

## Lexical Phonology in Korean Epenthetic-s Phenomenon

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Compound nouns in Korean often surface with an inserted consonant which is not present in either of the constituent nouns in isolation. The emergence of the consonant is conditioned by the morphological and phonological relationship between the constituents of a compound. This phenomenon has been traditionally called sai sios, translated by Martin (1954:55) as 'Epenthetic-s' or 'Bindungs-g.' It has been the center of attention in Korean phonology for the past 40 years ( Lee S-N 1954, Huh 1965, Kim-Renaud 1974, Y-S Kim 1984, J-M Kim 1991, among others). The purpose of this paper is to argue that the rule of Epenthetic-s must apply to the lexicon and thus to provide a crucial piece of evidence for the theory of Lexical Phonology.

The theory of Lexical Phonology has been proposed by Mohanan(1982) and extended by Kiparsky(1982), Pullyblank(1983), Kiparsky(1985), Mohanan(1986), etc. The heart of this theory is the claim that the lexicon must allow some phonological rules, which bears some disagreement (eg., Sproat 1986). In order to support this claim, this paper is organized in the order of, first, the phonological analysis, second, the morphological analysis, then third, the lexical status of this phenomenon.

### 1. Phonology of Epenthetic-s Phenomenon

The phonological aspect of Epenthetic-s phenomenon, though looks complex, can be analyzed as coherent and regular phonology made of just one simple rule of insertion and other independently motivated rules. This section shall strive to show how this can be achieved, since its being a regular phonological rule serves an important basis for the arguments in the following sections.

The following table (1) illustrates this phenomenon. The surface representations of compound nouns are in brackets [ ], and those of constituent nouns are on

the left and right side of the symbol #. All inserted segments are underlined, and the Epenthetic-s segments in our analysis are in bold letters. Their phonological environments are written in the upper-most column and the left-most row.

(1) Data on Epenthetic-s Phonology

	V # —	C # — [+son]	C # — [-son]
—#{i,y}	I. t <u>u</u> #il [t <u>unn</u> il]	II. p <sup>h</sup> <u>a</u> n#yuli [p <sup>h</sup> <u>a</u> nniyuri]	III. k'oc <sup>h</sup> #ip [k'onnip]
—# V other than {i,y}	IV. i <u>y</u> pu#adil [i <u>y</u> budadil]	V. NONE	VI. NONE
—# C [+son]	VII. k <sup>h</sup> <u>p</u> #nal [k <sup>h</sup> <u>onn</u> nal]	VIII. NONE	IX. NONE
—# C [-son]	X. n <u>a</u> #ka [n <u>a</u> t <u>k</u> 'a]	XI. kil#ka [kil <u>k</u> 'a]	XII. pok#t <u>o</u> NGi [p <u>o</u> kt' <u>o</u> NGi]

(1)' glosses of the data above

- I. back # work (future affairs)
- II. board # glass (sheet glass)
- III. flower # leaf (flower leaves)
- IV. step father # son (a step son)
- VII. nose # blade (nasal septum)
- X. stream # side (stream bank)
- XI. road # side (side of roads)
- XII. fortune # lump (a fortunate person)

It is important to notice that the epenththesized segments appear in various forms. It appears as two n's in data set I; as a single n in sets II, III and VII; as a single t in sets IV and X; as a [+ tense] feature<sup>1</sup> in sets XI and XII; and as a phonologically null segment (if it exists at all) in sets V, VI, VIII and IX. In order to account for all these data, we need to follow the majority of previous works which have correctly argued that the "Epenthetic-s" is not underlyingly present, but is inserted between the two constituent nouns (eg., C-W Kim 1970). The reasons are:

(i) The segments appear only in compounds but not in

constituent nouns in isolation, and (ii) their feature specification is predictable.

Once we admit that Epenthetic-s is inserted between the two constituent nouns, there are three possible places of insertion: i) as a final segment of the first constituent, ii) as an initial segment of the second constituent, and iii) as a segment independent from either of the constituents. Most previous literature opts for the third possibility, essentially because we do not find evidence for either of the other two options (eg., Ahn 1985). I will argue later, however, for the first possibility in order to account for the neglected data set in V and VI.

For the moment, let us concentrate on the majority of data by positing the rule of t-insertion as the following.

