

# Stress and Long Vowels in Korean: Chicken or Egg First?

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## 1. Introduction

In languages with a weight distinction, a syllable with a phonologically long vowel often attracts stress (e.g. Khalkha Mongolian, Zec 1995; Lenakel, Lynch 1978). At the same time, stress often induces the lengthening of a vowel as an acoustic manifestation of prominence (Beckman 1986, Sluijter 1999). Therefore, the issue of primacy arises when a language has both a long vowel and a stress on a single location – is one derived from the other, and, if so, which one is the primary? In the theoretical framework of generative phonology on which the current study is premised, the lexicon is considered as a storehouse of a language's idiosyncrasies which should be free of redundant information. Thus, in the coexistence of two closely related features, the lexicon includes only the information on the feature that cannot be derived from the other. This study investigates an interesting case of intertwined duration and prominence from Korean, and will argue that only the information on lexical stress is listed in the lexicon and duration is derived from it.

Whether Korean has a word-level stress has been an issue of controversy for the last few decades. Many previous studies assumed that there is a stress system in Korean, although the specific proposals did not always agree with each other (Polivanov 1936, H-B Lee 1973, H-Y Lee 1990, J-H Jun 1994, Davis & Lee 1996, etc.). On the other hand, the most recent and widely accepted proposal of Accentual Phrase theory for Korean (Jun 1993, 1998) assumes that there is no word-level stress in Korean. It instead assumes that Korean prosody is best characterized by tonal pattern at the phrasal level.

Contrary to the controversies over the Korean word-level prominence system, previous studies of Korean phonology have almost unanimously agreed that Korean has phonemically long vowels, allowed in phrase-initial positions. The assumption that Korean has phonemic vowel length has been based on the existence of lexically contrastive minimal pairs where the duration of vowel seems to play a distinctive role.

- |     |          |           |        |               |
|-----|----------|-----------|--------|---------------|
| (1) | a. nun   | 'eye'     | nu:n   | 'snow'        |
|     | b. caŋ   | 'market'  | ca:ŋ   | 'soy sauce'   |
|     | c. coŋ   | 'bell'    | co:ŋ   | 'servant'     |
|     | d. sakwa | 'apple'   | sa:kwa | 'apology'     |
|     | e. sicaŋ | 'hunger'  | si:caŋ | 'market'      |
|     | f. kocaŋ | 'village' | ko:caŋ | 'malfunction' |

There are quite a few mono- and disyllable minimal pairs that show the distinctive pattern as in (1). In terms of distribution, there is only one long vowel allowed in each word.

However, in the absence of the evidence that the vowel duration is *phonological*, we should be wary of interpreting it as a phonemic feature. Interestingly, the fact that there is only one long vowel allowed in a word is reminiscent of the culminative nature of stress. Given that stress often induces lengthening of the vowel as a phonetic manifestation of prominence, we should carefully examine the possibility of stress being the primary feature and the elongated vowel duration one of its *phonetic* properties in Korean.

The traditional assumption that a Korean long vowel is allowed only in the initial position of a word or a phrase is based on the behavior of words whose initial long vowels undergo shortening when embedded in a compound (e.g. nun 'eye' + pjə:ŋ 'disease' → nunpjəŋ 'eye disease'). However, such a description of the data in previous studies was purely based on impressions. Recent phonetic studies (Jun 1995, Cho & Keating 2001) have found that Korean reinforces the left edge of a phrase in terms of duration, and this effect called *domain-initial strengthening* is known to be stronger in Korean than in other languages (Keating et al. 2003). If the duration of a

vowel is phonetic, being derived from stress, we could expect a situation where the magnitude of the lengthening of the stressed vowel is much greater in the initial syllable than in the second syllable. I have shown elsewhere (Ko 2002) that such a prediction is borne out, i.e. the ratio of vowel duration in the first syllable of a disyllabic minimal pair (e.g. sákwa vs. sákwá) is much greater than that in the second syllable (e.g. sakwá vs. sákwa). The stressed vowel in the initial syllable was realized about twice as long as the unstressed syllable whereas the stressed vowel in the second syllable was about 1.2 times longer than the unstressed syllable. In addition, the lengthened vowel was also realized with higher pitch and greater amplitude than its shorter counterpart in both locations of the stress.

