Weight-sensitive Tone Patterns in Loanwords of South Kyungsang Korean

DONGMYUNG LEE
Indiana University

0. Introduction

The purpose of this paper is to provide an explicit formal account of the loanword tone patterns of South Kyungsang Korean (SK), a dialect spoken in the south-eastern part of Korea. SK is a pitch accent language. The location of the pitch accent H tone is lexically determined. However, this paper will show that, unlike native words, SK loanwords are subject to a H tone assignment that is predictable from a combination of various factors including syllable weight. Such various factors determining the H tone location can be formalized with phonological constraints, under the framework of Optimality Theory (Prince and Smolensky 1993, McCarthy and Prince 1995). We will show that these constraints interact to produce the attested tone patterns of SK loanwords.

For the database of the present study, we have collected 2265 words[1] and classified them by the number of component syllables and the syllable weight. This paper is organized as follows. In section 1, we discuss the previous research on the tone patterns of SK native words. In section 2, we describe the SK loanword data. In section 3, we provide a formal optimality-theoretic account of the SK loanword data. In section 4, we summarize our findings.

1. The Tone Patterns of SK Native Words

In SK words, as discussed by Kim (1994), H tone is assigned on one syllable or on a sequence of two syllables in a word. The location of the H tone pitch accent is lexically determined. The SK native tone patterns are summarized in (1). H and L stand for High and Low tones respectively. As seen in (1), we posit H and L tones for the tone inventory.[2]

[1] Most of the words come from Minjung's Essence Korean-English Dictionary 3rd edition published by Minjung Seorim, Seoul, Korea in 1997.

[2] Kim (1994) claims that H, M and L tones comprise the SK toneme inventory. However, in this paper, we assume that only H and L tones are needed phonologically.

(1)

Disyllabic	Trisyllabic	Quadrisyllabic
/ku.rɨm/ HH 'cloud'	/o.re.pi/ HHL 'elder brother'	/a.ʤu.mə.ni/ LHHL 'aunt'
/ə.rɨm/ HL 'ice'	/maŋ.a.ʤi/ LHL 'foal'	/hal.a.pə.ʤi/ HHLL 'grandfather'
/kə.ri/ LH 'street'	/pu.k'u.rum/ LHH 'shyness'	(/ki.ta.ri.ki/ LHLL 'waiting')
	/a.ʤi.me/ HLL 'aunt'	(/ki.p'ə.ha.ki/ HLLL 'pleasing')
		(/na.mu.ta.ri/ LHHH 'wood bridge')

High tone assignment in SK native words is not predictable. This is seen by the disyllabic words in (2).

(2) a. ku.rɨm (HH) 'cloud' b. ki.rɨm (HL) 'oil' c. kə.rɨm (LH) 'fertilizer'

In (2), the three words which have similar segments and the same syllable structure have different tone patterns. Hence the tonal patterns of native words are not predictable from any other phonological attribute and are lexically specified.

2. Tone Patterns of SK Loanwords

In this section, we classify 2265 loanwords by the weight and number of component syllables in order to describe the tone patterns of SK loanwords.[3] The loanword data are divided into three groups depending on how many syllables a word consists of: disyllabic, trisyllabic and quadrisyllabic words. (Monosyllabic loanwords such as [k^ha] 'car' all have a high tone and will not be discussed.) The tonal pattern on disyllabic loanwords is reflected by the chart in (3).[4] We only discuss the most frequent patterns.

(3)

Syllable composition	Main tone pattern	Example	Percentage of all data (%)
Light-Heavy	LH	ka.ʃip (gossip)	189/207 (91%)
Heavy-Light	HL	kol.p^hɨ (golf)	146/146 (100%)
Heavy-Heavy	HH	men.ʃən (mansion)	123/129 (80%)
Light-Light	HL	ka.sɨ (gas)	238/238 (100%)

It thus can be summarized as in (4).

