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Syllabification and Consonant Cluster Simplification
in Korean

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0. Introduction

There is a fairly well known constraint in the Korean language that multiple consonants are allowed neither in the onset position nor in the coda position at the surface phonetic level. If there is a sequence of three consonants in the underlying structure,¹ one of them is eventually deleted in the course of the derivation. This phenomenon, which is generally covered under the term "Consonant Cluster Simplification (=CCS)", has been understood as something "peculiar (Cheun 1976b:69)"² to Korean phonology and has attracted the attention of many Korean linguists in recent years.

It seems that work on CCS can largely be categorized into two groups:³ (i) those which try to sharpen the details of the CCS rules, especially with respect to the various dialectal or idiolectal differences one finds concerning CCS (cf. Kim-Renaud (1974), H. Lee (1980), H. Choe (1982), Hong (1982)); (ii) those that try to explain CCS by resorting to some general principles that are necessary for other phonological processes in Korean (cf. C.W. Kim (1970, 1972, and 1973)).

This paper will provide another approach in the latter category to the CCS phenomena in Korean. What we aim to do in this paper is to keep the syllabification in Korean as simple as possible, and, at the same time, seek an alternative explanation for CCS, a hopefully better one than those in the literature. We will argue that CCS is directly related to the syllabification processes in that most of the phonological processes captured under CCS, if not all, are due to the Stray Erasure convention (=SEC) in the sense of Steriade (1982) and Harris (1983):

(1) Stray Erasure Convention (Steriade 1982:89):

Erase segments and skeleton slots unless attached to higher levels of structure.

Thus, in our analysis, this peculiarity is limited to a small number of subcases of CCS; the others simply are a result of the presumed universal convention.

It will be shown in this paper how our theory works and why CCS can be handled better in it than in its known alternatives. Following Steriade (1982) and Harris (1983), we will show why the 'syllable' theory is more general and thus less expensive than its major alternative 'deletion' theory. Furthermore, we will present a case that the 'deletion' theory fails to explain, and yet pose no problem to our theory.

Also in this paper is a discussion of the possibility of subsuming the remaining 'peculiar' sub-cases of CCS under other general principles of phonology. Several alternatives to our analysis are dealt with and rejected. However promising those alternatives may sound at first, they were shown to be mere notational variants at best or simply an ad hoc way of treating exceptions at worst. Most of this discussion constitutes sections 2, 3, and 4 of this paper. But, first, in section 1, we will discuss basic facts and issues concerning CCS. Section 5 is again about CCS facts, but, this time, ones that are exceptions to our generalization, or to any generalization. We will try to show how they can be accommodated in our theory. Finally, in section 6, the conclusion and some speculative remarks regarding the syllable theory assumed in this paper will appear.

1. Facts and the Problem

1. 1. Consider the following pair of derivations:

- (2) a. /kaps+i/ → [kapsi] 'the price(Nom.)'
 b. /kaps+to/ → [kapt'o] 'even the price'

In (2a), the underlying consonant sequence has surfaced as it was, but, in (2b), one of the consonants, /s/, has dropped out in the course of derivation. This is not an isolated phenomenon, as the following list shows. The list, which is meant to be exhaustive, consists of the types of apparent morpheme-final double consonants and a typical example of each.¹⁻⁵

- (3) a. p(s): /kaps+to/ → [kapt'o] 'even the price'
 Cf. /kaps+i/ → [kapsi] 'the price(Nom.)'
 k(s): /naks+to/ → [nəkt'o] 'even the soul'
 Cf. /naks+i/ → [nəksi] 'the soul(Nom.)'

