Shortening in the P-stem*

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This paper argues that two seemingly different types of Korean shortening are actually one identical phenomenon that can be adequately accounted for in terms of the phonological stem (P-stem), which exists universally in human language. Two types of shortening have been postulated in the past because the triggers of shortening that were identified differ both phonologically and morphologically. Thus, it was impossible to collapse them into one natural class. However, the triggers that have been proposed so far are not the real triggers. Instead, a unified account of the two apparently different types of shortening can be made in which shortening is shown to occur only when a mora is incorporated into the domain of a P-stem in compensation for the loss of a mora from the morphological root (M-root). Using the framework of Optimality Theory, the domain of a P-stem is defined in terms of a conspiracy of phonological and morphological factors.

Key words: shortening, p-stem, m-stem, p-root, m-root, p-word, m-word

1. Introduction

This paper argues that two apparently different types of shortening are one identical phenomenon that can be adequately explained in terms of the phonological stem (P-stem) which exists universally in human language. It has been claimed that Korean verbs have two different types of shortening: shortening of a long vowel in the root-final syllable (i) before a vowel-initial inflectional suffix and (ii) before a derivational suffix.[1] Previous studies (Ahn, 1985; Mwunkyopwu, 1988; G.-R. Kim, 1988;

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1) It is recognized that certain native speakers of Seoul Korean including anonymous reviewers of this paper do not have a contrast in vowel length. However, other native

Y.-H. Chung, 1991, 1997, 2001; H.-S. Sohn, 1987, 1997) have assumed that the triggers of these two types of shortening cannot be collapsed into one natural class because they differ both phonologically and morphologically. The trigger appears to be a suffix-initial vowel for one type of shortening, whereas the other shortening seems to occur regardless of the nature of the following segment. The first type of shortening occurs before the inflectional suffix, while the second one, before a derivational suffix. There are two problems with this approach. First, a single unified phenomenon has been divided because the triggers have been misidentified. Second, the analyses that have been given are *ad hoc* and counterintuitive (i) in that they do not follow generalizations established by Hayes (1989) and (ii) in that consequently, similar phenomena are never found in any other languages.

In this paper, a unified account of the two apparently different types of shortening is proposed in which shortening is shown to occur only when a mora is incorporated into the domain of a P-stem in compensation for the loss of a mora from the morphological root (M-root). Using the framework of Optimality Theory (Prince & Smolensky, 1993; McCarthy & Prince, 1995), the domain of a P-stem is defined in terms of a conspiracy of phonological and morphological factors.

Section 2.1 defines morphological units such as 'morphological root (M-root),' 'morphological stem (M-stem),' and 'morphological word (M-word).' In Section 2.2, three different phonological domains are motivated and they are 'phonological root (P-root),' 'phonological stem (P-stem),' and 'phonological word (P-word).' There is no evidence that the domains of a P-root and a P-word differ from their counterparts in morphology. However, one mismatch is found between a P-stem and an M-stem driven by syllabification. In Section 3, a unified account is made of the two apparently different types of shortening, using the notion of the P-stem. Comparison with previous studies is made in Section 4. Concluding remarks and residual problems are given in Section 5.

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speakers of Seoul Korean such as E.-J. Han (1990), D.-Y. Kim (1992), and Y. Lee (1993) still maintain the contrast. C.-W. Kim (1979) and Mwunkyopwu (= Department of Education) (1988) also recognized that contrastive vowel length occurs at least in the word-initial syllable in Seoul Korean. Hence, it is argued that the proposal made in this paper is valid not only for North Kyungsang Korean but also for all the other dialects of Korean which have a contrast in vowel length. However, it is also recognized that certain examples in section 3.2 are transcribed as they are pronounced in North Kyungsang Korean and that such examples are put in footnotes.

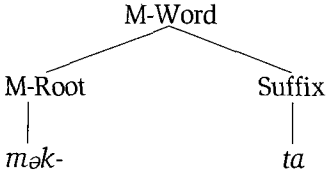
In transcribing Korean data throughout this paper, phonetic symbols generally adopted by current phonologists are used. However, in romanizing the titles of the Korean books listed in References, Martin's Yale Romanization (Martin, 1954, pp. 1-2) is adopted except for proper nouns such as 'Kyungsang (Korean),' 'Hanshin (Publishing Co.),' etc.

2. P-stem in Korean

2.1. Morphological Structure of Verbs

This section motivates three morphological domains: (i) a morphological root (M-root), (ii) a morphological stem (M-stem), and (iii) a morphological word (M-word). An M-root is a morphological unit, which has no suffixes (Bauer, 1983, p. 20; Spencer, 1991, p. 5; Katamba, 1993, p. 41). For instance, *mək-* 'to eat' in *mək-ta* 'to eat + Indicative' is an M-root. Verbal M-roots cannot be used in isolation, and thus the form **mək-* is ungrammatical if it stands by itself. On the other hand, an M-word is a morphological unit, which can be used in isolation (Bauer, 1983, p. 12; Spencer, 1991, p. 45; Katamba, 1993, p. 18). By this definition, the verbal root *mək-* cannot be an M-word since it cannot be used in isolation, while the form *mək-ta* is an M-word since it stands by itself. Thus, the following word-internal structure is tentatively motivated for the M-word *mək-ta*.

(1)



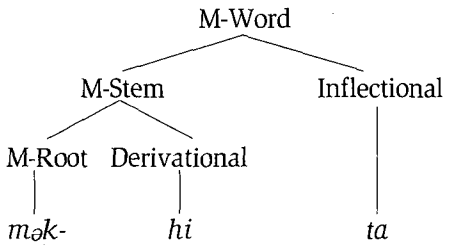
Korean verbal suffixes are divided into two types: (i) derivational and (ii) inflectional (Ahn, 1985; Mwunkyopwu, 1988; G.-R. Kim, 1988; Y.-H. Chung, 1991; N.-J. Kim, 1997). Korean has two derivational suffixes, i.e., the causative suffix and the passive one. The causative suffix exhibits six variants such as *-i, -li, -hi, -ki, -u,* and *-hu,* while the passive suffix shows three variants such as *-i, -hi,* and *-ki* (H.-B. Choi, 1929, 1984, pp. 350-354). The initial consonants of these two suffixes show four variants on the surface, that is, *Φ*(= zero)*-l-k-h.*[2] Among these variants of derivational

suffixes, the form *-i* (beginning with a vowel) occurs when the preceding verbal root ends with *-h* or *k* but this variant is not found in the forms which undergo shortening. This seems to be an accidental gap.

Korean has more than 25 inflectional suffixes (Ahn, 1985; G.-R. Kim, 1988; Y.-H. Chung, 1991; N.-J. Kim, 1997). Among these, only the two suffixes that begin with a vowel /ə/ cause shortening of a long vowel in the root-final syllable.[3] They are the past tense marker /-əs/ and the imperative /-ə/.

