Korean Base Vowel Shortening as Multiple Exponence in Derivational Morphology*

Sunghwa Lee
(Busan Presbyterian University)

Lee, Sunghwa. (2015). Korean Base Vowel Shortening as Multiple Exponence in Derivational Morphology. *The Linguistic Association of Korea Journal, 23*(1). 43-64. This paper studies Korean vowel shortening (VS) in verb/adjective bases triggered by suffixes and proposes that VS in derivational morphology is in fact Multiple Exponence (ME). I argue that VS should be treated differently in inflectional and derivational morphology. In inflectional morphology, on the one hand, VS-triggering suffixes show a phonologically conditioned regular pattern. In derivational morphology, on the other hand, VS occurs when followed by a lexically specified suffix. In this case, I propose that a triggering suffix and a base modification together constitute ME. To distinguish ME from phonologically conditioned morphophonological processes, I propose four criteria for ME, examining properties of ME studied on Matthews (1972). VS in derivational morphology is examined through these criteria, and I conclude that VS and an accompanying-suffix constitute ME in Korean.

Key Words: Korean base vowel shortening, Multiple Exponence, derivational morphology, base modification, morphophonological alternation

1. Introduction

This paper studies vowel shortening (VS) in verb and adjective bases in Korean, traditionally known as verb stem vowel shortening. VS in verb/adjective bases refers to a phenomenon in which a vowel in the base is

* I gratefully thank the three anonymous reviewers for their suggestions and comments.

shortened when a suffix is added. VS, a base-internal modification always occurs with a suffix. Therefore, the alternation is arguably morphologically conditioned. For instance, a base vowel is shortened when certain suffixes are added to the base (e.g., *ki:l-i*[1)] 'long-Nominative'→*kili* 'length'). The same vowel in the base, *i:* is not shortened when other suffixes are affixed (e.g., *ki:l-i* 'long-Adverbial'→*ki:li* 'for long', as in *ki:lipocenhasey* 'Let's preserve (the country) for good'). It should be noted, however, that there are two distinct kinds of morphophonological alternations: one is phonologically conditioned and the other is not.

The current study proposes that Korean base VS should be treated differently in inflectional morphology and derivational morphology. On the one hand, in inflectional morphology, VS occurs before vowel-initial suffixes, with no exceptions. In this case, VS is considered to be a phonologically conditioned process. In derivational morphology, on the other hand, a base vowel is shortened when followed by particular suffixes. A special property of this alternation in derivational morphology is that VS is not phonologically conditioned. I also propose that a triggering suffix and a non-phonologically conditioned base modification together constitute Multiple Exponence (ME). ME or extended exponence (Alderete, 2001; Harris, 2009; Matthews, 1972, 1991; Xu, 2007, among others) refers to a phenomenon in which two or more exponents are used simultaneously to express a particular morphosyntactic value in a word.

The remainder of this paper is organized as follows: Section 2 discusses ME in inflectional morphology, and four criteria for ME are proposed that can be applied to both inflectional and non-inflectional morphology. Section 3 provides a comprehensive description of suffixes that accompany base VS in Korean. Section 4 discusses Korean VS as ME based on the proposed criteria. Section 5 summarizes and concludes.

1) The present study uses the Yale Romanization system for data transcription.

2. ME in inflectional morphology and ME criteria

2.1. ME in inflectional morphology

In his study of Latin, Matthews (1972) raises questions about the principle of one-to-one mapping between function and form. ME, a phenomenon in which two or more exponents in a word jointly convey a morphosyntactic or semantic feature value, is a challenge to this principle, because it involves the occurrence of more forms than grammatical functions. Herein, the term *exponent* refers to the phonological representation of a morphosyntactic property. As an illustration of the problem, consider *re:ksistis* 'you (pl) ruled'. The word *re:ksistis* can be segmented into units as illustrated below.

(1) /reg/[2] 'rule' + Perfective + [2nd plural]

re:k + *s* + *is* + *tis*

In this example, three units denote semantic or grammatical meaning, but there are four segmented units, including an extra unit *is* that seems not to be associated with any meaning. *-tis* refers to the 2nd plural (cf. *fer-tis* 'you (pl) carry'). Also, *-s* appears to be the perfective suffix used independently, as it represents the perfective in *re:k-s-i:* 'I ruled'. Consequently, *is* appears to be an empty morph: it has a phonological form but no meaning.

However, Matthews points out that *is* is not an empty morph for the following reasons. First, *is* is not a series of epenthetic segments inserted for phonological reasons. We might consider the possibility that *is* is inserted before a suffix with a CVC structure or before a suffix that begins with a *t*; however, these segments do not appear before the CVC suffix in *re:k-s-i-mus* 'we ruled' or before the *t* in *re:k-s-i-t* '[he, etc.] ruled'. We might also assume that *is* is inserted before *tis*, 2nd plural altogether. However, this account is implausible, since *is* does not appear in the 2nd plural imperfective (*fer-tis* 'you (pl) carry'). Rather, *is* always appears with the perfective paradigm, regardless of whether the

2) /e/ in /reg/ undergoes vowel lengthening when followed by *g* and *s* or *t*; and /g/ becomes voiceless when followed by a voiceless consonant.

perfective suffix is *s* (2a), *u* (2b), or zero-morph (2c and 2d).