- n(c): /anc+ta/ → [ant'a] 'to sit down'
 Cf. /anc+a/ → [anca] 'sit down and'
- l(th): /halt^h+ta/ → [halt'a] 'to lick'
 Cf. /halt^h+a/ → [halt^ha] 'lick and'
- l(s): /tols+to/ → [toit'o] 'even the full year'
 Cf. /tols+i/ → [tolsi] 'the full year(Nom.)'
- b. (l)k: /ilk+ta/ → [ikt'a] 'to read'
 Cf. /ilk+a/ → [ilgə] 'read and'
- (l)p: /palp+ta/ → [papt'a] 'to step on'
 Cf. /palp+a/ → [palba] 'step on and'
- (l)p^h: /ilp^h+ta/ → [ipt'a] 'to recite (a poem)'
 Cf. /ilp^h+a/ → [ilp^hə] 'recite and'
- (l)m: /salm+ta/ → [samt'a] 'to boil'
 Cf. /salm+a/ → [salma] 'boil and'
- c. n(h): /manh+ta/ → [mant^ha] '(there are) many'
 Cf. /manh+a/ → [mana] 'many(Ind.)'
- l(h): /silh+ta/ → [silt^ha] 'to dislike'
 Cf. /silh+a/ → [sirə] 'dislike and'

The parenthesized segment in the first column indicates an alternation in standard Korean. That is, it will delete when the morpheme is followed by a word boundary or by another morpheme which begins with a consonant. Otherwise, it surfaces at the phonetic level.

We have broken up the examples into three groups for the purpose of easy reference. The examples in (3b), except /lm/, usually show dialectal or idiolectal variation. Others seldom display dialectal variation.⁶ As far as the data of CCS are concerned, the single most troublesome issue in previous studies has been this dialectal variation. Some linguists have simply stuck to a certain dialect or idiolect and ignored other dialects, while others have tried to capture the range of dialectal variations using some minor rules (cf. Kim-Renaud 1974).

As for the syntactic/morphological categories of the CCS examples, they are either nouns or stems of the predicates (=verbs or adjectives). Some types of examples in (3) are only composed of nouns.⁷ Cf. /ls/ and /ks/. Some other types involve only predicates. Cf. /nh/, /lh/, /nc/, /lt^h/, and /lp^h/. The examples of the other types involve both nouns and the predicates. Cf. /ps/, /lm/, /lp/, and /lk/. Cf. Appendix 1.

1. 2. A usual way of treating the alternations in (3), which will be referred as the standard approach, has been to introduce relevant phonological rules as follows:

- (4) (a) [+ cor] → ∅ / [+ cons] _____ {#}
 [+ cons] [c]

(b) [+ cons] $\rightarrow \emptyset / \text{ } ______ C \left\{ \begin{smallmatrix} \# \\ C \end{smallmatrix} \right\}$

We will call (4a) and (4b) the standard CCS rules--SCRa and SCRb, respectively.⁸ SCRa will take care of five types of CCS in (3)--/ls/, /lt^h/, /ps/, /ks/, and /nc/. SCRb will cover four others--/lp/, /lk/, /lp^h/, and /lm/.

SCRa and SCRb are extrinsically ordered, so that SCRa may apply first. The following sample derivations show this:

(5)	/kaps+to/ 'even the kap +to price'	/ilk+ta/ 'to read'	
	-----	i k+ta	SCRa
	SCRb
	[kapt'o]	[ikt'a]	
	/kaps+to/ ka s+to	/ilk+ta/ i k+ta	
	-----	-----	SCRb
	SCRa
	*[katt'o]	[ikt'a]	

The other two, which have the second consonant as /h/, will be dealt with by the following well-motivated rule:

(6) [+obst]
Aspiration: h, [-tense] \Rightarrow 1, [2]
 1 2 \emptyset [+asp]

The extrinsic ordering relationship between SCR's and (6) is also important. That is, the rule in (6) must apply before SCR's (cf. Cheun 1976a, b).

Another rule that has to be pointed out is the tensing rule, which tenses the initial non-aspirated obstruent of the following morpheme (cf. Cheun (1976a), Hwang (1979)):⁹

(7) [+obst] \rightarrow [+tense] / [+ obst] + $______$
 [-asp]

Again, the order of rule applications between SCR's in (4) and the tensing in (7) should be extrinsically given so that the correct result can be obtained. Since /l/ can not trigger the tensing of the following obstruent, (7) must apply before the intervening /t^h/ is deleted by SCRa in the following.

