

Paradigmatic Uniformity and Contrast: Korean Liquid Verb Stems*

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ABSTRACT The recent literature on paradigms has uncovered two forces that pull a morpheme in different directions, often contravening a language's normal phonological processes and constraints. Paradigm Uniformity (PU) optimizes for the same stem/affixal shape through a range of morphosyntactic contexts while Paradigmatic Contrast (PC) strives to maintain some minimal distance between morphemes. In this paper we apply these notions to the analysis of a much-discussed class of irregular verbs in Korean.

1. Background

Korean is a CVC language with severe restrictions on the coda. As in Japanese, both stems and suffixes alternate in order to conform to these syllable structure requirements so that an optimal CV(C) structure emerges when morphemes are combined. In addition, two more particular phonotactic restrictions are at play in the data we describe. First, Korean bans the combination of a liquid and coronal nasal [l+n] (as well as [n+l]) and repairs these sequences in various ways depending on the morphological context (see H. Sohn (2006) for recent discussion). Second, a liquid plus [s] sequence is avoided in compounds and inflections by deletion of the liquid: cf. *pul* 'fire', *sap* 'shovel', *pu-sap* 'fire-place shovel'.

In the verbal inflection the suffixes that can immediately follow the verb stem are traditionally divided into those that start with a vowel vs. a consonant (H-M. Sohn 1999). Just two vowels characterize the first set: [ʌ] ≈ [a] (reflecting mid-low vowel harmony) and the minimal vowel [ɨ], which we shall refer to hereafter as "schwa". The consonant-initial suffixes are more varied, drawing on three places as well as diverse manners of articulation. Included in the latter are suffixes that come in allomorphic pairs showing a CCV... shape after a vowel-final verb stem and a *nɨ* or *sɨ* augment after a consonant-final stem. The following data (taken from Choi (2004), based on H-M. Sohn (1999)), illustrate. The three classes of suffixes are shown in (1).

- (1) a. ʌ/a, ʌ/ala, ʌ/asʌ, ʌ/ataka, ʌ/ato, ʌ/ayo
b. ɨlla, ɨllay(-yo), ɨl, ɨlke(yo), ɨlyʌko, ɨm, ɨma, ɨmyʌn, ɨmse, ɨn, ɨna, ɨni, ɨnikka, ɨo, ɨpsita, ɨsi, ɨsipsio
c. ca, ci, ci(yo), ciman, kʌtɨn, ke (Fam.), ke, ki, ki wihesʌ, ko (inf.), ko, ko(se), kun(yo), na, ne (Fam), ne(yo), ni, nɨlako, nɨla-myʌn, nɨn, (nɨ)nka, (nɨn)ta, (nɨ)nte, nɨnya, nya, (sɨ)pnikka, (sɨ)pnita, se, so/o, ta, taka, tʌlato, tolok, tɨnci

While one might be tempted to treat the schwa of the V-initial suffixes in (1b) as epenthetic, such an analysis is challenged by the fact that the same consonant types [n] and [s] appear in the *ɨ*-initial class as well as in the C-initial class (1c). We therefore follow the consensus in the literature (e.g. Ahn 1998) and assume that the schwa is present in the input of (1b) and is deleted after vowel-final verb stems as a hiatus resolution strategy.

In (2) we illustrate the combinations of a consonant-final stem *cap-* 'catch' and a vowel-final *ca-* 'sleep' followed by representatives of the three relevant classes of suffixes: *a*-initial (1a), schwa-initial (1b), and consonant-initial (1c).

(2) a.- /a initial suffix		
cap-a	ca	infinitive
cap-as'-ta	ca-s'-ta	past
cap-ala	ca-la	imperative
b. schwa-initial suffix		
cap-in	ca-n	relative
cap-isi-ta	ca-si-ta ¹	honorific
cap-ɪl	ca-l	future relative
cap-ɪlʌ	ca-lʌ	objective (in order to)
cap-ini	ca-ni	effective (as a result of)
cap-ɪmyʌn	ca-myʌn	conditional
cap-iso	ca-so	propositive (why don't you V)
cap-ina	ca-na	adversative (you V but)
cap-ɪmɪlo	ca-mɪlo	having Verb therefore
c. consonant-initial suffix		
cap-ta	ca-ta	indicative
cap-ko	ca-ko	conjunctive (Verb and)
cap-tolok	ca-tolok	projective (so as to Verb)
cap-tʌlʌ	ca-tʌlʌ	retrospective (they were Ving)
cap-ni	ca-ni	interrogative
cap-ca	ca-ca	let's V
cap-nɪlako	ca-nɪlako	because V
cap-ne	ca-ne	indicative
cap-se	ca-se	propositive (let's V)

