

A reanalysis of loanword tone in NK*

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Kim, Gyung-Ran, 2010. A reanalysis of loanword tone in NK. *Studies in Phonetics, Phonology and Morphology* 16.1. 19-39. This study reviews the previous works on loanword tonology of NK and presents a better analysis of it. Chung (2000) and Kenstowicz & Sohn (2001) are found to miss two important points. For one thing, both works have no way to provide an attested tone [HL] to a group of two-syllable words like [syam.p^hu] 'shampoo' consisting of a closed syllable followed by a light syllable. This group has been treated as the same as a default penultimate tone group, which consists of light syllables and forms a bimoraic trochaic foot at the end of a word such as [de.mo] 'demo' [HL] or [si.na.ri.o] 'scenario' [LLHL]. It is claimed in this study that these two [HL]'s stem from different sources and that there should be a specific constraint taking care of this difference in syllable weight in two-syllable words. For another, both the previous works do not give a proper tonal description to words with more than one heavy syllable, especially when heavy syllables appear in a row at the end of words: [LHL] in words like [wa.sij.t^hon] 'Washington' or [k^hi.rin.t^hon] 'Clinton.' The interaction of constraints dealing with heavy syllables and preventing a uniform application of the higher constraints is shown to provide a more accurate analysis of loanword tone in NK. (Yeungnam University)

Keywords: loanword, tone, North Kyungsang Korean (NK), constraints

1. Introduction

There have been several works on the tone pattern of North Kyungsang Korean (NK, henceforth) from a variety of frameworks of phonological theory such as the standard generative phonology (Chung 1980), Autosegmental Phonology (Kim 1988), and Optimality Theory (Chung 1991, Kim 1997) to name a few. In line with the fever in loanword phonology in the last decade, the tone pattern of loanwords comes to get the attention of recent workers. As for NK, the representative works are Chung (1998, 2000) and Kenstowicz & Sohn (2001), while Lee (2003) is the one on South Kyungsang Korean.

Based on the data from the previous works on NK, this study provides a better constraint-based analysis of loanword tone in NK, claiming that there should be a more fine division of two-syllable words depending on syllable weight and that constraints dealing with heavy syllables should be described more adequately.

The present study is organized as follows. Section 2 reviews the previous works and points out several descriptive shortcomings, especially related with heavy syllables in two-syllable words and words with more than one

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heavy syllable. Section 3 reassesses the data, presenting a series of checking procedures in assigning tone, which are in turn converted into constraint ranking. It is pointed out that two surface [HL]’s need to be differentiated since they are from two different sources: one from a combination of a closed syllable and a light syllable like [syam.p^hu] ‘shampoo’ and another from two light syllables like [de.mo] ‘demo,’ a word of a typical default penultimate tone class. In addition, our analysis is able to provide a proper tone to words with two consecutive heavy syllables word-finally like [k^h.rin.t^hon] ‘Clinton’ [LHL], while the previous works give a wrong form [LLH]. Discussion and conclusion is given in section 4.

2. Review of previous works

2.1 Chung (2000)

Kim (1997) may be the first work addressing loanword tonology of NK, claiming that the place of a high tone (H) is predictable, usually on the heavy syllables consisting of long vowels and otherwise on the penultimate syllable.

A more concrete description of loanword tone pattern is given by Chung (1998), where it is argued that loanword phonology is distinct from native phonology. Several important findings of her study are as follows. First, there is no match between the position of stress in English words and that of a H in loanwords.¹ Second, closed syllables behave as light syllables in native words, while those in loanwords act as heavy syllables, thus attracting a H. Third, epenthetic vowels do not get a H. On the other hand, there is one thing in common between native and loanword tonology: long vowels attract a H and the default tone falls on the penultimate syllable.

In a subsequent work, Chung (2000) offers a constraint-based analysis of tone of loanwords in NK, drawing on the findings of her previous work. The general tone pattern of loanwords in NK is such that a H falls on a heavy syllable if there is one: otherwise it falls on the penultimate. Data in (1) show the words with heavy syllables, (1a) with initial long vowels and (1b) with closed syllables.