This paper focuses on the phonological data and argues that positing a lexical accent at UR yields a much simpler and more elegant analysis of the data than assuming a phonemically long vowel. Before I proceed to develop the arguments, let me make some clarifications on data, terminology, and notations. First, the dialects of discussion in this paper include only those with a vowel length distinction such as Standard Korean spoken among older generation speakers or Chonnam. Second, the terms stress and accent are used for slightly different purposes. By accent, I mean the lexical specification for prominence on certain syllables, similar to the accents assumed in Vedic and Russian. On the other hand, stress refers to the head of a foot, which is physically realized with a combination of properties such as longer duration, greater amplitude and higher pitch. In many cases, however, the distinction between these two terms is not critical for the purpose of the discussion. Finally, the notation of long phonemic duration, : , always reflects the perspective of previous studies whereas the notation of accent or stress, ´ , reflects the view of the current approach. When the distinction is not crucial, they are used together to reflect both perspectives.

The structure of the arguments will be as follows: I will first present evidence for stress in Korean from the tonal realization of vocative chant. I will then present data from *deaccenting in verbal suffixation* to show that an analysis of stress based on the lexical specification of prominence is simpler and more intuitive than an account relying on the moraic analysis of phonemic long vowel. Finally, an additional set of data from the alternation of stress patterns in phrases and compounds will be presented to supplement the argument for the primacy of stress over vowel length.

## **2. Evidence for stress in Korean**

In trying to find out the most prominent syllable in a word, one might initially think of examining some of the acoustic features in each syllable of a word. However, such a process turns out to be not a very successful discovery procedure for stress. There are many reasons for this, including various

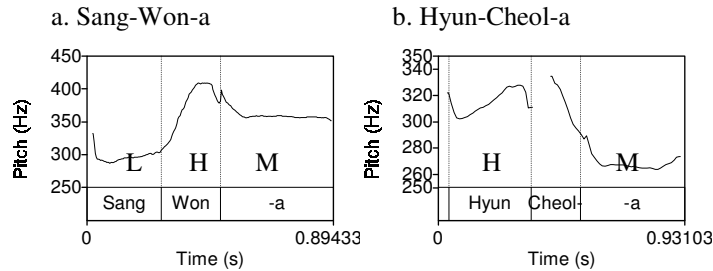
phrasal factors that contribute to the realization of stress, but perhaps the most immediate reason is that stress is not a physical but a psychological reality. Literature refers to greater loudness, higher pitch, and longer duration as general acoustic correlates of stress, but none of these serve as a reliable cue for stress. For example, Fry (1995, 1958) has run a perception study with synthesized stimuli and found that loudness is the least important contributing factor in the perception of stress. It is not the case that higher pitch invariably signals prominence, either. For example, the word *Pennsylvania*, which would be normally realized with the highest pitch on the penultimate stressed syllable is realized with a L\* tone in a specific question intonation as in the context of clarification question. Finally, duration does not always serve as a cue for prominence. For example, when the noun-verb pair *tórmént* and *tormént* pronounced after an accented sentential element as in *I TOLD you the tórmént should end* or *I TOLD you they tórmént the cattle* are taken out of the context, listeners cannot reliably judge the category of the word even though the speaker pronounces the first syllable of *tórmént* longer than that of *tormént*.

Let us then take an example which demonstrates the reflection of stress as a psychological reality. In Western music, it has been well-known that stress plays an important role in explaining the alignment of tune with text. Speakers do not need to learn about the regularity in the alignment of tune and text but they know it as part of their linguistic knowledge. For example, when children are presented with improvised verses for a well-known nursery song such as *Skip to my lou*, they would have no difficulty in matching up the new verses to the melody even though nobody has taught them the rule of aligning a stressed syllable to a strong beat (Lieberman 2004). This is because stress is part of the knowledge of the English language for its native speakers.