Morphologically, a combination of an M-root plus a derivational suffix differs from that of an M-root plus an inflectional suffix. The combination of an M-root plus a derivational suffix cannot stand by itself, whereas that of an M-root plus an inflectional suffix can be used in isolation. For instance, the form **mək-hi* 'to eat + passive' cannot stand by itself, whereas the form *mək-ta* 'to eat + Indicative,' where the indicative suffix *-ta* is inflectional, can be used in isolation. Thus, we need to recognize another morphological unit, which can represent a combination of an M-root plus a derivational suffix. This intermediate morphological unit is called 'M-stem' and the form *mək-hi-ta* is assumed to have the structure in (2).[4]

(2)



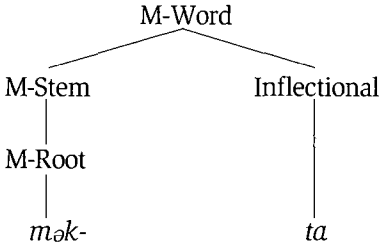
2) Two previous studies argue that these four variants derived from one underlying representation (UR). C.-W. Kim (1973) proposes that the UR of the suffix-initial consonant is /h/. Y. Kang (1991) proposes that the UR is /k/. It is irrelevant to this paper that which proposal is correct and thus realization of surface forms will not be discussed here.

3) The following eight inflectional suffixes show the *i*/*ϕ* alternation. They are the relativizer *-(i)n*, the prospective *-(i)l*, the honorific *-(i)si*, the objective *-(i)lo*, the effective *-(i)ni*, the conditional *-(i)myən*, the formal propositive *-(i)so*, and the adversative *-(i)na*. When the preceding M-stem ends with a vowel or liquid, the *ϕ* (= zero) form occurs on the surface. If these suffixes are taken into consideration, we could tell that ten inflectional suffixes begin with a vowel. However, these are not included in this paper for two reasons. First, they are argued to begin with a consonant in the UR (N.-J. Kim, 1997, pp. 414-5). Second, inclusion of these suffixes does not affect the reasoning this paper is going to make.

4) The form *mək-hi-ta* is phonetically realized as [*mək*^{h}ita], where the consonant sequence /kh/ is actually pronounced as an aspirated /k/. However, this fact is irrelevant to this paper and hence ignored.

Derivational suffixes are optional in the sense that the form *mək-ta*, which does not have a derivational suffix, is grammatical, as shown in (1) above. In (1), an M-root node is directly dominated by an M-word node whereas in (2), it is directly dominated by an M-stem node. Assuming the two different structures in (1) and (2), we encounter a problem in explaining why these two different morphological categories show the same morphological pattern. Both of them can be followed by an Inflectional suffix node. Both of them can be dominated by the same mother node, i.e., M-word. Hence, instead of (1), the revised structure in (1'), where an M-root node is dominated by an intervening M-stem node, is adopted in this paper. Consequently, an M-stem is defined as a 'morphological unit to which inflectional suffixes can be attached.' By this definition, a combination of an M-root plus a derivational suffix forms an M-stem. In addition, an M-root itself can constitute an M-stem in case it is followed by inflectional suffixes with no intervening derivational suffix.

(1')

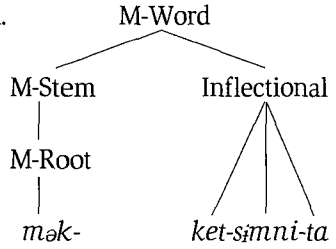


Only one derivational suffix can be attached to an M-root. However, more than one inflectional suffix can be attached to an M-stem, as shown in *mək-ket-si̗mni-ta* 'to eat + Future + Formal + Indicative,' where all three suffixes are inflectional. Assuming a derivational theory, Y.-H. Chung (1991) argues that 'inflectional suffixes are added to a verbal stem all at once on one cycle'. One justification for this argument is that the forms in (3a) cannot be used in isolation. The verbs can stand alone only when it takes the indicative suffix *-ta*, as shown in (3b).

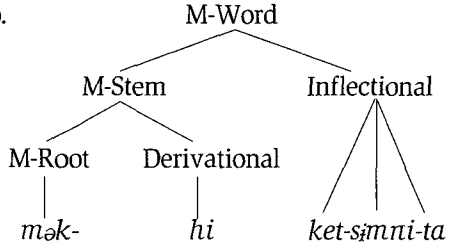
(3) a. **mək-* 'to eat'
**mək-ket-* 'to eat + Future'
**mək-ket-si̗mni-* 'to eat + Future + Formal'
b. *mək-ket-si̗mni-ta* 'to eat + Future + Formal + Indicative'

Following Y.-H. Chung (1991), this paper assumes the 'flat' morphological structures in (4a-b), where all inflectional suffixes are directly dominated by one Inflectional node:

(4) a.

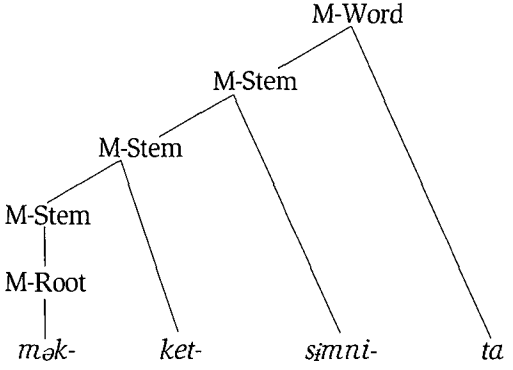


b.



Alternatively, one could assume the structure in (5) instead of (4a). It is a standard assumption that inflectional morphemes occur at the margin of a word after all derivational suffixes are added. Assuming the structure in (5), the inflectional suffixes *-ket* 'Future' and *-sɨmni* 'Formal' would end up as occurring word-internally. Then, it is not possible to explain why inflectional suffixes occur word-internally in Korean. Thus, this paper does not adopt the alternative structure in (5).

(5)



In conclusion, three morphological domains are motivated. They are (i) M-root, (ii) M-stem, and (iii) M-word. An M-root is a morphological unit, which contains no suffix. An M-word is a morphological unit, which can be used in isolation. An M-stem is morphological unit, to which inflectional suffixes can be attached. An M-root itself can constitute an M-stem since it can be followed by inflectional suffixes with no intervening derivational suffix. A combination of an M-root plus a derivational suffix forms an M-stem since it can also be followed by inflectional suffixes. A construction of an M-stem plus inflectional suffixes constitutes an M-word. All inflectional suffixes are dominated by one Inflectional node.

2.2. P-stem in Korean

In Section 2.1, three morphological domains are motivated: (i) M-root, (ii) M-stem, and (iii) M-word. In parallel with morphology, three different phonological domains are required, that is, (i) a phonological root (P-root), (ii) a phonological stem (P-stem), and (iii) a phonological word (P-word). The existence of a P-root is already shown in Inkelas (1989). In addition, the existence of a P-stem in the Nguni languages is proven by Downing (1994, 1998) and its existence in Korean is shown in N.-J. Kim (1997). It seems to be needless to say that a P-word exists in all human languages.