(2) a. *re:k-s-is-tis* 'you (pl) ruled'
b. *mon-u-is-tis* 'you (pl) advised'
c. *tul-is-tis* 'you (pl) carried'
d. *kekin-is-tis* 'you (pl) sang'

Furthermore, as shown above, this sequence of segments *is* has the same phonological form in words with any verbal base, whether the verbs are monosyllabic (2a-c) or multisyllabic (2d). For these reasons, Matthews argues that *is* contributes to the expression of the perfective. In other words, *is* is a signal of the perfective; Matthews proposes that *s* and *is* in *re:ksistis* are multiple (extended) exponents that together encode the perfective.

To summarize, the segment sequence *is* is considered as one of the perfective exponents for the following reasons: (i) it is not phonologically conditioned; (ii) it always occurs with perfectives regardless of the shape of other perfective affixes; (iii) its phonological representation is invariant, and (iv) it can occur with any lexical base of the same morphological category (i.e., verbs in this case).

2.2. Criteria for Multiple Exponence

Based on the line of reasoning discussed in the previous subsection, I propose four criteria for ME.

(3) Criteria for ME
A pattern is defined as an instance of multiple exponence, if and only if the following two conditions are met:
(i) ***Non-phonological condition***: no exponents are phonologically conditioned;
(ii) ***Consistent co-occurrence***: two or more exponents that signify the same expression co-occur.

The following two conditions may be met:

(iii) ***Phonological consistency***: phonological representations of the co-occurring exponents are consistent.

(iv) ***No exceptions on base selection***: an exponent may appear on any lexical base of a morphological category.

To explain each of the four criteria, the first criterion, *Non-phonological condition,* indicates that exponents of ME are not sensitive to the phonological environment of a form with which they occur. In other words, for instance, phonologically conditioned alternations are not part of ME. This criterion draws a sharp line between morphophonological alternations as ME and phonologically conditioned morphophonological alternations as non-ME.

The second criterion stipulates that exponents that signify a single function or meaning must invariably co-occur. One of the exponents may appear as an allomorph, but its co-occurrence must be regular. Thus, in the current study, an instance of apparent ME that shows an optional co-occurrence of two forms is not identified as ME. The first two criteria must be satisfied for a set of co-occurring forms to be identified as ME.

The third criterion, *Phonological consistency,* is satisfied when the phonological shapes of all exponents are invariant and regular. However, this criterion is not always met. For instance, in the above examples of Latin perfectives, an exponent of the perfective *is* is, on the one hand, phonologically consistent in the paradigm. On the other hand, other exponents of the perfective in (2) show phonological variations such as *s, u,* or zero-morph. Since not all exponents show phonological regularity, the criterion, *Phonological consistency* is not met in Latin perfectives[3]. In other words, when a suffix or base modification appears as an allomorph, then the criterion is not satisfied.

The fourth criterion, *No exceptions on base selection* concerns the lexical base[4] with which exponents occur. If exponents occur with a given lexical category such as verbs or adjectives, then the same exponents can occur on any lexical

3) Central Yup'ik shows the case of ME where *Phonological consistency* is not met. For this case study, please refer to Lee (2013).

4) The term 'lexical base' refers to a linguistic unit to which derivational or aspectual makers are attached, a unit which is referred to as a root in Item-and-Arrangement models.

bases of that lexical category.

To summarize, two criteria, *Non-phonological condition* and *Consistent co-occurrence* are crucial for a base modification to be considered an instance of ME. In particular, the criterion, *Non-phonological condition* distinguishes ME from a phonologically conditioned morphophonological process. The other two criteria, *Phonological consistency* and *No exceptions on base selection* are optional properties to diagnose ME.

3. Verb/Adjective base vowel shortening

This section explores suffixes that trigger VS in inflectional and derivational morphology to attempt to provide a comprehensive description. Since the status of the vowel length contrast is not straightforward, I have chosen data for the present study with caution. The data in this study are drawn either from previous literature or from my own vocabulary. In cases of words chosen from my own vocabulary, I have consulted the *Kuketaysacen* [*Comprehensive Dictionary of Korean*] (Lee 1982), one of the most representative dictionaries, to confirm my own impressions of vowel length. Unless otherwise specified, I have drawn the data from my own vocabulary, a native speaker of Busan Korean (Kyeng-sang dialect).

