annotators) to be able to adjust themselves to the task, a practice set with 20 sample sentences was provided before the task. All four participants listened to 2,925 tokens (117 sentences produced by each of 25 speakers) and annotated the tone patterns. Due to the large number of production tokens for this study, the annotation task was divided into six sections. Each section contained around 500 sentences, and the participants were given a short break between the sections. All in all, each production token was annotated four times by different annotators and in total 11,700 annotation responses were collected. Comparing the annotation results of each participant annotator, they had more than 93% agreement with one another, and all four annotators

indicated the same tone pattern in more than 90% of the tokens. Unlike previous chapters, in this chapter the annotation was done by annotators, but by and large, my own judgement agrees with the majority annotation results.

6.3. Results

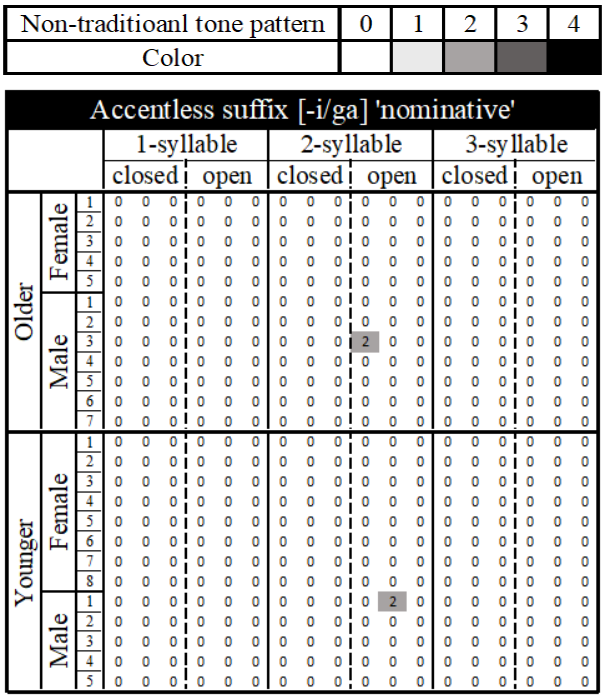
6.3.1. NK native words

To check if NK native words with final accent are undergoing any kind of tone pattern change, 1,350 sentences were recorded and the tone patterns were annotated by four annotators. In total, 5,400 annotation responses were collected. Among them, 1,800 are for the NK native words with the accentless nominative suffix [-i/ga], and 3,600 are for those with the accented suffixes [-pó.da] 'more than' and [-tɕʰÁ.ɾʌm] 'like'.

Figures 1 and 2 below present the annotation responses for the final accented native word tokens with each of the suffixes through a three-dimensional plot. It uses numbers (range from 0 to 4) and gradations of color to display the four annotation responses to each token. The horizontal axis represents each of the one-, two-, and three-syllable words that end with either a closed syllable or an open syllable. The vertical axis represents each participant of the four different age and gender groups. The older generation speakers are indicated in the top half of the figures and the younger generation speakers are indicated in the bottom half. The number and darkness of each cell represent the number of annotation responses that are different from the traditional tone patterns. For example, the number 0 means that none of the annotators annotated the token as a non-traditional pattern, and the number 4 means all four of the annotators indicated the token as a non-traditional tone pattern. Also, the more participants report non-traditional tone patterns in annotation, the darker the cell is. The number and darkness range from 0 (white) to 4 (black). Each

plot exhibits the results of each suffix. First, Figure 1 presents the annotation responses for the NK native words with the accentless nominative suffix [-i/ga].

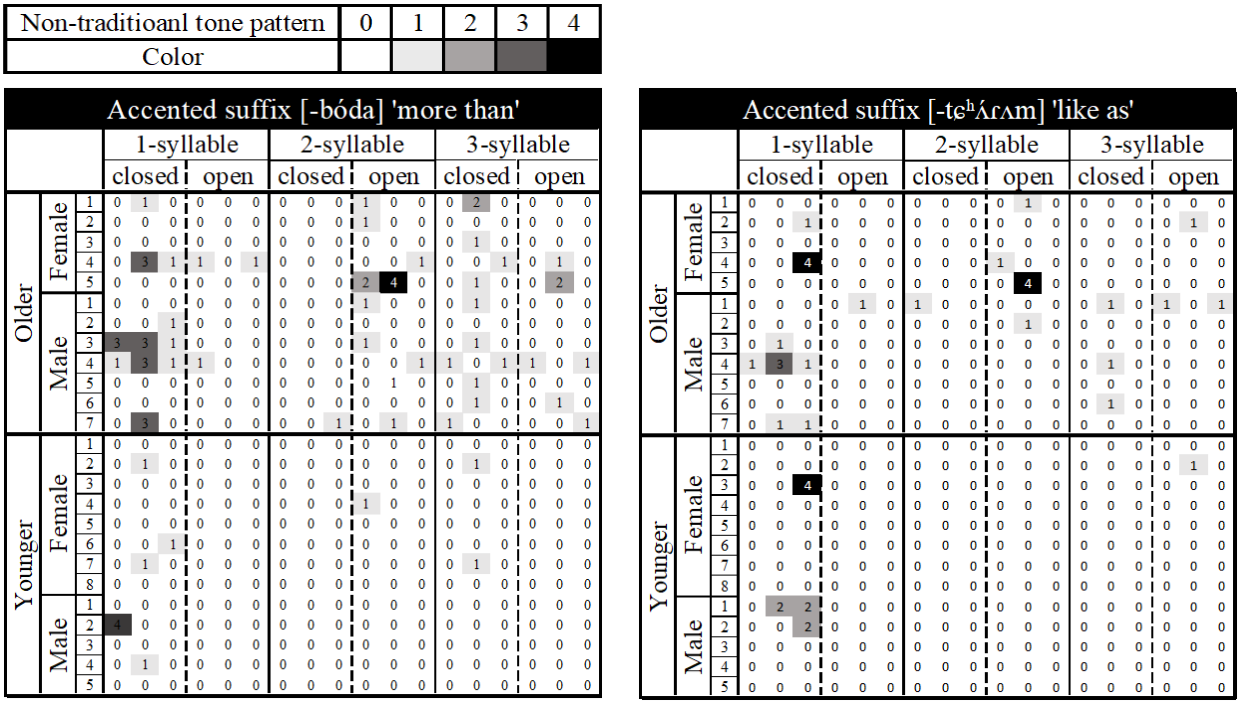
Figure 1. Annotation responses for native word tokens with the accentless suffix



For the tokens with the accentless suffix [-i/ga], very little variation was observed and there was no token that three or more participants annotated as a non-traditional tone pattern. Among the 1,800 annotation responses, 1796 (99.8%) were annotated as stem accent. This shows that there is no noticeable tone pattern change happening in NK native words when they are combined with an accentless suffix.

However, unlike the results with the accentless suffix [-i/ga], the annotation results with the accented suffix [-pó.da] and [-tɕʰÁ.ɾʌm] show a little more variation. Figure 2 shows the annotation responses for each of the accented suffixes [-pó.da] ‘more than’ and [-tɕʰÁ.ɾʌm] ‘like’.