[3] The data were collected by the author through interviews with four SK native speakers. All of them were born and live in Masan city in the South Kyungsang province of Korea.

[4] Coda consonants are considered moraic, though a syllable closed by a geminate /l/ behaves as light. Nouns tend not to contain long vowels in SK words, whether native or loanwords, but this is controversial. We do not discuss these issues here.

(4) Disyllabic words
   a. H tone is imposed on heavy syllables.
   b. If the two syllables are both light, H tone is imposed on the first syllable (HL).

The tone patterns on trisyllabic loanwords are shown in (5).

(5)

Syllable composition	Main tone patterns	Example	Percentage (%)
$\sigma_L\sigma_L\sigma_L$	LHL	ka.i.ti (guide)	412/446 (92.4%)
$\sigma_H\sigma_L\sigma_L$	HHL	rep.so.ti (rhapsody)	71/75 (94.7%)
$\sigma_H\sigma_H\sigma_L$	HHL	ak.sen.t^{h}ɨ (accent)	23/25 (92%)
$\sigma_H\sigma_L\sigma_H$	HHL	ʃin.tɨ.rom (syndrome)	20/26 (76.9%)
$\sigma_H\sigma_H\sigma_H$	HHL	dʒen.t^{h}ɨl.men (gentleman)	13/14 (92.8%)
$\sigma_L\sigma_H\sigma_L$	LHL	o.ren.dʒi (orange)	124/126 (98.4%)
$\sigma_L\sigma_H\sigma_H$	LHH	k^{h}ɨ.rem.rin (Kremlin)	33/36 (91.7%)
$\sigma_L\sigma_L\sigma_H$	LHH	ri.mu.dʒin (limousine)	246/269 (91.4%)

The tone patterns of SK trisyllabic loanwords are summarized in (6).

(6) Trisyllabic words
   a. If the first syllable is heavy, H tone is imposed on the first two syllables (HHL).
   b. If the first syllable is light and the final syllable is heavy, H tone is imposed on the second and last syllables (LHH).
   c. H tone is imposed on the second syllable in the other cases (LHL).

(It is worth noting that many of the exceptions to the general pattern in (5) involve inserted vowels into English /st/ or /ft/ consonant clusters. For example [kɛ.sɨ.tɨ] 'guest' has the HLL tone pattern rather than the expected LHL.) As can be seen above, the H tone is realized on the heavy syllable in trisyllabic words in a way similar to disyllabic words, although a heavy final syllable tends not to have H tone in heavy-light-heavy loanwords.

There are three main tone patterns of quadrisyllabic words according to the syllable weight constitution. These are provided in (7). The items from (a) to (m) show all possible syllable constitutions of quadrisyllabic words.

(7)