3.1. Description of vowel shortening in previous studies

In previous literature, a full description of vowel shortening (VS) in verbal and adjectival bases has not, surprisingly, been made. To my knowledge, Huh (1965: 264-265) was the first to note base VS. He states that a long vowel in a verbal or adjectival base becomes short when followed by a vowel-initial suffix. Huh also mentions that VS occurs in some words such as *al-li-ta* 'to inform', *yel-li-ta* 'to be opened', *wul-li-ta* 'to resound, to make someone cry', although he did not observe that all these words contain the causative suffix *-li*. Martin (1968) notes that "[B]asic vowel length in the last syllable of a base drops before those ending shapes that begin with vowels (*e/a, o, i; un, -ul,* etc.) and usually in derived forms (such as passives and causatives)" (p.102-103). His observation is

accurate in the sense that derived forms are included in the description, but neither the details of derived forms nor examples are provided. Later works by other scholars cite just part of Martin's description. For instance, Kim-Renaud (1973: 21), citing Huh (1965) and Martin (1968), mentions that "underlying long vowels in verb stems are shortened when a vowel initial affix follows". Her description of VS is only partly complete. She neither mentions adjective nor includes 'derived forms'. Relatively recent works consider that VS occurs before vowel-initial suffixes, though with some irregularity (Kim, 1998, 2000). Sohn (2001) states that VS occurs before a vowel-initial suffix or a causative/passive suffix. Although their theoretical analyses are distinct, Davis and Cho (1994) and Ko (2002) agree that VS is attributable to a certain group of suffixes. Ko's studies describe more VS-associated suffixes than do any other works. However, no comprehensive description of the process has yet been provided. In what follows, I provide a comprehensive description of VS by examining inflectional and derivational morphology in turn.

3.2. Base vowel shortening in inflectional morphology

When inflectional suffixes are affixed to a verbal/adjectival base, vowels in the base are shortened if the suffix begins with a vowel. The examples in (4), drawn from Kim (1998: 294), show this fact clearly. Suffixes starting with a consonant, such as the declarative sentence ending *-ta* and the connective clause ending *−ko*, do not trigger base VS. In contrast, vowels in the base are always shortened when affixed by vowel-initial inflectional suffixes, such as the connectives *-a* and *-uni*. The examples in (4) also demonstrate that it is the suffix that triggers VS, rather than a property of the base, since the same bases, *ta:m-, sa:l-,* and *ku:lm-* either lose vowel length or retain a long vowel in the presence or absence of a suffix, respectively.

(4)	Declarative	Sequential Connective	Causal Connective	Causal Connective		Gloss
a.	ta:m-	ta:m-ta	ta:m-ko	tam-a	tam-uni	'to put in'
b.	sa:l-	sa:l-ta	sa:l-ko	sal-a	sal-uni	'to live'
c.	kwu:lm-	kwu:m-ta	kwu:m-ko	kwulm-e	kwulm-uni	'to starve'

To my knowledge, no exceptions have been observed about the given generalization that long vowels become short before vowel-initial inflectional suffixes[5]. From this fact, I conclude that VS in inflectional morphology is phonologically conditioned and, therefore, is not related to ME, which must satisfy the criterion of *Non-phonological condition*. Rather, VS in inflectional morphology is a phonologically conditioned alternation.

3.3. Vowel shortening in derivational morphology

Within derivational morphology, VS consistently accompanies particular suffixes, regardless of initial sounds in the latter. Despite the large number of derivational suffixes[6], only a limited number of them can be added to verbs/adjectives. These are verb/adjective-deriving suffixes, noun-deriving suffixes, and adverb-deriving suffixes, which will be discussed below.

3.3.1. Verb/adjective deriving suffixes

Three types of suffix derive verbs/adjectives: causative, passive, and some intensifier suffixes. Some suffixes are used to form both causative and passive. Below, I examine each type of verb/adjective-deriving suffix.

First, as previous studies (Martin, 1992; Sohn, 2001) point out, the causative/passive suffixes *-i, -hi,- li,* and *-ki* accompany VS, as shown in (5). Notice that the causative/passive suffixes start with either the vowel *i* or a consonant, as in *-li, -ki,* and *-hi*.

(5)	UR	Gloss	Causative/Passive	
a.	kkwu:-	'borrow'	kkwu-i	'loan'
	nwu:p-	'lie down'	nwu-i	'lay down'
b.	sa:l-	'live'	sal-li	'save'
	a:l-	'know'	al-li[7]	'inform'

5) There is disagreement on the status of VS in multi-syllabic words. See Lee (2013) for the discussion.

6) Lee (2005) lists 231 derivational suffixes and 140 derivational prefixes; Sohn (2001) states that there are several hundred derivational affixes, including 270 prefixes.

7) - *li* is used as only causative in this case, since the verb *a:l* 'know' cannot be passivized.

c.	ta:m-	'put in'	tam-ki	'be put in'
	a:n-	'hug'	an-ki	'make someone hug'
d.	pa:lp-	'step on'	pal-phi[8]	'be stepped on'
	te:p-	'hot'	te-phi	'heat'

In addition, the suffixes, *-wu, -kwu,* and *-chwu* are used exclusively for the causative construction and accompany VS as shown in (6a) and (6b).

(6)	UR	Gloss	Causative	
a.	kkay:-	'awake'	kkay-wu	'wake up'
	pi:-	'vacant'	pi-wu	'vacate'
b.	i:l-		il-kwu	'bring under cultivation'

There are a limited number of verbs to which the causative suffixes *-kwu* and *-chwu* can attach. I have not found verbs with long vowels in the base occurring with the causative suffix *-chwu*. While (7) illustrates some examples that are causativized by affixing *-chwu*, VS is not verified, since the lexical bases contain short vowels. We may consider *–chwu* to be a VS-accompanying suffix, by analogy with other causative suffixes.