Figure 2. Annotation responses for native word tokens with the accented suffixes



Among each of the 1,800 annotation responses, 1,732 (96.2%) of the accented suffix [-pó.da] 'more than' and 1,761 (97.8%) of the accented suffix [-tɕʰʌ́.ɾʌm] 'like' reveal the traditional tone patterns (suffixal accent). Although vast majority of the annotation results show that the traditional suffixal tone patterns are retained in the production of both older and younger NK speakers, the annotation results were analyzed by running a poisson regression in order to check if there is any social or linguistic factor that affects the variation. The dependent variable was the annotation responses and the independent variables were age (older vs. younger), gender (male vs. female), the structure of the final syllable (open vs. closed), and the number of syllables (1-, 2-, 3-syllable). The statistical analysis of the data revealed main effects of age, the structure of the final syllable, and the number of syllables. The results show that the older speakers exhibit significantly

more non-traditional tone patterns (stem accent) than the younger speakers (p<.001), and the variation is more frequently observed from words with a final closed syllable than words with a final open syllable (p=.001). For syllable numbers, 1-syllable words display more variation than 2-syllable and 3-syllable words (p=.003), but there was no significant difference observed between 2-syllable and 3-syllable words. More detailed results of the statistics are presented in Table 6.

Table 6. Results of the poisson regression for NK native words with accented suffixes

Parameter		B	Std. Error	95% Wald CI		*P*
				Lower	Upper	
(Intercept)		-1.646	0.2389	-2.114	-1.178	0.000
Age	Younger	-1.425	0.2421	-1.900	-0.951	0.000
Structure of final syllable	Open	-0.652	0.2028	-1.049	-0.254	0.001
Number of syllables	1	0.693	0.2315	0.240	1.147	0.003
	2	-0.154	0.2782	-0.699	0.391	0.579

Although the statistical results revealed that age, the structure of the final syllable, and the number of syllables are significant, the differences seem to be driven by annotation errors or speech errors. In both suffixes, less than 4% of the results exhibit the non-traditional patterns, and in most cases, only one of the four participants annotated the tone pattern differently. There were only 11 tokens that were annotated as a non-traditional tone pattern by three or more people, and most of them were found out to be speech errors. For instance, a single high accented word [mal] 'horse' should be pronounced with a suffixal accent (e.g. [mál] H 'horse' + [-tɕʰʌ́.ɾʌm] HL 'like' → [mal-tɕʰʌ́.ɾʌm] LHL 'like a horse'), but some tokens seemed to be confused with its minimal pair, a double high accented word [ma:l] 'speech', and pronounced with a stem accent (e.g. [má:l] H 'speech' + [-tɕʰʌ́.ɾʌm] HL 'like' → [má:l-tɕʰʌ́.ɾʌm] HHL 'like a speech').

In addition, for the observed difference between the two age groups, it could be considerd

that a generational difference might exist regarding the location of the pitch peak. According to Lee and Jongman (2015), South Kyungsang Korean, another pitch-accent dialect spoken in an area adjacent to the North Kyungsang dialect region, exhibits a generational difference for the location of where a pitch peak occurs. They reveal that the pitch peak is substantially delayed for younger speakers and is realized about a syllable later than older speakers. If a similar change is also happening in North Kyungsang Korean, the suffixal accent might be more clearly perceived in the speech of younger speakers, whereas it could be somewhat confused with the stem accent for the speech of older speakers.

Overall, there was little variation observed in NK native words, and no noticeable tone pattern change was observed. Although some differences were observed between age group, structure of final syllable, and number of syllables, it seems that these can largely be attributed to annotation errors by the transcribers as well as speech errors by the speakers (especially with respect to the confusion regarding the word [mal] ‘horse’).

6.3.2. NK English loanwords

To check if any suffixal tone pattern change is happening on NK English loanwords with final accent, 1,575 production tokens were recorded and the tone patterns were annotated by four annotators. In total, 6,300 annotation responses were collected. Among them, 2,100 are for the English loanwords with the accentless nominative suffix [-i/ga], and 4,200 are for those with the accented suffixes [-pó.da] ‘more than’ and [-tɕʰʌ́.ɾʌm] ‘like’. First, Figure 3 presents the 2,100 annotation responses with the accentless nominative suffix [-i/ga].

Figure 3. Annotation responses for English loanword tokens with the accentless suffix

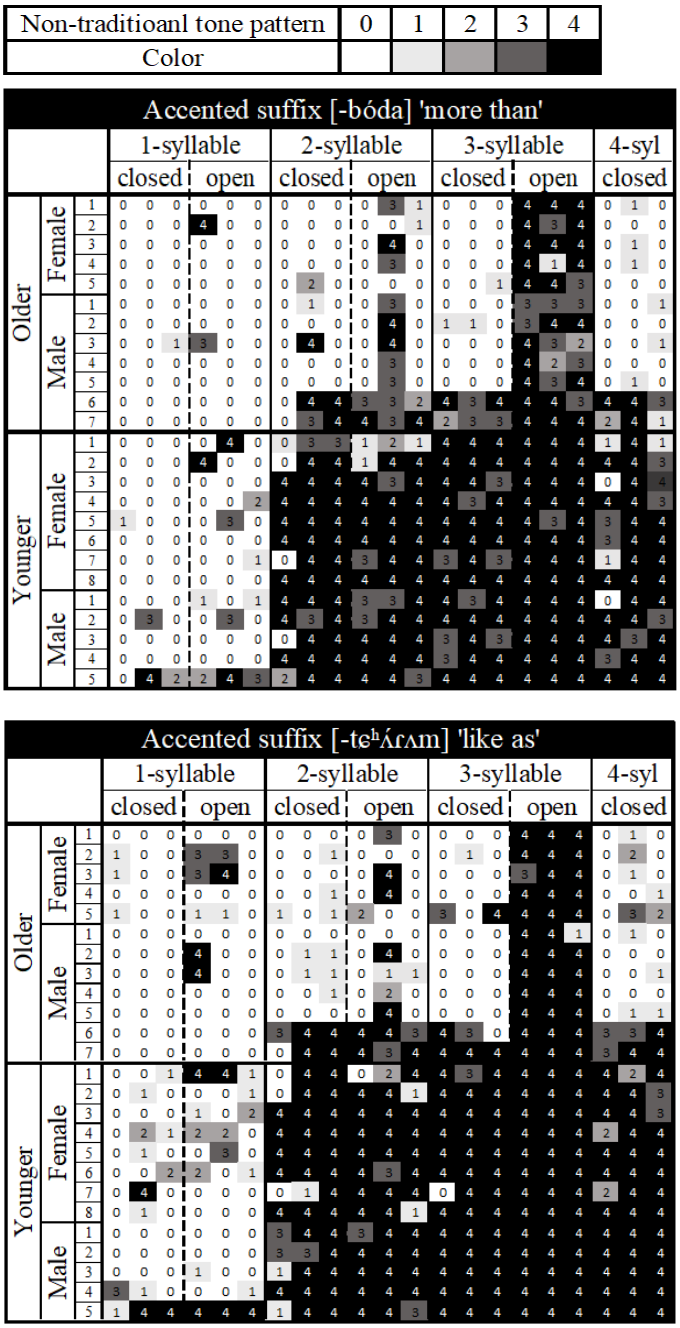
Non-traditioanl tone pattern	0	1	2	3	4
Color					

Accentless suffix [-i/ga] 'nominative'																								
			1-syllable					2-syllable					3-syllable						4-syl					
			closed			open			closed			open			closed			open			closed		
Older	Female	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Male	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Younger	Female	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0
		2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
		7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Male	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Among the 2,100 annotation responses, 2,095 (99.8%) were annotated with the traditional loanword tone patterns, retaining the stem accent. Since there is no token that was annotated as a non-traditional tone pattern by three or more participants, all tokens can be considered to maintain the traditional tone pattern (stem accent). This shows that there is no noticeable tone pattern change occurring in NK English loanwords when an accentless suffix is added.