2. Liquid Stems

We now turn to focus of our study--stems ending in a liquid. There are c. 94 stems of this type, making them the largest class of consonant-final stems. They display a distinct pattern of alternation that has earned them the designation "l-irregular verbs". The "l-irregular verbs" have been the subject of several recent studies (Kim 2003, Choi 2004, Oh 2000, 2006, Kang 2006, and Kim 2007). These verbs are peculiar in that they behave like vowel-final stems as far as the suffixal schwa deletion process is concerned. That is to say, the schwa that appears after the consonant-final stem in the suffixes of (1b) is systematically missing after the stems ending in a liquid. The stem /sal-/ 'dwell' with samples of the three classes of suffixes is given in (3). Note the absence of schwa in (3b).

(3) a.	sal-a	b. sal-myʌn ← /sal-ɪmyʌn/ (cf. cap-ɪmyʌn)	c. sal-ta
	sal-as'-ta	sal-lako /sal-ɪlako/	sal-ko
	sal-ala	sa-ni /sal-ɪni/	sa-nɪlako
		sal-lʌ /sal-ɪlʌ/	sal-ca
		sa-so /sal-iso/	sal-tolok
		sal-mɪlo /sal-ɪmɪlo/	sa-ne
			sa-se

Various forms in (3) show the imposition of the constraint against *l+n* and *l+s* clusters. The strategy to respect the ban on *l+n* and *l+s* clusters is deletion rather than epenthesis (or feature

change), motivating a Markedness, Ident-F, Dep-V >> Max-C constraint ranking in an OT grammar. The deletion applies to an underlying cluster (/sal-ne/, /sal-so/) as well as to one that results from the loss of the suffixal schwa: cf. *sa-ni* < /sal-*ini*/, *sa-so* < /sal-*iso*/. The fact that it is the first segment in the illegal cluster that is deleted rather than the second follows the familiar pattern of cluster resolution studied in Côté (2000) and Wilson (2001).

(4)

/sal-ne/	*l+n	Dep-V	Max-C
sal-ne	*!		
>sa-ne			*
saline		*!	

While the liquid deletion site for the suffixal schwa might be viewed as simply an extension down the sonority hierarchy from vocoids to approximants (as suggested by Choi (2004)), an alternative explanation is available.²

Korean has a relatively large class (N=59) of verb stems that end in a liquid plus schwa. The vast majority (49) display the inflectional pattern of *tali-* 'to differ' which we show in (5) in a sample of the three suffixal contexts of (2) and compared with the liquid stem *sal-* 'to dwell'.

- (5) a. tall-a sal-a
 tall-as'-ta sal-as'-ta
 b. tali-milo sal-milo
 tali-lako sal-lako
 tali-ni sa-ni
 c. tali-ko sal-ko
 tali-ta sal-ta
 tali-nilako sa-nilako

Two phonological changes are observed. First, the final schwa of the *li* stems is missing before a vowel-initial suffix such as the past tense (5a). This is an expected reflex of hiatus resolution eliminating the weaker schwa vowel even though it belongs to the stem. But in precisely the contexts where the schwa is dropped, another, more quirky change occurs: the liquid geminates. Thus, underlying /tali-as'-ta/ maps to [tall-as'-ta]. In (6) we show the input-output pairings for a verbal form drawn from each of the suffixal classes in (5). The two stem classes contrast happily before consonants (6c). Before schwa-initial suffixes they become ambiguous (6b) with a [li] sequence that parses as /li-/ vs. /l- i/. But thanks to schwa deletion they remain distinct in the output. Finally in (6a), where a hiatus repair threatens to merge the classes, the overlap is avoided by gemination.