(7)	mac-	'be correct'	mac-chwu	'to verify, fix up'
	tul-	'to lift'	tul-chwu	'to reveal'

One exceptional causative suffix that does not trigger VS is *-ay*. To my knowledge, only one word is causativized by adding *–ay* and the word, shown in (8), is not involved in VS.

(8) e:ps- 'does not exist' e:ps-ay 'remove'.

Korean includes several verb-deriving suffixes. These suffixes are inconsistent in terms of accompanying VS. The data in (9) - (11) are drawn from Sohn (2001: 225-226). Vowel length is not indicated in the original source; but has been

8) A regular phonological process is involved: When an obstruent and [h] are adjacent, the two sounds merge and become an aspirated obstruent.

determined by consultation with the *Kuk.etay sacen*.

(9) Verb/adjective-deriving suffixes accompanied by VS

-kkali 'intensifier'	noy.kkali	'harp on'
	noy:-kkali	
	repeat -INT	

(10) Verb/adjective-deriving suffixes not accompanied by VS

a. -ttul 'intensifier'			b. -chi		'intensifier'
ppay:.ttul	'grab'		mi:lchi		'push hard'
ppay:-ttul	take.out - INT		mi:l -chi		push-INT

(11) Verb/Adjective-deriving suffixes in which VS is not verified

a. -cilu 'intensifier'			b. -ttuli		'intensifier'
kwukicilu	'wrinkle up'		kkay.ttuli		'smash'
kwuki - cilu	wrinkle.it -INT		kkay - ttuli		break-INT
c. coli 'gently'	ulphcoli		'recite gently'		
ulph - coli	recite-gently				

The intensifier *-kkali* in (9) accompanies VS. The verbal base *noy:-* becomes short when followed by *-kkali*. The intensifiers *-ttul* (10a) and *-chi* (10b) do not trigger VS. For the suffixes in (11), it is not possible to verify whether they trigger VS, because the base vowels are underlyingly short and bases that can occur with such suffixes are very limited.

In summary, all passive/causative suffixes (with the exception of *-ay*) accompany VS, regardless of the initial sounds in the suffixes. Also, one of the intensifiers, *-kkali* among others, occurs with VS.

3.3.2. Adverb-deriving suffixes

Adverb-deriving suffixes also can be added to verbal or adjectival bases, changing the category of the base from a verb/adjective into an adverb. Three suffixes belong in this group: *-i, -key,* and *-o/wu*[9]. Among the three, only *-o/wu*

9) *o* and *wu* are alternations: *o* comes after vowel *o* and *wu* occurs elsewhere.

occurs with VS. *-o/wu* shown in (12) is unproductive and words formed by it are completely fossilized, whereas *-key* is the most productive of the other two.

(12) ne:m- 'exceed' nem-u[10] 'too much, excessively, so'
to:l- 'turns' tol-o '(over) again'

Yeon and Brown (2011) state that the adverbs above are lexicalized and most native speakers are not aware that they are derived forms.

In contrast to the suffix *-o/wu*, neither *-key* nor *-i* accompany VS. Notice that the two suffixes behave the same way with respect to VS, although one begins with a vowel and the other with a consonant.

(13) ma:nh- 'many' ma:n-i 'many, much'
ko:p- 'beautiful' ko:-i 'beautifully, well'

Adverbial forms with the most productive suffix *-key* are not listed in dictionaries. Note that ko:p (<ko:-i) and ne:m (<nem-u) also can be affixed with *-key*. (14b) shows its productivity.

(14) a. ko:p- beautiful ko:p-key 'finely'
ne:m- 'exceed' ne:m-key 'excessively'
b. nwuc- late nwuc-ke 'late'
ssa- cheap ssa-key 'cheaply'

In summary, in observing adverb-deriving suffixes, it seems conclusive that VS is attributable to a property of individual suffixes, rather than to a group of suffixes (e.g., adverbial suffixes or voice-deriving suffixes). Also, segmental differences do not affect the presence/absence of VS in derivational morphology. Whether the productivity of suffixes plays a role in triggering VS will be determined in the following section.

10) Note that in the Yale system *wu* is represented as *u* after bilabials.

3.3.3. Noun deriving suffixes

Korean includes another group of suffixes that can be added to verbal/adjectival bases. These suffixes derive nouns by attaching to verbs/adjectives. There are four noun-deriving suffixes: *-i* 'act, thing, quality',*-um* 'fact, thing',*- ki* 'act, thing, quality', and *–po* 'thing, person'. Among the four, *-i* and *-um* accompany VS, while *-ki* and *-po* do not.

As for the suffix, *-i*, Sohn (2001) points out that a small number of verbs become nominalised by affixing it. Nouns derived by-*i* are relatively lexicalized and mostly listed in dictionaries. The suffix *-i* shortens the base vowel, as in (15).