(1) a. initial long vowels

ru:.mə	‘rumor’	[HH]
p ^h a:.t ^h i	‘party’	[HH]
mi:.t ^h iŋ	‘meeting’	[HH]
sə:.pi.sɨ	‘service’	[HHL]
po:.nə.sɨ	‘bonus’	[HHL]

¹ This is confirmed by words like an.t^he.na ‘antenna’ [HHL], ra.ti.o ‘radio’ [LHL], and wa.sɨŋ.t^hon ‘Washington’ [LHL], where there is no mapping of English stress into a H in NK. Kenstowicz & Sohn (2001) also agrees with Chung (1998) on this point.

b. closed syllables

ka.wun	‘gown’	[LH]
t ^h i.k ^h et	‘ticket’	[LH]
k ^h e.c ^h ap	‘kechup’	[LH]
ri.t̩m	‘rhythm’	[LH]
a.t ^h ɪ.lan.t ^h a	‘Atlanta’	[LLHL]
an.t ^h e.na	‘antenna’	[HHL]

It can be noted that a heavy initial syllable as well as its following syllable has a H, leading to a double H [HH]: [p^ha:ti] ‘party’ [HH] and [an.t^he.na] ‘antenna’ [HHL]. A heavy syllable closed by a liquid [l] from a geminate [ll] does not contribute to syllable weight: [a.t^hɪ.lan.t^ha] ‘Atlanta’ [LLHL], *[LHLL], *[LHHL].

Otherwise, the penultimate syllable has a H as in (2).

(2) default H on the penultimate

de.mo	‘demo’	[HL] ²
o.ha.i.o	‘Ohio’	[LLHL]
ra.ti.o	‘radio’	[LHL]
ma.sɪ.k ^h a.ra	‘mascara’	[LLHL]

On the other hand, words with more than one heavy syllable show a different tone pattern. The first three words in (3) have an initial double H, while the second two have a penultimate H and the last has a final H.

(3) more than one heavy syllable

ak.sen.t ^h ɪ	‘accent’	[HHL]
k ^h ak.t ^h e.il	‘cocktail’	[HHL]
c ^h em.p ^h i.on	‘champion’	[HHL]
wa.sɪŋ.t ^h on	‘Washington’	[LHL]
k ^h ɪ.rin.t ^h on	‘Clinton’	[LHL]
o.raŋ.u.t ^h an	‘orangutan’	[LLLH]

In light of this situation in words with more than one heavy syllable, Chung suggests the relevant constraints in (4), whose hierarchy is given in (5).

- (4) a. Initial Heavy H: The word-initial heavy syllable has a H.
 b. Penultimate Heavy H: A penultimate heavy syllable has a H.
 c. Final Heavy H: The word-final heavy syllable has a H.

(5) Initial Heavy H >> Penultimate Heavy H >> Final Heavy H

² Two-syllable words like [syam.p^hu] ‘shampoo’ [HL] consisting of a heavy syllable and a light syllable are considered to have a default penultimate tone [HL]. However, there is no way to get a correct tone pattern in her analysis as will be shown in (15).

In passing, there are two things to note here. One is that there is no mention of “words with more than one syllable” in each constraint of (4), even though it is mentioned in the text of her work (Chung 2000: 174). The other is that the hierarchy in (5) seems to make the final heavy H look like a default tone. We will come back to these points later.

Other relevant constraints are listed in (6). The constraints employed in Chung (2000: 180) are ranked in (7).

- (6) a. Moraic Coda: A coda consonant must head a mora.
 - b. Mora Faith: If the number of moras linked to S_I (input segment) is n , then the number of moras linked to S_O (output segment) is n .
 - c. Heavy H: A heavy syllable has a H.
 - d. Single H: A word cannot have more than one H.
 - e. Initial H Doubling: A syllable adjacent to an initial heavy syllable is high-toned.
 - f. Penult H: A H falls on the penultimate syllable.
- (7) Mora Faith >> Moraic Coda >> Initial H Doubling >> Heavy H >> Single H >> Penult H >> Initial Heavy H >> Penultimate Heavy H >> Final Heavy H³

As a way of verifying her analysis, let us take a look at how each representative word in (1) and (2) fares. The first one is [p^ha:t^hi] ‘party’ [HH] from (1a) with an initial long vowel. The tableaux below are adapted from Chung (2000: 182-184), with irrelevant candidates and constraints omitted (The symbols σ and μ in tableaux represent a syllable and a mora, respectively).

³ The ranking between Moraic Coda and Mora Faith in her original (22) and that in all tableaux of hers is reversed (cf. Chung 2000: 180-182). We believe the ranking shown in her tableaux to be correct. Another thing to note is that constraint Penult H is not specified in her tableaux of words with more than one heavy syllable. We assume that constraint ranking shown in her tableaux suggests that in (7). To take an example, see tableau (11) below for [k^hak.t^he.il] ‘cocktail’ [HHL].

(8) [p^ha:.t^hi] ‘party’ [HH]

p ^h a _u u. t ^h i _u	Ini-Hv-D	Heavy H	Single H	Penult H
a. H σ σ / μ μ μ \ \ p ^h a t ^h i	*!			
b. H σ σ / μ μ μ \ \ p ^h a t ^h i		*!		*
c. H H σ σ / μ μ μ \ \ p ^h a t ^h i			*!	