However, the traditional loanword tone patterns seem to be disappearing when the final accented English loanwords are combined with an accented suffix. Figure 4 presents the annotation responses of the English loanword tokens with the accented suffixes [-pó.da] ‘more than’ and [-tɕʰʌ́.ɾʌm] ‘like’. (Recall that in the Figures the darker cells indicate the non-traditional loanword patterns with accent on the suffix rather than on the stem.)

Figure 4. Annotation responses for English loanword tokens with the accented suffixes



Among each of the 2,100 annotation responses, 1,102 (52.5%) of the accented suffix [-pó.da] HL ‘more than’ and 1,006 (47.9%) of the accented suffix [-tɕʰʌ́.ɾʌm] HL ‘like’ show the traditional loanword tone patterns (stem accent) when they are combined with final accented

English loanwords. The annotation results reveal that around half of the English loanword tokens have nativized their tone patterns having the accent on the suffix. This phenomenon indicates that some native-like tone pattern change is in progress in NK final accented English loanwords when they are combined with an accented suffix. In addition, the results of the accented suffix [-pó.da] HL 'more than' and [-tɕʰʌ́.ɾʌm] HL 'like' display very similar patterns. This means that the change is not limited to a certain suffix but is applied more generally with any accented suffix. Even though the change is slightly more advanced for the accented suffix [-tɕʰʌ́.ɾʌm] 'like', the difference does not seem to be meaningful.

In order to examine which factor affects the change, the results of each factor will be discussed one by one. First, the annotation responses of both accented suffixes exhibit a clear difference between the two different age groups. Among the 2,100 annotation responses of each suffix, 1,008 were for the older speakers (21 words x 12 speakers x 4 annotations) and 1,092 were for the younger speakers (21 words x 13 speakers x 4 annotations). The results of the older speakers reveal that 757 (75.1%) responses in the accented suffix [-pó.da] HL 'more than' and 705 (69.9%) responses in the accented suffix [-tɕʰʌ́.ɾʌm] HL 'like' were annotated as the traditional tone patterns. For the results of the younger speakers, 345 (31.6%) responses in the accented suffix [-pó.da] HL 'more than' and 301 (27.6%) responses in the accented suffix [-tɕʰʌ́.ɾʌm] HL 'like' were annotated as the traditional tone patterns. Both generations seem to be experiencing some change in their tone patterns, but the change is much more advanced for the younger generation. Although the older speakers still tend to maintain the traditional loanword tone patterns, the younger speakers have already lost their loanword specific tone patterns from most of the loanwords. This provides evidence that the native-like tone pattern change in NK English loanwords is being advanced by younger generations.

In addition, the number of syllables also seems to influence the degree of the tone pattern change happening in NK English loanwords. For both three-dimensional plots in Figure 4, the horizontal axis is divided by each of the one-, two-, three-, and four-syllable words. From the annotation results, it can be noticed that the rate of the traditional loanword tone patterns tends to decrease as the number of syllables increases and the change is quite patterned in both generations. First, for the younger generation, each of the one-, two-, three-syllable tokens have 312 annotation responses and the four-syllable tokens have 156 responses with both suffixes. The results of the younger speakers show that for each of the suffixes [-pó.da] and [-tɕʰÁ.ɾʌm], 274 (87.8%) and 249 (79.8%) one-syllable tokens, 38 (12.2%) and 39 (12.5%) two-syllable tokens, 9 (2.9%) and 5 (1.6%) three-syllable tokens, and 24 (15.4%) and 8 (5.1%) four-syllable tokens retain the traditional loanword tone patterns (stem accent). The results indicate that the younger generation retains the traditional loanword tone patterns almost exclusively for the monosyllabic words. Although younger speakers keep the stem accent for more than 80% of the monosyllabic loanword tokens, the rate decreases dramatically for the words with two or more syllables. This shows that the loanword specific tone patterns have mostly disappeared from polysyllabic words in the production of the younger generation.

Although the change is not as advanced as the younger speakers, the older speakers are also experiencing the tone pattern change. For the older generation, each of the one-, two-, three-syllable tokens have 288 annotation responses and four-syllable tokens have 144 responses for both suffixes. For each suffix [-pó.da] and [-tɕʰÁ.ɾʌm], 280 (97.2%) and 262 (91%) monosyllabic, 218 (75.7%) and 213 (74%) bisyllabic, 139 (48.3%) and 121 (42%) trisyllabic, and 120 (83.3%) and 109 (75.7%) quadrisyllabic responses were considered to maintain the traditional loanword tone patterns. The results of the older speakers are somewhat similar with those of the younger

speakers in that the change tends to be more advanced in polysyllabic loanwords. However, the degree of the change is quite different. Unlike the results of the younger speakers, the traditional loanword tone patterns are generally maintained for the older speakers, and the trisyllabic words are the only group that has lost the traditional loanword tone pattern from more than 50% of the tokens. However, even within the trisyllabic word group, the degree of change in the tone pattern is very different from one word to another, and this difference seems to be greatly influenced by the structure of the final syllable.

In Figure 4, the annotation results of each syllable, that is represented in the horizontal axis, are subdivided by the structure of the final syllable: Closed and Open. The results of both younger and older generations reveal that the tone pattern change is more advanced for words with a final open syllable. This invariantly applies to all the one-, two-, and three-syllable groups. However, the degree of the change is different for the two different generations. For the younger generation, the tone pattern change has mostly finished for the loanwords with two or more syllables, while it seems to be just started for the monosyllabic loanwords. Since most of the polysyllabic loanwords already have the nativized tone pattern, relatively little difference was observed between the loanwords with a final open syllable and those with a final closed syllable. Nevertheless, it is still observed that the change is a bit more advanced for the loanwords with a final open syllable in the production of the younger speakers.

On the other hand, when it comes to the results of the older generation, the difference between the words with two different types of final syllable becomes very clear. For the older generation, the tone pattern seems to be very actively changing especially for the loanwords that end with an open syllable, though each syllable group differs in the degree of the change. The change with loanwords ending in an open syllable is most complete for the trisyllabic words; most

of them have already nativized their tone pattern. For bisyllabic loanwords, the change is in progress, but the traditional pattern is still retained for more than 60% of the words with a final open syllable. The monosyllabic loanwords seem to be at the very initial stage of the change, and a few words have started to nativize their tone pattern. That is, the traditional tone pattern is changing in every syllable group for English loanwords ending in an open syllable, though varying in degree. Yet, for the English loanwords ending with a closed syllable, the older speakers show little change in the tone pattern and no noticeable change is observed even in the quadrisyllabic loanwords. From these results, it can be assumed that the change occurs first on English loanwords with a final open syllable, and in longer words before shorter words. This study also considered the gender difference as a social factor that might affect the degree of the tone pattern change, but there was little gender variation that generally applies.

