

A Two-Root Theory of Korean Geminate Consonants*

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Since the proposal of an autosegmental CV tier by McCarthy (1979), there have been debates regarding how to represent the length of segments to properly capture relevant phonological phenomena that are length-sensitive. Central among the different standpoints regarding this issue is the treatment of geminates. There have been largely two standard viewpoints of representing geminates; earlier versions of autosegmental phonology assume that the quantity of a segment is represented as a single melody unit linked on a skeletal tier composed of so-called timing units such as C's and V's, or simply X's. More recently, McCarthy and Prince (1986) and Hayes (1989) have contended that the skeleta of templatic morphology are solely composed of prosodic constituents such as foot, syllable and mora, but no use is made of a skeletal tier composed of C, V, or X.

Parallel to the development of the theories of skeleton, there has also been a development of the theories of feature structure. In earlier versions of autosegmental phonology, the feature content of a segment was represented on a melody tier as a simple distinctive feature matrix. However, it is now generally assumed that features are organized into a structured representation called feature geometry (Clements 1985). Although there are different opinions as to the detailed structure of the feature geometry, what is generally assumed is that a *root node* dominates all other features that specify a segment.

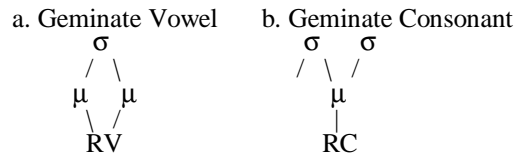
Putting together the theoretical development of featural representation and prosodic structure, Selkirk (1990) proposes a two-root theory of length. She basically accepts the McCarthy-Prince notion of the skeleton as constituted, in its lower reaches, by a syllable and mora structure, and lacking any representation of a skeletal tier. Incorporating the feature structure of Clements (1985), the root tier is the interface between feature structure and the prosodic

* I thank Gene Buckley and Rolf Noyer for helpful discussions on this issue. However, I alone am responsible for the arguments made in this paper and any remaining errors .

structure of the skeleton. Now, the arising question is how to represent the length in such framework.

Many of the proponents of moraic theory assume a one-root theory of length as follows:

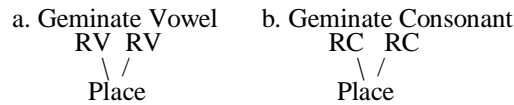
(1) One-Root Theory of Length



As in the above lexical representation (1b), geminate consonants consist of a single root node linked to a single mora, and the double-linking is produced by general rules of syllabification.

Alternatively, Selkirk (1990) contends that geminate entities involve two identical root nodes and some amount of shared feature specifications, including shared features for Place:

(2) Two-Root Theory of Length



In her representation, full geminates involve sharing of all features whereas partial geminates are structures where specifications for laryngeal features or nasality may differ in the two halves.

In this paper, adopting Selkirk's two-root theory of geminates, I will give an analysis of some geminate-related phonological phenomena in Korean. In section 1, I will briefly review the debates on the representation of the Korean tense consonant and will propose to see it a geminate. In section 2, I will go over some arguments of Selkirk in support of the two-root theory of length, and will apply it in explaining Korean degemination and post obstruent tensing. In section 3, the two-root theory of Korean fortis consonants will be strengthened with a more elaborated theory of the moraic tier in Korean. An account of /h/ related phonological phenomena will also be given. In section 4, I conclude that a two-root theory is better in representing the geminates and the separation of weight from length.

1. Korean Fortis Consonant

Korean obstruents show a three-way laryngeal surface contrast between plain, aspirated and tense. There have been two opposite views regarding proper representation of the underlying distinctiveness among these consonants. While many assume that Korean has a three-way underlying phonation contrast (Kim-Renaud 1974, Cho and Inkelas 1994, etc.), there also have been attempts to reduce the contrast to a binary one (Han 1992, Jun 1995, etc.).