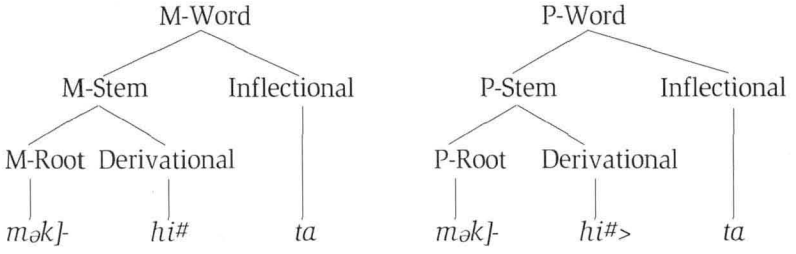
There is no evidence that a P-root or P-word is different from an M-root or M-word. However, one mismatch occurs between an M-stem and a P-stem driven by syllabification. The domain of a P-stem corresponds to that of an M-stem in general. The basic domain of a P-stem is determined by the constraint {Right}-Anchor (P-stem, M-stem), which requires the right edge of a P-stem to be aligned with that of an M-stem:

(6) {Right}-Anchor (P-stem, M-stem) (R-Anchor)
Any element at the right edge of a P-stem must have a correspondent at the right edge of an M-stem.

As shown in Section 2.1, the right edge of an M-stem is aligned with the right edge of a derivational suffix if the given word has a derivational suffix, as in *mək]-hi#-ta* 'to eat + Passive + Indicative,' as shown in (7a), where the symbols "]" and "#" represent the right edge of

an M-root and an M-stem, respectively. The right edge of a P-stem is forced to correspond to that of an M-stem owing to the constraint R-Anchor, as illustrated in (7b), where the symbol ">" means the right edge of a P-stem:

(7) a. Morphological Structure b. Phonological Structure



'to eat + Passive + Indicative'

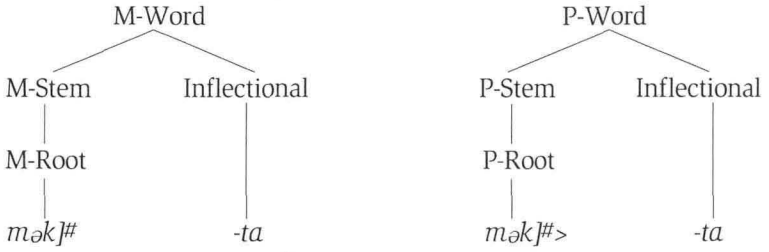
In Table 1 below, the first two candidates, where the right edge of a P-stem is not aligned with that of an M-stem, are eliminated by the constraint R-Anchor. The last candidate *mək]-hi#>-ta*, where the right edge of a P-stem is aligned with the right edge of an M-stem, is selected as optimal.

Table 1. Input: *mək]-hi#-ta* 'to eat + Passive + Indicative'

Candidates	R-Anchor
mək]>-hi#-ta	*!
mək]-hi#-ta>	*!
☞ *mək]-hi#>-ta*	

If a given word does not have a derivational suffix as in *mək-ta*, the right edge of a P-stem appears to be aligned with that of an M-root rather than an M-stem. However, in this case, the M-root itself forms an M-stem, to which inflectional suffix *-ta* 'Indicative' is attached, as pointed out in Section 2.1. Thus, it can be argued that the right edge of a P-stem is still aligned with that of an M-stem, as indicated in (8):

(8) a. Morphological Structure b. Phonological Structure



'to eat + Indicative (Inflectional)'

In Table 2 below, the first candidate, where the right edge of a P-stem is not aligned with that of an M-stem, is ruled out by the constraint R-Anchor. The second candidate *məkʃ#>-ta*, where the right edge of a P-stem is aligned with that of an M-stem, is chosen as optimal.

Table 2. Input: *məkʃ#-ta* 'to eat + Indicative'

Candidates	R-Anchor
məkʃ#-ta>	*!
☞ *məkʃ#>-ta*	

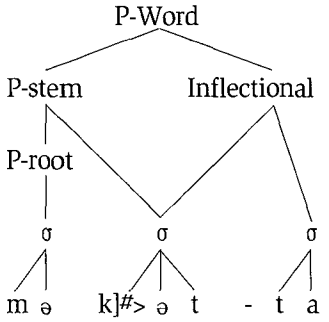
As shown above, the right edge of a P-stem corresponds in general to that of an M-stem. However, one mismatch between the right edges of an M-stem and a P-stem occurs due to syllabification. When verbal stems are followed by a vowel-initial inflectional suffix, certain prosodic changes occur at the boundary between the M-stem and the vowel-initial inflectional suffix. The vowel-initial inflectional suffix is unstable because the onsetless syllable is prohibited by the constraint Onset, which prohibits a syllable beginning with a vowel.

(9) Onset
A syllable beginning with a vowel is prohibited.

The onsetless syllable obtains an onset by taking an M-stem-final consonant if the preceding M-stem ends with a consonant. Consequently, we encounter a case where the M-stem boundary is placed inside of the syllable which is constructed across the M-stem boundary. Suppose the right edge of a P-stem is also placed inside of the syllable which is

constructed across the M-stem boundary due to the constraint R-Anchor. Then, we will encounter the problematic phonological structure in (10), where the P-stem boundary is located inside of the syllable:

(10)



There is a tendency for the edge of a P-stem to be aligned with the edge of a syllable (Downing, 1994, 1998; N.-J. Kim, 1997). This generalization can be expressed by the constraint Align (P-stem, r; σ, r), which requires the right edge of a P-stem to be aligned with that of a syllable. This constraint outranks R-Anchor, and thus a violation of R-Anchor is compelled.

(11) Align (P-stem, r; σ, r)
Align the right edge of a P-stem with the right edge of a syllable.

(12) Align (P-stem, r; σ, r) >> R-Anchor

Due to the ranking in (12), the structure such as in (10) is prohibited universally. However, repair strategies can differ across languages. Either we can exclude the syllable (which is constructed across the M-stem boundary) from the domain of a P-stem or we can incorporate the syllable into the domain of a P-stem. In the case of Nguni languages like SiSwati and Xhosa (Downing, 1994, 1998), the syllable which is constructed across the morphological stem boundary is excluded from the domain of a P-stem. However, in Korean, the problematic syllable (constructed across the M-stem boundary) is incorporated into the domain of a P-stem (N.-J. Kim, 1997).

The above facts are explained by the two constraints MAX (M-stem) and DEP (P-stem). The concept 'M-stem' is purely morphological, and thus

it does not exist in phonology. The 'P-stem' is purely phonological, and it does not exist in morphology. Hence, the P-stem on the surface is a counterpart of an M-stem in the UR. In this respect, the following two constraints simply regulate the Input-Output faithfulness.

(13) a. MAX (M-stem)
Any segment in an M-stem must have a correspondent in a P-stem.
b. DEP (P-stem)
Any segment in a P-stem must have a correspondent in an M-stem.

In Nguni languages like SiSwati and Xhosa, the constraint DEP (P-stem) outranks MAX (M-stem). Hence, inclusion of any non-M-stem material is prohibited.

(14) Ranking in Nguni languages
DEP (P-stem) >> MAX (M-stem)

In Korean, exclusion of any M-stem material is prohibited by the reversed ranking MAX (M-stem) >> DEP (P-stem). Therefore, the syllable constructed across the M-stem boundary is incorporated into the domain of a P-stem.