In order to check the effect of the linguistic and social variables statistically, a poisson regression was conducted. The dependent variable was the annotation results and the independent variables were age (older vs. younger), gender (male vs. female), the structure of the final syllable (open vs. closed), and the number of syllables (1-, 2-, 3-, 4-syllable). The results confirmed that main effects of all independent variables were statistically significant. For the age difference, younger speakers are significantly more likely to nativize the tone pattern placing the accent on the suffix ($B=.968$, $p<.001$). For the difference found in gender, male speakers show more evidence of the new pattern than female speakers ($B=.134$, $p=.003$). The weight of the final syllable also has a significant effect on the accent change, and words with a final open syllable show more rating of the suffixal accent than words with a final closed syllable ($B=.396$, $p<.001$). For the effect of word length, the pattern appearing on the 1-syllable words is substantially different from the patterns appearing on other syllable words ($B=-1.832$, $p<.001$). The pattern of 2-syllable words is also

significantly different from that of 4-syllable words (B=-.197, p=.006), but the difference is not as substantial as that of 1-syllable words. There was no significant difference observed between 3-syllable and 4-syllable words. More detailed statistical results are presented in Table 7 below.

Table 7. Results of the poisson regression for NK loanwords with accented suffixes

Parameter		B	Std. Error	95% Wald CI		*P*
				Lower	Upper	
(Intercept)		0.140	0.0709	0.001	0.279	0.048
Age	Younger	0.968	0.0503	0.869	1.066	0.000
Gender	Male	0.134	0.0445	0.047	0.221	0.003
Structure of final syllable	Open	0.396	0.0487	0.301	0.492	0.000
Number of syllables	1	-1.832	0.1059	-2.039	-1.624	0.000
	2	-0.197	0.0724	-0.339	-0.055	0.006
	3	0.094	0.0698	-0.043	0.231	0.178

The results show that all the linguistic factors (structure of final syllable and number of syllables) and social factors (age and gender) have an influence on the degree of the suffixal tone pattern change occurring in NK English loanwords. The change is much more advanced for the younger generation and is patterned by the word length and structure of the final syllable. Although the statistical analysis revealed that the gender distinction also affects the change, it seems that the results of OM 6, 7 and YM 5 are driving this effect, rather than it being a gender effect.

6.4. Summary and general discussion

The results show that a pitch-pattern diffusion is in progress across the board in final accented NK English loanwords when they are combined with an accented suffix. Such loanwords seem to be losing their traditional tone patterns (stem accent) and are becoming more like native words, having a suffixal accent. Although the diffusion is happening for both younger and older

speakers, the degree of diffusion is different and is quite patterned, based on the word length and structure of the final syllable. For the younger speakers, most of the loanwords with two or more syllables have already nativized their tone patterns, whereas the diffusion is only beginning for monosyllabic loanwords, most of which keep their stem accent under suffixation. However, the older speakers mostly retain the traditional loanword tone patterns (stem accent) as described by M Kim (1997) and Kenstowicz and Sohn (2001) except for two structurally defined group of words: bisyllabic and trisyllabic words that end with an accented open syllable. Between them, the change is much more advanced for the trisyllabic words. Here, it is inferred that the pitch-pattern diffusion witnessed by the younger generation began with trisyllabic words ending in final open syllables since this change is the one that is most advanced with the older generation.

Given the observations above regarding the similarities and differences between the two generations, the course can be plotted for how the native-like pitch pattern diffusion is occurring on English loanwords in NK Korean. For example, trisyllabic loanwords that end with a final open syllable show nativized tone patterns from both younger and older speakers. However, older speakers still tend to retain the traditional tone patterns for words with final closed syllable. Also, monosyllabic words produced by the younger speakers show that those consisting of a closed syllable are most conservative in keeping the traditional loanword pattern of stem accent. Taken altogether, the results reflect that the change begins from polysyllabic loanwords with a final open syllable and ends with monosyllabic loanwords consisting of a final closed syllable. That is, polysyllabic words are more affected by the diffusion, and within them, words that end with a open syllable change first.

Although in this study there was surprisingly little individual variation, one younger male speaker (YM5) exhibited that his pitch-pattern was nativized for all word categories. In his

production, the diffusion was mostly done even for monosyllabic loanwords that end with a closed syllable. This study also found two older male speakers (OM6, OM7) who have already nativized their suffixal tone patterns just like younger speakers. The data presented here shows evidence for individual variation within this change, but in a predictable way. All in all, the results show that a pitch-pattern diffusion is in progress in NK English loanwords and it is a patterned diffusion. This supports Labov's (2012:290) contention of the "breathtaking uniformities" found in cases of in-progress community language change.

As a final matter, one can view the traditional difference in the resolution of accent clash in native words (suffixal accent wins) versus loanwords (stem accent wins) as emanating from a distinction in the domain of accent clash. This also could explain why loanwords with a final light syllable nativize their suffixal tone patterns first. In native words, only vowels can bear a mora (N-J Kim 1997; Chung 1998) and the accent clash domain is defined with respect to the syllable. If two accented syllables are next to each other, direct accent clash occurs between them. However, in loanwords, both vowels and coda consonants can bear a mora (Kenstowicz and Sohn 2001; Chung 1998, 2002; Kim 2009), and the accent clash domain seems to be defined in terms of the mora. If a final accented word that ends with an open syllable, such as [sɨ.kʰí] LH 'ski', is followed by an accented suffix, such as [-tɕʰÁ.ɾʌm] HL 'like', the two accented moras create a direct accent clash since there is no intervening mora between them. However, if a final accented word that ends with a closed syllable, such as [le.món] LH 'lemon', is combined with an accented suffix, it does not constitute a direct accent clash because there is an intervening mora (i.e. the coda-final /n/ of lemon would comprise a mora) between the two accented moras. It seems that the intervening mora alleviates the underlying accent clash and slows down the suffixal tone change in English loanwords that end with a closed syllable.

In addition, the relative resistance of monosyllabic words to the change in progress may be due to a bimoraic minimal word requirement on loanwords. The accentuation of NK English loanwords is based on a bimoraic trochaic foot (Kenstowicz and Sohn 2001; Kim 2009; Chung 2002), and this might make the monosyllabic loanwords overtly or covertly bimoraic and thus more resistant to accent clash especially if the domain for loanword accent clash is moraic adjacency rather than syllable adjacency. It can also be speculated that the suffixal tone change robustly occurring among younger speakers perhaps relates to the apparent loss of vowel length distinction by the younger generation (see Kim 2018). Given that NK loanword phonology is mora-sensitive, the loss of the vowel length distinction might affect the entire loanword accentuation system, as discussed in Chapter 5.

6.5. Conclusion

This chapter has documented a patterned tonal change in progress involving suffixal forms of English loanwords in NK Korean whereby the unique pattern of the preference for stem accent under clash resolution in loanwords is being lost in favor of the native pattern of suffixal accent. Since the suffixal tone change is ongoing, subsequent research should be conducted to track the progress of the change in NK English loanwords.