To take a more linguistic example, the notion of stress is crucial in explaining the tonal pattern of the calling contour or vocative chant. It is well-known that the word-level prosody of English, Dutch, and Serbo-Croatian is reflected in the tonal realization of vocative chant (Lieberman 1975, Gussenhoven 1993, Inkelas & Zec, 1988). For example, the tonal pattern of the English vocative chant is (L)H\*M. Each name is realized with a single H tone, which aligns with the stressed syllable. The M tone is aligned with a secondary stress or the last syllable of a name. The initial L tone is optional and realized when stress is located beyond the first syllable. The fact that the vocative chant serves as a window to the metrical structure in at least some languages motivates us to look into the case of Korean.

The tonal pattern in the Korean vocative chant is remarkably similar to that of English in that there is an obligatory H and M tones, which may be preceded by an optional L tone. The following examples illustrate the tonal realization of names in the Korean vocative chant followed by the vocative suffix *-a*.

(2) Sample pitch track of vocative chant in Chonnam



The tonal pattern in (2a) is LHM, and in (2b) is HM. The second syllable *Cheol* in (2b) does not have a tonal target of its own, so is realized as an interpolation of the H and M tones on its neighboring syllables. It is clear that the M tone is always aligned with the vocative suffix *-a*. Therefore, the focus of discussion henceforth will be on the varying locus of the H tone.

More examples of the varying tonal pattern are presented in (3-4) below:

(3) Names with a H tone on the first syllable in vocative chant

- a. Young-Sun, Bo-Young, Jae-Hun, Kye-Ju
- b. Hyun-Cheol, Seon-Suk, Ho-Jun, Hye-Ri

(4) Names with a H tone on the second syllable in vocative chant

- a. Eon-Suk, Myung-Joon, Eun-Ah, Ki-Ho,
- b. Sang-Won, P<sup>h</sup>yung-Geun, Hi-Myung, Ha-Young

The names in (3b) and (4b) all begin with aspirate consonants, which are known to raise the F<sub>0</sub> of the following vowel. However, the presence of an aspirate consonant does not seem to affect the placement of the H tone because all the names in (3b) have an initial H tone whereas those in (4b) have a H tone on the second syllable. The presence of a coda consonant is not a determining factor either. This is clear from the mixed distribution of coda consonants in each of the name groups. For example, *Young-Sun* in (3a) is composed of a sequence of closed syllables whereas neither of the two syl-

lables of *Kye-Ju* in (3a) has a coda consonant. Yet, both *Young-Sun* and *Kye-Ju* host the H tone on the initial syllable.

The vowel duration, on the other hand, has a close correlation with the location of the H tone (Ko 2002, 2003). That is, a syllable with a H tone is realized with a longer duration of a vowel than the one without a H tone. Given that duration and stress are closely related in many languages, and that there is only one H tone per name, we could reach a tentative conclusion that the H tone aligns with a stressed syllable in the Korean vocative chant. This generalization aligns the case of Korean with languages such as English, Dutch, and Serbo-Croatian.

The next question is how then the location of stress is determined. People who believe in a phonemic vowel length in Korean might suggest that stress is determined by the weight of the syllable, i.e. initial stress if the vowel is phonemically long; otherwise, second syllable stress. Alternatively, we could assume that the location of stress is lexically determined, i.e. initial stress if accented at UR; otherwise, second syllable stress. In the following sections, I will examine two sets of data, *deaccenting in verbal suffixation* and *stress shift in compounds*, and argue for the primacy of lexical accent at UR.

### 3. Deaccenting in verbal suffixation

What I call the *deaccenting in verbal suffixation* has previously been known as verb-stem vowel shortening (Kim-Renaud, 1973; Davis & Cho 1994; Kim 2000), where the long vowel in the verb stem shortens when followed by certain suffixes. Observe that the data in (5a) undergo shortening of the vowel stem whereas the stems in (5b) do not. I have indicated both the long vowel and the accent in the transcription to simultaneously reflect the perspectives of the previous view and the one presented in the current study.