Candidate (8a) is out since the second syllable, adjacent to the initial heavy syllable, has no H, violating Initial H Doubling. The initial heavy syllable of (8b) does not have a H, violating Heavy H, while the H in the second syllable leads to a violation of Penult H. Candidate (8c) has two H's and thus violates Single H. However, the higher constraints are not violated, which makes (8c) optimal.

Next is the case of words with closed syllables in (1b).

(9) [t^hi.k^het] ‘ticket’ [LH]

t ^h i _μ .k ^h e _μ t	Mora Faith	Moraic Coda	Ini-Hv- D	Heavy H	Single H	Penult H
a. H σ σ μ μ t ^h i. k ^h e t		*!				
b. H σ σ \ μ μ μ t ^h i. k ^h e t				*!		
c. H ̣ σ σ \ μ μ μ t ^h i. k ^h e t						*

The coda consonant [t] in (9a) does not have a mora, violating Moraic Coda, while the second syllable in (9b), which is heavy, has no H and thus violates Heavy H. As a result, (9c) is selected as optimal with a violation of the lowest constraint, Penult H.

The following is the case of a default penultimate tone, where no heavy syllables are involved.

(10) [de.mo] ‘demo’ [HL]

d e _μ .mo _μ	Ini-Hv-D	Heavy H	Single H	Penult H
a. $\begin{array}{c} \text{H} \\ \\ \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad \\ \text{d} \quad \text{e m} \quad \text{o} \end{array}$				
b. $\begin{array}{c} \text{H} \\ \\ \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad \\ \text{d} \quad \text{e m} \quad \text{o} \end{array}$				*!
c. $\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \sigma \quad \sigma \\ \quad \\ \mu \quad \mu \\ \quad \\ \text{d} \quad \text{e m} \quad \text{o} \end{array}$			*!	

The first two constraints are not violated since no heavy syllables are involved. (10b) has a final tone, violating Penult H, while (10c) has two H's, violating Single H. (10a) is selected as optimal with no violation of any constraint.

So far her analysis seems to work well. However, there are cases where her analysis makes wrong predictions. The first case comes from her tableau (30) (Chung 2000: 184), which is adopted in (11). The violation marks in the parentheses (*) are not in her original tableau. The symbol ☉ is for the actual attested form. Candidate (11c) is selected as optimal in her original tableau with no (*)'s. The ranking of Penult H is not specified in her tableau. However, the placement of the constraint between Single H and Initial Heavy H or below Final Heavy H does not make any difference in the selection of the correct and attested form.

(11) [k^hak.t^he.il] ‘cocktail’ [HHL], * [LLH]

k ^h a _μ k.t ^h e _μ .i _μ l	Ini- Hv-D	Hv- H	S-H	Initial Hv-H	Penult Hv-H	Final Hv-H
a. $\begin{array}{c} H \\ \\ \sigma \quad \sigma \quad \sigma \\ / \quad \quad / \\ \mu \mu \quad \mu \quad \mu \mu \\ \quad \quad \quad \\ k^h a k \quad t^h e \quad i l \end{array}$	*!	(*)				*
b. $\begin{array}{c} H \\ \\ \sigma \quad \sigma \quad \sigma \\ / \quad \quad / \\ \mu \mu \quad \mu \quad \mu \mu \\ \quad \quad \quad \\ k^h a k \quad t^h e \quad i l \end{array}$		*! (*)		*		*
c. $\begin{array}{c} H \quad H \\ \odot \quad \quad \\ \sigma \quad \sigma \quad \sigma \\ / \quad \quad / \\ \mu \mu \quad \mu \quad \mu \mu \\ \quad \quad \quad \\ k^h a k \quad t^h e \quad i l \end{array}$		(*)	*!			*
d. $\begin{array}{c} H \\ \odot \quad \\ \sigma \quad \sigma \quad \sigma \\ / \quad \quad / \\ \mu \mu \quad \mu \quad \mu \mu \\ \quad \quad \quad \\ k^h a k \quad t^h e \quad i l \end{array}$	(*)	*!		*		

The final syllable in each candidate is heavy and thus should be assigned a H. However, her tableau has no violation marks for it in candidates (11a, b, c). The addition of the violation mark (*) for Heavy H should choose (11d) as optimal, but this is wrong. This happens even when the (*) for Initial H Doubling is not included as in her original tableau. If we assume that she makes a mistake of not putting a violation mark for Initial H Doubling in (11d), then candidate (11c) may win.

At this moment, however, it is necessary to take a closer look at how to interpret Initial H Doubling. It is repeated below in (12).

(12) Initial H Doubling: A syllable adjacent to an initial heavy syllable is high-toned.