(15) Ranking in Korean
MAX (M-stem) >> DEP (P-stem)

In conclusion, there is no evidence that a P-root or P-word differs from an M-root or M-word. However, one mismatch is found between an M-stem and a P-stem because the structure in (10) is prohibited due to the constraint Align (P-stem, r; σ, r), which outranks R-Anchor. In Korean, the syllable constructed across the M-stem boundary is incorporated into the domain of a P-stem, whereas in Nguni languages, it is excluded from that of a P-stem.

3. Shortening in P-stem

This section shows that the two seemingly different types of shortening are one identical phenomenon that can be adequately explained in terms of the P-stem. The triggers of shortening that have been argued so far are not the real triggers. This section shows that shortening occurs only when a mora is incorporated into the domain of a P-stem to compensate for the loss of a mora from the M-root.

3.1. Verbal Roots with a Closed Syllable

Stems in (16) contain a long vowel in the root-final syllable and end with a coda consonant. Stems in (16) includes examples dealt with in H.-B. Choi (1929, 1984), Ahn (1985), H.-S. Sohn (1987, 1999), Nam and Ko (1988), Mwunkyopwu (1988), G.-R. Kim (1988), and Y.-H. Chung (1991, 1997, 2001). Several examples are newly collected by the author, e.g., *mool-* 'to drive', *nəəl-* 'to spread out', '*k'ool-* 'to lose (money)', etc. Additional examples are given in Appendix A.

Shortening does not occur when the following inflectional suffix begins with a consonant, as shown in (16).

(16)	*aal-ta*	'to know + Ind(icative)'
	uul-ta	'to cry + Ind'
	kəəl-ta	'to hang + Ind'
	nool-ta	'to play + Ind'
	puul-ta	'to blow + Ind'

All the verbs in (16) exhibit shortening in two apparently different contexts. First, a root-final long vowel is shortened when it is followed by a vowel-initial inflectional suffix, as indicated in (17). Additional examples are listed in Appendix B.

(17)	*al-at-ta*	'to know + Past + Ind(icative)'
	ul-ət-ta	'to cry + Past + Ind'
	kəl-ət-ta	'to hang + Past + Ind'
	nol-at-ta	'to play + Past + Ind'
	pul-ət-ta	'to blow + Past + Ind'

Second, a root-final long vowel is also shortened when it is followed by a derivational suffix, as indicated in (18). Certain verbal roots, especially stative verbs, cannot combine with a derivational suffix for morpho-semantic reasons, and they are not listed below.[5] Additional examples are given in Appendix C.

(18)	*al-li-ta*	'to know + Causative + Ind(icative)'
	ul-li-ta	'to cry + Causative + Ind'
	kəl-li-ta	'to hang + Passive + Ind'
	nol-li-ta	'to play + Causative + Ind'
	pul-li-ta	'to blow + Passive + Ind'

For the data in (17) and (18), previous studies have assumed that the triggers of these two types of shortening cannot be collapsed into one natural class because the triggers that have been identified in the past differ both phonologically and morphologically (Ahn, 1985; Mwunkyopwu, 1988; G.-R. Kim, 1988; Y.-H. Chung, 1991; H.-S. Sohn, 1997). In (17), shortening appears to be caused by a suffix-initial vowel, whereas in (18), shortening occurs regardless of whether the following segment is a vowel or consonant. In (17), shortening occurs before the inflectional suffix, while in (18), before derivational suffixes. As a natural corollary of this reasoning, Korean has been analyzed as having two separate phenomena of shortening. Excluding the data in (18), previous studies assume that in (17), the trigger of shortening at the inflectional level is the suffix-initial vowel. On the other hand, for the data in (18), they assume a separate morphologically-conditioned rule. However, it will be shown in Section 4 that the approach taken by previous studies is *ad hoc*.

Before dealing with the data in (16)-(18), we need to consider another type of relevant data in order to determine the place where shortening occurs. There is evidence that only a long vowel in the M-root-final syllable undergoes shortening. As shown in (19), a long vowel in a non-final syllable does not undergo shortening even if all the other conditions for shortening are satisfied. Hence, considering the data in

5) Korean has two kinds of verbs: (i) 'dynamic' verbs, e.g., *uul-* 'to cry', and (ii) 'stative' verbs, e.g., *čaak-* 'to be small'. Stative verbs usually describe qualities like adjectives in English. For this reason, stative verbs are often called 'adjectival verbs' (Y.-H. Chung, 1991, p. 13). However, these two kinds of verbs show very similar behavior in morphological conjugation. Thus, the term 'verb' is used as a cover term for these two kinds of verbs.

(17)-(19), we can conclude that only a long vowel in the M-root-final syllable undergoes shortening.

(19) *təələw#-ət>-ta*[6] < /təələp]#-ət-ta/ 'be dirty + Past + Ind'
koomaw#-ət>-ta < /koomap]#-ət-ta/ 'to be thankful + Past + Ind'

I propose the constraint *VV(C)]$_{\text{M-root}}$, which prohibits a long vowel in the M-root-final syllable.[7] This constraint outranks MAX (μ) which penalizes deletion of a mora, and thus a violation of MAX (μ) is compelled.

(20) *VV(C)]$_{\text{M-root}}$
A heavy syllable in the M-root-final syllable is prohibited.

(21) *VV(C)]$_{\text{M-root}}$ >> MAX (μ)

The ranking in (21) can account for the data in (17) to (19): in (17) and (18), a long vowel occurs in the M-root-final syllable and thus is compelled to be shortened, whereas in (19), it is found in the non-final syllable, and thus surfaces as a long vowel. However, the data in (16) are not explained yet.

It is argued that shortening occurs in the M-root-final syllable only when a mora is incorporated into the domain of a P-stem that can compensate for the loss of mora from an M-root. This generalization is expressed as the constraint *P-stem<M-root, which prohibits a P-stem whose weight is lighter than that of an M-Root.

(22) *P-stem<M-root
A P-stem whose weight is lighter than that of an M-root is prohibited.

For the constraint *P-stem<M-root, the weight of a P-stem is compared with that of an M-root. It is a standard assumption that 'counting' is not allowed in phonology. The concept of 'counting' differs from that of

6) The M-root-final /p/ alternates with [w], and these verbs belong to the so-called /p/-irregular verbs, and these segmental changes are ignored in this paper.

7) A similar constraint, which prohibits a heavy syllable in a word-final position, is found in Leti (Hume, 1996).

'comparison'. Without counting the numbers of the moras, any system which can recognize binarity can compare the number of the moras in a P-stem with that in an M-root.

The constraint *P-stem<M-root outranks $*VV(C)]_{M\text{-}root}$ and thus a violation of $*VV(C)]_{M\text{-}root}$ is compelled in (16).