- (6) a. tall-a ← /tali-a/ sal-a
 b. tali-myΔn /sal-imyΔn/ → sal-myΔn
 c. tali-ko sal-ko

Our idea is that the post-liquid suffixal schwa deletion (6b) as well as the gemination of the stem liquid (6a) are maneuvers the phonology makes in order to keep the two stem classes (*l* stems vs. *li* stems) distinct in the output. The motivation is lexical access. If the grammar were left to its own devices, roughly 150 Korean verbs would surface with a [...liC...] sequence in the paradigm cells occupied by the (1b) class of suffixes that must be arbitrarily parsed with the schwa as either

part of the verb stem or as part of the suffix in order to recover the underlying /li/ vs. /l/ stem and enter the lexicon. A similar ambiguity arises before the (1a) suffixes due to hiatus resolution where /tal-a/ should surface as *tal-a* (cf. *sal-a*). It does not seem surprising that the morphophonology may cooperate in this procedure. The paradigmatic constraint in (7) expresses this idea.

- (7) Unique Parse: a liquid-vowel (more generally C-V) sequence at the stem-suffix juncture in the output cannot correspond to distinct input strings (different morphemic parses or different input segments)

As with the constraints of Paradigm Contrast discussed by Crosswhite (1997), Kenstowicz (2002, 2005), Ito and Mester (2004), and others, an Anti-Merger constraint will block convergent input-output mappings. But it does not tell which of the two competing mappings will be repaired. For the case at hand the repairs employed minimize the overall variation in the two morpheme classes involved and hence fall under the rubric of Paradigm Uniformity (PU). Deletion of the schwa in *-imyΛn* merely extends the distribution of an existing alternant beyond what is called for by hiatus resolution and so does not add any new variation to the suffixal paradigm. And while deletion of the liquid in *sal-* would also extend the range of an existing variant (cf. *sa-ne*), this move leads to a hiatus and will be excluded for independent reasons. As for the disambiguation of the two stem classes in the (1a) cells of the paradigm, the gemination seen in *tall-* is a minimal difference of one segment from *tali-* that maintains the same moraic count while satisfying hiatus.³

The tableaux below sketch the analysis. First we show the violation profile for a completely uniform paradigm where the stems and suffixes fail to alternate (8a). It violates the various phonotactic constraints against hiatus and the liquid-nasal sequence. In (8b) we see the paradigms that would occur if the grammar were left to its own devices to satisfy the phonotactics. It incurs two violations of Uniform Parse.

- (8) input / stems: *tali*, *sal*; suffixes: *a*, *imyΛn*, *ne*/

a.

	Phonotactics	PU
<i>tali-a</i> <i>sal-a</i>	*	
<i>tali-imyΛn</i> <i>sal-imyΛn</i>	*	
<i>tali-ne</i> <i>sal-ne</i>	*	

b.

	Phonotactics	UP	PU	Max
<i>tal-a</i> <i>sal-a</i>		*	*	*
<i>tali-myΛn</i> <i>sal-imyΛn</i>		*	*	*
<i>tali-ne</i> <i>sa-ne</i>			*	*

In (9) we show how within the space circumscribed by the regular phonotactics, PU regulates the choice among the allomorphs that constitute the quirky changes to satisfy Unique Parse. First, we look at some options in the (1b) cells of the paradigm.

(9)

	phonotactics	UP	PU	Max
> A. tall-a sal-a			*	*
tali-myΛn sal-myΛn				* *
tali-ne sa-ne			*	*
cap-i-myΛn			*	
B. tall-a sal-a			*	*
tali-myΛn sa-i-myΛn	*!		*	* *
tali-ne sa-ne				*
cap-i-myΛn			*	
C. tall-a sal-a			*	*
tal-myΛn sal-i-myΛn			*!	* *
tali-ne sa-ne			*	*
cap-i-myΛn			*	

The first paradigm (9a) is the winner. We must show that its quirky changes are minimal in comparison to alternatives. First, all three paradigms have equivalent violations of PU by virtue of deleting the schwa from the (1b) suffix when compared to its faithful realization in a regular consonant-final stem like *cap-i-myΛn*. In (9b) we see an alternative repair in which the liquid is deleted from the stem /sal-/ in order to contrast with *tal-i-myΛn*. While this alternative does not earn any additional PU violations since the *sa-* alternant occurs in *sa-ne*, it does incur a phonotactic violation (hiatus) and so loses to (9a). (If hiatus is satisfied by additional deletion (*si-myΛn*) it still loses to (9a) at Max). In (9c) UP is satisfied by deleting the schwa from /tali-/. This alternative is blocked at PU since now the stem has three distinct alternants: *tall-*, *tal-*, and *tali-*.