As for the term “double,” we use it to indicate that something includes or is made of two things of the same kind. From this, it can be presumed that a H on the initial heavy syllable is doubled to the following syllable. The correct statement of Initial H Doubling should be like (13). In other words, only when the initial heavy syllable is assigned with a H, its following syllable is high-toned, too.

(13) Initial H Doubling: A syllable adjacent to an initial heavy syllable with a H is high-toned, too.

The problem, however, is that the revised constraint (13) cannot make (11c) the optimal and correct output. For (11d) does not violate constraint (13), with no H assigned to the initial syllable.

The only way out of this dilemma is to change the constraint hierarchy, switching the ranking between Heavy H and Initial H Doubling: Heavy H >> Initial H Doubling. Then, there is no need to add “with a H” to the statement in (12).

(14) Mora Faith >> Moraic Coda >> Heavy H >> Initial H Doubling⁴ >> Single H >> Penult H >> Initial Heavy H >> Penultimate Heavy H >> Final Heavy H

Another example of descriptive inadequacy of her analysis comes from words like [syam.p^hu] ‘shampoo,’ considered to have the default penultimate H. However, the hierarchy in (14) leads to *[HH], not [HL], which is the attested form.

There is no way to select the attested form (15a) from the ranking in (14) or (7). Candidate (15c) should be chosen as optimal, violating Single H only, with the higher two constraints not violated.

The problem lies in the treatment of two-syllable words consisting of an initial closed syllable followed by a light syllable, whose tone is [HL], not *[HH]: [syam.p^hu] ‘shampoo,’ [t^hek.si] ‘taxi,’ [nəm.bə] ‘number,’ and [səm.mə] ‘summer.’ Even though Chung treats these words as a default tone group, it is impossible to get correct output forms for this group in her analysis. Compare two words of this group [de.mo] ‘demo’ [HL] in (10) and [syam.p^hu] ‘shampoo’ [HL] in (15), whose initial syllables are different in syllable weight.

⁴ The checking of all her tableaux confirms the correctness of the ranking Heavy H >> Initial H Doubling.

(15) [syam.p^hu] ‘shampoo’ [HL], *[HH]

syam.p ^h u	Hv-H	Ini- Hv-D	S-H	Initial Hv-H	Penult Hv-H	Final Hv-H
a. H ☉ σ σ / μ μ μ sya m p ^h u		*!				
b. H σ σ / μ μ μ sya m p ^h u	*!			*	*	
c. H H ☐ σ σ / μ μ μ sya m p ^h u			*!			

Let us move on to the next description of loanword tonology of NK.

2.2 Kenstowicz & Sohn (2001)

Kenstowicz & Sohn (2001) examines how English loanwords are adapted into NK, concentrating on changes in accentuation. While they generally agree with Kim (1997) in accepting the penultimate accent H as the regular pattern for words with no long vowel, their description is more fine-grained. According to them, words with heavy initial (long vowel or closed) syllables are assigned a doubled accent [HH] while the rest of words are assigned a bimoraic trochaic foot at their right edge. They divide the NK loanwords into three classes, based on the position of heavy syllables. Their generalization is given in (16), whose component sentences are in a disjunctive relation (Kenstowicz & Sohn 2001: 243).

- (16) a. If the initial syllable of the output is heavy, then the word falls into the doubled-accent class.
 b. Otherwise, if the final syllable is heavy, the word falls into the final-accent class.

c. Otherwise, the word falls into the penultimate class.

Compared with Chung (2000)'s description in (4), the general statements in (16) treat the penultimate syllable as the position of a default accent, which is agreed upon by the previous studies (Kim 1997, Chung 1998, 2000).

As for syllable weight, its relative ranking is illustrated in (17), depending on the constituents of syllable rime.

(17) $V: >> VC_{\text{son}} >> VC_{\text{obstr}} > V > V_{\text{epen}}$

As words below in (18a) show, one of characteristics of loanword adaptation is observed to be that heavy initial syllables of the doubled class extend further down to syllables with a sonorant coda and to syllables with an obstruent coda in some but not all cases.⁵

Their second observation is that as in (18b) epenthetic vowel [ɨ] never takes the accent regardless of its position in a word but it can serve as the second member of the doubled accent in heavy initial syllables. Compare [səŋ.kɨ.ra.sɨ] 'sunglass' [HHLL] with [ni.kɨ.ro] 'negro' [LLH], which otherwise would receive the default accent *[LHL].

Their third observation is that as in (18c) the heavy syllable closed by [l] from geminate liquids does not contribute to weight, which is also observed by Chung (2000). Both [pol.lyum] 'volume' and [al.li.pa.i] 'alibi' have no doubled accent in spite of heavy initial syllables.