(23) *P-stem<M-root >> $*VV(C)]_{M\text{-}root}$ >> MAX (μ)

With the constraints and their ranking in (23), now we can explain all the data given in (16) to (19). The typical examples are repeated in (24) below. Note the positions of M-root, M-stem and P-stem boundaries marked by '], '#', and '>,' respectively in (24):

(24)	a. *aal#>-ta*	< /aal]#-ta/	'to know + Ind(icative)'
	b. *al#-at>-ta*	< /aal]#-at-ta/	'to know + Past + Ind'
	c. *al-li#>-ta*	< /aal]-li#-ta/	'to know + Causative + Ind'
	d. t*əələw#-ət>-ta*	< /təələp]#-ət-ta/	'be dirty + Past + Ind'

In the form *aal#>-ta* derived from /aal]#-ta/ in (24a), the bimoraic M-root *aal]-* itself forms an M-stem because it is followed by an inflectional suffix *-ta* with no intervening derivational suffix. Owing to the constraint R-Anchor, which requires any element at the right edge of a P-stem to have a correspondent at the right edge of an M-stem, the P-stem boundary is required to correspond with the M-stem boundary. Note that owing to the constraint *P-stem<M-root, shortening can not occur when no mora is incorporated into the domain of a P-stem that can make up for the loss of mora from the M-root. If shortening occurred, as in **al#>-ta*, we would encounter a monomoraic P-stem that is lighter than the bimoraic M-root *aal]-*. Therefore, shortening is blocked by the constraint *P-stem<M-root.

In Table 3 below, the second candidate, where shortening occurs, incurs a violation of *P-stem<M-root, and thus is ruled out. The first candidate is selected as optimal even though it violates $*VV(C)]_{M\text{-}root}$. Its violation of $*VV(C)]_{M\text{-}root}$ is forced by *P-stem<M-root.

Table 3. Input: /aal]#-ta/ 'to know + Ind'

	*P-stem<M-root	*VV(C)]$_{M\text{-}root}$	MAX (μ)
☞ *aal#>-ta*		*	
al#>-ta	*!		*

In the form *al#-at>-ta* derived from /aal]#-at-ta/ in (24b), the bimoraic M-root itself forms an M-stem because it is followed by two inflectional suffixes *-at-ta*. The M-stem-final consonant is syllabified as the onset of the following vowel in order to satisfy the constraint Onset. Hence, we meet a case where the M-stem boundary is placed inside of the syllable which is constructed across the M-stem boundary. As argued in Section 2.2, there is a strong tendency for the edge of a P-stem to be aligned with the edge of a syllable (Downing, 1994, 1998; N.-J. Kim, 1997). Korean must include the syllable *-lat-* (which is constructed across the M-stem boundary) within the domain of a P-stem by the conspiracy of the constraints Align (P-stem, r; σ, r), R-Anchor, DEP(P-stem) and MAX(M-stem), discussed in Section 2.2. Consequently, a mismatch is found between the M-stem boundary and the P-stem one, and a compensatory mora *a* in *-lat-* is incorporated into the domain of a P-stem. The incorporated mora can make up for the loss of mora from the bimoraic M-root. In *al#-at>-ta*, shortening is found, and this is explained by the above-mentioned generalization. The weight of the bimoraic P-stem *al#-at>* is equal to that of the bimoraic M-root *aal]-*, and therefore, the form *al#-at>-ta* satisfies the constraint *P-stem<M-root.

In Table 4, the first candidate, which does not undergo shortening, is ruled out by its violation of *VV(C)]$_{M\text{-}root}$. The second one, where shortening occurs, is selected as optimal because it satisfies the two higher ranked constraints *P-stem<M-root and *VV(C)]$_{M\text{-}root}$.

Table 4. Input: /aal]#-at-ta/ 'to know + Past + Ind'

	*P-stem<M-root	*VV(C)]$_{M\text{-}root}$	MAX (μ)
aal#-at>-ta		*!	
☞ *al#-at>-ta*			*

Thirdly, in the form *al-li#>-ta* derived from /aal]-li#-ta/ in (24c), the bimoraic M-root is followed by a derivational causative suffix *-li*. Thus, the combination of a root and a derivational suffix forms an M-stem.

Owing to the constraint R-Anchor, the P-stem boundary is required to correspond with the M-stem boundary. Note that the derivational suffix already exists inside of the domain of a P-stem because an M-stem is defined as a linguistic unit to which inflectional suffixes can be attached. In this case, the derivational suffix can play a role as compensatory material that can make up for the loss from the M-root. Though shortening occurs as in *al-li#>-ta*, the weight of the P-stem *al-li#>* is still equal to that of the bimoraic M-root *aal]-*, and thus it satisfies *P-stem<M-root.

In Table 5, the first candidate, which does not undergo shortening, is eliminated because it violates *VV(C)]$_{\text{M-root}}$. The second candidate, where shortening occurs, is selected as optimal because it satisfies both *P-stem<M-root and *VV(C)]$_{\text{M-root}}$.

Table 5. Input: /aal]-li#-ta/ 'to know + Causative + Ind'

	*P-stem<M-root	*VV(C)]$_{\text{M-root}}$	MAX (μ)
aal-li#>-ta		*!	
☞ *al-li#>-ta*			*

Finally, in the form *təələw#-ət>-ta* derived from /təələp]#-ət-ta/ 'be dirty + Past + Ind' in (24d), shortening does not occur even though a compensatory mora is incorporated into the domain of a P-stem. Since the long vowel does not occur in the M-root-final syllable, there is no reason this vowel has to be shortened.

In Table 6, the first candidate, which satisfies all three constraints, is selected as optimal. The second candidate, where the initial long vowel is shortened, is ruled out by its violation of MAX (μ).

Table 6. Input: /təələp]#-ət-ta/ .... 'be dirty + Past + Ind'

	*P-stem<M-root	*VV(C)]$_{\text{M-root}}$	MAX (μ)
☞ *təələw#-ət>-ta*			
tələw#-ət>-ta			*!

In summary, shortening occurs in the M-root-final syllable only when a mora is incorporated into the domain of a P-stem to compensate for the loss of a mora from an M-root. This generalization is captured by the constraints and their ranking in (23), repeated below as in (23').

(23') *P-stem<M-root >> *VV(C)]$_{\text{M-root}}$ >> MAX (μ)

3.2. Verbal Roots with an Open Syllable

When an M-root-final long vowel in the open syllable is followed by a vowel-initial inflectional suffix or by a derivational suffix, it undergoes shortening. This is also explained by the same constraints and their ranking established in Section 3.1 but with the addition of the constraints *Superheavy Syllable (*SS) and *Diphthong. However, one remaining problem is that two possible output forms surface from one input when an M-root-final long vowel in the open syllable is followed by a vowel-initial inflectional suffix, as in *see#ət>ta* and *see#t>ta* derived from /see#-ət-ta/ 'to be strong + Past + Ind. This problem is solved by assuming that the constraint *VV(C)]$_{\text{M-root}}$ is linked with the constraint *Diphthong disjunctively. If two constraints are linked disjunctively as in *VV(C)]$_{\text{M-root}}$ ∪ *Diphthong, a violation of either of the two constraints is equally fatal, and thus two output forms can be selected.