Most works that assume the Korean tense consonant as singleton represent its distinctive laryngeal status with the [+constricted glottis] feature. However, in a cineradiographic study of Korean consonants, Kim (1970) provides a persuasive argument that the Korean tense consonant should not be treated as a glottalized consonant which involves an ejective aerodynamic mechanism in its pronunciation.

One of the strongest phonological arguments against the geminate analysis of the Korean tense consonant has been that it violates Korean syllable structure, which does not allow a consonant cluster in an onset. However, this constraint is a byproduct of the C/V or X theory. If we shift our representational theory to the system that does away with the timing slots, the only restriction on the onset position will be that it should be nonmoraic. As will be discussed in later sections, I assume that only sonorant geminates are moraic in Korean. Therefore, the existence of an obstruent geminate onset is no longer a problem. Under such a mora-based restriction on the distribution of onset, the absence of sonorant geminates in the onset position won't be a mere coincidence if it is moraic as will be argued in section 3.

Among the arguments for the geminate analysis of Korean tense consonants have been the following:

(3) Geminate Analysis of Korean Tense Consonants (Han 1992)¹

- a. morphological gemination: morphological tensification happens in co-compounds. Since sonorant consonants involve gemination in the same environment, tensification of obstruents can also be seen as gemination.

i) /i + mom/ → [immom] 'tooth + body → gum'
 ii) /so + caŋ/ → [soc'aŋ] 'call + paper → subphoena'

- b. surface fake geminates are phonetically identical to tense consonants

i) /tok + ki/ → [tok'i] 'poison + temper → vice'
 ii) /tok'i/ → [tok'i] 'ax'

¹ I have not listed other evidence that is not phonologically very interesting among her proposals.

Besides the above, there is also convincing acoustic evidence that the Korean tense consonant is geminate. That is, two of the important phonetic cues for the Korean tense consonant is its long closure duration intervocalically and its strong burst at the onset of voicing, which is also a typical phonetic cue for geminates cross-linguistically (Hume et al. 1997).

Based on the above, I will assume that the Korean tense consonant is a geminate and will give an analysis of some phonological phenomena involving Korean tense consonants based on this assumption. It will be shown that tense consonants related phenomena are best explained by the geminate analysis of tense consonants with two-root theory.

2. The Two-Root Theory of Length

Having defined the Korean tense consonant as a geminate, I will argue that its length is best represented using the framework of the two-root theory proposed by Selkirk (1990). In the following subsections, I will first go over some data and arguments supporting the two-root theory of length from Klamath. Then I will look at post-obstruent tensification from Korean and argue that it is best explained using the two-root theory, being the kind of rules that affect the feature content of just one half of a geminate.

2.1 Laryngeals in Klamath and Icelandic (Selkirk 1990)

The first argument for a two-root theory of length can be found in Steriade (1987a), where she presents evidence for the existence of rules which modify only half of a geminate. The following is an example which Selkirk names *laryngeal fission*.

In Klamath, obstruents are phonemically voiceless [p, t, c, k, q], voiced [b, d, j, g, G], and glottalized [p', t', c', k', q']. Within the rime, however, this distinction is neutralized. Selkirk proposes the following rule for this explanation:

(4) Klamath Laryngeal Neutralization

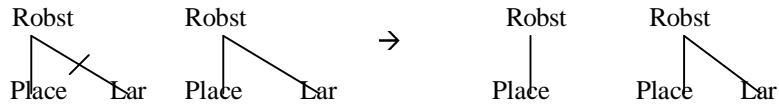
Rime
|
Robst
↓
Laryngeal

It is assumed that a default rule later fills in the voiceless plain value observed in this position.

When the rule applies to a heterosyllabic obstruent, it will produce a derivation like the following:

(5) Klamath Laryngeal Fission: Nongeminate Obstruent Clusters

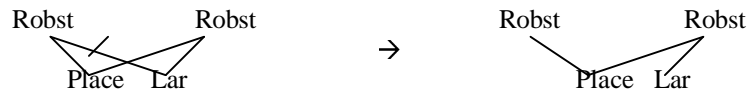
/p'k/ → [pk], /dk'/ → [tk']



Interestingly, the neutralization rule affects the first half of geminate consonants, too.