(2) The rule of t-insertion

Ø ----> t / \_\_\_\_\_]N [N

This rule inserts a t as a last segment of the first constituent of a compound noun. The rule environment is specified for nouns because other types of compounds (eg. verb compounds) do not obey this rule. Once we set this rule, a variety of data can be explained without any further contemplation. Let us review the data sets in (1) one by one. The data sets IV, VII, X, XI and XII in (1) are readily accounted for as shown in the following derivation.

(3) Derivation of IV, VII, X, XI and XII in (1)

(a) example from IV

(2) voicing

ɨyɸu atɨl ----> ɨyɸut atɨl -----> [ɨɸudadɨl]

(b) example from VII

(2) nasalization

k<sup>h</sup>o nal ----> k<sup>h</sup>ot nal -----> [k<sup>h</sup>onnal]

(c) example from X

(2) tensing

nɛ ka ----> nɛt ka -----> [nɛtɕk'a]

(d) example from XI

(2) tensing SEC

kil ka ---> kilt ka -----> kilt k'a -----> [kilk'a]



First, the inserted n always appears to the right of the epenthesized [t] by our previous rule (2). Let us consider the following alternative derivations from the data set I.

(5a) If n is inserted to the right of the t-insertion:

(4) (2) nasaliz-  
tū il ---> tū nil ---> tūt nil -----> [tūnnil]  
ation

(5b)\* If n is inserted to the left of the t-insertion:

(4) (2) nasaliz-  
tū il ---> tūn il ---> tūn til -----> [tūndil]  
ation

There is also a historical hint. In Middle Korean there were underlying n's which were subject to deletion before any i/y initial stems. As Kim-Renaud (1974:149) convincingly demonstrates, this historical deletion rule no longer exists in synchronic phonology; and an n-insertion rule is now in effect. Such historical fact suggests that n is the initial part of the second constituent. Also this view explains the fact that the inserted n must always follow the inserted t. We thus conclude that the n-insertion rule (4) must be stated independently from the t-insertion rule (2).

For the sake of completeness, let us complete our derivations of the data set I, II and III, where the n-insertion rule is now involved.

(6) Derivation of the data in I, II & III in (1)

(a) example from I

(4) (2) nasaliz-  
tū il ---> tū nil ---> tūt nil -----> [tūnnil]  
ation

(b) example from II

(4) (2) SEC  
[p<sup>h</sup>an][yuli] ---> p<sup>h</sup>an nyuli ---> p<sup>h</sup>ant nyuli --->  
[p<sup>h</sup>annyuri]

(c) example from III

(4) (2) SEC  
[koc<sup>h</sup>][ip] ---> koc<sup>h</sup> nip ---> koc<sup>h</sup>t nip ---> k'oc<sup>h</sup> nip  
nasalization  
-----> [k'onnip]

As shown above, data sets I, II and III are all covered by the present analysis, whereas an alternative analysis by Ahn (1985), for example, could not account

for the data set I. In particular, he cannot derive the two n's from this data.

Thus we have now covered all the surface segments of the "Epenthetic-s" phenomenon. Let us now turn to sets V, VI, VIII and IX, where there is no "Epenthetic-s" on the surface. Among these data sets, the non-existence of "Epenthetic-s" in VIII and IX is exactly what is predicted by our previous rules. Consider the following derivations.

(7) Absence of "Epenthetic-s" in VIII and IX.

(a) Example from VIII

(2) SEC

s'al mul ----> s'alt mul ----> [s'almul]

(b) Example from IX

(2) SEC

pap nāmsä ----> pap<sup>t</sup> nāmsä ----> pap nāmsä ---->  
nasalization  
-----> [pamnāmsä]

These are the cases where the first noun ends with a consonant and the second one begins with a sonorant consonant. As illustrated above, the inserted t is subject to SEC, due to the phonetic constraint \*CCC of Korean which is mentioned previously. Therefore, there should be no inserted segment left to create an "Epenthetic-s."

However, unlike sets VIII & IX, the absence of "Epenthetic-s" in sets V & VI remains unexplained under our previous analysis. According to the analysis provided so far, the examples in this category should surface with the "Epenthetic-s," [t] or [d], as in the following illustration in (8):

(8) Incorrect prediction by the analysis thus far

(a) Example from data set V

(2) voicing

yaNG adɪl ----> yaNG<sup>t</sup> adɪl ---->

\*[yaNG<sup>d</sup>adɪl], but [yaNGadɪl]

(b) Example from data set VI

(2)

sok os ----> \*[sok<sup>t</sup> ot], but [sogot]

In order to handle these cases, I will argue below that the t-insertion rule in (2) still takes place for

these sets; therefore these sets are not any exception to the "Epenthetic-s" phenomenon. While doing so, I will also discuss the reserved issue that the rule environment of t-insertion in (2) must be the last element of the first segment.