(15)	no:l-	'play'	nol-i	'playing'
	ka:l-	'till, cultivate'	kal-i	'plowing'
	ke:l-	'hang'	kel-i	'hanger'

The suffix *-um/m*[11] 'fact, thing' also shortens the vowel in the base. Some derived forms are lexicalized and found in dictionaries.

(16) a.	no:l-	'play'	nol-um	'gambling'
	wu:l-	'cry'	wul-um	'weeping, crying'
	e:l-	'freeze'	el-um	'ice'
b.	mit-	'believe'	mit-um	'belief'

In contrast to *–i* and *-um*, the nominative suffixes *–ki* and *-po* do not accompany VS, as can be seen in (17).

(17) a.	u:l-	'cry'	u:l-po	'someone who cries often'
	ccay:-	'tear'	ccay:po	'a hare lipped person '
b.	ta:m-	'to put in'	ta:m-ki	'putting in'
	a:n-	'to hug'	a:n-ki	'hugging'

Only a limited number of verbs are nominalised by adding *-po*; the forms are

11) The alternations are phonologically conditioned. *m* occurs with vowel-final bases; *um* occurs with consonant-final bases.

completely lexicalized and listed in dictionaries. The nominalising suffix *-po*, as demonstrated in (17a), does not trigger VS.

In terms of productivity, the nominalising suffix *-ki* is the most productive among the four. Among words formed by adding *-ki*, none are lexicalized. *-um* is fairly productive. It is not clear what differences between the suffixes produced their distinct behaviours with respect to VS, but it is clear that productivity does not play a role in determining the presence/absence of VS.

In conclusion, we have seen that the initial sounds are not associated with the presence/absence of VS. In addition, it is suggested that productivity is not a factor in triggering VS. Also, it is verified that suffixes belonging to the same category (e.g., adverb-deriving suffixes) behave differently. It appears conclusive that base VS occurs in the presence of individual, triggering suffixes.

4. VS as ME in derivational morphology

This section discusses whether VS in verbs and adjectives is a morphological exponent in derivational morphology, based on the four criteria discussed in §2.2.

4.1 Non-phonological condition

If base VS and an accompanying-suffix comprise ME, then VS must not be phonologically conditioned. To examine whether VS meets this criterion, two possibilities for phonological conditioning will be examined: whether Korean base VS (1) creates a well-formed foot shape and/or (2) occurs in phonologically conditioned segmental environments.

Vowel length adjustment (VLA), cross-linguistically, tends to be motivated by the need to create well-formed metrical structure (Hayes, 1987, 1995; McCarthy and Prince, 1990; Kim, 1998, 2000, 2013). Some previous studies argue that, like VLA, base VS is a phonologically conditioned process (Kim-Renaud, 1973; Kang, 1991; Kim, 1998, 2000, 2013). However, this originates from the incomplete description of the environments in which VS occurs, as discussed in an earlier subsection. Kang's (1991: 187) moraic analysis of base VS is based on very limited data: three verbs followed by vowel-initial suffixes. However, Kim (1998,

2000, 2013) provides comprehensive studies on the phonological motivation for base VS. Below, I discuss Kim's studies and show that his proposed phonological motivation faces empirical difficulties.

In his studies of base VS, Kim (1998, 2000, 2013) argues that this phenomenon occurs to create a better-formed foot structure, under the assumption that Korean has iambic feet and that codas are moraic. Consider the data in (18).

(18) a. [(H)F L]PrWd → [(L L)F]PrWd
ta: . ma ta.ma
b. [(H)F L]PrWd → [(H)F L]PrWd
ta:m . ko ta:m. ko

Kim argues that the base vowel in (18a) is shortened in order to form an iambic foot, (L L)F, by parsing all syllables into a foot. The vowel in (18b), on the other hand, does not undergo shortening, because the first syllable is super-heavy (CVVC), a situation that cannot be repaired by shortening the vowel. Thus, the motivation of VS, i.e., exhaustive parsing into a foot structure, is not satisfied, and the long vowel is tolerated.

However, empirical counter-evidence challenges this argument. In addressing this counter-evidence, Kim points out that causative/passive suffixes that start with a consonant accompany VS. Then, he attributes this exceptional case to the unique morphological structure of the causative/passive. Specifically, causative/passive suffixes form a stem, whereas other suffixes form a prosodic word, as illustrated in (19).

(19) a. Causative
{{ (μ μ) }Stem[12] μ }[13]Stem cf) {{ (μμμ) }Stem μ }Stem
am . ki *ta:m . ki
b. Connective
[{ (μμμ) }Stem μ]Prwd
ta:m . ko (Kim 1998: 300-301)

12) The stem here is equivalent to a lexical base in the present study.
13) {} denotes a stem-level representation, while [ ] represents a morphological or phonological word.