Tone patterns	LHHL		LHHH		HHHL	
Syllable composition	No.	Percentage	No.	Percentage	No.	Percentage
a. $\sigma_L\sigma_L\sigma_L\sigma_L$ ʃi.na.ri.o (scenario)	250	95.8% (250/261)			1	0.3% (1/261)
b. $\sigma_L\sigma_H\sigma_L\sigma_L$ kɨ.raŋ.p^{h}ɨ.ri (grand prix)	29	96.7% (29/30)			1	3.3% (1/30)
c. $\sigma_L\sigma_L\sigma_H\sigma_L$ kɨ.ra.un.tɨ (ground)	37	94.9% (37/39)			1	2.6% (1/39)
d. $\sigma_L\sigma_H\sigma_H\sigma_L$ k^{h}a.un.sel.lə (counselor)	7	100% (7/7)				
e. $\sigma_L\sigma_L\sigma_L\sigma_H$ re.sɨ.t^{h}o.raŋ (restaurant)	20	27.4% (20/73)	53	72.6% (53/73)		
f. $\sigma_L\sigma_L\sigma_H\sigma_H$ pa.i.ol.lin (violin)	2	18% (2/11)	9	81% (9/11)		
g. $\sigma_L\sigma_H\sigma_L\sigma_H$ sɨ.p^{h}ek.t^{h}ɨ.rəm (spectrum)	3	25% (3/12)	9	75% (9/12)		
h. $\sigma_L\sigma_H\sigma_H\sigma_H$ p^{h}i.reŋ.k^{h}ɨl.lin (Franklin)	2	33% (2/6)	4	67% (4/6)		
i. $\sigma_H\sigma_L\sigma_L\sigma_L$ sen.tɨ.wi.tʃi (sandwich)	16	35.5% (16/45)			27	60% (27/45)
j. $\sigma_H\sigma_H\sigma_L\sigma_L$ ʃaŋ.til.li.e (chandelier)	1	25% (1/4)			3	75% (3/4)
k. $\sigma_H\sigma_L\sigma_L\sigma_H$ k^{h}om.p^{h}o.dʒi.ʃən (composition)	1	16.7% (1/6)			5	83.3% (5/6)
l. $\sigma_H\sigma_L\sigma_H\sigma_L$ wil.li.am.sɨ (Williams)	1	16.7% (1/6)			5	83.3% (5/6)
m. $\sigma_H\sigma_H\sigma_H\sigma_L$ k^{h}ən.səl.t^{h}ən.t^{h}ɨ (consultant)					2	100% (2/2)

The tone patterns of SK quadrisyllabic loanwords can be summarized as in (8).

(8) Quadrisyllabic words
- a. If the first syllable is heavy, H tone is imposed on the first three syllables (HHHL).
- b. If the first syllable is light and the last syllable is heavy, H tone is imposed on the last three syllables (LHHH).
- c. Otherwise, H tone is imposed on the second and third syllables (LHHL).
- (d. H tone is not imposed on syllables which have a /st/ or /ft/ consonant cluster in the corresponding original English words.)

From the descriptions in (4), (6) and (8), we can generalize the SK loanword tone patterns as in (9).

(9) SK loanword tone patterns
- a. If the first syllable is heavy, H goes on the first syllable.
- b. Otherwise, H goes on the second syllable.
- c. The H tone spreads rightward.
- d. The final mora is extrametrical so it cannot receive H tone.

(9a-b) reflect H tone being assigned to the head syllable of an initial iambic foot. (9c-d) reflect rightward tone spreading with final mora extrametricality.

In this section, we have seen that the tonal pattern on SK loanwords is predictable, unlike native SK words. The loanword tonal pattern relies on the component syllables' weight and number. This can be viewed as an effect of the Emergence of the Unmarked. In the next section, I propose a formal analysis of the SK loanword tone patterns.

3. Analysis of SK Loanwords

In this section, we provide a formal analysis of SK loanword tone patterns in the framework of Optimality Theory (Prince and Smolensky 1993, McCarthy and Prince 1995), in which all the phonological phenomena are analyzed as the result of the interaction of constraints. For the representation of the phonological form, we employ the Autosegmental Phonology model (Goldsmith 1976, Clements and Keyser 1983). Tonemes occupy the tone tier, separated from segments, and the tonemes and their hosts are connected with association lines.

3.1. Disyllabic Words

In the SK loanword data we discovered a regularity that is not found in SK native words. The regularity that H tone is imposed on the heavy syllable is the most basic and central to the analysis of SK loanwords. To provide an account for this regularity, we adopt the following constraint (Kim 1997), which is based on WEIGHT-TO-STRESS (e.g. Kager 1999:155).

(10) WEIGHT-TO-TONE: Heavy syllables have a High tone.

As a result of constraint (10), H tone is imposed on the heavy syllable in SK loanwords in which one or two syllables are heavy.

Secondly, to explain that every word has a High tone even if there is no heavy syllable, in a word like /ka.si/ 'gas', HL), we adopt the following constraint.

(11) ONE-H-PW: Only one H tone is present in every prosodic word.