(8) a. /halt^h + ta/ 'to lick'
 halt^h + t'a Tensing
 hal + t'a SCRa

b.	/hal ^h + ta/	
	hal + ta	SCRa
	-----	Tensing
	hal + da	Voicing
	*[halda]	

Let us consider SCR's again. No rule has been reported to intervene between SCRa and SCRb. Can the two be collapsed into one then? Technically, it is possible as B. Lee (1976:101), among others, has shown us.

$$(9) C \rightarrow \emptyset / \left\{ \begin{array}{l} C \text{ [-----]} \\ \text{[+cor]} \\ \text{C} \end{array} \right\} \left\{ \begin{array}{l} C \\ \# \end{array} \right\}$$

But, compare (9) with SCR's. It is clear that we are not getting anything by collapsing the two into (9). One might argue that by introducing the brace notation, we are imposing the disjunctive ordering between the subrules in (9) (for discussion of the brace notation in general, cf. Kenstowicz & Kisseberth 1979:360). However, this difference is not significant at all in this case. Although it is not logically impossible to apply both SCR's to an underlying representation, actually no such case occurs since generating a sequence of more than three consonants is not possible in Korean phonology.

What, then, is the criterion for the dichotomy? Why do we not break it down into four (sub)rules rather than two, for example? (Many linguists have in fact claimed that there are four CCS rules in Korean (cf. Kim-Renaud 1974, H. Lee 1980, and H. Choe 1982), though their rule formulations are different from each other's.) Or could it be the case that we may need a CCS rule for each of eleven CCS types in (3)?

Furthermore, even if one may argue that two CCS rules--say, SCRa and SCRb--are enough, s/he has to decide on which two rules are the correct ones. As far as the correct derivation of the surface forms is concerned, the following two rules are no less compatible with the given data than SCR's:

$$(10) a) [+ \text{cons}] \rightarrow \emptyset / \text{-----} \left\{ \begin{array}{l} [+ \text{cons}] \\ [- \text{cor}] \end{array} \right\} \left\{ \begin{array}{l} \# \\ C \end{array} \right\}$$

$$b) [+ \text{cons}] \rightarrow \emptyset / C \text{ ----} \left\{ \begin{array}{l} \# \\ C \end{array} \right\}$$

The rules in (10) as well as SCR's have the same number of phonological features, so feature counting, which is assumed to be a universal measure,¹⁰ does not help us in selecting one of

2. Syllabification and CCS: A first approximation

(12) /kaps+to/ 'price-also' /kaps+i/ 'price(Nom.)'

kaps+to
. . .

kaps+i
. . .

Syllabification

kap +to
[kapt'o]

kaps+i
[kapsi]

SEG

That is, there is no need to introduce any language particular rules like SCRa or SCRB; CCS is simply a result of syllabification and a universal convention. If the syllabification is something we need independently of CCS,¹³ then the cost is nothing to explain the (3a) types of CCS.

In one particular dialect, our hypothesis covers all but one type of CCS in (3). One of the characteristics of CCS has been its dialectal variations, and, interestingly, those variations involve mostly (3b) cases. In the South-eastern province of Korea (S-E dialect), the following variations are observed:

(13)

consonant sequence	standard dialect	SE dialect	
/ilk+ta/	[ikt'a]	[ilt'a]	'to read'
/nəlp+ta/	[nəpt'a]	[nəlt'a]	'to be large'
/ilp ^h +ta/	[ipt'a]	[ilt'a]	'to recite'
/salm+ta/	[samt'a]	[samt'a]	'to boil'

Therefore, in S-E dialect, every case of CCS, except /lm/, falls out naturally from general properties of syllabification in our hypothesis.

The attempt to make use of SEC for the simplification process is not new at all. Steriade (1982) and Harris (1983) have proposed the same idea for Attic and Spanish, respectively. For example, in Spanish, a stop between a consonant and another obstruent is deleted as these examples show:

(14) (= Harris 1983, (2.37))

- a. escu/lp/ + ir --> escu[lp]ir 'to sculpt'
 escu/lp/ + tura --> escu[l]tura 'sculpture'
 escu/lp/ + tor --> escu[l]tor 'sculptor'
- b. disti/ng/ + ir --> disti[ŋg]ir 'to distinguish'
 disti/ng/ + cion --> disti[n]cion 'distinction'
 disti/ng/ + to --> disti[n]to 'distinct'

Harris argues that the clusters /lpt/ and /ngt/ are neither possible onsets nor possible rhymes in Spanish phonology, so those unattached /p/ and /g/ can never be incorporated, which a version of SEC will take care of.