First, consider examples where bimoraic M-roots are followed by a consonant-initial inflectional suffix *-ta* 'Indicative'. In (25), the M-root itself forms an M-stem because it is followed by an inflectional suffix *-ta*. Owing to the constraint R-Anchor, the P-stem boundary is required to correspond with the M-stem boundary. Since no compensatory mora exists within the domain of a P-stem, shortening is prohibited by the undominated constraint *P-stem<M-Root, which prohibits a P-stem whose weight is lighter than an M-root. As predicted, the forms in (25) never undergo shortening.

(25) *see#>ta*	<	/see]#-ta/	'to be strong + Ind'
čee#>ta[8]	<	/čee]#-ta/	'to measure + Ind'
nee#>ta	<	/nee]#-ta/	'to put a show + Ind'
ponee#>ta	<	/ponee]#-ta/	'to send + Ind'

8) The following three examples are transcribed as they are pronounced in North Kyungsang Korean. In Seoul Korean, the vowel /e/ in the first two examples should be transcribed as /æ/. The third example should be transcribed as /ponæ]#-ta/, in which the vowel in the second syllable is short in the UR.

čee#>-ta	<	/čee]#-ta/	'to measure + Ind'
nee#>-ta	<	/nee]#-ta/	'to put a show + Ind'
ponee#>-ta	<	/ponee]#-ta/	'to send + Ind'

In Table 7, the first candidate, where shortening occurs, is ruled out by its violation of the constraint *P-stem<M-Root. The second one is determined to be optimal though it violates $*VV(C)]_{M\text{-}root}$. Its violation of $*VV(C)]_{M\text{-}root}$ is forced by *P-stem<M-root.

Table 7. Input: /ponee#-ta/ 'to send + Ind'

	*P-stem<M-root	$*VV(C)]_{M\text{-}root}$	MAX (μ)
pone#>-ta	*!		*
☞ *ponee#>-ta*		*	

Before considering the case where an M-root-final long vowel in the open syllable is followed by a vowel-initial inflectional suffix, let me first consider the example, where it is followed by a derivational suffix, as shown in (26).

(26) *pone-či#>-ta* < /ponee-či#>-ta/ 'to measure + Passive + Ind'

In the form *pone-či#>-ta*, shortening occurs as expected. The combination of an M-root and a derivational suffix forms an M-stem. Owing to the constraint R-Anchor, the P-stem boundary is required to correspond with the M-stem boundary. The derivational suffix already exists inside of the domain of a P-stem because an M-stem is defined as a linguistic unit to which inflectional suffixes can be attached. Because the derivational suffix can compensate for the moraic loss from the M-root, shortening is induced in *pone-či#>-ta*. Note that the weight of the trimoraic P-stem *pone-či#>* is still equal to that of the trimoraic M-root *ponee-*, and thus it satisfies *P-stem<M-root.

In Table 8, the first candidate, which does not undergo shortening, is not selected as optimal due to its violation of $*VV(C)]_{M\text{-}root}$. The second one, which undergoes shortening, turns out to be optimal.

Table 8. Input: */ponee-či#-ta/* 'to measure + Ind'

	*P-stem<M-root	$*VV(C)]_{M\text{-}root}$	MAX (μ)
ponee-či#>-ta		*!	
☞ *pone-či#>-ta*			*

Let me now consider the data where an M-root-final long vowel in the

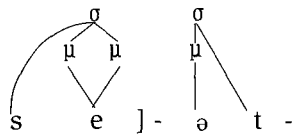
open syllable is followed by a vowel-initial inflectional suffix. One potential problem is that two possible output forms surface from one input, as indicated in (27). This problem can be handled with constraint disjunction. In (27), the symbol '*Φ*' represents a place where a mora is deleted.

(27)

		UR	
seΦ#ət>-ta	*see#Φt>-ta*	/see]#-ət-ta/	'to be strong + Past + Ind'
čeΦ#ət>-ta	*čee#Φt>-ta*	/čee]#-ət-ta/	'to measure + Past + Ind'
neΦ#ət>-ta	*nee#Φt>-ta*	/nee]#-ət-ta/	'to put a show + Past + Ind'
poneΦ#ət>-ta	*ponee#Φt>-ta*	/ponee]#-ət-ta/	'to send + Past + Ind'

Suppose the UR /see#-ət-ta/ 'to count + Past + Ind' surfaces as an output, as shown in (28). In (28), The M-root and a vowel-initial inflectional suffix are syllabified into separate syllables. This representation violates two crucial constraints Onset and *VV(C)]$_{M\text{-}root}$, and thus ruled out.

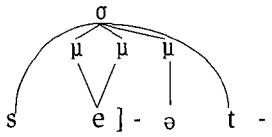
(28) *



'to count + Past'

Consider the form in (29), where a stem and a suffix are syllabified into the same syllable. Note the place where the M-root boundary "]" is located. The long vowel *e* still incurs a violation of *VV(C)]$_{M\text{-root}}$, and thus is ruled out although Onset is no longer violated.

(29) *

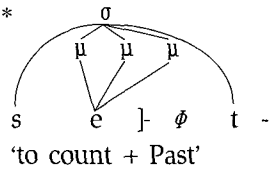


'to count + Past'

Consider the representations in (30a-b). In (30a), the second vocalic root is deleted and the three moras are linked to the first vocalic root. while in (30b), the first vocalic root is deleted and the three moras are linked to

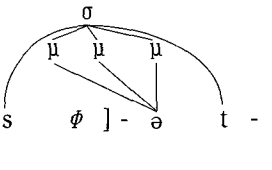
the second vocalic root.

(30) a. *



'to count + Past'

b. *



The representation in (30a) still violates $*VV(C)]_{M\text{-}root}$ because the vocalic root node *e* is still in the domain of the M-root. Thus, this representation could be eliminated. The representation in (30b) does not violate $*VV(C)]_{M\text{-}root}$ because the vocalic root node *ə* is now outside of the domain of the M-root. Thus, it is necessary to adopt another constraint in order to eliminate both representations in (30). The syllables in (30) are trimoraic, and following Hayes (1989), a trimoraic syllable is generally prohibited. Even though trimorainc syllables do exist in a dialect of Hindi, Dutch (Hulst, 1984), Persian (Hayes, 1979), Estonian (Lehiste, 1966; Prince, 1980), and in various German and Danish dialects (Hock, 1986), the maximum number of moras per syllable is usually two. The tendency, which prohibits a trimoraic syllable, is expressed by the constraint *Superheavy Syllable (*SS). It is assumed that this constraint outranks MAX (μ). Thus, the syllables in (30) are eliminated by this constraint.

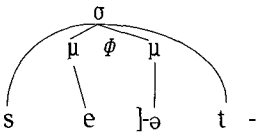
(31) *Superheavy Syllable (*SS)

* $\sigma_{\mu\mu\mu}$

(32) *Superheavy Syllable (*SS) >> MAX (μ)

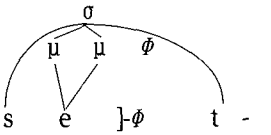
Now let me consider the two possible outputs, as repeated in (33). The form in (33a) loses the mora from the root-final vowel, while the form in (33b) loses the mora from the suffix vowel.

(33) a.