In the case of words with multiple H tones, we hypothesize that the H tone is linked to neighboring syllables. This is supported by the observation that in words with multiple high tones, the high tones are always on adjacent syllables. Using the two constraints, we analyze the words in which both syllables are heavy as in (12).

(12) Heavy-Heavy (sandal)

/sen.tɨl/	ONE-H-PW	W-T-T
a. L H		*!
b. H L		*!
☞c. H H		
d. L L	*!	**!

The structure of (12c) is as in (13). H is doubly linked to both syllables.

(13)

Now consider disyllabic words in which the final syllable is light e.g. /kol.p^{h}ɨ/ (golf, HL). These words have a H tone on the first syllable. To explain that a final light syllable does not have H tone, we adopt the following constraint on the basis of the NONFINALITY constraint (e.g. Kager 1999:151) in which stress is not imposed on the final syllable.

(14) NONFINALITY: Final mora is extrametrical.

The practical effect of (14) for SK is that a final light syllable cannot have a H tone. We provide the analysis of words in which the first syllable is heavy and the final syllable is light in (15).

(15) Heavy-Light (golf)

/kol.p^{h}ɨ/	ONE-H-PW	W-T-T	NONFINALITY
a. L H		*!	*
☞b. H L			
c. H H			*!
d. L L	*!	*	

Next, the words in which the first syllable is light and the final syllable is heavy, e.g. /tɨ.rim/ ‘dream’ (LH), have a H tone on the final syllable. This does not violate NONFINALITY since the final /m/ is the extrametrical mora, not the preceding vowel. One of the possible candidates, [tɨ.rim] ‘dream’ (*HH) has H on both syllables and [tɨ.rim] ‘dream’ (LH) has high tone on the final syllable. However, the optimal output does not have a H on the initial light syllable. To explain this we maintain that the foot structure of SK loanwords is iambic. A consequence of the iambic foot structure is that a H tone will be assigned to the

head syllable (and L to the non-head syllable) of the iambic foot. We combine the iambic foot structure and the H assignment in the constraint (16).

(16) FOOTFORM-IAMBIC: High tone goes on the head syllable of an iambic foot.

The analysis of words consisting of Light-Heavy syllables is provided in (17).

(17) Light-Heavy (dream)[5]

/tɨ.rim/	ONE-H-PW	W-T-T	IAMBIC
☞a. (L H)			
b. (H L)		*!	*
c. (H H)			*!
d. (L L)	*!	*	*!

We can provide the analysis of the words in which both syllables are light using the above constraints and their ranking. Here we can see that NonFinality outranks the Iambic constraint. Were this not the case, the LH tone pattern would be the optimal output, rather than the HL tone pattern.

(18) Light-Light (gas)

/ka.sɨ/	ONE-H-PW	W-T-T	NONFINALITY	IAMBIC
a. (L H)			*!	
☞b. (H) L				*
c. (H)H			*!	*
d. (L) L	*!			*

We have analyzed disyllabic loanword tone patterns in the framework of OT. The relative constraint ranking of SK disyllabic loanwords is as below.

(19) Constraint ranking based on disyllabic words
ONE-H-PRWD, WEIGHT-TO-TONE, NONFINALITY >> FOOTFORM-IAMBIC

3.2. Trisyllabic Words

The H tone assignment of SK trisyllabic loanwords is more complex than that of disyllabic words. The trisyllabic loanwords tone patterns are summarized as in (20).

[5] The parentheses indicate the foot structure of the words. The legitimate iambic foot structures are (LH) when both syllables are light or the first syllable is light and the second syllable is heavy, and (H) when the syllable is heavy.

(20) a. If the first syllable is heavy, H tone is imposed on the first syllable (e.g. /rep.so.ti/ 'rhapsody', HHL).
b. Otherwise H tone is imposed on the second syllable (e.g. /ra.ti.o/ 'radio', LHL).
c. H tone spreads rightwards (e.g. /t^hɨ.rəm.p^het/ 'trumpet', LHH).