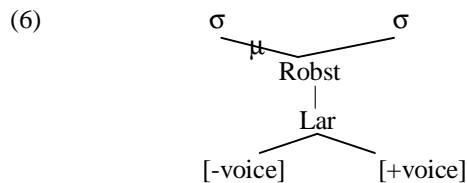
(7) Klamath Laryngeal Fission: Geminate Obstruent Clusters

/p'p'/ → [pp'], /dd'/ → [td]



In the above example, the first half of the geminate is neutralized and by default changed into a voiceless. In the proposed two-root analysis, each root node is separately specified for laryngeal features.

In an alternative one-root theory of the geminate, the dual laryngeal specifications should be assigned to a single root node.



In this approach, however, the problem of proper ordering of features arises. Drawing arguments from Sagey (1986) and Lombardi (1989), Selkirk argues that there is no independent basis for assuming that an ordering of feature specification is possible under the root node (i.e. *No-Feature-Ordering Generalization*). This problem could be obviated if universal principles could be called on to guarantee the proper ordering of the two laryngeal specifications in geminate obstruents (Kingston 1986). However, Selkirk points out that we are still left with the necessity of seeing the ordering of the laryngeal features in geminates and nongeminates in different terms, which is really the essential drawback.

Selkirk also gives an explanation of Icelandic preaspiration in terms of two-root theory. Icelandic preaspiration involves the delinking of aspiration from an underlying aspirated stop and a transfer of that aspiration to the preceding consonantal segment. Readers are referred to her original analysis due to space limitations, but the essential point is that a two-root representation of geminate stops permits preaspiration in geminates to be subsumed under the more general phenomenon of preaspiration in consonant clusters. With one-root theory of geminates, however, it becomes a mystery why geminates should pattern with consonant sequences. This point will be repeated with other similar phenomena from Korean in following sections.

2.2 Post Obstruent Tensification in Korean

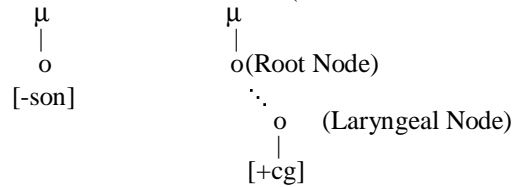
In Korean, there are several sources for the so-called ‘tense’ consonants. For example, the following /k/’s are identially realized as [k’]² at the phonetic level:

- (7) a. /tokki/ → [tok’i] ‘ax’
 b. /tok+ki/ → [tok’i] ‘poison + temper = vice’
 c. /top-ki/ → [topk’i] ‘help-nml’

(7a) is an underived word, while (7b) and (7c) are each derived by compounding and nominalization.

Proponents of the singleton analysis of tense consonants have argued that the tense *kk* [k’] in (7a) is underlyingly a singleton specified with a [+cg] feature, while the ones in (7b) and (7c) are derived by the following rule of Post Obstruent Tensification:

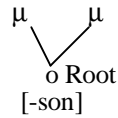
(8) Post Obstruent Tensification (Cho and Inkelas 1994)



Cho and Inkelas argue that the above rule faces a paradox if applied to geminates:

² Throughout the paper, this notation does not commit itself to any lexical status of the tense consonants but is used as a shorthand for representing phonetic ‘tense’ness.

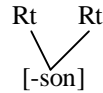
(9) Geminate



According to the Linking Constraint (LC, Hayes 1986), which interprets the association lines of a rule exhaustively, the POT rule (8) cannot apply to the geminate with the configuration as (9). Thus the LC incorrectly predicts no tensification of a geminate. Also, according to the Uniform Applicability Condition (UAC, Schein and Steriade 1986), it is not possible to insert the [+cg] feature only to the second half of a geminate. Therefore, UAC will also incorrectly block the tensification of geminate. Based on this line of argument, Cho and Inkelas contend to abandon the geminate hypothesis of Korean tense consonants rather than abandoning the LC and the UAC.