'to count + Past'

b.



It appears to be problematic in that both of these two forms are possible. The representation in (33a) satisfies *VV(C)]$_{M\text{-}root}$, and thus it appears to be selected as optimal. However, the one in (33b) also selected as optimal though it incurs a violation of *VV(C)]$_{M\text{-}root}$. Note that the representation in (33a) contains a diphthong, which is in general less favored than a monophthong. Therefore, it is argued that the two relevant constraints are connected disjunctively, so a violation of either of the two constraints is evaluated as equally fatal, and thus both forms can appear on the surface.[9] The two relevant constraints are *VV(C)]$_{M\text{-}root}$ and *Diphthong. The constraint *Diphthong prohibits tautosyllabic moras from being linked to two separate vocalic roots.

(34) *Diphthong (Rosenthall, 1994, p. 30; N.-J. Kim, 1997, p. 418)
Tautosyllabic moras cannot link to two separate vocalic roots.

(35) Disjunctive Ranking
*VV(C)]$_{M\text{-}root}$ ∪ *Diphthong

In Table 9, candidate a, where the form is syllabified into two separate syllables, is ruled out by the constraint Onset. The next three candidates, where each of the forms is syllabified into one syllable and does not undergo shortening, are eliminated by the constraint *Superheavy Syllable (*SS). The next two candidates, where the forms surface as monomoraic, are ruled out by *P-stem<M-root. The last two candidates are evaluated as equally harmonious in terms of the two constraints *VV(C)]$_{M\text{-}root}$ and *Diphthong linked disjunctively: candidate g, where the second mora is deleted, incurs a violation of *Diphthong and MAX (μ); candidate h, where the second vocalic root and the third mora are deleted, violates *VV(C)]root and MAX (μ).

9) Anonymous reviewers of this paper point out that optionality can be solved by assuming that the two constraints *VV(C)]$_{M\text{-}root}$ and *Diphthong are unranked. However, I do not adopt this alternative for the following reason. Constraints are assumed to be universal in OT. Hence, all the constraints in human language are assumed to exist in Korean even though they are not mentioned in the Tableaux. If any two constraints are unranked, they are independent. In other words, they can behave differently. Therefore, there is no way to guarantee that the two constraints are ranked the same with respect to the rest of the constraints that are not mentioned. By assuming the two constraints are linked disjunctively, we can guarantee that they behave dependently and that they are ranked the same with respect to the rest of the constraints. Hence, constraint disjunction is proposed in this paper.

Table 9. Input: /*see-ət-*/ 'to count + Past'

	Onset	*SS	*P-stem<M-root	*VV(C)]$_{M\text{-}root}$ ∪ *Diphthong	MAX (μ)
a. *see.ət-*	*!			*	
b. *seeət-*		*!		*	
c. *seeet-*		*!		*	
d. *səət-*		*!			
e. *set-*			*!		**
f. *sət-*			*!		**
☞g. *seΦət-*				*	*
☞h. *seeΦt-*				*	*

To conclude, shortening of an M-root-final long vowel in the open syllable requires the addition of the constraints *Superheavy Syllable (*SS) and *Diphthong. However, two possible output forms are selected from one input when an M-root-final long vowel in the open syllable is followed by a vowel-initial inflectional suffix. This problem is solved by assuming that the constraint *VV(C)]$_{M\text{-}root}$ is linked with the constraint *Diphthong disjunctively. Since a violation of either of the two constraints is evaluated equally harmonious, two output forms are selected.

4. Comparison with Previous Studies

Korean verbs have been claimed to have two different types of shortening: shortening of a long vowel in the root-final syllable (i) before a vowel-initial inflectional suffix and (ii) before a derivational suffix. Previous studies (Ahn, 1985; Mwunkyopwu, 1988; G.-R. Kim, 1988; Y.-H. Chung, 1991, 1997, 2001; H.-S. Sohn, 1987, 1997) have assumed that the triggers of these two types of shortening cannot be collapsed into one natural class because they differ both phonologically and morphologically, as indicated in (36). The trigger appears to be a suffix-initial vowel for one type of shortening, whereas the other shortening seems to occur regardless of the nature of the following segment. The first type of shortening occurs before an inflectional suffix, while the second one occurs before a derivational suffix.

(36) Two Seemingly Different Types of Shortening

	Shortening$_1$ before Inflectional Suffix	Shortening$_2$ before Derivational Suffix
Examples	*aal-ta* 'to know + Ind' *al-at-ta* 'to know + Past + Ind'	*aal-ta* 'to know + Ind' *al-li-ta* 'to know + Causative + Ind'
Triggering Phonemes	V (*ə* or *a*)	none
Triggering Morphemes	Inflectional	Derivational

However, there are two problems with this approach. First, a single unified phenomenon has been divided because the triggers have been misidentified. Second, the analyses that have been given are *ad hoc* and counterintuitive (i) in that they do not follow generalizations established by Hayes (1989) and (ii) in that consequently, similar phenomena are never found in any other languages.

Korean has two derivational suffixes, i.e., the causative and the passive. A long vowel in the M-root-final syllable is shortened when it is followed by either of these suffixes. For this, previous studies proposed a morphologically conditioned rule. However, it is hard to imagine that this rule would be found in any other language because it is not possible for any other language to have the same passive and causative morphemes as Korean does. We can avoid this anomaly by taking the new approach suggested in this paper.

Ignoring the similarity to shortening before the derivational suffix, previous studies have also argued that a long vowel is shortened when it is followed by a vowel-initial inflectional suffix. In this context, an M-root-final consonant is syllabified as the onset of the following vowel. Following Hayes (1989), if a coda is resyllabified as the onset of the following syllable and the coda is non-moraic, no change in vowel length is expected, as in Lardil, Hausteco, Hawaiian, etc. If the coda is moraic as in Latin, Sierra Miwok, Hausa, etc., compensatory lengthening is expected. However, following the analysis of previous studies, Korean is unique in having shortening in this situation. We can avoid this exceptionality by taking the new approach suggested in this paper.

5. Concluding Remarks and Residual Problems

By recognizing the P-stem, a unified solution is possible for the two seemingly different types of shortening. Shortening occurs in Korean only when a mora is incorporated into the domain of a P-stem in compensation for the loss of mora from the M-root. The domain of a P-stem is defined in terms of the interaction of phonological and morphological factors.

We encounter ten counter-examples to the above generalization. The following M-roots are not shortened although the conditions of shortening are satisfied. All of them are stative verbs and it is possible to devise a constraint that blocks shortening, based on the nature of the M-root-final consonants. However, this problem is not discussed in this paper due to the lack of space. Readers might refer to N.-J. Kim (1997, pp. 400-406).