CHAPTER 7

GENERAL DISCUSSION AND CONCLUSION

7.1. Summary of findings

The main goal of this dissertation was to examine the intergenerational tone changes happening in NK English loanwords. In order to determine which phonological changes cause the generational differences in the loanword tone assignment patterns, it was necessary to properly understand the general tone assignment system of NK English loanwords. Thus, in Chapter 3, this dissertation first investigated the general tone assignment patterns of NK loanwords, based on 3,384 English loanwords produced by six native speakers of NK Korean. Then, in Chapter 4, based on the observations from Chapter 3, the NK loanword tone assignment system was analyzed in the framework of Optimality Theory in order to identify which phonological constraints are active and how they interact to assign tones to NK loanwords. The analyses presented in Chapters 3 and 4, while built on previous studies, such as Kenstowicz & Sohn (2001), Chung (2000, 2002), and Kim (2009), make an independent contribution by offering a more comprehensive analysis that broadens the understanding of the tone assignment system of NK English loanwords, providing new findings that were not reported in the previous literature.

One of the main contributions in the analyses of Chapters 3 and 4 is that they provide an appropriate explanation of why loanwords with an initial heavy syllable display an unusual tone assignment pattern (double high accent), especially in relation with the bimoraic trochee. Kim (2009) is so far the only study that discussed foot structure type of double high accent and proposes that double high accent is assigned with two consecutive bimoraic trochaic feet. However, even her analysis fails to explain why loanwords with an initial heavy syllable must be assigned two

consecutive feet despite the violation of higher-ranked constraints, such as *Accented-ɨ (no high tone on the epenthetic vowel [ɨ]) and FOOT BINARITY [Moraic Trochee] (the bimoraic trochee). The analysis of this dissertation accounts for the unusual tone assignment pattern (double high accent) by proposing the special salience of word-initial heavy syllables.

In NK loanwords, there is a constraint that heavy syllables should be parsed in a foot. However, sometimes heavy syllables are allowed not to be parsed in a foot in order to respect the higher-ranked metrical constraint (the bimoraic trochee). For instance, the final accented loanword sɨ.pʰek.tʰɨ.(ɾʌ́**m**) LLLH 'spectrum' has a heavy second syllable with a coda consonant, but the heavy syllable is not parsed in a foot since parsing the syllable in a foot violates the bimoraic trochee, having more than two moras in a foot, as in *sɨ.(pʰék.tʰɨ.ɾʌm) LHLL 'spectrum.' That is, heavy syllables in non-initial position sometimes yield a foot head to a following syllable to respect the bimoraic trochee. Yet, the results in Chapters 3 and 4 reveal that this pattern is not observed from word-initial heavy syllables and they are always parsed in a foot, having a foot head on them.

NK loanwords have an undominated constraint that the right edge of the foot must be aligned with the right edge of the word. Thus, to assign a foot head on the initial syllable sometimes violates the bimoraic trochee (e.g. *(pín.tʰi.tɕi) HLL 'vintage'; *(pó:.nʌ.s'ɨ) HLL 'bonus'). However, word-initial heavy syllables do not yield a foot head to the following syllables to respect the bimoraic trochee (e.g. *pin.(tʰí.tɕi) LHL 'vintage'; *po:.(nʌ́.s'ɨ) LHL 'bonus'). Instead, they add an additional foot to the following syllables in order to minimize violation of the bimoraic trochee (e.g. (pí**n**).(tʰí.tɕi) HHL 'vintage'; (pó:).(nʌ́.s'ɨ) HHL 'bonus'). From the observation, this study claims that word-initial heavy syllables have a special salience and this special salience plays an important role in assigning double high accent to loanwords, having word-initial heavy syllables be parsed in a foot.

Moreover, this study also claims that the level of the salience differs between word-initial heavy syllables with a long vowel (CVV) and those with a coda consonant (CVC): word-initial CVV has a stronger salience than word-initial CVC. Although both heavy syllables must be assigned high tone in word-initial position by being parsed in a foot, their tone assignment patterns are slightly different. English loanwords with an initial long vowel are always assigned double high accent, regardless of the violation of the bimoraic trochee (e.g. (pʰá:).(tʰí) HH 'party'; (kʰjú:).(ɾé.i.tʰʌ) HHLL 'curator'). That is, word-initial heavy syllables with a long vowel always retain the bimoraicity. However, the bimoraicity is sometimes not maintained in word-initial closed syllables. If the initial syllable is guaranteed to be parsed in a foot, loanwords with a closed initial syllable make a choice that minimizes the violation of the bimoraic trochee by interacting with the variable coda weight system. For instance, in two-syllable loanwords with a closed initial syllable, the coda consonant in the initial syllable becomes non-moraic to respect the bimoraic trochee (e.g. *(tʰé**m**).(pʰó) HH; (tʰém.pʰo) HL 'tempo'). That is, even if word-initial heavy syllables with a long vowel and those with a coda consonant both must be parsed in a foot, the bimoraicity is more strongly retained in those with a long vowel, attracting double high accent. This shows that word-initial CVV has a stronger salience than word-initial CVC.

From the different level of salience between word-initial CVV and word-initial CVC, this study also presents a new assertion that the special salience of word-initial heavy syllables is derived from a unique characteristic of long vowels that they mostly appear in word-initial syllables. The phenomenon that the salience of closed initial syllables is being weakened as long vowels are being lost in the production of younger NK speakers provides additional evidence for this assertion (see Chapter 5 for more detailed information).

In addition, in NK loanwords, the bimoraic trochee is not strictly respected and a

monomoraic foot can be assigned to loanwords with the epenthetic vowel [ɨ] (e.g. si.(kʰí) LH ‘ski’) and those with an initial long vowel (e.g. (pʰá:).(tʰí) HH ‘party’). However, there is no evidence that the right alignment constraint can be violated. Based on these observations, this study newly proposes that a trimoraic foot is assigned to three- and four-syllable loanwords with antepenultimate accent (e.g. (tʰó.si.tɨ) HLL ‘toast’; a.(tʰí.si.tʰɨ) LHLL ‘artist’) and four-syllable loanwords with double high accent (e.g. (kʰjú:).(ɾé.i.tʰʌ) HHLL ‘curator’; (kʰó**n**).(kʰɾ́.ɾi.tʰɨ) HHLL ‘concrete’).

This study also found out that English loanwords that end with [ɕjʌn] must be assigned penultimate accent unless the initial syllable is heavy. This pattern invariantly applied to all two-, three-, and four-syllable loanwords in the corpus of this dissertation (e.g. [pʰík.ɕjʌn] HL ‘fiction’; [ɾi.s’ép.ɕjʌn] LHL ‘reception’; [na.ɾe.í.ɕjʌn] LLHL ‘narration’), but this has not been reported in the previous studies. In NK English loanwords, [ɕjʌn] in the final syllable seems to be pre-accenting and assign high tone to the preceding syllable (see Chapter 3 for more information).

All in all, the analyses in Chapters 3 and 4 broaden and strengthen the basic understanding of the tone assignment system of NK English loanwords. Based on this, Chapters 5 and 6 compared tone patterns of English loanwords in the production of younger and older NK speakers and examined if there is any intergenerational difference in their tone assignment pattern. Recent studies, such as Kim (2018), have shown that the vowel length distinction has been lost in the production of younger NK speakers, whereas the distinction is still maintained among older NK speakers. Given that the vowel length distinction plays an important role in the loanword tone assignment system, losing the distinction may change the moraic structure of English loanwords and further influence their tone patterns. Since long vowels have a close relation with double high accent, Chapter 5 focused on double high accented loanwords and examined if the loss of long

vowels in the production of younger NK speakers has any influence on their tone patterns, creating generational differences.