(5) Stress clash avoidance in verbal suffixation (adapted from J-S Lee 1991, Davis & Cho 1994)

#### a. Stems with a lexical stress

Stem	Declarative	Connective	Stative	Effective	Gloss
tá:m	tá:m-ta	tá:m-ko	tam-á	tam-íni	'put in'
á:n	á:n-ta	á:n-ko	an-á	an-íni	'hug'
ká:m	ká:m-ta	ká:m-ko	kam-á	kam-íni	'roll up'
sá:lm	sá:lm-ta	sá:lm-ko	salm-á	salm-íni	'boil'

b. Stems without a lexical stress

Stem	Declarative	Connective	Stative	Effective	Gloss
ip	ip-tá	ip-kó	ip-ǎ	ip-íni	'wear'
kot	kot-tá	kot-kó	kot-á	kot-íni	'be straight'
pak	pak-tá	pak-kó	pak-á	pak-íni	'thrust'
cəlm	cəm-tá	cəm-kó	cəlm-ǎ	cəlm-íni	'be young'

Kim-Renaud (1973) and later studies by other scholars (e.g. B-G Lee 1979) analyzed the vowel shortening as conditioned by a vowel-initial suffix. The common analysis was that a monosyllabic verb stem undergoes vowel shortening when followed by a vowel-initial suffix.

More recently, however, Kim (2000) has come up with an analysis based on moraic theory. Kim's analysis is based on the assumption that long vowels and coda consonants are moraic in Korean. He argues that the vowel shortening as in /*ta:m-a/* → [*tam-a*] 'put in-*STATIVE*' is motivated to parse the prosodically trapped second syllable into an iambic foot. He explained the preservation of the stem vowel duration as in /*ta:m-ko/* → [*ta:m-ko*] 'put in-*CONNECTIVE*' as a toleration of the trapped mora due to the fact that the shortening of the vowel does not enhance the foot structure [(H) L] (H=heavy, L=light). This is because the stem /*ta:m/* is a trimoraic syllable under his assumption – even after the shortening of the vowel, the syllable will still be heavy.

Previous accounts based on the segmental composition of the suffixes or moraic phonology encounter several difficulties. First, the verb-stem vowel shortening occurs in causative/passive suffixation regardless of whether the suffix begins with a vowel or a consonant (6).

(6) a.	k'ú:-ta	'borrow'	k'u-í-ta	'be borrowed'
b.	k'í:-ta	'put in'	k'i-ú-ta	'cause to put in'
c.	tó:p-ta	'be hot'	təp-í-ta	'heat'
d.	hó:l-ta	'demolish'	həl-í-ta	'be demolished'
e.	á:n-ta	'hug'	an-kí-ta	'be hugged'
f.	tá:l-ta	'become hot'	tal-kú-ta	'cause to become hot'

The data in (6) suggest that the morphological class of causative/passive suffixes behave as a group based on their lexical properties rather than on a segmental basis.

Second, if segmental or moraic approach were correct, we would expect homophonous suffixes to behave together. However the data in (7-8) demonstrate different effects of homophonous suffixes on the adjustment of vowel duration.

- (7) a. nominalizing suffix *-i*
- |         |           |        |           |
|---------|-----------|--------|-----------|
| kí:l-ta | ‘be long’ | kil-í  | ‘length’  |
| nó:l-ta | ‘play’    | no-l-í | ‘playing’ |
- b. adverbializing suffix *-i*
- |                       |            |                      |          |
|-----------------------|------------|----------------------|----------|
| kí:p <sup>h</sup> -ta | ‘be deep’  | kí:p <sup>h</sup> -i | ‘deeply’ |
| má:nh-ta              | ‘be a lot’ | má:nh-i              | ‘a lot’  |
- c. nominative case marker *-i*
- |          |                  |         |                 |
|----------|------------------|---------|-----------------|
| ká:m-to  | ‘persimmon-also’ | ká:m-i  | ‘persimmon-NOM’ |
| pyó:ŋ-to | ‘disease-also’   | pyó:ŋ-i | ‘disease-NOM’   |