In order to argue, I will draw some data from s-Neutralization and Cluster Reduction as the following. The point of interest here is the behaviour of the underlined segments.

(9) s-Neutralization and Cluster Reduction

(a')	/kaps+i/	"price + Nom."	[kaps'i]
(a")	/kaps/	"price"	[kap]
(a''')	/kaps+kwa/	"price + and"	[kapk'wa]
(a''')	/kaps#elim/	"price # measurement"	[kabərim]
		(estimate)	
(b')	/k'oc <sup>h</sup> +il/	"flower+Acc."	[k'oc <sup>h</sup> il]
(b")	/k'oc <sup>h</sup> /	"flower"	[k'ot]
(b''')	/k'oc <sup>h</sup> +pak'e/	"flower+besides"	[k'otp'ak'e]
(b''')	/k'oc <sup>h</sup> #ald/	"flower # bottom"	[k'odard]
		(below a flower)	

In these two sets of data, the underlined ps and c<sup>h</sup> in (9') have been changed into p and t, either in final position as in (9"), or when followed by a consonant as in (9'''). The segments in (9''') are followed by vowels, yet behave the same as those in (9''') which are followed by a consonant, but differently from those in (9') which are followed by a vowel. Note that the crucial difference between (9') and (9''') is that (9''') are **compound nouns** whereas (9') are nouns plus suffixes.

What is interesting about the data in (9''') is that the coda consonants remain as coda for the syllabification (Kim and Shibatani 1974). Due to the syllabic constraint in Korean which allows only plain stops in coda, ps and c<sup>h</sup> in the above data are neutralized into p and t, which later undergo the intervocalic voicing rule. Only after the coda neutralization, may the resyllabification process occur to make these segments phonetic onset.

Let us recall at this point our reservations concerning as to the structural description of the t-insertion rule (2). The inserted position is the last part of the first constituent noun, and the reasons are the following.

Suppose we had an epenthetic-s segment as the last element of the first constituent noun for the data in

(9""), then that epenthesized segment would have no place in the coda, since Korean coda allows only one consonant. We would thus expect not to observe any epenthesized segments for data sets V and VI. These data in (9) plus the ordering relationship in (5) constitute the evidence of applying the t-insertion rule (2) to the last part of the first constituent noun.

We thus conclude that the t-insertion rule (2) still took place for these data sets V and VI. By doing so, we achieve elegance of analysis in that data sets V and VI in (1) are not exceptional with respect to the "Epenthetic-s" phenomenon, but are instead a different realization of the same t-insertion rule (2).

H-S Sohn (1987:451) formalizes this in terms of Stray Erasure Convention. Adopting Sohn's insight, we illustrate a sample data in the set V & VI as the following. The rule ordering is given on the right corner.

(10) non-appearance of Epen-s in [sogot] 'underwear'



t is inserted by the rule (2) and it is subsequently deleted because of the Stray Erasure Convention. The n-insertion rule does not apply because the structural description is not met. As Sohn notes, it is crucial that the SEC be effective prior to resyllabification, since otherwise the unincorporated t would be resyllabified as the onset of the following syllable. If it is not erased and is resyllabified as the onset of the following syllable, the wrong form [soktot] would be derived.

We thus arrive at our first conclusion that a comprehensive account of the Epenthetic-s phonology can be achieved by one rule of t-insertion and other independently motivated rules. By doing so, we establish the status of Epenthetic-s being regular phonology.

## 2. Morphology of Epenthetic-s Phenomenon

The phenomenon of Epenthetic-s, however, gets further complicated by its morphological facts since the epenthesis may not occur even if the phonological



environment meets. We shall explore in this section the morphological environment of Epenthetic-s.

Epenthetic-s stemmed from a genitive marker -s in middle Korean which was once used with an honorific or inanimate possessor as opposed to -i/ -i for an animate possessor noun (S-N Lee 1954, Kim-Renaud 1974). Historical traces of this genitive marker are left in the synchronic phonology.