The tableaux in (10) compare gemination sites in order to satisfy Unique Parse in the (1a) cells of the paradigm. Once again PU chooses the correct alternative: geminating /sal-/ introduces a distinct stem alternant while geminating /tali/ economizes on PU by changing a cell that already departs from the input in virtue of hiatus avoidance.

(10)

	PU	Dep-Mora	Max
>A. tall-a sal-a	*	*	*
tali-myΛn sal-myΛn			* *
tali-ne sa-ne	*		*
B. tal-a sall-a	* *!	*	*
tali-myΛn sal-myΛn			* *
tali-ne sa-ne	*		*

To summarize, two quirky sound changes occur in order to keep the liquid-final and *li* final stem classes distinct in the verbal inflection. First, before the *a/Λ*-initial suffixes of (1a) the liquid of the *li* class geminates in the wake of hiatus-resolution. Second, the schwa-initial suffixes of (1b) drop their schwa after the liquid stems. No change is required before the consonant-initial suffixes of (1c).

3. Innovations

In the course of the past several decades two innovations in the speech of many younger Korean speakers have appeared that have a significant bearing on the analysis of the liquid verbs. In the Seoul dialect the innovations affect the liquid as well as the *li* stem classes.

In the first change the geminated lateral that is found in the prevocalic contexts for the *li* stems is generalized through the paradigm.

(11)	<u>Innovating</u>	<u>Conservative</u>
a.	tall-a tall-as'-ta	tall-a tall-as'-ta
b.	talli-milo talli-lako talli-ni	tali-milo tali-lako tali-ni
c.	talli-ko talli-ta	tali-ko tali-ta

Following Kang (2006), we will assume that this leveling reflects a reanalysis in which the stem form appearing before the *a*-initial (1b) suffixes is taken to reflect the underlying representation (analogous to the isolation form in the nominal inflection). Kang notes that while various other properties of the stem allomorph appearing before the *-a* suffixes tend to be leveled, the generalization of liquid gemination is more widespread and systematic.

We can now ask what effect the leveling of gemination in the *li* class will have on the liquid stems such as *sal-* 'dwell'. Recall that the original motivation for the deletion of the suffixal schwa after the liquid stems is to keep this verb stem class distinct from the *li* class. But given that the geminate has been leveled through the paradigm, the *li* stems are now distinct from the liquid stems across the board. Consequently, the quirky post-liquid suffixal schwa deletion loses its motivation. In fact, the innovative speech style suppresses suffixal schwa deletion. In her recent discussion of the phenomenon, Choi (2004) distinguishes two variant speech forms in this regard. In the first (her variant A), the liquid stems are effectively reclassified as (the expected) consonant-final so that the deleted schwa from the schwa-initial suffix class reemerges in the output. For this variant Choi reports the stem shapes in (12) for the various suffix classes.

(12)	<u>Conservative</u>	<u>Innovative (style A)</u>
a.	sal-as'-ta sal-ala	sal-as'-ta sal-ala
b.	sal-myʌn sa-nikka	sal-i-myʌn sal-i-nikka
c.	sal-ko sa-ne	sal-ko sa-ne

The restoration of the schwa in the (1b) class of suffixes is predicted by the analysis of the preceding section, as shown by the tableau in (13). Given that the stem of the *li* class has been restructured to contain the geminate in the input (effectively becoming a new *lli* class), UP (Uniform Parse) is satisfied in every paradigm cell. As a result the Max-V constraint steps in to restore the schwa and the faithful candidate (13a) is now the winner.

(13) input /stems: tall̩, sal; suffixes: -a, -imyΛn, ko /

	UP	PU	Max-V
>A. talla sala		*	*
tall̩imyΛn sal̩imyΛn			*
tall̩iko salko			
B. talla sala		*	*
tall̩imyΛn salmyΛn			* *!
tall̩iko salko			

One of the side-effects of the leveling of *l*-gemination and restoration of the schwa in the class (1b) suffixes is that the process of *l*-deletion before the *-n* and *-s* suffixes such as *sa-ni* < /sal-*ini*/ and *sa-so* < /sal-*iso*/ in the conservative dialect is curtailed. The result is an extension of the *sal-* allomorph through the cells occupied by the (1b) class: *sal-*ini**, *sal-*iso**. This follows because the lower-ranked Max-C will now penalize *l*-deletion in favor of the more faithful realization of the verb stem.