(18) a.	po:.nə.sɨ	'bonus'	[HHL]
	rən.tən	'London'	[HH]
	syam.p ^h e.in	'champagne'	[HHL] ⁶
	p ^h ap.səŋ	'popsong'	[HH]
	nep.k ^h in	'napkin'	[HH]
b.	in.p ^h ɨ.le	'inflation'	[HHL]
	cu:.sɨ	'juice'	[HH]
	səŋ.kɨ.ra.sɨ	'sunglass'	[HHLL]
cf.	ni.kɨ.ro	'negro'	[LLH], *[LHL]
	me.t ^h ɨ.ro	'metro'	[LLH], *[LHL]
c.	pol.lyum	'volume'	[LH], *[HH] ⁷
	al.li.pa.i	'alibi'	[LLHL], *[HHLL]

⁵ The thing is how to predict when obstruent codas belong to heavy syllables and when they don't.

⁶ They regard this as a two-syllable word [syam.p^hein] [HH].

⁷ We follow suit of Chung (2000) and Kenstowicz & Sohn (2001) in treating syllables closed by a liquid [l] from a geminate [ll] as light syllables and do not deal with the words in (18c) here. For the treatment of them, see Chung (2000).

Both Chung (2000) and Kenstowicz & Sohn (2001) agree upon these observational facts.

However, Chung's heavy syllables include those with all consonant codas, both sonorants and obstruents. Another difference between these two studies is concerned with diphthongs. Chung considers them two separate vowels, while Kenstowicz & Sohn regards the diphthong [ej] as a diphthong and treat other diphthongs heterosyllabically. We follow Chung here, assuming that there are no falling diphthongs in Korean, both native and adapted.

Going back to their generalization in (16), we come to encounter the same problem in two-syllable words with a heavy initial followed by a light syllable. The accent is on the penultimate syllable, realized as [HL].

(19) syam.p ^h u	'shampoo'
tan.sɪ	'dance'
t ^h ek.si	'taxi'
c ^h an.sɪ	'chance'
nəm.bə	'number'

The statement (16a) classifies these words into the doubled-accent class since the initial syllables are heavy, and they should be assigned the doubled accent *[HH]. Instead, the surface tone is [HL], the default accent. The disjunctive relation in which the three statements of (16) are placed does not make any room for the words in (19), which are to be dealt with as default cases by (16c). Given the fact that these two-syllable words are among most frequently used loanwords, it is necessary to give a proper description to this group of words.

This leads us to reassess loanword tone in NK, which is to be discussed in the next section.

3. Reanalysis

Our preliminary observation is that a "double tone" or a "doubled accent" appears in one of the following three cases: first, when the initial vowel is long like [p^ha:t^hi] 'party' [HH], second, when the initial syllable is closed in words with more than two syllables like [an.t^he.na] 'antenna' [HHL], or third, when both syllables are heavy in two-syllable words like [p^hap.sɔŋ] 'popsong' [HH].

How do the speakers of NK decide the tone pattern of loanwords? The checking procedures would be like the following:

(20) checking procedures⁸

- [illegible]

The NK speakers would check first the initial syllable of a word. If the initial syllable has a long vowel, the word has a double tone [HH] (20a). Then, they would check whether the initial syllable is closed or not (20b). If the initial syllable is closed, they would check the number of syllables in a word. If it has just two syllables and the final is open, then the word has [HL] (20b, i). In all other cases, the word has [HH(L)-] (20b, ii). If initial syllable is not heavy, they would assign a H to the heavy penultimate syllable, if any, (20c). Otherwise, they would assign a H to the heavy final syllable, if any, (20d). Finally, they would assign a H to the penultimate syllable.

The checking procedures in (20a, b) lead to the relative ranking of syllable weight in (21), which is a slight revision of (17).

$$(21) V: \gg VC \gg V \gg V_{\text{open}}$$

Closed syllables are treated equally in our analysis regardless of the kind of the coda consonant, a sonorant or an obstruent.

Another thing to think about is concerned with an epenthetic vowel in loanwords in NK. As all previous researchers have observed, it never takes a H but can serve as the second member of a double tone. Chung posits No Empty Segment to prevent the epenthetic vowel [ə] from getting a H, ranking it above Penult H (Chung 2000: 182). For example, /st^ha/ 'star' becomes [sə.t^ha] [LH]. Vowel [ə] is inserted to the empty slot by default in her analysis and gets a L even though it is the penultimate syllable, due to the ranking No Empty Seg H >> Penult H.

Following Kenstowicz & Sohn (2001), however, we regard [ɪ] as the epenthetic vowel in NK loanwords. In NK native words, vowel [ɪ] is not used in content words at least, with vowel [ə] taking its place, instead.⁹ On the other hand, in NK loanwords whose majority is nouns, the epenthetic vowel is [ɪ], which does not take a H.

⁸ The generalization in (16) will soon be found not to cover the cases of (20bi) and (20c).