2. 2. Let us consider (3b), which cannot be handled properly yet.

- (3b) (1)k: /ilk+ta/ --> [ikt'a] 'to read'
 Cf. /ilk+ta/ --> [ilgə] 'read and'
- (1)p: /palp+ta/ --> [papt'a] 'to step on'
 Cf. /palp+a/ --> [palba] 'step on and'
- (1)p^h: /ilp^h+ta/ --> [ipt'a] 'to recite (a poem)'
 Cf. /ilp^h+a/ --> [ilp^hə] 'recite and'

continued

- (1)m: /salm+ta/ --> [samt'a] 'to boil'
 Cf. /salm+a/ --> [salma] 'boil and'

In this subsection, we are going to consider various ways to deal with these 'exceptional' cases. Eventually, we hope, for one reason or another, to reject all the possibilities we consider here. Then we will propose our solution in the next section.

First, let us consider the possibility of subsuming (3b) into syllabification. Once we say that much of CCS in the traditional sense is a direct result of the syllabification, why do we bother to have CCS rule at all? In other words, wouldn't it be nice if the syllabification could deal with ALL of the CCS phenomena, not part of them as we have argued in the above?

The obvious problem in this possibility lies in the ad hoc nature of the following sort of syllabification:

- (15)
$$\begin{array}{c} \diagdown \quad \diagup \\ /ilk + t a/ \end{array}$$

In other words, if we want to have (3b) follow from general principles of syllabification as (3a) does, we somehow skip the incorporation of /l/ in /ilk/ into syllabification, so that /k/ can instead be incorporated. /l/, then, could be dealt with by SEC. However, we reject this possibility since we do not want to sacrifice syllabification for the sake of CCS.

Another way of looking at the examples in (3b) is to introduce an auxiliary rule for them. Suppose we have the following kind of rule:

- (16)
$$\begin{array}{cc} 1 [+cons] & \rightarrow [+cons] 1 \\ [-cor] & [-cor] \end{array}$$

If (16) applies to (3b) cases before the relevant syllabification, we would not need to have any CCS rules per se at all.

- (17)
$$\begin{array}{lcl} /ilk + ta/ & \text{'read'} & \\ ikl + ta & & \text{Metathesis} \\ \begin{array}{c} \curvearrowright \quad \curvearrowright \\ ikl + ta \end{array} & & \text{Syllabification} \\ \begin{array}{c} \curvearrowright \quad \curvearrowright \\ ik + ta \end{array} & & \text{SEC} \\ \dots & & \\ [ikt'a] & & \end{array}$$

It is not surprising at all that essentially the same argument as this can be found in the literature. For example, C.K. Kim (1974:73) derives [tʌmk'o] from /talm+ko/ as follows (We have made slight changes for our own purposes while keeping the relevant point intact.):

- (18) /talm + ko/ 'look after (someone) and'
 talm + ko Metathesis
 tam + ko SCRb
 ...
 [tʌmk'o]

But the metathesis would have a lot of exceptions, more exceptions, in fact, than confirming cases:

- (19) a) /talkuci/ 'cart', /talkak/ 'rattling', /tal + ko/
 'hung-and' Cf. /ilk + ta/
 b) /halməni/ 'grandmother', /mulmaŋch'o/ 'a forget me not',
 /tal + maci/ 'enjoying the moon' Cf. /talm + ko/

Metathesis is never observed in the examples in (19). If a rule has more exceptions than not, there will be essentially two ways to consider it: revise it or reject it. In this case, the revision would mean to make the rule very specific, so that the rule applies only to the cases in (3b).