Related to this historical fact are the following four synchronic generalizations about the application of this process in the compound noun [[X][Y]]: i) application in Modifier X and Head Y relationship, ii) non-occurrence in coordinate compounds, iii) non-occurrence in object X and action Y relationship, and iv) non-occurrence in animal X. We discuss these in the given order.

The first generalization is the application of Epenthetic-s between the modifier X and head Y. There is a general consensus that Epenthetic-s is a genitive marker (Huh 1975, among others). The genitive relationship is right-headed, with the first element modifying or specifying the second element in some way. In the compound structure [[X][Y]], Epenthetic-s is shown when:

(11) Occurrence of Epen-s in modifier-head compounds

- (a) Y is for the purpose of X as in [[mākcu][py<sup>NG</sup>]]  
"beer # bottle," pronounced as in [mākcutp'y<sup>NG</sup>]
- (b) XY is a kind of Y as in [[phi][pa<sup>NGul</sup>]] "blood #  
drop," pronounced as in [phitp'a<sup>NGul</sup>]
- (c) Y is part of X as in [[hy<sup>o</sup>][patak]] "tongue #  
bottom," pronounced as in [hy<sup>o</sup>tp'adak]

In these examples, Y is modified by X, and they contain an Epenthetic-s as underlined above. Thus we are led to hypothesize that the Epenthetic-s reflects a modifying relationship between the two elements in the compound.

Once we hypothesize so, the prediction is that the phenomenon must not occur in coordinate compounds. Co-compounds have the structure "head + head + head ..." whereas our earlier examples have the structure "modifier + head."

As noted by K-H Yi (1976), Y-S Kim (1984), Ahn (1985), Co-compounds do not observe the Epenthetic-s phenomenon. The examples are the following.

(12) Non-occurrence of Epenthetic-s in Co-compounds

- (a) /pi # palam/ "rain and wind (rainstorm)" is pronounced [pibaram], but not \*[pitp'aram]
- (b) /pom # ka:l/ "spring and fall" is pronounced [pomga:l], but not \*[pomk'a:l]
- (c) /nun # pi/ "snow and rain" is pronounced [nunbi], but not \*[nunp'i]

These examples are all "X and Y" relationship, where one does not modify the other. Thus, our hypothesis is assured that the epenthetic-s marks the modifying relationship.

In addition to these well-discussed conditions on the application of Epenthetic-s, a contrast can be found between the modifier-head cases and the compounds with a sentential source. Consider the following examples with the deverbalizer -i and -im.

(13) Non-occurrence of Epen-s in sentential compounds

- (a) /hã # tot-i/ "sun # rise-Nominalizer (sunrise)" is pronounced [hãdoji], but not \*[hãtt'o:ji]
- (b) /mul # pat-i/ "water # receive-Nominalizer (drain-pipe)" is pronounced [mulbaji], but not \*[mulp'aji]
- (c) /caNG # coli-im/ "soy sauce # boil-Nominalizer (meat boiled in soy sauce)" is pronounced [caNGjorim], but not \*[caNGc'orim]

These examples illustrate various argument-predicate relationships between the first noun and the base verb of the second element. (a) is a subject and intransitive verb relationship; (b) is a direct object and transitive verb relationship; and (c) is an oblique noun and verb relationship. Since such argument-predicate relationships are the property of sentences, we conclude that all sentential compounds resist Epenthetic-s. Readers are referred to J-M Kim (1991) for arguments against other views.

The historical fact reemerges in our fourth generalization about the occurrence/ non-occurrence of the epenthetic-s. It has often been noted in the literature that epenthetic-s does not apply when the first noun is an animate possessor. In other words, a semantic relationship in which, for example, animal X owns Y as in [[kolã][tɪNG]] "whale # back (back of a whale)," is pronounced as [korãdɪNG], but not [korãtt'ɪNG].

From these four generalizations about the occurrence/ non-occurrence of Epenthetic-s,<sup>2</sup> we

conclude that the historical trace of the morphological rule is still observed in the synchronic grammar.

Given this conclusion, let us now recall Bauer (1983)'s position that lexicalization is essentially a diachronic process, but that the traces it leaves in the form of lexicalized lexemes should be dealt with within synchronic grammar. I will now argue for this position based on morpho-phonological evidence.