(37)	čaak-ət-ta	*čak-at-ta	'to be small in height + Past + Ind'
	čəək-ət-ta	*čək-ət-ta	'to be small in quantity + Past + Ind'
	koow-ət-ta	*kow-at-ta	'to be colorful + Past + Ind'
	swiiw-ət-ta	*swiw-ət-ta	'to be easy + Past + Ind'
	səəlw-ət-ta	*səlw-ət-ta	'to be sorry + Past + Ind'
	t'əəlp-ət-ta	*t'əlp-ət-ta	'to be astringent + Past + Ind'
	kuulk-ət-ta	*kulk-ət-ta	'to be thick + Past + Ind'
	əəps-ət-ta	*əps-ət-ta	'not to exist + Past + Ind'
	čoo(h)-at-ta[10]	*čo(h)-at-ta	'to be good + Past + Ind'
	maan(h)-at-ta	*man(h)-at-ta	'to be large in number + Past + Ind'

Appendices

Appendix A

saal-ta	'to live + Ind'
piil-ta	'to pray + Ind'
miil-ta	'to push + Ind'
əəl-ta	'to freeze + Ind'
yəəl-ta	'to open + Ind'

10) The /h/ in the parentheses is not pronounced when it occurs intervocalically.

təəl-ta	'to reduce + Ind'
t^{h}əəl-ta	'to dust off + Ind'
tool-ta	'to turn + Ind'
mool-ta	'to drive + Ind'
nəəl-ta	'to spread out + Ind'
k'ool-ta	'to lose + Ind'
čuul-ta	'to decrease + Ind'
čool-ta	'to doze + Ind'
səəl-ta	'to cut + Ind'
k'ɨɨl-ta	'to drag + Ind'
pəəl-ta	'to earn + Ind'
məəl-ta	'to be far away + Ind'
kiil-ta	'to be long + Ind'
siim-ta	'to plant + Ind'
naam-ta	'to remain + Ind'
nəəm-ta	'to overflow + Ind'
taam-ta	'to put in + Ind'
saam-ta	'make something of + Ind'
kəəm-ta	'to be black + Ind'
aan-ta	'to hug + Ind'
siin-ta	'to put on (shoes) + Ind'
siip-ta	'to chew + Ind'
uus-ta	'to laugh + Ind'
kuup-ta	'to roast + Ind'
kiip-ta	'to patch + Ind'
təəp-ta	'to be warm + Ind'
kəət-ta	'to walk + Ind'
muut-ta	'to ask + Ind'
puut-ta	'to increase + Ind'
siit-ta	'to load + Ind'
nuut-ta	'to burn + Ind'
čiis-ta	'to build + Ind'
čuus-ta	'to pick up + Ind'
naas-ta	'to get well + Ind'
čaas-ta	'to weave + Ind'
saa(l)m-ta[11]	'to boil + Ind'
čəə(l)m-ta	'to be young + Ind'
paa(l)p-ta	'to tread + Ind'

Appendix B

sal-at-ta	'to live + Past + Ind'
pil-ət-ta	'to pray + Past + Ind'
mil-ət-ta	'to push + Past + Ind'
əl-ət-ta	'to freeze + Past + Ind'
yəl-ət-ta	'to open + Past + Ind'
təl-ət-ta	'to reduce + Past + Ind'
tʰəl-ət-ta	'to dust off + Past + Ind'
tol-at-ta	'to turn + Past + Ind'
mol-at-ta	'to drive + Past + Ind'
nəl-ət-ta	'to spread out + Past + Ind'
k'ol-at-ta	'to lose + Past + Ind'
čul-ət-ta	'to decrease + Past + Ind'
čol-at-ta	'to doze + Past + Ind'
səl-ət-ta	'to cut + Past + Ind'
k'ɨl-ət-ta	'to drag + Past + Ind'
pəl-ət-ta	'to earn + Past + Ind'
məl-ət-ta	'to be far away + Past + Ind'
kil-ət-ta	'to be long + Past + Ind'
sim-ət-ta	'to plant + Past + Ind'
nam-at-ta	'to remain + Past + Ind'
nəm-ət-ta	'to overflow + Past + Ind'
tam-at-ta	'to put in + Past + Ind'
sam-at-ta	'to make something of + Past + Ind'
kəm-ət-ta	'to be black + Past + Ind'
an-at-ta	'to hug + Past + Ind'
sin-ət-ta	'to put on (shoes) + Past + Ind'
sip-ət-ta	'to chew + Past + Ind'
us-ət-ta	'to laugh + Past + Ind'
kuw-ət-ta[12]	'to roast + Past + Ind'

11) When verbal roots have complex codas as in *saa*(l)*m-ta* 'to boil + Ind', *čəə*(*l*)*m-ta* 'to be young + Ind', *paa*(*l*)*p-ta* 'to tread + Ind', the (l) put in parentheses is not pronounced in this context.

12) In Appendix B, certain root-final consonants show segmental changes as in kuw-ət-ta derived from /kuup-ət-ta/ 'to roast + Past + Ind,' *kər-ət-ta* from /kəət-ət-ta/ 'to walk + Past + Ind,' *či-ət-ta* from čiis-ət-ta 'to build + Past + Ind'. They belong to the so-called /p/-, /t/-, and /s/-irregular verbs, and these segmental changes are ignored in this paper.

kiw-ət-ta	'to patch + Past + Ind'
təw-ət-ta	'to be warm + Past + Ind'
kər-ət-ta	'to walk + Past + Ind'
mur-ət-ta	'to ask + Past + Ind'
pur-ət-ta	'to increase + Past + Ind'
sir-ət-ta	'to load + Past + Ind'
nur-ət-ta	'to burn + Past + Ind'
či-ət-ta	'to build + Past + Ind'
ču-ət-ta	'to pick up + Past + Ind'
na-at-ta	'to get well + Past + Ind'
ča-at-ta	'to weave + Past + Ind'
sal.m-at-ta	'to boil + Past + Ind'
čəl.m-ət-ta	'to be young + Past + Ind'
pal.p-at-ta	'to tread + Past + Ind'

Appendix C

sal-li-ta	'to live + Causative + Ind'
mil-li-ta	'to push + Passive + Ind'
əl-li-ta	'to freeze + Causative + Ind'
yəl-li-ta	'to open + Passive + Ind'
tʰəl-li-ta	'to dust off + Passive + Ind'
tol-li-ta	'to turn + Causative + Ind'
mol-li-ta	'to drive + Passive + Ind'
nəl-li-ta	'to spread out + Passive + Ind'
čul-i-ta	'to decrease + Causative + Ind'
čol-li-ta	'to doze + Passive + Ind'
k'ɨl-li-ta	'to drag + Passive + Ind'
pəl-li-ta	'to earn + Passive + Ind'
sim-ki-ta	'to plant + Passive + Ind'
nam-ki-ta	'to remain + Causative + Ind'
nəm-ki-ta	'to overflow + Causative + Ind'
tam-ki-ta	'to put in + Passive + Ind'
an-ki-ta	'to hug + Passive + Ind'
sin-ki-ta	'to put on (shoes) + Causative + Ind'
sip-hi-ta	'to chew + Passive + Ind'
us-ki-ta	'to laugh + Causative + Ind'
kup-hi-ta	'to roast + Passive + Ind'

kət-ki-ta	'to walk + Causative + Ind'
sit-ki-ta	'to load + Passive + Ind'
sa(l)m-ki-ta	'to boil + Passive + Ind'
pal.p-hi-ta	'to tread + Passive + Ind'

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