Kim considers both the stem and the lexical base as a stem. Thus, when a derivational suffix (the causative *-ki*) is added to a lexical base (or stem in his terms), a stem is formed, as in (19a). When an inflectional suffix is added to the lexical base, a prosodic word is formed, as in (19b). Since the morphological causative/passive construction always requires inflectional suffixes to complete the form, affixing the causative/passive suffix in fact creates a stem, rather than a phonological or morphological word. Kim suggests that a trimoraic syllable is allowed only in stem-final position (at the right edge of the stem), as in (19b), but not in stem-internal position, as in (19a). Kim's explanation seemingly works, even with some derivational suffixes, such as the nominatives *-ki* and *-po* 'person'. Since they create a prosodic word, a trimoraic syllable is allowed. Note that in (20), *-ki* and *-po* do not trigger VS.

(20) a. u:l-ki 'crying'
[{ (μμμ) }Stem μ]Prwd
wu:l . ki

b. u:l-po 'someone who cries easily'
[{ (μμμ) }Stem μ]Prwd
wu:l . po

However, examples in which a trimoraic syllable is tolerated even within the stem[14] challenge Kim's explanation. Consider *mi:l-chi* 'push violently'. The intensifiers *-chi* (21) and *-ttul* (22) are derivational suffixes that derive a verb from a verbal base, as do causative/passive suffixes[15]. *-ay* in (23) is a causative suffix that does not trigger VS.

(21) Verbalintensifier *-chi*
a. {{ (μμμ) }Stem μ }Stem
mi:l . chi

b. {{ (μ μ) }Stem μ }Stem
*mil . chi

(22) Verbal intensifier *-ttul*
a. {{ (μμμ) }Stem μμ }Stem
ppay: . ttul

b. {{ (μ μ) }Stem μμ }Stem
*ppay . ttul

14) In fact, not many derivational suffixes in Korean create stems; only derivational suffixes that derive verbs or adjectives from a verbal or adjectival base are applicable.

15) The suffix *-chi* can be affixed only to a limited number of verbs, which include *tat* 'close' (tat-chi 'close'), *teph* 'cover' (teph-chi 'attack'), and *mi:l* 'push' (mi:l-chi-ta 'push violently').

(23) Causative *-ay*

a. {{ (μμμ) }Stem μ }Stem
e:ps . ay

b. {{ (μ μ) }Stem μ }Stem
*eps . ay

All three suffixes are derivational, create a stem, and do not trigger VS. If Kim's claim is true, we would predict VS, since the super-heavy syllable is not allowed in non-final position. Contrary to this prediction, however, *-chi, -ttul,* and *-ay* do not trigger VS and stem-internal trimoraic syllables are attested. This empirical evidence weakens the motivation for the stem-internal trimoraic VS in Kim's analysis.

In a similar vein, Ko (2002) argues that the motivation Kim (2000) presents for trimoraic VS cannot explain why VS occurs in CVVC.CV constructions. As mentioned earlier, Kim claims that the motivation for VS is to create a well-formed iambic foot (L. L)$_F$; when there is a super- heavy syllable (CVVC), in which VS would not succeed in creating (L. L)$_F$, no VS occurs. The same environment is created when consonant clusters are followed by a vowel through resyllabification, as in (24). Although the bases in (24) should be able to tolerate super-heavy syllables, after resyllabification (i.e., **sa:l.ma, *kwu:l.me*), the vowels are shortened and yield *sal.ma* and *kwul.me*. Ko argues that Kim's analysis cannot explain these examples.

(24) sa:lm-a → sal.ma 'boil-CAS.CON' *sa:l.ma
kwu:lm-e → kwul.me 'starve-CAS.CON' *kwu:l.me

Along with the exceptions provided above, Ko's argument against the trisyllabic VS motivation weakens Kim's analysis even for VS in inflectional morphology, since the examples with consonant clusters above occur with an inflectional suffix.

Another possible phonological motivation for base VS suggested by many previous studies is the initial sounds of the suffixes. (25) summarizes the derivational suffixes that were examined in § 3.3.

(25)	VS-triggering suffixes	Non VS-triggering suffixes
Causative/passive	*-i, -hi, -li, ki*	---
Causative	*-wu,-kwu,-chwu*	*-ay*
Intensifier	*-kkali*	*-ttul, chi*
Adverbial	*-o/wu*	*-i, -key*
Nominalizer	*-i, -um/m*	*-ki, -po*

As can be seen in (25), VS-accompanying suffixes in derivational morphology start either with vowels (i.e., *i, wu [u], o*) or consonants (i.e., *k, kk,ch, h, l*). In terms of the distribution of the sounds, the vowels belong to a natural class only on a large scale: Three vowels shown at the beginning of the derivational suffixes are [−low]. The consonants do not constitute a natural class. In addition, some suffixes that do not trigger VS start with the same vowel *i* and with the consonants, *k* and *ch*. Moreover, segmentally identical suffixes behave differently, e.g., the adverbial suffix *-i*, which does not trigger VS, versus the nominalising suffix *-i*, which does; or the nominaliser *-ki*, which does not trigger VS, versus the passive/causative *-ki*, which does.

In summary, there has been one attempt to account for VS as a phonologically conditioned process. However, neither metrical structure nor segmental environment motivates VS; no further reasons exist to suggest that VS is phonologically conditioned.