Note, however, that in the representational system of the two-root theory, the problems associated with the LC and the UAC do not arise. Since the representation has two linking lines under each Root node, the violation of the LC will not arise. Also, UAC is no longer a problem since one of the main advantages of the two-root theory was exactly aimed at this—altering featural content of only half of the geminate.

(10) Geminate in Two-root Theory



Thus, as in the Icelandic preaspiration case, a two-root representation of the tense consonant seems to permit the tensification of geminates to be subsumed under the more general phenomenon of POT.

However, the above paragraph which entails a possibility of analyzing the tensing of geminate and the POT as a unified phenomenon has a serious logical paradox. Recall that, adopting the two-root theory of Korean tense consonants, we decided to get rid of the [+cg] feature in Korean phonology since what makes the geminate sound ‘tense’ is not any featural specification under the laryngeal node at the underlying level, but a phonetic implementation. We cited Kim (1970) to support our intuition that [+cg] is not really a proper feature to represent the ‘tenseness’ of Korean tense consonants. Therefore, the POT analysis of geminate reinforcement which assumes an insertion of the [+cg] feature to the latter half of the geminate is not a viable analysis. The same is true with the POT of obstruent clusters.

If there is no [+cg] feature in Korean phonology, then, we are forced to come up with a new analysis of the POT that does not involve an insertion of the [+cg] feature. The ‘tenseness’ of underlying geminate consonants and the result of

POT seem to be at least an identical phonetic entity: they are indistinguishable both acoustically and perceptually (Han 1996). Then one possibility would be to think of the POT as a gemination process rather than tensification: in other words, we shift our focus from the featural specification to the segmental tier.

I suggest that the POT be seen as a Post Obstruent Gemination whereby the features of the right hand side obstruent spreads to the root node on its left in a concatenation of two obstruents, whether they be geminate or not.

- (11) Post Obstruent Gemination (phonological gemination³)
-

For example, in the obstruent sequence /ks/ in the following example, /s/ ends up with two root nodes via the gemination rule (11).

- (12) /c^hæksaŋ/ → [c^hæks'aŋ] 'desk'
-

Once the features of the obstruent /s/ is linked to two root nodes, the way it gets 'tense' is by phonetic implementation as in the case of underlying geminates.

3. Moraic Theory of Korean Consonants

In this section, we will turn our attention to the moraic tier to explain some phonological phenomena that are hard to explain at the segmental level.

As mentioned before, the lexical representation of a two-root theory itself does not make any commitment as to the status of geminate vowels and consonants in a syllable/mora structure. The moraification and syllabification of geminates is presumed to be accomplished by general principles and rules in the grammars of individual languages, and, therefore, the moraic status of geminates may vary from one language to another. In this way, two-root theory makes potentially different predictions from one-root theory (Selkirk 1990).

In the following subsections, I will examine the moraic status of Korean geminates with two phonological phenomena: degemination (3.1) and umlaut (3.2). Then I will also take a look at the moraic status of aspirated consonants in 3.3.

³ There is also a corresponding morphological gemination process in cocompounds as we've seen in section 1. It applies to both sonorants and obstruents, unifying the source of the 'tensing' from phonology and morphology.

3.1. Umlaut

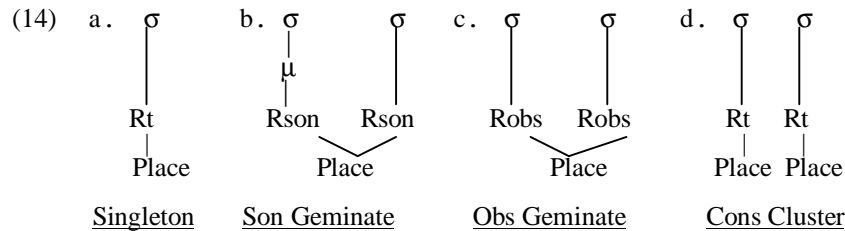
Lee (1993, cited in Tak&Davis 1994) argues that umlaut occurs only when the target and trigger are moraically adjacent.⁴ In the following, we see that umlaut occurs across a singleton consonant as in (13a), but does not occur across a geminate as in (13b). Interestingly, umlaut is not blocked for the tense consonants as in (13c), nor across consonant clusters as in (13d).