To explain these patterns, let us discuss what constraints are needed. First, as shown in (5), even when all three syllables are heavy, H tone is not imposed on all heavy syllables. This means the assignment of H tone on all syllables of a word is forbidden (in trisyllabic words or longer). To explain this, we propose the following constraint.

(21) *MONOTONE: Words of three or more syllable cannot be monotones.

*MONOTONE must be higher in ranking than W-T-T. If not, H tone would be imposed on all syllables in trisyllabic words having all heavy syllables, such as /dʒen.t^hɨl.men/ 'gentleman' (*HHH). Under this assumption, we can see that syllable weight in trisyllabic words, as in disyllabic words, plays a crucial role in tone assignment. We provide the analysis of the words in which the first two syllables are heavy and final syllable is light in (22).

(22) Heavy-Heavy-Light (accent)

/ak.sen.t^hɨ /	*MONOTONE	ONE-H-PW	W-T-T
a. H L L			*!
b. L H L			*!
c. L L H			**!
☞d. H H L			
e. L H H			*!
f. H L H		*!	*
g. H H H	*!		

The analysis of the words in which three syllables are all heavy is as in (23).

(23) Heavy-Heavy-Heavy (gentleman)[6]

/dʒen.tʰil.men/	*MONOTONE	ONE-H-PW	W-T-T	IAMBIC
a. (H) L L			**!	
b. (L) H L			**!	*
c. (L) L H			**!	*
☞d. (H) H L			*	
e. (L) H H			*	*!
f. (H) L H		*!	*	
g. (H) H H	*!			

The words in which the first syllable is heavy and the last two syllables are light, e.g. /rep.so.ti/ 'rhapsody' (HHL) have H tone not only on the first syllable but also on the second syllable. That means H tone spreads rightwards. To explain this, we adopt the following constraint.

(24) ALIGN-R: H is aligned with right edge of the prosodic word.

This is a gradient constraint. The violation of this constraint is determined by how far the H is from the right edge of the word. A HLL tone pattern which has H tone only on the first syllable incurs one more violation of the ALIGN-R constraint than a LHL tone pattern which has H tone on the second syllable (LLH > *LHL > **HLL).

We provide the analysis of the words in which only the first syllable is heavy in (25) and the words in which the first and final syllable are heavy in (26) using the above constraints and their ranking.

(25) Heavy-Light-Light (rhapsody)

/rep.so.ti/	*MONOTONE	ONE-H-PW	W-T-T	NONFINALITY	ALIGN-R
a. H L L					**!
b. L H L			*!		*
c. L L H			*!	*	
☞d. H H L					*
e. L H H			*!	*	
f. H L H		*!		*	
g. H H H	*!			*	

[6] We assume that SK loanwords have a word-initial iambic foot only. Any H tone beyond the initial foot comes about through H spreading; there is only one foot per word. Therefore the constraint ALIGN-L (WD, FT) ("Left edge of a word must begin with a foot") is considered to be a dominant constraint.

Next, the analysis of the words in which the first and last syllables are heavy, e.g. /ʃam.pʰe.in/ 'champagne' (HHL), is provided in (26). In this case we could expect that H tone is imposed on the first and last syllable (e.g. *HLH) but the actual tone pattern is HHL: H tone is imposed on the first two syllables. Therefore we conclude that the ONE-H-PW constraint outranks W-T-T. Were this not the case, the optimal output would be the HLH tone pattern, e.g. /ʃam.pʰe.in/ 'champagne' (*HLH) rather than HHL.

We could also conclude from this example that the IAMBIC constraint outranks the ALIGN-R constraint. If not, the tone pattern of the words in which the first and final syllables are heavy would be /ʃam.pʰe.in/ 'champagne' (*LHH or *LLH) rather than HHL.