In (7), we observe that, among the three different kinds of homophonous vowel initial suffixes, only the nominalizing suffix *-i* in (7a) triggers vowel shortening. Also observe the data in (8):

- (8) a. passive/causative suffix *-kí*
- |         |          |        |             |
|---------|----------|--------|-------------|
| tá:m-ta | ‘put in’ | tam-kí | ‘be put in’ |
| á:n-ta  | ‘hug’    | an-kí  | ‘be hugged’ |
- b. nominalizing suffix *-ki*
- |         |           |         |              |
|---------|-----------|---------|--------------|
| kup-tá  | ‘be bent’ | kup-kí  | ‘being bent’ |
| kú:p-ta | ‘bake’    | kú:p-ki | ‘baking’     |

As in the case of (7), we observe that homophonous suffixes behave differently in triggering vowel duration. That is, the passive/causative suffix *-kí* triggers vowel shortening whereas the nominalizing suffix *-ki* does not.

Finally, the moraic account of vowel shortening in terms of an anti-trapping effect (Mester 1994), as suggested in Kim (2002), invokes complications in explaining the shortening of vowel in stems with a complex coda. Observe the data in (9).

- (9) a. /sa:lm-ko/ → [sa:m.ko] ‘boil-CONNECTIVE’  
 b. /sa:lm-a/ → [sal.ma] (\*[sa:l.ma]) ‘boil-STATIVE’

The fact that the non-shortened form \*[sa:lm-a] (9b) is ill-formed despite its segmental composition being identical to the well-formed [ta:m-ta] ‘put in-DECL’ (5a) is puzzling. Kim (2000) explains the vowel shortening in (9b) as a repair strategy for the superheavy initial syllable. He argues that the stem-final consonant is extrasyllabic in Korean verb stems, which explains the well-formedness of (9a), syllabified as  $[[sa:.<m>]_{stem} ko]$ . The same

strategy, however, cannot be applied to (9b) because the stem-internal consonant cannot be made extrasyllabic, i.e.  $*[sa: <l> .m]_{stem} a$ .

This stipulation, however, introduces another complication in explaining the unexpected shortening in passive suffixation  $/ta:m\text{-}ki/ \rightarrow [tamki]$  ‘put-in-PASSIVE’ (8a). Compare this with  $/ta:m\text{-}ko/$  ‘put-in-CONNECTIVE’ (5a), where the long vowel is maintained. In addressing this question, Kim suggests that the passive suffix introduces a recursive stem structure as in  $l\{\{ta:m\}_{stem}\text{-}ki\}_{stem}$ , where the stem-final segment in  $/ta:m/$  is immune to the extrasyllabicity because it is positioned in the internal position of a bigger stem. Therefore, the shortening of the vowel is justified as the only way of repairing the superheavy syllable. On the other hand, the stem-final consonant in  $/ta:m\text{-}ko/$  is made extrasyllabic and surfaces as  $l\{ta: <m>\}_{stem}\text{-}ko$ .

In contrast to the previous analyses, I attribute the shortening of the vowel duration to an accentual property of the suffixes rather than the segmental or moraic composition of the morphemes. In an effort to achieve eurhythm (Prince 1983, Selkirk 1984, Hayes 1983, 1984), a language may move the accent to another location, lengthen the interval of the clashing accents, or simply delete one of the accents. I suggest that Korean adopts the last option, i.e. the lexical accent on a suffix causes deletion of the adjacent accent on a verb stem to avoid clash. This idea is cast as the Accent Deletion rule in (10).

(10) Accent Deletion:  $x \rightarrow \emptyset / \_ \_ - x$

The above rule states that if there are two consecutive accents over a morpheme boundary, then the one on the left is erased. The de-accented vowel in a verb stem is no longer realized as a “long vowel”, giving rise to the impression of “shortening”.

Let’s take an example from the data in (5a) repeated below using only the notation of accent.