(13) Umlaut

a.	/t̥alimi/	→ [t̥ærimi]	‘iron’
	/m̥əki/	→ [m̥eki]	‘food’
b.	/all-i-/	→ [alli] (*[ælli])	‘notify’
	/t̥ʰəll-i-/	→ [t̥ʰəlli] (*[t̥ʰælli])	‘tremble’
c.	/ak̥’i-/	→ [æk̥’i]	‘dear’
	/t̥ʰok̥’i/	→ [t̥ʰök̥’i]	‘rabbit’
d.	/nampi/	→ [næmbi]	‘pot’
	/an-ki-/	→ [æŋgi]	‘be hugged’

These data are interesting in two respects. First, tense consonants in (13c) pattern with the singletons as in (13a) rather than the sonorant geminates in (13b). Meanwhile, they also pattern with the consonant clusters in (13d) rather than the sonorant geminates in (13b). Their patterning with both the singleton and consonant clusters appears to be paradoxical.

In a one-root theory of length, it becomes a mystery why geminates pattern with consonant clusters. However, in the two-root representational system of geminate combined with a language specific moraic projection theory, these data can be nicely explained. The following are illustrations of each of the four cases (13a)-(13d):



⁴ A better explanation for umlaut blocking could be found in the secondary articulation of the intervening consonant. Namely, the reason umlaut is blocked in ‘alli-’ and ‘mati’ is probably because of the palatalization of [l] and [t] (Hong 1997). However, since Lee’s explanation nicely fits with the analysis of degemination, I will accept his analysis for now.

With the the representational system as above, moraic adjacency of some of the examples are represented as follows:

- (15) a. $\begin{array}{c} \mu \quad \mu \\ | \quad | \\ a.ki \end{array}$ b. $\begin{array}{c} \mu\mu \quad \mu \\ | \quad | \quad | \\ a.l.li \end{array}$ c. $\begin{array}{c} \mu \quad \mu \\ | \quad | \\ ak.ki \end{array}$ d. $\begin{array}{c} \mu \quad \mu \\ | \quad | \\ nam.pi \end{array}$

In the above illustration, we can see that the moraic tier plays a crucial role and that umlaut is blocked in (15b) because /a/ and /i/ are not adjacent in moraic tier.

What the data of umlaut above shows us is that the weight (i.e. mora) and length do not necessarily coincide, but they could be separated from each other.⁵

3.2. Degemination

In Korean, certain suffixes impose prosodic requirements on stems to which they attach. One such case is degemination which occurs when the suffix /-ini/ attaches to a monosyllabic stem.

- (16) Degemination in Korean (data adapted from Tak & Davis 1994⁶)
- | | | | |
|----|-------------|--------------|------------------|
| a. | /sək̚-ini/ | → [sək̚ini] | 'decomposed-sfx' |
| | /s'ip̚-ini/ | → [s'ip̚ini] | 'chew-sfx' |
| b. | /coll̚-ini/ | → [cor̚ini] | 'nag-sfx' |
| | /kəll̚-ini/ | → [kə̞r̚ini] | 'filter-sfx' |
| | /null̚-ini/ | → [nur̚ini] | 'press-sfx' |
| c. | /tak̚'-ini/ | → [tak̚'ini] | 'wipe-sfx' |
| | /sək̚'-ini/ | → [sək̚'ini] | 'mix-sfx' |
| | /pok̚'-ini/ | → [pok̚'ini] | 'fry-sfx' |

The above examples illustrate that when a stem ending in a geminate /l/ is followed by the suffix /-ini/, it is degeminated (16b). If the obstruent tense consonants in (16c) are also geminate, then, we would expect the application of degemination there, too. However, on the contrary, we find that they pattern with the singletons as in (16a) rather than the sonorant geminates in (16b).