For such purposes, we need to support three facts: i) that a phenomenon X is lexical, ii) that X is a diachronic process, iii) X must be dealt in synchronic phonology. I have just completed supporting the second and third points by showing that the phenomenon of Epenthetic-s is diachronic, and that its morphological and phonological trace must be dealt in the synchronic analysis. We are now left with having to justify the lexical status of the Epenthetic-s phonology.

### 3. Lexical status of Epenthetic-s rules

In this section, I will argue that the morpho-phonology of Epenthetic-s discussed so far is readily explained by assuming that the rules apply within the lexicon. By assuming so, we are in essence following the central claim of the theory of lexical phonology that some phonology must take place within the Lexicon (Mohanar 1982, among others). Allowing any "rules" in the lexicon has been a ground-breaking claim since Chomsky (1970), because previous assumptions have considered the lexicon to have no rule as such.

Although I follow this central claim of Lexical Phonology, I do not automatically adopt the prevailing definition of "lexicon" assumed by most of the literature supporting LP. The prevailed definition of lexicon in this camp is that the lexicon is identical to the word-formation component (Jensen & Jensen 1984, among others), but I tried to show in my dissertation (1986) that lexicon should only be a proper subset of word-formation.

If we follow Jensen's notion of lexicon, which is incorrect, we can easily identify what is lexical phonology and what is not lexical phonology, because any and all word-phonology is then lexical phonology. Since we do not follow this view of the lexicon, for the reasons given in my previous work, let us hold onto the most agreed criteria among different notions of being "lexical," in order to discuss the lexical status of epenthetic-s phonology.

The first criterion is that lexical phonology applies only to syntactically invisible strings whereas

post-lexical phonology may or may not. This follows from an agreed assumption that the lexicon is invisible for syntactic processes.

I shall provide two arguments that epenthetic-s is syntactically invisible. The first argument concerns our previous discussion that the phonology of Epenthetic-s does not apply between an argument-predicate relationship, but only in modification relationships. It goes without saying, therefore, that Epenthetic-s is irrelevant to sentential structure.

When the two constituent nouns are separated by another phrase, we predict not to find an epenthetic-s because in this case each of them has become a phrase. For instance, the compound  $[[nara]_N [il]_N]$  "national affairs" does have a modifier X - head Y structure where the first noun nara "nation" modifies the second noun il "affairs." As expected, in this compound noun, Epenthetic-s applies as in  $[narannil]$ .

If these two constituent nouns are separated, however, by another word or phrase, then Epenthetic-s no longer applies. For instance, if we insert an adjective cungtāhan "important" between the two constituents, then the surface string is  $[[nara]_N \text{y}]_{pp} [cungtāhan]_A [il]_N$  "important affairs of the nation," where y is the regular genitive case marker. In this example, the modification-head relationship remains the same, but the Epenthetic-s does not apply when the constituency is disturbed and each noun become a phrase. Thus, Epenthetic-s is not a phrasal operation.

The second argument for the irrelevance of Epenthetic-s to syntax concerns syntactically ill-formed strings (Y-S Kim 1984). When Epenthetic-s applies between two constituents which are syntactically ill-formed, then the whole string functions as a word, and is subject to no more of syntactic regulation. Consider the following data.

(14) Epenthetic-s in syntactically ill-formed strings

- (a)  $\text{t} + e \# i$   $[\text{t}^{\text{h}}\text{enni}] \sim \text{t} \# i$   $[\text{t}^{\text{h}}\text{nni}]$  "the upper teeth"  
(Gloss:  $\text{t}^{\text{h}}$  'the upper part', e(Locative), i 'teeth')
- (b)  $\text{kyet}^{\text{h}} + e \# \text{salam}$   $[\text{kyet}^{\text{h}}\text{ets'aram}]$  "one's acquaintances"  
(Gloss:  $\text{kyet}^{\text{h}}$  'nearby', e(Locative),  $\text{salam}$  'people')
- (c)  $\text{k}^{\text{h}} + e \# \text{mal}$   $[\text{k}^{\text{h}}\text{enmal}]$  "whisper"  
(Gloss:  $\text{k}^{\text{h}}$  'ear', e(Locative),  $\text{mal}$  'words')

The compound nouns in (14) would not be possible without the Epenthetic-s making the two parts stick together. A case marker -e cannot intrude into a normal compound. What is expected instead are clausal

expressions such as [[ü-e]<sub>AdvP</sub> iss<sub>V</sub>-n<sub>in</sub>]<sub>S</sub>, [i]<sub>NP</sub> 'the (set of) teeth that are at the upperpart' (cf.(14a)), [[kü-e-taka]<sub>AdvP</sub> han<sub>in</sub>]<sub>S</sub>, [mal]<sub>NP</sub> "a talk that is spoken in one's ear" (cf.(14c)). In other words, the occurrence of Epenthetic-s enables these ungrammatical strings in (14) to function as compounds. Once applies Epenthetic-s, the string is no longer visible to syntax, and permits syntactic ill-formedness of the constituents.