(11) a.  $/tám/ + /á/ \rightarrow tam\text{-}á$  ‘put in – STATIVE’  
 b.  $/tám/ + /ko/ \rightarrow tám\text{-}ko$  ‘put in – CONNECTIVE’

(11a) and (11b) have different stress patterns of the stem on the surface because of the different specification of lexical accent in the suffixes. The duration of the stem vowel is longer in (11b) than in (11a) because the stem is stressed only in (11b).

The current approach can easily explain the different behavior of homophonous suffixes as in (7-8), part of which is repeated in (12).

- (12) a. /tám/ + /ki/ → tám-ki ‘put in – NOMINAL’  
 b. /tám/ + /kí/ → tam-kí ‘put in – PASSIVE’

In the present approach, the nominalizing suffix *-ki* (12a) does not have a lexical accent whereas the passive suffix *-ki* (12b) does. Consequently, only the latter causes deaccenting to avoid clash.

The analysis based on lexical accent also gives a simple and coherent explanation as to why two verbs such as /sa:lm-a/ and /ta:m-ko/ with identical segmental composition show a difference in vowel duration on the surface, i.e. [salm-a] and [ta:m-ko], without invoking extrasyllabicity as in Kim (2000).

- (13) a. /sálm/ + /á/ → salm-á ‘boil – CONNECTIVE’  
 b. /tám/ + /ko/ → tám-ko ‘put in – CONNECTIVE’

In the accent approach, the suffixes *-á* and *-ko* have different accent specifications. Naturally, (13a) undergoes deaccenting whereas (13b) does not. Recall that in a moraic approach, the motivation for verb-stem vowel shortening was to maximize the number of syllables parsed into a foot. This explanation makes the shortening in (13a) futile because the shortening of the stem-vowel duration does not help parse any extra syllable into a foot in this case. Such a problem does not arise in the accent approach.

One crucial piece of evidence in favor of the accent approach comes from the behavior of the polysyllabic stems. Traditionally, it has been observed that the vowel shortening occurs only in monosyllabic verb stems. In polysyllabic stems, the duration of the vowel in the initial syllable is preserved regardless of the suffixes that they combine with.

(14) polysyllabic verb stems

Stem	Declarative	Connect.	Stative	Effective	Gloss
tó:ləp	tó:ləp-ta	tó:ləp-ko	tó:ləp-ə	tó:ləp-ini	‘dirty’
k’ó:ci	k’ó:ci-ta	k’ó:ci-ko	k’ó:ci-ə	k’ó:ci-ini	‘sink’
yó:ɲsəha	yó:ɲsəha-ta	yó:ɲsəha-ko	yó:ɲsəha-ə	yó:ɲsəha-ini	‘forgive’

The across-the-board preservation of the vowel duration in polysyllabic verb stems is naturally explained in the accent approach because the intervening syllables between the initial accented syllable and the accented suffix prevent the accents from clashing. In the moraic approach, however, this is not explained.

One last piece of evidence against the moraic approach comes from the different patterns of vowel duration in words of equal weight distribution.

- (15) a. /ta:m-asə/ → [tamasə] v. 'put-in-because'  
 b. /t<sup>h</sup>ə:ci-ə/ → [t<sup>h</sup>ə:ciə] ~ [t<sup>h</sup>ə:cjə] v. 'break out-STATIVE'  
 c. /kyo:toso/ → [kyo:doso] n. 'prison'  
 d. /tə:ləp-ə/ → [tə:rəwə] adj. 'be dirty-STATIVE'  
 e. /k'ə:ci-ki/ → [k'ə:cigi] n. 'extinguish-NOMINAL'

If the vowel shortening were simply a matter of rhythmic adjustment based on the moraic properties of the syllables, we would expect all of the data in (15) to pattern together. However, the fact that only (15a) undergoes vowel shortening suggests that vowel shortening in verb stems is not a regular process that can be explained based on moraic phonology. The category of the words does not seem to be a critical factor because (15a) and (15b) are both verbs but (15b) does not undergo vowel shortening.

The data I have presented in this section show that an analysis based on lexical stress provides a simpler account of the surface vowel duration adjustment than an account based on phonemic vowel length or a moraic approach.