Let us proceed with the revision, and to make the rule appropriately specific, let us assume it is syllable sensitive since, unlike the cases in (19), /lm/ and /lk/ in /talm+ko/ and /ilk+ta/ are placed between a vowel and the following onset. Given our assumption of restricted syllabification, the following seems to be the best guess we can think of.

- (20)
- | | | | | | | | |
|---|---------|-----|---------|---|--|-----|-------------------------|
| l | [+cons] | | [+cons] | l | | * : | means "not related to a |
| : | [-cor] | | [-cor] | : | | x | to a higher structure." |
| : | : | --> | : | : | | | |
| σ | x | | σ | x | | | |

This, then, is not general at all any more and is at best a notational variant of SCR, since the sole purpose of this rule is to cover the exceptional cases of CCS. Furthermore, compared to our proposed solution in the next section, (20) has an extra burden of specifying the extrinsic ordering relationships between it and the tensing, unless we assume the latter applies after SEC. Cf. /ilk+ta/ --> /ikt'a/.

Therefore, metathesis cannot be a better solution than the standard approach until the newly introduced rule can be independently proved to be necessary in Korean phonology, which

we doubt at this point. Even then we still have to consider if it is the most economic solution available.

How about if we have an /l/-Deletion rule instead of Metathesis? Notice that the /l/ that might be affected by Metathesis in the above seemingly does not play any role in other phonological processes. Furthermore, as Hong (1982:489) and Park (1983:104) have argued, there is an /l/-Deletion rule already in Korean phonology:

- (21) /pul-sap/ --> [pusap] 'fire shovel'
 /pul-cəy/ --> [pucəy] 'not-sincere'
 /pul-taj/ --> [putaj] 'not-right'

However, the independent /l/-Deletion applies in contexts opposite to those in (3b), for the following examples in which /l/ is followed by [-cor] do not undergo /l/-deletion.¹⁴

- (22) [pul-kil] 'fire flare' cf. *[pukil]
 [pul-pit] '(fire)-light' cf. *[pubit]
 [pul-man] 'not-satisfied' cf. *[puman]
 [pul-phyəŋ] 'complaints' cf. *[puphyəŋ]

Thus, as was the case with Metathesis, we reject the solution by /l/-Deletion as well.

Finally, let us consider a general problem in taking care of CCS before syllabification.

- (23) 1st: CCS
 2nd: Syllabification

The order in (23) seems to suggest that CCS has nothing to do with syllabification since it is after CCS that syllabification applies. But this is not so. CCS contributes to the simplification of the syllabification by getting rid of a segment which might have been syllabified and then deleted. Consider the following:

- (24) C V C₁ C C V

Suppose it is C₁ that is deleted. Other things being equal, there is no need to cut the syllabification line to that consonant and then relink it to the next consonant. (We had excluded the possibility of syllabifying both consonants, for there are no other cases where you have to syllabify two segments in the coda at surface.) If we follow the order as in (23) and delete C₁ first, the syllabification becomes as simple as possible.

However, there is a price we have to pay then. The rule will still have the unnatural context: i_n C₁ C₂ V.

- $$(25) \quad [+cons] \rightarrow \emptyset / \begin{matrix} [+cons] \\ [-cor] \end{matrix} \left\{ \begin{matrix} \# \\ C \end{matrix} \right\}$$

(25) is a classic case of syllable sensitive rule.¹⁵ We believe, following Kahn (1977) and others, that the context {#, C} is unnatural and is better avoided. Under the rule ordering given in (23), it is impossible to avoid having that context. There is a certain dilemma here. In order to make the syllabification as simple as possible, we would like to get rid of the non-syllabified consonant—for example, /l/ in (3b), choosing the ordering in (23). But the rule that will delete the consonant turns out to be syllable sensitive, that is, has to have {#, C} context.

The way we solve this dilemma is to do the syllabification step by step, incorporating the onset first, then the coda. This is what we are going to discuss in the next section.