4.2 Consistent co-occurrence and Phonological consistency

Another obligatory criterion for ME is *Consistent co-occurrence*, which stipulates that two or more exponents must consistently co-occur. The third criterion, *Phonological consistency* states that phonological representations of the co-occurring exponents must be consistent. In the case of Korean base VS, if the criterion *Consistent co-occurrence* is met, then the criterion *Phonological consistency* is also met, in that VS, which has no variants, always occurs in the first syllable of the base. Thus, if base VS co-occurs with particular suffixes, then the two criteria are met.

In fact, as examined in §3.3, VS is accompanied by lexically determined suffixes. Exceptions are rarely found in the literature. To my knowledge, there

are a few exceptions observed in Martin (1992): *pe:l* 'to earn money', *kku:l* 'to pull', and *sse:l* 'to chop'. The vowels in (26) are not shortened.

(26)	a.	pe:l	'to earn money'	pe:l-e 'to earn money and'
				pe:l-i 'earning money'
				pe:l-li 'to get earned'
	b.	kku:l	'to pull'	kku:l-e 'to pull and'
				kku:l-li 'to get pulled, to get attracted'
	c.	sse:l	'to chop'	sse:l-e 'to chop and'
				sse:l-li 'to be chopped'

However, it seems that this irregularity is attributable to the bases rather than the suffixes. Martin (1992: 33) points out that the bases have old forms such as *peul* 'earn money', *kkueul* 'pull', and *sehul* 'chop', and that the irregular retaining of the long vowels in these cases might be reminiscent of the pattern, in earlier Korean, of having consecutive vowels. In fact, regardless of types of suffixes (inflectional or derivational), the vowels are realized as long. The absence of VS in these three verbs, then, can be considered as characteristic of these particular verbs, rather than a property of suffixes.

As demonstrated in §3.3, the occurrence of VS with particular suffixes is regular and consistent enough to justify the conclusion that the base VS alternations meet the criteria for a part of ME.

4.3. Restrictions on base selection

The fourth criterion for ME proposed in previous sections is that, in principle, an alternation must occur in any bases of the categories to which a given suffix attaches. Specifically, in the case of base VS in Korean, the lexical categories of the bases are inherently restricted to verbs or adjectives. Thus, the relevant point here is that when a VS-accompanying suffix is added to a base, VS should occur in any verbal or adjectival base.

Logically, passive suffixes select only a verbal base, since adjective predicates are intransitive. Other than passive suffixes, VS-accompanying suffixes attach to both adjectives and verbs. In (27a), causative and nominalising suffixes attach to

verbal bases, triggering VS, while in (27b), the same suffixes affix to adjectival bases, producing base VS there as well.

(27) a.	kkay:	'awake'	kkay-wu (CAUS)	'wake up'
	pa:lp	'step on'	pal-phi (CAUS)	'have something stepped on'
	no:l	'play'	nol-i (NOM)	'playing'
b.	pi:	'vacant'	pi-wu (CAUS)	'vacate'
	te:p	'hot'	te-phi (CAUS)	'heat'
	ki:l	'long'	kil-i (NOM)	'length'

As shown above, both adjectival and verbal bases have the same effect with respect to VS when a VS-accompanying suffix is attached. Thus, the ME criterion regarding base selection seems to be met.

However, two exceptional cases must be considered. As mentioned in the previous subsection, there are three verbs that do not undergo shortening: *pe:l* 'to earn money', *kku:l* 'to pull', and *sse:l* 'to chop' (see (26) above for examples). In these verbs, VS is blocked, presumably because the long vowels are historical traces of former consecutive vowels (i.e., *peul* 'earn money', *kkueul* 'pull', *sehul* 'chop') (Martin, 1992). The second exceptional case concerns multi-syllabic bases. The status of VS in multisyllabic bases is disputable. Davis and Cho (1994) claim that VS occurs on multi-syllabic bases, whereas Ko (2002) argues that VS does not occur in such bases. If Ko's claim is correct, then VS-triggering suffixes select only for mono-syllabic bases. I will leave this issue for future study.

In light of our consideration of the three exceptional verbs and the uncertain status of VS on multi-syllabic bases, it seems reasonable to conclude that the criterion *No exceptions on base selection* is marginally satisfied.

To conclude, Korean VS and the triggering suffixes constitute ME. Base VS meets the three criteria *Non-phonological condition*, *Consistent co-occurrence,* and *Phonological consistency*, and also marginally meets the criterion *No exceptions on base selection*, with some exceptions and unknown cases.

5. Conclusion

Verb/adjective base VS has received attention since first observed in Huh (1965). A full description of the process, however, has not been made, and the consequences of that lack are reflected in the analyses in previous literature. The current study has examined base VS and noted that VS behaves differently in two areas of the morphology. In inflectional morphology, VS shows a regular pattern: it occurs only before vowel-initial suffixes. In derivational morphology, however, a base vowel is shortened when followed by a lexically specified suffix. The lexically VS-specified suffixes include the passive/causative suffixes *-i,- hi,- li*, and *-ki*, the causative suffixes *-wu* and *-kwu*, the nominalising suffixes, *-i* and *¬um*, the adverbialising suffix *-o/wu*, and the verbal intensifier *-kkali*. As can be seen in the list of VS-triggering suffixes, initial sounds do not play a role. Also, through a discussion of Kim's (1998, 2000, 2013) works, I have shown that creating a well-formed foot structure does not motivate base VS.