(14) input /stems: tall̩, sal; suffixes: -ini /

	UP	*l+n	Max-C
>a. tall̩ini sal̩ini			
b. tall̩ini salni		*!	
c. tall̩ini sani			*!

In the second innovation, termed by Choi (2004) (Variant B) and characterized as "more radical", the *sal-* alternant is extended through the remaining (1c) classes of suffixes by calling on a new repair of schwa epenthesis to still respect the phonotactic ban on *l+n* and *l+s*. Note that epenthesis is not extended to phonotactically legal sequences such as *sal-ko*, *sal-ta*.

(15) Schwa-initial suffixes (1b)

sal-*imyΛn*
sal-*inikka*

Consonant-initial suffixes (1c)

sal-*ine*
sal-*ise*
sal-*ko*
sal-*ta*

The tableaux below show the analysis of the more radical style. In the first two stages (Conservative and variant A), Paradigm Uniformity is below the Dep-V >> Max-C ranking from (4) that resolves the *l+n* and *l+s* phonotactic bans by deletion. But in Stage 3 (the more radical variant B), PU rises above the faithfulness constraints Dep-V and Max-C to promote the uniform *sal-* stem shape. The result is that a vowel (the minimal schwa) is inserted. No epenthesis occurs before other consonant-initial suffixes since here the *sal-* stem shape surfaces intact and so any additional epenthesis will be ruled an unnecessary departure in faithfulness to the input. Finally, note once again that this analysis is possible because the leveling of the *l*-gemination has made the *l̩* verbs distinct so /sal-*ne*/ is free to become *sal-*ine** without colliding into *tall̩-*ine**. The Dep-V >> Max-C ranking is still required to enforce *l*-deletion as the repair for the phonotactic ban on *l+n,s* in other contexts such as compounds.

(16) Stage 1,2

/sal-ne/	*l+n	Dep-V	Max-C	PU
salne	*!			
>sane			*	*
saline		*!		
cf. sal-a				

Stage 3

/sal-ne/	*l+n	PU	Dep-V	Max-C
salne	*!			
sane		*!		*
>saline			*	

/sal-ko/	*l+n	PU	Dep-V	Max-C
>salko				
sako		*!		*
saliko			*!	

4. Dialectal Variants

It is noteworthy that the extension of *l*-gemination is not found in the Kyungsang dialect, which restricts gemination to the (1a) context.

- (17) a. tall-as'-ta
 tall-a
 tall-ala
 b. tali-ni
 tali-nilako
 tali-milo
 tali-la
 c. tali-ta
 tali-ko

Since this dialect does not level liquid doubling, the motivation for suffixal schwa deletion in the liquid verbs like *sal-* 'dwell' is still present. This fact precludes an extension of the *sal-* alternant by epenthesis as seen in the Seoul dialect (13). In fact, we find a different leveling in Kyungsang: the alternative stem allomorph with the deleted liquid is being extended through the paradigm. This extension takes place in two stages. In the first, liquid deletion is generalized to all of the (1b) suffixes except those where the liquids of the stem and suffix have fused into a geminate. In the second stage it is extended to all consonant-initial suffixes. Liquid deletion is still blocked before a vowel since otherwise a hiatus violation would be incurred: regular phonology >> UP/PU.

(18)	<u>Conservative</u>	<u>Stage 1</u>	<u>Stage 2</u>
a.	sal-as'-ta	sal-as'-ta	sal-as'-ta
	sal-a	sal-a	sal-a
b.	sa:-ni	sa:-ni	sa:-ni
	sa:-ni ^l ak	sa:-ni ^l ako	sa:-ni ^l ako
	sa:l-mi ^l o	sa:-m ^l i ^l o	sa:-m ^l i ^l o
	sa:l-l ^l	sa:l-l ^l	sa:-l ^l
c.	sa:l-ta	sa:l-ta	sa:-ta
	sa:l-ko	sa:l-ko	sa:-ko
	sa:-se	sa:-se	sa:-se

Assuming that the same basic constraints are in force in the Kyungsang dialect, (19) shows the analysis for the conservative stage. Unique Parse forces deletion of the schwa and the phonotactic constraint $*l+n$ is satisfied by l -deletion, violating lowest ranked Max-C. Max-C will protect superfluous deletion of the liquid in *sa:lm^lilo*.