3. Syllabification and CCS : A proposal

3. 1. In this section, we propose the following CCS rule(=CCSR):¹⁶

- $$(26) \quad \begin{array}{ccc} C & \rightarrow \emptyset / \text{---} & \begin{bmatrix} + \text{ cons} \\ - \text{ cor} \end{bmatrix} \\ \vdots & & \vdots \\ x & & x \end{array}$$

(26) says that if there is a sequence of consonants that are not attached to the higher structure, i.e., not syllabified already, and if the second one is [-cor], the first consonant will delete. Therefore, only the cases in (3b) will fall under this rule. In other words, CCSR will cover the range of data that were covered by SCRB in the standard approach. Others will eventually be taken care of by SEC introduced in section 9.

Notice that there is an implicit assumption in (26): a partial syllabification has already been done when (26) applies since we want it to apply only to those segments not syllabified yet. In other words, we do not want it to delete the second consonant in a sequence of three consonants.

- (27) xx x x x
 : : : : :
 /talm + ko/ ----> /tal + ko/

Rather, the derivation should look like this:

- (28) $\begin{array}{cccc} \sigma_{xx} & \sigma & \sigma x & \sigma \\ \Lambda \uparrow \downarrow & \Lambda & \uparrow \downarrow & \Lambda \\ \text{.../italm} + \text{ko/} & \text{.../italm} \pm \text{ko/} \end{array}$

Here we are supporting the idea of non-exhaustive syllabification over exhaustive syllabification since we make distinctions between 'associated' segments and 'stray' ones. In particular, we will assume the theory of step-by-step syllabification such as the one in Steriade (1982).¹⁷ Based on her analyses of Ancient Greek, Steriade claims that "phonological strings are syllabified by a sequence of syllabification rules."

Specifically, Steriade sets up a universal first rule (=UFR) that creates a maximally unmarked CV syllable.¹⁸

(29)
$$\begin{array}{c} \sigma \\ \swarrow \\ (C) \ V \rightarrow (C) \ V \end{array}$$

UFR is then followed by language particular rules that incorporate into these 'core' CV syllables the adjacent segments.

The other syllabification rules are to be parametrically determined. Following our assumption of a "restricted" (cf. 2.1.) theory of syllabification, we will allow only the following non-iterative coda rule (=CR) for Korean phonology.

(30)
$$\begin{array}{c} \sigma \quad \sigma \\ | \quad \swarrow \\ V \ C \rightarrow V \ C \end{array}$$

3. 2. Now, let us take some examples from (3) and show the step-by-step derivation of the correct results in our hypothesis. (Compare the following derivations with others in the previous sections.)

(31)a. /kaps+to/ 'even the price' b. /ilk+ta/ 'to read'

$\begin{array}{c} \sigma \quad \sigma \\ \swarrow \quad \swarrow \\ \text{kaps+to} \end{array}$	$\begin{array}{c} \sigma \quad \sigma \\ \quad \swarrow \\ \text{ilk+ta} \end{array}$	UFR
-----	$\begin{array}{c} \sigma \quad \sigma \\ \quad \swarrow \\ \text{i k+ta} \end{array}$	CCSR
$\begin{array}{c} \sigma \quad \sigma \\ \swarrow \quad \swarrow \\ \text{kaps+to} \end{array}$	$\begin{array}{c} \sigma \quad \sigma \\ \swarrow \quad \swarrow \\ \text{i k+ta} \end{array}$	CR
$\begin{array}{c} \sigma \quad \sigma \\ \swarrow \quad \swarrow \\ \text{kaps+t'o} \end{array}$	$\begin{array}{c} \sigma \quad \sigma \\ \swarrow \quad \swarrow \\ \text{i k+t'a} \end{array}$	Tensing
$\begin{array}{c} \sigma \quad \sigma \\ \swarrow \quad \swarrow \\ \text{kap +t'o} \end{array}$	-----	SEC

[kapt'o]

[ikt'a]

Crucially, the two sample derivations in the above are derived through different processes. The role of CCS rules have become smaller--we now have only one CCS rule, and in its place, we have introduced SEC which achieves the same effects.