⁹ For example, the word for 'music' in NK is pronounced as [əm.ak], not as [ɪm.ak].

- (22)
- | | | | |
|------------------------|----------|-------|------------------------|
| tan.sɿ | ‘dance’ | [HL] | *tan.sə |
| c ^h an.sɿ | ‘chance’ | [HL] | *chan.sə |
| sɿ.t ^h a | ‘star’ | [LH] | sə.t ^h a |
| sɿ.t ^h a.il | ‘style’ | [LLH] | sə.t ^h a.il |

With these observational facts in hand, let us see how to implement a proper ranking of constraints onto the above observations. The preliminary suggestions of constraints and their ranking are illustrated in (23) and (24).

- (23)
- One-H-Prwd: There is at least one H in each prosodic word.
 - Weight-to-High (W-t-H): A heavy syllable has a H.¹⁰
 - Initial H Doubling: A syllable adjacent to a H on an initial heavy syllable is high-toned.
 - Single H: A prosodic word cannot have more than one H.
 - No H on [ɿ] (H[ɿ]): Vowel [ɿ] cannot have a H.
 - Penultimate H: A H falls on the penultimate syllable.
- (24) One-H-Prwd >> Weight-to-H >> Initial H Doubling >> Single H >> No H on [ɿ] >> Penultimate H

NK is a pitch-accent language and there should be at least one H in each prosodic word, which is taken care of by One-H-Prosodic Word. This constraint is never violated, ranking highest and we will omit it in the following tableaux. Even though Initial H Doubling can assign a doubled accent [HH] to initial two syllables, it seems more natural for a H to be realized on one syllable in a prosodic word, which is taken care of by the ranking Initial H Doubling >> Single H. This is a case where the specific comes before the general.

3.1 Two-syllable words

First, two-syllable words are on the test. All possible combinations of syllable types are illustrated again in (25).

- (25)
- | | | |
|------------------------------------|-----------|------|
| pa:.t ^h i | ‘party’ | [HH] |
| t ^h i.k ^h et | ‘ticket’ | [LH] |
| de.mo | ‘demo’ | [HL] |
| p ^h ap.səŋ | ‘popsong’ | [HH] |
| syam.p ^h u | ‘shampoo’ | [HL] |
| tan.sɿ | ‘dance’ | [HL] |

As mentioned in the previous section, the problem stems from words like [syam.p^hu] ‘shampoo’ and [tan.sɿ] ‘dance,’ consisting of an initial closed syllable and a final open one {[VC]_R[V]_R}_W (R and W stand for syllable

¹⁰ This is adopted from Lee (2003).

rime and phonological word, respectively). According to the constraint ranking in (24), the expected output form is [HH]. However, the attested form is [HL].

(26) two-syllable words

pa:.t ^{hi}	W-t-H	Ini-H-D	Single H	*H[ɪ]	Pen-H
a. HH			*		
b. HL		*!			
c. LH	*!				*
t ^{hi} .l ^h et					
a. HH			*!		
b. HL	*!				
c. LH					*
de.mo					
a. HH			*!		
b. HL					
c. LH					*
p ^h ap.son					
a. HH			*		
b. HL	*!	*			
c. LH	*!				*
syam.p ^h u					
a. HH			*		
b. HL		*!			
c. LH	*!				*
tan.sɪ					
a. HH			*	*	
b. HL		*!			
c. LH	*!			*	*

To get [HL] as an optimal output for words like [syam.p^hu] ‘shampoo,’ we need a constraint to prevent the assignment of a H on the final open syllable. This constraint is very special, blocking a uniform spreading of a H to the second syllable in two-syllable words.

(27) *{H[VC]_RH[V]_R}_W: A doubled tone [HH] is not allowed in a bisyllabic word consisting of closed and open syllables.¹¹

As seen in (20b), although closed syllables belong to heavy syllables, words with initial closed syllables need to be distinguished from those with

¹¹ We acknowledge that this constraint is awkward. However, it is necessary to distinguish words like [syam.p^hu] ‘shampoo’ [HL] from those like [pa:.t^{hi}] ‘party’ [HH].

initial long vowels. In the case of the former, it is necessary to check whether the final syllable is open or closed.

The situation of [syam.p^hu] ‘shampoo’ and all words in (19) as well is shown again in the following.

(28) [syam.p^hu] ‘shampoo’ [HL]

syam.p ^h u	W-t-H	Ini-H-D	[*] H[V] _R W	S-H	[*] H[i]	P-H
a. HH			*	*!		
☞ b. HL		*				
c. LH	*!		*			*
tan.sɨ						
a. HH			*	*!	*	
☞ b. HL		*				
c. LH	*!		*			*

The inclusion of ^{*}{[VC]_R H[V]_R}_W lets (28b) defeat (28a).