In brief, VS in derivational morphology is not phonologically conditioned and always co-occurs with certain suffixes. It shows a consistent effect when followed by particular suffixes. However, there are a few exceptional verbs in which VS does not occur for historical reasons. Also, the presence/absence of VS in multi-syllable bases is uncertain. Although the fourth criterion, *No exceptions on base selection* is not fully met, the evidence is sufficient to propose that VS and an accompanying-suffix constitutes ME in Korean.

The current study has a limitation but, at the same time, significance in the sense that the vowel length contrast has almost disappeared in modern Korean (Park, 1994; Kim, 1998; Ko, 2002; Lee, 2010). The limitation is caused by less distinctiveness of the vowel length contrast, which the study has endeavoured to overcome by consulting the dictionary. Importantly, it is hoped that the study, which compiles VS-accompanying suffixes, plays a role in documenting the process of base vowel shortening.

References

Alderete, J. (2001). Dominance effects as transderivational anti faithfulness. *Phonology, 18*, 201-253.

Davis, S., & Cho, M. (1994). Dominant affixation and vowel shortening: the case of Korean. Unpublished manuscript.

Harris, A. C. (2009). Exuberant exponence in Batsbi. *Natural Language and Linguistic Theory*, *27*, 267-303.

Hayes, B. (1987). A revised parametric metrical theory. In *Proceedings of North East Linguistics Society 17*. Amherst: GLSA, 274-289.

Hayes, B. (1995). *Metrical stress theory: Principles and case studies*. Chicago: The University of Chicago Press.

Huh, W. (1965). *Kwuke Umwunhak* [Korean Phonology]. Seoul: Jengumsa.

Kager, R. (1993). Alternatives to the iambic-trochaic law. *Natural Language And Linguistic Theory11*(3), 381-432.

Kang, S. (1991). Compensatory lengthening in Korean revisted. *Proceedings of the Eastern States Conference on Linguistics 91.*

Kim, J. (1998). Anti-trapping effects in an iambic system: vowel shortening in Korean. *Japanese/Korean Linguistics, 8*. 289-302.

Kim, J. (2000). *Quantity-sensitivity and feature-sensitivity of vowels: a constraint-based approach to Korean vowel phonology*. Doctoral dissertation, Indiana University at Bloomington.

Kim, J. (2013). Foot structure and vowel shortening. *The Linguistic Association of Korea Journal, 21*(2), 21-42.

Kim-Renaud, Y. (1973). *Korean consonantal phonology*. University of Hawaii, Doctoral dissertation.

Ko, E. (2002). *The phonology and phonetics of word level prosody and its interaction with phrase level prosody: a study of Korean in comparison to English.* Doctoral dissertation, The University of Pennsylvania.

Lee, H. (1982). Kuk.e tae sacen[*A comprehensive Dictionary of Korean*].Seoul: Min Joong So Rim.

Lee, I. (2005). *Hanku.emunpep [Korean grammar]*. Seoul: Seoul National University Press.

Lee, S. (2010). Homophony avoidance Effect: Phonetic studies on contrastiveness

in Korean vowel length. *Harvard Studies in Korean Linguistics XIII*, Harvard-Yenching Institute. Seoul: Hankook Munhwasa, 117-132.

Lee, S. (2013). *Multiple exponence in non-inflectional morphology.* Doctoral dissertation, The University of Victoria.

Matthews, P. H. (1972). *Inflectional morphology: a theoretical study based on aspects of Latin verb conjugation*. Cambridge: Cambridge University Press.

Matthews, P. H. (1991). *Morphology*. Cambridge: Cambridge University Press.

Martin, S. E. (1968). Korean standardization: problems, observations, and suggestions. *Ural-AltaischeJarhbücher* 48, 85-114.

Martin, S. E. (1992). *A reference grammar of Korean.* Rutland: Charles E. Tuttle.

McCarthy, J., & Prince, A. (1990). Foot and word in Prosodic Morphology: the Arabic broken plural. *Natural Language & Linguistic Theory,* 8, 209-283.

Park, J. (1994). Variation of vowel length in Korean. In Young, -K (Ed), *Theoretical Issues in Korean Linguistics*. Standford: CSLI, 174-187.

Sohn, H. (2001). *The Korean language*. Cambridge: Cambridge University Press.

Xu, Z. (2007). *Inflectional morphology in Optimality Theory*. Doctoral dissertation, Stony Brook University, New York.

Yeon, J., & Brown, B. (2011*). Korean: A comprehensive grammar*. Guernsey: Taylor and Francis Ltd.

Sunghwa Lee
Busan Presbyterian University
KimhaeDaero 1894-68
Kimhae. Kyeong Nam, Korea
Phone: 82-55-320-2528
Email: esunghwa@gmail.com

Received on January 6, 2015
Revised version received on March 8, 2015
Accepted on March 17, 2015