This sort of example in (14) can readily be dealt within the theory of lexical phonology. These are lexicalized strings which are subject to Epenthetic-s. Since lexicon is irrelevant to syntax, these examples in (14) may be syntactically ill formed, and does not obey the syntactic PS rules.

Assuming otherwise, however, we face a theoretical incoherence in that these examples are all exceptions to syntactic regulations. Furthermore, we cannot make any generalization as to why the appearance of Epenthetic-s causes syntactic irregularity. We thus conclude again that the morpho-phonology of Epenthetic-s must be placed in the lexicon. The above two arguments from a separated compound and syntactically ill-formed strings, we conclude that epenthetic-s is syntactically invisible, and thus lexical.

Let us now turn to the second criterion for the lexical status of a phonological rule. The second criterion for lexicon is that it defines lexical items of a given language, and thus may be idiosyncratic.

It has been claimed by those who have investigated Epenthetic-s process in great detail that the phenomenon is largely unsystematic and idiosyncratic (eg., K-H Yi 1976). In particular, there are lexical minimal pairs involving the Epenthetic-s as in the following examples. The examples in (15') are lexical items with the Epenthetic-s underlined, and those in (15") are their lexical counterparts without Epenthetic-s. The underlying forms are given in (a), (b) and (c).

#### (15) Lexical minimal pairs

- (a) [ [namu]<sub>N</sub> [p<sup>h</sup>]<sub>N</sub> ]<sub>N</sub> "wood # boat"  
 (a') [namutp<sup>h</sup>]<sub>N</sub> "a boat laden with wood"  
 (a") [namub<sup>h</sup>]<sub>N</sub> "a boat made of wood"
- (b) [ [namu]<sub>N</sub> [cip]<sub>N</sub> ]<sub>N</sub> "wood # house"  
 (b') [namutc<sup>h</sup>ip]<sub>N</sub> "a house selling wood"  
 (b") [namujip]<sub>N</sub> "a house made of wood"

- (c) [ [mun]<sub>N</sub> [ca]<sub>N</sub> ]<sub>N</sub> "literature # letter"  
 (c') [munc'a] "letters, characters"  
 (c'') [munja] "bookish prose"

In these examples, the occurrence/ non-occurrence of Epenthetic-s determines different lexical items with different meaning. Since these are all modifier-head relationships, the rule of Epenthetic-s should simply apply to all those examples including those in (15"). However, those in (15") do not have the Epenthetic-s, and thus mark themselves as lexical exceptions.<sup>2</sup>

Such lexical minimal pairs can readily be dealt by assuming the rule of Epenthetic-s in the lexicon, given that the lexicon defines different lexical items, and lexical idiosyncrasy is property of lexicon.

Assuming, on the other hand, the rule of Epenthetic-s to be post-lexical, we would have to risk further complication in syntax by saying that some forms undergo the Epenthetic-s rules, and some do not. Obviously, this is against our expectation about syntax. Thus, we conclude that the rule of Epenthetic-s belongs to lexical phonology.

In summation, We argue that the rule of Epenthetic-s belongs to lexical morpho-phonology, on the grounds that i) the rule is syntactically invisible and ii) the rule observes lexical exceptions.

#### NOTES

\*\*\* This article is a revised version of my previous work (1991), and was benefitted by comments of H. Samuel Wang and Matthew Y. Chen.

1. The symbol p', t', k', c' represents obstruents with [+tense] value. Korean obstruents are classified into three groups; the plain group, the tense group and the aspirated group. Other symbols used in this paper are ə for the mid back unround vowel [ə], and NG for the velar nasal [ŋ].
2. One could, of course, attempt to build two different lexical strata in order to account for the occurrence/ non-occurrence of Epenthetic-s.

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