Next is the turn of words with more than two syllables.

3.2 Words with more than two syllables

The following is a group of words with more than two syllables, assembled from the previous section. As for the first two examples, it is easy to see how to get their output forms. The rest have more than one heavy syllable, which are focused on here.

- (29) po:.nə.sɨ ‘bonus’ [HHL]
 an.t^he.na ‘antenna’ [HHL]
 ak.sen.t^hɨ ‘accent’ [HHL]
 wa.sɨŋ.t^hon ‘Washington’ [LHL]
 o.raŋ.u.t^han ‘orangutan’ [LLLH]

Let us see the situations of the last three examples. Words beginning with two heavy syllables can be dealt with by the existent constraints and their ranking. The irrelevant constraints are omitted in the following tableaux.

(30) [ak.sen.t^hɨ] ‘accent’ [HHL]

ak.sen.t ^h ɨ	W-t-H	S-H	[*] H[i]	Pen-H
☞ a. HHL		*		
b. LHL	*!			
c. LLH	*!*		*	*
d. LHH	*!	*	*	

However, when words have heavy syllables in positions other than the initial position, we have difficulty. In cases like [wa.siŋ.t^hon] ‘Washington’ and [o.raŋ.u.t^han] ‘orangutan,’ the attested forms (31b) are impossible to obtain. The former has the penultimate H [LHL], while the latter has the final H [LLLH].

(31) wa.siŋ.t^hon [LHL], o.raŋ.u.t^han [LLLH]

wa.siŋ.t ^h on	W-t-H	S-H	Pen-H
☞ a. LHH		*	
☹ b. LHL	*!		
c. LLH	*!	*	
o.raŋ.u.t ^h an			
☞ a. LHLH		*	*
☹ b. LLLH	*!		*
c. LHHL	*!	*	
d. LLHH	*!	*	

Each candidate (a) is faithful to the constraint ranking, but is not the attested output form.

The thing is that a double H can appear only in word-initial position in NK, both native words and loanwords, and that discontinuous H’s are not allowed such that there is no [LHH], [LHLH] or [HLHL]. This is taken care of by the following two constraints.

- (32) a. Initial Double H (Ini-D-H): A double H comes at the word initial position.
 b. H-Contiguity: H’s should be contiguous.

Like One-H-Prosodic Word in (23a), constraints in (32) rank highest and are never violated in NK. The situation in (31) is changed into that in the following.

(33) wa.siŋ.t^hon [LHL], o.raŋ.u.t^han [LLLH]

wa.siŋ.t ^h on	Ini-D-H	H-Con	W-t-H	S-H	Pen-H
a. LHH	*!			*	
☞ b. LHL			*		
c. LLH			*		*!
o.raŋ.u.t ^h an					
a. LHLH		*!		*	*
☞ b. LLLH			*		*
c. LHHL	*!		*		
d. LLHH	*!		*	*	

The addition of two more constraints in (32) makes each candidate (b) an optimal output.¹²

In our analysis, it is not necessary to adopt Chung (2000)'s constraints in (4), which specify each heavy syllable in a specific position like initial, penultimate and final positions. When combined with other constraints, our Weight-to-High fares well in handling words with more than one heavy syllable.

Another thing to note is that the statement in (16b) from Kenstowicz & Sohn (2001) leads [wa.sɨŋ.t^hon] 'Washington' to have *[LLH], due to the final heavy syllable [t^hon]. However, the attested form is [LHL]. The same situation is found in [k^hɨ.rin.t^hon] 'Clinton' [LHL], *[LLH]

3.3 Words with epenthetic vowel [ɨ]

A few words with the epenthetic vowel [ɨ] are illustrated in the following.

- (34) tan.sɨ 'dance' [HL]
 sɨ.t^ha 'star' [LH]
 sɨ.p^he.in 'Spain' [LLH]
 ni.gɨ.ro 'negro' [LLH]¹³

Since the situation of [tan.sɨ] 'dance' is shown in tableau (28), let us start with [sɨ.t^ha] 'star.' The situation of words in the above is like (35).

(35) words with epenthetic [ɨ]

	sɨ.t ^h a	W-t-H	*H[i]	Penult-H
☞	a. LH			*
	b. HL		*!	
	sɨ.p ^h e.in			
☞	a. LLH			*
	b. LHL	*!		
	c. HLL	*!	*	*
	ni.gɨ.ro			
☞	a. LLH			*
	b. LHL		*!	
☞	c. HLL			*

¹² As Sohn, Hyang-Sook points out, we can think of another candidate (33d) [LHLL] for [o.raŋ.u.t^han], which shows exactly the same violations of Weight-to-H and Penultimate-H as (33b) does. However, constraint Align Right, which is to be seen in (36), makes (33b) the optimal output.