(26) Heavy-Light-Heavy (champagne)

/ʃam.pʰe.in/	*MONOTONE	ONE-H-PW	W-T-T	NONFINALITY	IAMBIC	ALIGN-R
a. (H) L L			*			**!
b. (L) H L			**!		*	*
c. (L) L H			*		*!	
☞d. (H) H L			*			*
e. (L) H H			*		*!	
f. (H) L H		*!				
g.(H) H H	*!					

Next, we provide the analysis of the words in which the first two syllables are light and the final syllable is heavy, e.g. /ri.mu.dʒin/ 'limousine' (LHH), using the above constraints.

(27) Light-Light-Heavy (limousine)

/ri.mu.dʒin/	*MONOTONE	ONE-H-PW	W-T-T	NONFINALITY	IAMBIC	ALIGN-R
a. (H L) L			*!		*	**
b. (L H) L			*!			*
c. (L L) H					*!	
d. (H H) L			*!		*	*
☞e. (L H) H						
f. (H L) H		*!			*	
g. (H H) H	*!				*	

Finally we provide the analysis of the words in which all three syllables are light, e.g. /ra.ti.o/ 'radio' (LHL), using the above constraints and their ranking.

(28) Light-Light-Light (radio)

/ra.ti.o/	*MONOTONE	ONE-H-PW	W-T-T	NONFINALITY	IAMBIC	ALIGN-R
a. (H L) L					*!	**
☞b. (L H) L						*
c. (L L) H				*!	*	
d. (H H) L					*!	*
e. (L H) H				*!		
f. (H L) H		*!		*	*	
g. (H H) H	*!			*	*	

According to the analyses of this section, the constraint ranking for SK di- and trisyllabic word tone patterns is as below.

(29) The final constraint ranking of SK Korean di- and trisyllabic loanword tone patterns:

*MONOTONE, ONE-H-PW >> WEIGHT-TO-TONE, NONFINALITY >> FOOTFORM-IAMBIC >> ALIGN-R

3.3. Quadrisyllabic and Monosyllabic Words

In SK quadrisyllabic loanwords, syllable weight plays a crucial role in the tone realization, as in di- and trisyllabic words. First, if the first syllable is heavy, H tone is imposed on the first three syllables, e.g. /sen.ti.wi.tʃi/ 'sandwich' (HHHL). Second, if the first syllable is light and the final syllable is heavy, H tone is imposed on the last three syllables, e.g. /pa.i.ol.lin/ 'violin' (LHHH). Third, H tone is imposed on the second and third syllable in the other cases, e.g. /ʃi.na.ri.o/ 'scenario' (LHHL). Therefore SK quadrisyllabic loanword tone patterns could be accounted by the same constraints which are already used for the analysis of di- and trisyllabic words.

Finally, it should be noted that SK monosyllabic loanwords have one H tone in a word, e.g. /ʃut/ 'shoot' (H), /k^{h}əp/ 'cup' (H), /k^{h}a/ 'car' (H). This can be accounted for by the high-ranking nature of the ONE-H-PW constraint, which means every prosodic word has at least one High tone. This constraint would outrank NONFINALITY since [k^{h}a] 'car' surfaces with H.

4. Conclusion

For this paper we have collected 2265 loanwords in the South Kyungsang dialect of Korean and have classified them according to syllable weight and number. We have shown that while the tone patterns of native SK words are unpredictable, the tone patterns of loanwords are predictable, with syllable weight playing a crucial role in the assignment of high tone. We have also provided an optimality-theoretic analysis of the loanword data. One can view the tone pattern on loanwords in SK

as an instance of the emergence of the unmarked. We assume that loanwords do not have lexically specified tone patterns and therefore an unmarked tone pattern that makes crucial reference to an iambic foot structure emerges. We leave for future research the investigation of the role of the iambic foot in other areas of SK phonology and morphology.

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dl6@indiana.edu