The results in Chapter 5 exhibited that the loss of long vowels has been changing tone patterns of English loanwords and double high accent is becoming less frequent in the production of younger speakers. However, although the generational tone change was expected to appear only in English loanwords with an initial open syllable, those with an initial closed syllable, whose moraic structure is not affected by the loss of long vowels, also exhibited the generational tone change, losing double high accent. Since the special salience of word-initial heavy syllables was given by a characteristic of long vowels, which mostly appear in word-initial position, the loss of the vowel length distinction seems to weaken the special salience of word-initial heavy syllables not only from word-initial CVV but also from word-initial CVC.

However, the results of Chapter 6 reveal that the intergenerational tone change is not only happening in double high accented loanwords, but also observed from single high accented loanwords especially under suffixation. In NK Korean, when a stem word is combined with a suffix, the stem accent is generally maintained in both native words and English loanwords. However, when a final accented word is combined with an accented suffix and accent clash occurs, native words and loanwords display different tone patterns: native stem words yield accent to the suffix, whereas loanwords still retain the stem accent. However, in Chapter 6, it was observed that this traditional loanword suffixal tone pattern is changing in the production of younger speakers. Although the traditional loanword tone patterns (stem accent) are still generally maintained in the production of older speakers, younger speakers start to exhibit nativized tone patterns (suffixal accent) even in English loanwords. This change seems different from that witnessed in chapter 5 because it does not seem to involve the loss of long vowels.

7.2. Changes in the moraic structure of NK loanwords

The results of Chapter 5 and Chapter 6 both reveal that some tonal changes are happening among younger NK speakers. That is, younger speakers displayed new tone assignment patterns that were not reported in the previous studies, while older speakers exhibited the traditional tone patterns as described in the previous studies. We can posit that the loss of long vowels affects the moraic system of NK loanwords and initiates some intergenerational tone changes not only in loanwords with double high accent but also in those with single high accent. According to Hayes (1989), languages that have a syllable weight distinction (moraic characteristic) typically exhibit a vowel length contrast. That is, the vowel length distinction is an important element in moraic languages, and it is very rare that a language lacks a vowel length distinction but nonetheless has a moraic distinction with just coda consonants. Based on this typological background, this study proposes that the loss of the vowel length distinction in NK Korean is weakening the moraic characteristics of the language as a whole, and thus bimoraicity is being lost not only from syllables with a long vowel but also from syllables with a coda consonant especially in the production of younger NK speakers. This assertion is supported by the results of Chapters 5 and 6.

First, in Chapter 5, the results reveal that the special salience of word-initial heavy syllables is disappearing from word-initial closed syllables as well as word-initial syllables with a long vowel. Double high accent was expected to be lost from loanwords that had a long vowel in the initial syllable because these loanwords no longer have a heavy initial syllable as the vowel length distinction has been lost in the production of younger speakers. However, the fact that double high accent is also being lost from loanwords with an initial closed syllable shows that word-initial heavy syllables no longer maintain the stronger bimoraicity nor the stronger tendency

to be parsed in a foot. This change shows that the moraic characteristics of NK loanwords has been weakened; the loss of vowel length weakens the moraicity of coda consonants.

As the special salience is being lost even from word-initial closed syllables, such syllables now have very similar characteristics with closed syllables in non-initial positions. That is, word-initial closed syllables are now parsed in a foot only when the bimoraic trochee is respected. Otherwise, they yield high tone to one of the following syllables in order to respect the bimoraic trochee. For instance, four-syllable English loanwords with a closed initial syllable traditionally fall into the double high accent class since the initial syllable is heavy (e.g. (sé**n**).(dɨ́.wi.tɕʰi) HHLL 'sandwich'; (é**n**).(dó.ɾɨ.pʰin) HHLL 'endorphin'). However, for younger speakers they now fall into either the penultimate accent class (e.g. sen.dɨ.(wí.tɕʰi) LLHL 'sandwich') or the final accent class (e.g. en.do.ɾɨ.(pʰí**n**) LLLH 'endorphin'), depending on the moraic structure of the last two syllables. Given that the loanwords with a final closed syllable still attract final accent, the general moraicity of coda consonants seems to be still maintained, though the special salience of word-initial closed syllables has been disappearing. To sum up, in Chapter 5, it was noticed that closed syllables in word-initial position are losing their special salience as long vowels have been lost.

However, the loanword suffixal tone change reported in Chapter 6 provides a possibility that the moraicity of coda consonants is being lost even in non-initial positions. In NK native words, only vowels can carry a mora and the domain of tone assignment is defined in terms of the syllable (Chung 1998). Thus, if a final accented stem is combined with an initial accented suffix, a direct accent clash occurs because the accented moras (accented syllables) are placed right next to each other (i.e. σ́ + σ́ = μ́ + μ́). Yet, in NK English loanwords, both vowels and coda consonants can bear a mora, and the domain of tone assignment is defined with respect to the mora (Kenstowicz and Sohn 2001; Chung 1998, 2002; Kim 2009). Thus, if a final accented loanword is combined

with an initial accented suffix, the accented syllables are placed next to each other, but this does not mean that the accented moras are adjacent to each other. In NK loanwords, single high accent is assigned high tone with a bimoraic trochaic foot, and this means that there is an intervening mora between the accented moras of the stem and suffix (i.e. σ́ + σ́ = (μ́μ) + μ́).[12] Thus, it can be inferred that the reason that English loanwords always maintain the stem accent may be because there is no direct accent clash between the accented mora in the stem and that in the suffix.

However, the results in Chapter 6 reveal that younger NK speakers started to nativize their loanword suffixal tone patterns and now even final accented loanwords yield accent to the suffix just like final accented native words. This tone change might show that English loanwords now have a direct accent clash among younger speakers as the moraicity of coda consonants is being lost. If the final syllable of a final accented loanword is no longer considered heavy, it contains only one mora and this makes the accented moras in the stem and suffix be placed right next to each other (i.e. σ́ + σ́ = (μ́) + μ́). Then, a direct accent clash occurs, and English loanwords also yield their accent to the suffix just like NK native words. From the change in the loanword suffixal tone pattern, it can be inferred that the loss of the vowel length distinction weakens the moraic system of NK loanwords and now coda moraicity is being affected as well. That is, the final syllables in final accented English loanwords are now becoming monomoraic for younger speakers, and this seems to cause the intergenerational difference in the loanword suffixal tone patterns.

Chapter 5 and Chapter 6 display two very different tone changes: Chapter 5 focuses on a tone change happening in double high accented loanword stems, whereas Chapter 6 focuses on a

[12] The results of Chapter 3 reveal that over 92% of final accented loanwords have a coda consonant in the final syllable. For those with a final open syllable, Kenstowicz & Sohn (2001) report that final accented loanwords that end with an open syllable sometimes contain a long vowel in the final syllable, though they are not common. That is, loanwords with final accent generally have a heavy (bimoraic) final syllable, either with a long vowel or with a coda consonant.

tone change occurring in single high accented loanwords under suffixation. However, these two distinct groups of loanwords both exhibit that the moraic characteristics are being weakened in NK loanwords. Not only that, they also display very similar changing patterns: in both groups, the intergenerational tone change is happening first 1) from English loanwords that contain an accented open syllable and 2) in English loanwords that are longer. Then, why do these two very distinct groups of loanwords exhibit a very similar patterned change?