¹³ We agree with Kenstowicz & Sohn (2001: 253) that the epenthetic vowel may have a H in words which are fully integrated into the tonal system of NK such as [ma.kɨ.ma] 'magma' [LHL] or [k^ha.ri.sɨ.ma] 'charisma' [LLHL].

The existent constraints can handle the data with no problems. However, there is no way to choose (a) [LLH] over (b) [HLL] for [ni.gĩ.ro] ‘negro.’ Another constraint is needed to get the correct form (a), which ranks below Penult-H: Penult-H >> Align Right.

(36) Align Right: Align the right edge of a H with that of a phonological word.

To verify this constrain and its place in the ranking, one more exemplary word is included in (37), where a default penultimate H is optimal.

(37) [ni.gĩ.ro] ‘negro’ [LLH]

ni.gĩ.ro	W-t-H	*H[ĩ]	Penult-H	Align-R
☞ a. LLH			*	
b. LHL		*!		*
c. HLL			*	*!*
si.na.ri.o				
a. LLLH			*!	
☞ b. LLHL				*
c. LHLL			*!	**

The addition of Align-R in the ranking does not bring any change in the selection of all the above data. The final ranking of the constraints employed in our analysis is listed in the following.

(38) One-H-Prwd, Initial Double H, H-Contiguity >> Weight-to-H >> Initial Heavy Doubling, *{H[VC]_R H[V]_R}_w >> Single H >> *H on [ĩ] >> Penultimate H >> Align Right

4. Discussion and conclusion

Both Chung (2000) and Kenstowicz & Sohn (2001) pay a special attention to words with more than one heavy syllable. However, they fail to do so when it comes to two-syllable words, especially when these are composed of a heavy syllable and a light one like [syam.p^hu] ‘shampoo’ or [t^hek.si] ‘taxi.’ They consider those words to have a default penultimate tone as in [de.mo] ‘demo’ [HL] or [si.na.ri.o] ‘scenario’ [LLHL]

However, it is shown in the present analysis that two-syllable words should be treated more accurately. As seen in the checking procedures in (20), what matters is the weight of each syllable. When words consist of two light syllables like [de.mo], they have a default penultimate tone [HL]. On the other hand, when the first syllable is heavy, it is necessary to check the weight of the final syllable. This is because a double tone [HH] does not appear uniformly in all two-syllable words with closed initials. Only if

the final syllable is also heavy, [HH] is realized: [p^hap.son] ‘popsong.’ If not, the tone is [HL]: [syam.p^hu] ‘shampoo.’

Put concretely, Chung (2000)’s analysis is found to be descriptively inadequate, since there is no way to assign a correct tone to words like [k^hak.t^he.il] ‘cocktail,’ as noted in (11). This is due to her misinterpretation and misapplication of Initial Heavy Doubling. In addition, her Penultimate H is not specified in her constraint ranking.

On the other hand, Kenstowicz & Sohn (2001)’s observation is more accurate. However, when it comes to the tone of two-syllable words, their generalization in (16) misses the same point. Besides, their generalization cannot bring a correct tone [LHL] for [wa.sin.t^hon] ‘Washington’ and [k^hi.rin.t^hon] ‘Clinton,’ where the application of (16b) prior to that of (16c) would result in *[LLH]. When it comes to words with heavy syllables both in the final syllable and elsewhere, the generalization in (16) is found to fall short of complete correctness.

A more accurate analysis of loanword tone in NK needs constraints taking care of two-syllable words like [syam.p^hu], which do not make a bimoraic trochaic foot at the right edge. In this group of words, whose initial syllables are heavy, the high ranked constraints Weight-to-High and Initial Heavy Doubling would take priority of application. The result would be *[HH], instead of [HL]. To prevent this from happening, we need a special constraint $\{H[VC]_R H[V]_R\}_W$, which leads to the attested tone [HL].

The tone [HL] in words like [syam.p^hu] looks the same as a default penultimate tone [HL] at the right edge of [de.mo] ‘demo’ and [si.na.ri.o] ‘scenario,’ composed of light syllables only. However, these two [HL]’s stem from two different sources. The first comes from the interaction of Weight-to-High, Initial Heavy Doubling, and $\{H[VC]_R H[V]_R\}_W$, while the second results from that of Penultimate H and Align Right. The previous analyses overlook this difference in sources, leading to wrong outputs.

In conclusion, our study can be claimed to give a more proper and accurate analysis of loanword tone in NK. In addition, our constraint ranking in (38) reflects the checking procedure in (20), which may be working in the mind of the native speakers of NK. It is regrettable that ours is not a watertight analysis covering all the loanwords with exceptional behavior.

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