There are logically two possibilities to get around this problem. First, we could simply abandon the geminate hypothesis of the tense consonant and go back to the singleton analysis of it. However, since we have already seen convincing arguments for the geminate analysis of the tense consonant in section 2.2, this is not an attractive option. Alternatively, we could solve this

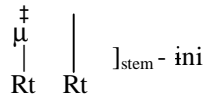
⁵ Further data illustrating the separation of weight and length can be found in Leti (Hume et al. 1997) and Trukese (Hart 1991).

⁶ Tak & Davis (1994) uses this phenomena to argue that the Korean tense consonant is a non-moraic singleton. In my analysis, they are still geminates, despite being non-moraic.

problem by turning to the representation of the moraic tier as in the previous section 3.1.

Following the moraic status of geminates as has been established in the previous section with umlaut, we could say that degemination applies only to moraic geminates, but not to nonmoraic geminates such as obstruent geminates. This could be more properly called, then, ‘demoraification’ and formally represented like the following:

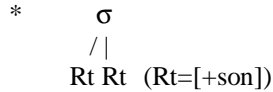
(17) Demoraification



Since it is only half of the geminate that is deleted, this phenomenon supports the two-root theory of geminate.

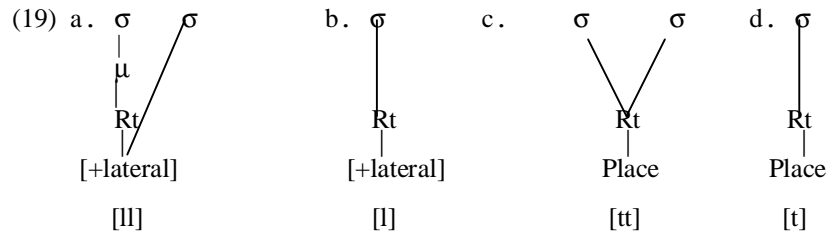
There might have to be an additional constraint, like the following, which prevents the floated root node from being linked to the following syllable.

(18) Constraint



Note that this constraint independently captures the fact that there is no sonorant geminate in onset position in Korean.

If geminates are represented in a one-root theory, the above explanation will face a problem. Given the moraic status of the sonorant and obstruent geminates assumed here, the representation of singletons and geminates in a one-root theory would be as follows:



In the above representation (19c), obstruent geminate appears as ambisyllabic in contrast to the singleton. However, Suh (1993) has argued that ambisyllabicity should be considered separately from geminates since Korean exhibit a case where singleton should be represented as ambisyllabic. His

argument is based on the following data of delateralization in syllable onset position:

- (20) Delateralization in Korean
- | | | |
|----------------|---------------|---------------------|
| a. /lakwən/ | → [nakwən] | ‘paradise’ |
| b. /sillakwən/ | → [sillakwən] | ‘paradise lost’ |
| c. /poklakwən/ | → [poŋnakwən] | ‘paradise regained’ |
| d. /solɪ/ | → [sori] | ‘sound’ |

His argument, in a nutshell, is that delateralization is blocked in (20b) and (20d) because they do not meet the structural description of the rule. Crucially, (20b) is explained best when treated as ambisyllabic.

Thus, with two-root representations of the singletons and geminate as in (14), we can save the argument of Suh (1993) for explaining delateralization as well as explaining other phonological phenomena.

As articulated by McCarthy & Prince (1986), one-root theory is a moraic theory of length; in lexical representation, long segments consist of a single root node linked to a single mora. However, the lexical representation of two-root theory does not make any commitment as to the status of geminate vowel and consonants in a syllable/mora structure. We have seen that this is an advantage of the representation system of the two-root theory which gives us the richness of a representational system to accommodate various sorts of relation between length and weight.