First, the phenomenon that the tone change happens first from loanwords with an open accented syllable than those with a closed accented syllable can be explained with the order in which the weight of each syllable has changed: the bimoraicity was lost first in CVV and then started to be lost in CVC. Although the moraic feature is being weakened from NK loanwords in general, and both syllables with a long vowel and those with a coda consonant are losing their bimoraicity, this moraic change was first triggered by the loss of the vowel length distinction. That is, long vowels disappeared first, and to that effect, coda moraicity started to be weakened, and this explains why loanwords with an accented open syllable exhibit the tone change faster than those with an accented closed syllable.

Then why does the tone change occur first in longer loanwords? This can be explained in relation with word frequency. Generally, shorter words are more frequent than longer words. Thus, it can be assumed that younger speakers hear shorter loanwords more frequently than longer loanwords. According to Haspelmath & Sims (2010), frequent words are more easily remembered and are retrieved faster than rare words, and this is why irregularities mostly exist in frequent words. Since shorter loanwords are more frequent, their tone patterns may be more influenced by the production of older speakers, and this presents a possibility that their tone patterns have been lexicalized. This explains why tone patterns of shorter loanwords do not reflect the moraic changes

happening in NK loanwords. On the other hand, longer loanwords are less frequent, and thus they may be less influenced by the production of older speakers. Since words with low frequency are more subject to analogical levelling (Haspelmath & Sims, 2010), longer loanwords seem to follow the regular tone assignment patterns of NK loanwords, reflecting the loss of long vowels and weakened coda moraicity.

7.3. Expected changes in the loanword tone assignment system

In the past, both older and younger NK speakers are assumed to exhibit the traditional loanword tone patterns with little generational difference. That is, both generations would have strong moraic characteristics in their loanwords, including the vowel length distinction, coda moraicity, and salience of word-initial heavy syllables.

However, the results of this dissertation showed that younger speakers are losing the traditional moraic characteristics of English loanwords, while they are still well maintained in the production of older speakers. As the vowel length distinction disappeared recently from younger NK speakers, this not only changed the moraic structure of loanwords that had a long vowel, but also weakened the overall moraic feature of NK English loanwords, changing the loanword tone assignment patterns of younger speakers. However, although younger NK speakers are adapting their loanword tone patterns to the new tone assignment system, reflecting the changed moraic structure, their current tone assignment system still seems to be in a transitional stage. That is, their loanword tone patterns are still quite affected by and reflect those of older speakers. This shows that the traditional tone assignment system is still coexisting with the new system in the production of younger speakers.

Nevertheless, the tone change happening in the production of younger speakers is very

patterned and quite predictable. Although they still display quite a bit of the historical tone patterns, as the change continues, in the future younger speakers are expected to have an independent loanword tone assignment system that is distinguished from the traditional loanword tone system. What is not clear is the extent to which older speakers might change to the younger speaker pattern. Chapter 6 seems to provide some evidence that older speakers are changing in the direction of younger speakers.

Then what would happen if the tone change continues in the production of younger speakers? First, if the tone change proceeds conservatively, the general coda moraicity can be expected to be retained at least within loanword stems, even if the vowel length distinction and salience of word-initial heavy syllables are lost. In this case, double high accent will be lost from all English loanwords with an initial open syllable because they no longer have cues (long vowels) for double high accent. Yet, for loanwords with a closed initial syllable, two different scenarios are possible. First, double high accent will be lost only from loanwords with four or more syllables because the bimoraic trochee is not violated when double high accent is assigned to loanwords with two or three syllables (see section 5.4. for more information). Otherwise, for the second scenario, it can be anticipated that double high accent will be completely lost even from loanwords with a closed initial syllable since double high accent itself stemmed from the special salience of word-initial heavy syllables, which has been losing as the vowel length distinction disappeared. Then all double high accented loanwords in the past or in the production of older speakers will be assigned single high accent based on the structure of the last two syllables; loanwords with a final closed syllable will be assigned final accent, and those with a final open syllable will be assigned penultimate accent in general.

If the tone change continues innovatively, the coda moraicity as well as the vowel length

distinction can be completely lost. If this happens, every syllable in NK loanwords will be considered light, regardless of the existence of a coda consonant. Then, double high accent will be completely lost from NK loanwords, and all English loanword stems will be assigned penultimate accent with a bimoraic trochaic foot that is aligned at the right edge of the words. Possible exceptions to this scenario may be some very high frequency loanwords that might continue to retain their conservative loanword tone pattern.

7.4. Implications and future direction

The major contribution of this dissertation is that it documented intergenerational tone changes currently taking place in NK English loanwords based on the empirical data, analyzing linguistic and social factors that affect the changes. Since the new tone assignment patterns observed from the younger generation in Chapters 5 and 6 were not reported in the previous studies 10-20 years ago, it seems that we are witnessing the initial stage of the generational tone change. In this sense, it can be considered that this study was conducted in a timely manner.

A second important implication of this dissertation derives from documenting and analyzing how a moraic language is losing the moraic characteristics. Findings of this study confirm the assertion of Hayes (1989) that the vowel length distinction is a key feature of moraic languages and show that losing the vowel length distinction may weaken the moraicity of coda consonants as well, diminishing the moraic feature of the language as a whole.

A third implication of this study stems from exhibiting instances of a patterned community language change in progress, emphasizing the uniformities within the pattern of variation. The generational tone changes observed in this dissertation were very patterned and predictable, and this supports Labov's (2012:290) contention of the "breathtaking uniformities" found in cases of

in-progress community language change, which can be viewed as a response to the emergence of third wave sociolinguistics (e.g. Eckert 2012) that underscores the role of the individual in language change in progress.

However, there are several issues that this dissertation did not completely address, and one of them is whether the loss of vowel length is phonetic or not. Previous literature on the loss of long vowels in NK Korean mostly focuses on native words, and very few studies examine the vowel length change in NK English loanwords. Unlike NK native words, NK English loanwords are sensitive to moraic structure, and this presents a possibility that long vowels may last longer in NK English loanwords, compared to NK native words. In particular, while double high accent has been lost from four-syllable loanwords in the production of younger speakers, the results of this dissertation exhibited that it is still retained in two- and three-syllable loanwords, even if the vowel length is known to no longer have its phonetic status among younger speakers. This posits that syllable number may affect the degree of the vowel length change. Thus, a comparative study, which focuses on the duration of the vowels in word-initial position, should be conducted in the future with English loanwords that have an initial open syllable. If NK English loanwords still have long vowels, vowels with double high accent will have longer duration than those with single high accent. The results should be separately examined by number of syllables and age group to check if each group displays different degree of change.

In addition, although this study suggested the expected path of future tone change based on the changes documented in this dissertation, further research needs to be conducted to track the progress of the tone change in order to have a clearer understanding on how the moraic characteristics of NK loanwords are changing and how the change affects the loanword tone patterns. It would be interesting if this study is extended in longitudinal and comparative ways by

tracking the same speakers to see if there have been or will be further changes along the lines of lifespan change (Sankoff, 2019) and if change is progressing and affecting older speakers as well. Since the observations in this dissertation are limited to two distinct generational groups, a further examination with a larger age range for younger and older generations of NK Korean speakers would also allow us to track the tonal change more clearly.