#### 4. Stress shift in compounds

In this section, I will present another set of the data which are better analyzed in terms of lexical accent than phonemic vowel length. Cross-linguistically, phrases often have a different stress pattern from compounds. For example, English phrases such as *white hóuse* or *black bóard* have different stress patterns from their compound counterparts *White House* or *bláckboard*.

A parallel phenomenon has been documented in Korean except that it has been described in terms of vowel shortening rather than stress shift. Observe the following set of data which illustrate that certain compounds and their phrasal counterparts exhibit a difference in the duration of the vowel.

- (16) / cá:k- / 'little'  
 a. cá:k-ta 'be little'  
     little- DECL  
 b. cá:k-ín cip 'little house'  
     little- ADNOMINAL house  
 c. cak-ín cip 'younger uncle's house'  
     little- ADNOMINAL house

- (17) /k<sup>h</sup>i:-/ ‘big’
- |    |                         |                       |
|----|-------------------------|-----------------------|
| a. | k <sup>h</sup> i:-ta    | ‘be big’              |
|    | little- DECL            |                       |
| b. | k <sup>h</sup> i:-n cip | ‘big house’           |
|    | big-ADNOMINAL house     |                       |
| c. | k <sup>h</sup> in cip   | ‘older uncle’s house’ |
|    | little- ADNOMINAL house |                       |

This phenomenon has been previously recognized as “vowel shortening” (Kim-Renaud, 1973; Jun, 1993; Korean Ministry of Education, 1988; Lee, 1990), but I argue that it is essentially the stress shift commonly observed in compounds across languages. The Korean case, however, is different from the case of English in that the compounds have a stress on the second syllable rather than on the initial. The proposed explanation is that the morphological process of ‘idiomatic compounding’ reanalyzes the compound as a single lexical item, erasing all the previous information on the lexical specification. Then a default stress is assigned on the second syllable of the compound as a new lexical item. As in verb stems, a de-stressed initial syllable is not lengthened at the phonetic level, which may be perceived as shortening of a vowel because the duration is the major cue for stress in Korean.

A nice consequence of the current proposal is that the two kinds of vowel shortening phenomena we observed in sections 3 and 4 now find a connection in metrical phonology. Previous studies, on the other hand, never attempted to associate these two phenomena with each other. The proposed analysis also positions the Korean data in a cross-linguistic context, describing them as a general phenomena rather than an anomalous one.

## 5. Conclusion and implications

This paper aimed at clarifying the issue of primacy between stress and long vowels in Korean. I first presented evidence for stress in Korean from the tonal pattern of the vocative chant where there is one distinctive H tone per name. By using the data of vowel duration adjustment in verb stems, I have argued that positing a phonemic vowel at UR does not have solid phonological evidence. Instead, I have shown that positing a lexical accent yields a much simpler analysis of the data. Moreover, I argued that the data of vowel duration adjustment in compounds can also be understood in terms of stress shift.

The current analysis of stress and long vowels advances our understanding of Korean metrical phonology in that the seemingly disparate phonological phenomena of the vocative chant, deaccenting in verb-stem suffixation, and stress shift in compounds are brought together under the single

heading of metrical phonology and are analyzed in a coherent and unified way.

The proposed analysis radically challenges the widespread assumptions regarding word level phonology of Korean by eliminating the vowel length from UR and instead introducing a lexical stress. It also makes a prediction that the lengthening of the vowel should also be possible beyond the first syllable if it is stressed. As mentioned earlier, this prediction is backed up by findings in other phonetic studies (Cho & Keating 2001, Keating et al. 2003), and was shown to be borne out in my other work (Ko 2002).

Finally, the present study's finding of the prosodic head at the word-level has interesting implications for the widely enjoyed Accentual Phrase theory of Korean which is premised on the absence of a lexical accent in Korean (Jun 1993, 2005). I have argued in a separate paper (Ko, to appear) that the Accentual Phrase can be derived from syntactic structures and the tonal pattern can be also predicted from the metrical structure. The proposed analysis of word-level prosody may find further support by studying phenomena such as downstep or high-vowel devoicing, which will be taken up in future research.

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