Note that one-root and two-root theories are couched within a representational system that does away with the X-tier. From the point of view of the theory of phonological representation, two-root theory could be seen as a revision of the early autosegmental theory where features of the melody are associated to two positions in a C/V or X tier. What distinguishes the conception of the root tier from the conception of C/V or X tier is that root nodes are understood to be part and parcel of the feature organization of the representation. On this view, the C/V tier is a proto-root tier, and properly belongs to feature structure (Selkirk 1990). Therefore, unlike in Clements (1985), it is not a well-formed representation to link the root node to the timing tier again. For example, it is not possible to doubly link a root node to two timing slots.

So far, we have seen that the umlaut and degemination phenomena can be well explained with a combined theory of two-root and moraic tier. In the following section, we will look at another mora-related phenomena from aspirated consonants of Korean.

3.3 Moraic phonology of Korean /h/ and aspirated consonants

This section is not directly related to the central issue of this paper, i.e. one-root vs. two-root theory of geminates. However, to give a full theory of moraic scale

in Korean consonantal phonology, I will illustrate some additional data involving /h/.

Compensatory lengthening has served as a good indication of the existence of the moraic tier in each language. In the following data, we see that instead of the deleted /h/, the vacancy can be filled in by a default vowel /i/ or by spreading the following consonant /n/.

(21) Compensatory Lengthening

- a. /olh-ni/ → [olini] 'be right-Q'
 b. /noh-ni/ → [nonni] 'put-Q'

Although the above could also be represented in a X-tier theory, Hayes (1989) argues that moraic structure permits a more natural account of the compensatory lengthening process, which occurs mostly when something in the rime is deleted.

On the assumption that /h/ is moraic in Korean as is seen in the compensatory lengthening fact in (21), we can now ask what the moraic status of an aspirated consonant is. The following data show some /h/ related phonotactic facts:

- (22) a. /coh-ta/ → [cott^ha] 'good-ending'
 b. /coh-ni/ → [conni] 'good-Q'
 c. /coh-so/ → [cosso] 'good-ending'

First, note that under one-root theory of Korean tense consonants, the data (22c) has been a problem since, although the phonetic realization seems to conform to the POT, the triggering segment /h/ has never satisfactorily reached a unanimous agreement that it is an obstruent. However, by attributing the 'tenseness' to the phonetic implementation of the obstruent geminate as suggested by the phonological gemination rule (11), (22c) can get a natural account by spreading the features of /s/ under the root node of /h/.

To illustrate, let us assume that the onset spreads to the root node of /h/ and vice versa at a morphological boundary.

- (23) a.
$$\begin{array}{c} \mu \\ | \\ \text{Rt}]_{\sigma} \quad \text{Rt} \\ | \quad \diagdown \\ \text{Lar} \quad \text{Place} \end{array}$$
 b.
$$\begin{array}{c} \mu \\ | \\ \text{Rt}]_{\sigma} \quad \text{Rt} \\ | \quad \diagdown \\ \text{Lar} \quad \text{Place} \end{array}$$


(23a) illustrates the process happening in (22a) and (22c), and (23b) illustrates the one in (22b). In (23a), laryngeal feature can be licensed by the onset of the following syllable and it survives to the surface realization. However, in (23b),

since /n/ cannot have a laryngeal node, it cannot be licensed by the onset of the following syllable, and deletes.

Note that one consequence of the above explanation is that derived aspirated consonant /t^h/ and geminates such as /ss/ and /nn/ are now moraic. This seems to be true when we see the following data:

- (24) a. /noh-ki/ → [nok^hi] *[nök^hi] ‘put-nml’
 /nah-ci/ → [nac^hi] *[næc^hi] ‘bear-conj’
 b. /cap-hi/ → [cæp^hi] ‘catch-passive’
 /cəc-hi/ → [cec^hi] ‘push-causative’