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Hwang, Y. (2019). Perceptual dialectology study of Korean focusing on authentic speakers of Gyeongsang dialect. *Indiana University Linguistics Club Working Papers, 19*(1).

Hwang, Y. (2013). *The interlanguage speech intelligibility benefit for native speakers of Korean and Chinese: focusing on production and perception of English flapping*. MA thesis. Yeungnam University.

Shin, S.-H. & Hwang, Y. (2012). Perception and production of English geminate consonants across word boundaries by Korean learners and native speakers of English. *Studies in Phonetics, Phonology and Morphology, 18*(1), 85-110.

CONFERENCE PRESENTATIONS

Davis, S., and Hwang, Y. (2019). "Patterned community sound change in progress: American ay-raising and North Kyungsang Korean loanword tone change," The 27th Japanese/Korean Linguistics Conference Satellite Workshop: Word Prosody and Sentence Prosody, Seoul National University, Seoul. October 17. (Oral presenatation)

Hwang, Y. (2019). "Articulatory and acoustic characteristics of Korean and English word-final laterals produced by Korean learners of English," Spring Meeting of the Korean Society of Speech Sciences, Yonsei University, Seoul. June 1. (Oral presentation)

Hwang, Y., Lotven, S. and Berkson, K. (2019). "Pitch accent and the three-way laryngeal contrast in North Kyungsang Korean," Hanyang International Symposium on Phonetics and Cognitive Sciences of Language (HISPhonCog 2019), Hanyang University, Seoul. May 24-25. (Poster presentation)

Hwang, Y., Lotven, S. and Berkson, K. (2019). "Pitch accent and the three-way laryngeal contrast in North Kyungsang Korean," The 177th Meeting of the Acoustical Society of America, The Galt House, Louisville. May 13-17. (Poster presentation)

Hwang, Y., Lotven, S. and Berkson, K. (2018). "Pitch accent and the three-way laryngeal contrast in North Kyungsang Korean," The 23rd Annual Mid-Continental Phonetics & Phonology Conference (MidPhon 23), Northwestern University, Evanston, Illinois. October 5-6. (Poster presentation)

Davis, S. and Hwang, Y. (2017). "The course of intergenerational suffixal accent change in English loanwords of North Kyungsang Korean," The 25th Japanese/Korean Linguistics Conference: Prosody and Prosodic Interfaces in Japanese and Korean, University of Hawai'i, Mānoa. October 11-14. (Poster presentation)

Hwang, Y. and Davis, S. (2017). "Pitch-pattern diffusion of generational tone change in North Kyungsang Korean English loanwords," 4th International Workshop on Sound Change (WSC4), University of Edinburgh, Edinburgh, Scotland. April 19-22. (Poster presentation)

Hwang, Y. (2016). "English loanword suffixal tone patterns in North Kyungsang Korean," 21st Mid Continental Phonetics & Phonology Conference (MidPhon), Michigan State University, East Lansing, Michigan. September 16-18. (Oral presentation)

Hwang, Y. (2016). "Loanword suffixal tone patterns in North Kyungsang Korean," 10th Annual Indiana University Linguistics Conference (IULC), Indiana University, Bloomington, Indiana. April 9. (Oral presentation)

TEACHING EXPERIENCE

2017-2018 Associate Instructor

- LING-L103 Introduction to the Study of Language (undergraduate level)
- LING-L542 Phonological Analysis (graduate level)

Department of Linguistics, Indiana University

2011-2013 Teaching Assistant

Department of English Language and Literature, Yeungnam University

2009 English Mentor (Mentor Program funded by Daegu City Office of Education)

Yeungnam Technical High School, Daegu

2007-2009 English Teacher

Ehwa American Language School, Daegu

INVITED LECTURES

October 2017 Guest Lecture – *Lexicography*

LING-L203 Introduction to Linguistic Analysis (undergraduate level)

Department of Linguistics, Indiana University

May 2017 Invited Lecture – *Study Abroad*

Department of English Language and Literature, Yeungnam University

March 2016 Guest Lecture – *Morpho-phonological Analysis*

LING-L203 Introduction to Linguistic Analysis (undergraduate level)

Department of Linguistics, Indiana University

WORK EXPERIENCE

2015-2018 Grants Assistant

East Asian Studies Center, Indiana University

2014-2015 Outreach Assistant

East Asian Studies Center, Indiana University

2012-2013 Research Assistant

Department of English Language and Literature, Yeungnam University

SCHOLARSHIPS AND AWARDS

2019-2020 College of Arts and Sciences Dissertation Completion Fellowship, Indiana University

2019 Outstanding Research Presentation Award, The Korean Society of Speech Sciences

2018	Student Conference Fund Travel Grant, Department of Linguistics, Indiana University
2018	IU CIBER Scholarship, Kelly School of Business, Indiana University
2017	American Alumni Scholarship, Yeungnam University
2017	Householder Memorial Research Award, Department of Linguistics, Indiana University
2017	Student Conference Fund Travel Grant, Department of Linguistics, Indiana University
2017	College of Arts and Sciences Travel Award, Indiana University
2016	EASC Conference Travel Grant, Indiana University
2015	Householder Memorial Research Award, Department of Linguistics, Indiana University
2013-2015	Fulbright Scholarship
2011-2013	Cheon-ma Graduate Academic Scholarship, Yeungnam University
2008-2009	Undergraduate Academic Scholarship, Yeungnam University
2008	National Agricultural Cooperative Federation Scholarship
2008	The Grand Prize, English Speech Contest, Yeungnam University

PROFESSIONAL DEVELOPMENT

2018-2019	Linguistics Associate Instructor Monthly Workshops Department of Linguistics, Indiana University
2018	Linguistics Teacher Training Department of Linguistics, Indiana University
2017	Center for Innovative Teaching and Learning Workshops Indiana University, Bloomington, Indiana
2013	Fulbright Pre-academic Orientation Program Center for English as a Second Language, University of Arizona

SKILLS

- Multimedia Analysis: Praat
- Computation: R, SPSS, MATLAB
- Experiment Device: 3D/4D Ultrasound

LANGUAGES

- Korean (Native Proficiency)
- English (Fluent)

SELECTED VOLUNTEER AND EXTRACURRICULAR ACTIVITIED

2019	Reviewer – *Phonetics and Speech Sciences* The Korean Society of Speech Sciences
2018	Volunteer – *GALANA-8* (The 8th biennial conference on Generative Approaches to Language Acquisition - North America) Indiana University, Bloomington, Indiana
2018	Volunteer – *Phonetics & Phonology Fest* Department of Linguistics, Indiana University
2017-2020	Coordinator – *GradPhon* : weekly academic meeting for graduate students in phonetics and phonology) Department of Linguistics, Indiana University
2016	Reviewer – *Indiana University Linguistics Club Working Papers* Department of Linguistics, Indiana University
2015-2018	Coordinator – *Korean Night* East Asian Studies Center, Indiana University
2015-2018	Coordinator – *East Asian Book Workshop "Meet the authors"* East Asian Studies Center, Indiana University
2014	Volunteer – *Morphology Fest* Department of Linguistics, Indiana University
2008-2009	Volunteer – *Club EVER* (Enthusiastic Volunteers with English Resources) : taught English to underprivileged children funded by Daegu city Department of English Language and Literature, Yeungnam University