(19)

/sa:l- <i>i</i> ni/	* $l+n$	UP	Max-V	Max-C
sa: ^l ini		*!		
sa:lni	*!			
> sa:ni			*	*
/sa:l- <i>i</i> mi ^l o/				
sa: ^l imi ^l o		*!		
> sa:lm ^l o			*	
sa:m ^l o			*	*!
/sa:l- <i>ne</i> /				
sa:rne	*!			
> sa:ne				*

Now suppose that PU rises above Max-C. The undominated phonotactic constraints against hiatus and the phonotactic $*l+n$ will still enforce departures from complete uniformity. But the remaining slots in the paradigm can now be faithful to either the *sal*- variant found in the hiatus contexts or to the *sa:-* variant that appears before [n] and [s]. Other things being equal, we expect the larger class to prevail (a kind of "majority rules" effect discussed by McCarthy 2005). The fact that the *sa:-* variant is being extended suggests that the latter class is larger. In fact, the inventory in (1) indicates that there are more suffixes with n and s in (1b,c) than there are suffixes beginning with a low vowel (1a). Forms like /sal-*i*mi^lo/ and /sal-ko/ are therefore attracted to the *sa:-* allomorph.

(20)

/sa:l- <i>i</i> mi ^l o/	* $l+n$	UP	PU	Max-C
sa: ^l imi ^l o		*!		
sa:lm ^l o			*!	
sa:m ^l o				*
/sa:l- <i>ko</i> /				
sa:lko			*!	
> sa:ko				*

5. Summary and Conclusions

The obvious question the analysis presented in section 2 raises is why the liquid stems are singled out for such special treatment in Korean verbal inflection? The answer is suggested by the table in (21) showing the counts for verb stems that end in a consonant vs. those ending in the same consonant plus schwa.⁴ Recall that the entire analysis hinges on the phonology making special moves in order to prevent the merger of these two classes so as to promote efficient affix stripping and lexical access. It is evident that the liquid stems stand out in both their relative frequency and the more balanced distribution between the two classes. In other words, in all other classes except the liquid, the speaker of Korean can be relatively confident whether the stem ends in a lexical consonant or a schwa on the basis of the surface consonants themselves. It would be interesting to do a lexical access/reaction time study to see whether these differences actually play a role in lexical access. In addition, one wonders whether schwa deletion is ever an option for more balanced classes such as *ph(i)* and *s*(i)*. These are tasks for future research.

(21)	<u>VC-</u>	<u>VCi-</u>
l	94	59
p	63	0
t	30	0
h	24	0
c	23	0
k	22	2
m	19	0
s	18	0
th	13	0
ps	12	0
k*	10	1
lh	9	0
nh	9	0
lk	8	0
ph	7	5
lm	6	0
lp	5	0
lth	2	0
p*	0	3
s*	3	6
nc	3	0
n	1	0
ch	1	0
lph	1	0
kh	0	2
t*	0	5

Notes

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¹ While morphologically correct, the honorific of 'sleep' and a few other verbs has a special lexical substitute, in this case *cumu-si-ta*.

² The instrumental/locative suffix *-ilo* of the nominal inflection deletes its schwa after a liquid as well as after a vocoid.

<u>citat.</u>	<u>acc.</u>	<u>instr.</u>	
nuna	nuna-lil	nuna-lo	'sister'
cip	cip-il	cip-ilo	'house'
khal	khal-il	khal-lo	'knife'

On the strength of this case one might conclude with Choi (2004) that the suppression of schwa after a liquid is a more general process in Korean: **li*. We are dubious about this move. For one thing this outcome must be blocked in the accusative: *khal-il*. More importantly, the deletion of schwa in the instrumental remains unchanged in the dialects and speech styles that curtail schwa deletion in the verbal inflection (see below). This suggests that deletion in the instrumental is a separate phenomenon from deletion in the verbal inflection.

³ Chiyuki Ito (p.c.) informs us that the geminate derives from a *l+ɣ* cluster in Middle Korean for many of these stems. While the [ɣ] might have functioned as the consonantal glide variant of the [ɨ], we assume that in the current grammar the second half of the geminate and the [ɨ] are not correspondents of one another.

⁴We are indebted to Chiyuki Ito for these counts taken from the King Sejong corpus.

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