Although phonetically identical, the derivational process of the aspirated consonants are different in the data (24a) and (24b). Namely, the aspirated consonants in (24a) are derived by the process in (23a), where the underlying mora of the coda /h/ is inherited by the output consonant. However, the aspirated consonants in (24b) are nonmoraic since their aspiration comes from a nonmoraic /h/ in the onset position, as illustrated in the following (25):

- (25) Rt]_σ Rt
 
 Place Lar

To sum the discussion of this section, the following have been argued to be moraic in Korean:

- (26) vowel, sonorant geminate, /h/, derived aspirate and geminate consonants involving moraic /h/

4. Conclusion

In this paper we have seen several phonological phenomena that are problematic when represented with a system that is solely dependent on the length of the segments, such as C/V or X theory, or on the weight of the segments, such as the one-root version of the moraic. Using the two-root theory of length by Selkirk (1990), which leaves the moraicification and syllabification of geminate open to be accomplished by general principles and rules in the grammars of individual languages, I have shown that such phonological phenomena can be nicely explained without a further costly complication of the representational system. Specifically, I have argued that Korean tense consonants should be seen as underlyingly nonmoraic geminates, whose phonetic implementation is achieved by a general rule of post-obstruent

tensification. Such a representational definition of Korean tense consonants as has been applied in explaining umlaut and degemination of Korean is expected to further clarify other phonological phenomena that involve either length or weight or both.

References

- Cho, Y-M, and S., Inkelas. 1994. "Post obstruent tensification in Korean and geminate inalterability", in Kim-Renaud (ed), *Theoretical Issues in Korean Linguistics*, CSLI
- Clements, G. 1985. "The geometry of phonological features", *Phonology* 2: 223-250
- Han, J-I. 1992. "On the Korean Tense Consonants and Tensification", *CLS* 28: 206-223
- Han, J-I. 1996. *The Phonetics and Phonology of 'Tense' and 'Plain' Consonants in Korean*, Cornell dissertation
- Hart, M. 1991. "The moraic status of initial geminates in Trukese", *BLS* 17
- Hayes, B. 1986. "Inalterability in CV phonology", *Lg* 62, 3221-251
- Hayes, B. 1989. "Compensatory lengthening in moraic phonology", *LI* 20.2
- Hong, S-H. 1997. "Palatalization and umlaut in Korean", *UPenn Working Papers in Linguistics* 4.3: 87-133
- Hume, E, M. Jennifer, and A. Engelenhoven. 1998. "Nonmoraic geminates in Leti", *Phonology* 15
- Jun, J. 1994. "Metrical weight consistency in Korean partial reduplication", *Phonology* 11.1: 69-88
- Kim, C. 1970. "A theory of aspiration", *Phonetica* 21: 107-116
- Kim-Renaud, Y-K. 1974. *Korean consonantal phonology*, UHawaii doctoral dissertation
- Kingston, J. 1986. *The Phonetics and Phonology of Timing of Oral and Glottal Events*, UC Berkeley dissertation
- Lee, Y-S. 1993. *Topics in the Vowel Phonology in Korean*, Ph.D. Dissertation, Indiana Universtiy
- Lombardi, L. 1990. "The nonlinear organization of the affricate", *NLLT* 8.3: 375-425
- McCarthy, J. 1979. *Formal Problems in Semitic Phonology and Morphology*, Garland, NY
- McCarthy, J and A. Prince. 1986. "Prosodic morphology", ms., Brandeis University
- Sagey, E. 1986. *The Representation of Feature and Relation in Nonlinear phonology*, MIT doctoral dissertation
- Schein, B. and D., Steriade. 1986. "On geminates", *LI* 17: 691-744
- Selkirk, E. 1990. "A two-root theory of length", *UMOP* 14
- Suh, C-K. 1993. "Ambisyllabicity in Korean: evidence from *Melisoli Kyuchik* (Word-initial Avoidance)", *Harvard Studies in Korean Linguistics*, Hanshin, Seoul
- Tak, J. and S. Davis. 1994. "A reanalysis of Korean tense consonants", *CLS* 30: 405-417

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