The rule ordering between Tensing and CCSR is no longer extrinsically fixed. We could have put Tensing before CCSR in (31). This may seem to distract our attention from the real issue because, in a sense, the apparent ordering between Tensing and SEC has now become crucial. However, there is a clear difference between stipulating extrinsic ordering relationships between two rules and putting a universal convention at a certain point of derivation. That is, the apparent order between Tensing and SEC in our theory is simply a natural result of our assumption that SEC applies at the end of a certain component.¹⁹

One nice aspect of our proposal is that much of CCS phenomenon, i.e., that which is covered by SEC, is now seen as a language universal process, and not a language particular one as the standard approach have assumed.

Another nice point is that the relevant rules are more restricted than in the standard approach. Recall that we could not find an independent measure by which we may choose one of the two sets of CCS rules--between SCR's and the equally compatible rules in 1.2.

That kind of indeterminacy does not bother our approach. To see why, let us first make this point clear. Given a sequence of three consonants, or in an equivalent situation, we have argued that the first may be affected by CCSR and the second by SEC. The obvious question we might put to ourselves, as Michael Kenstowicz (p.c.) has pointed out, is whether we can allow the opposite possibility--making the first consonant affected by SEC and the second by a CCS rule.

We have already rejected this possibility (cf. (15) and related discussions), and the argument was that it will cost us dearly. We will not show in detail how it affects the syllabification processes, but the cost basically shows up in the form of a much more complicated coda rule than our simple one, which is independently necessary for the bulk of syllabification processes in Korean phonology. Therefore, the choice is clear in our theory, and the other possibility is effectively blocked.

We would like to argue that the reason that mostly the data in (3b) show dialectal variations is due to the rather 'unstable' nature of CCSR. Remember that our CCS rule covers only (3b). Now the S-E dialect can be explained by the following rule that will be a version of CCSR for this dialect.

(32) C --> \emptyset / _____ [+son]
 | |
 x x

(32) says that if there is a sequence of [+cons] and [+son] that are not syllabified yet, the former will delete.

Indeed, it has been observed in the literature that more and more native speakers in Korean take the S-E dialect with respect to CCS.²⁰ This is supposed to be an aspect of historical change which has been going on for years. What this indicates, if our proposal is correct, is that a universal principle (SEC) may eventually replace the role of the (unstable) language particular rule (CCSR). This, in the least, is an interesting prediction that can be tested in various languages.²¹

On the other hand, under the standard approach to CCS, the story about these dialectal variations would be that the data covered by SCRb are, in S-E dialect, covered by some version of SCRa. This is an ad hoc explanation at best.

One of the questions raised by our proposal would be whether there are any other phonological processes which might be relevant to the distinction between the consonants affected by CCS and those by SEC. We do not have any direct evidence to answer the question. But one advantage of having SEC take care of the middle consonant in the sequence of the three has appeared in the form of freedom from extrinsic ordering. We will discuss this further in section 4.

4. Tensing and CCS

4. 0. In section 1.2., we have briefly introduced a tensing rule in Korean which must apply before SCR's. In this section, we will show that there appears a paradoxical situation where the tensing rule, or a version of it, must come after SCR's and that our theory provides a reasonable solution to the paradox simply because there do not arise any ordering paradoxes in our approach with respect to tensing and CCS.

Tensing has been one of the tough issues in Korean phonology. Broadly speaking, "when there is a sequence of two consonants across a boundary the first being an obstruent and the second a non-aspirated obstruent,

(33) [+obst] --> [+tense] / [+obst] + _____
 [-asp]

the latter becomes tensed unless there is a pause between them (Hwang 1979:83)." Usually a distinctive pause is marked by more

than one # boundary—for example, between two NPs. But the tensing, as has been pointed out by many Korean linguists, has many apparent peculiarities which seem to be related to various factors—grammatical categories, boundaries, or even the origin²² of the morphemes.

The following is a descriptive summary of tensing in Korean based on the discussions in Kim-Renaud (1975), Cheun (1976a), Hwang (1979), and K.H. Lee (1982).²³

(34) * I have underlined the segment that becomes tense at surface.

a) Post-Unreleased Fortition:

- i) /pap-cahsu/ 'cooked rice-seller', /pap-kirit/ 'cooked rice-bowl', /pap-saŋ/ 'dinner-table'
- ii) /nac-cam/ '(day-)nap', /nat-kari/ 'straw-stack', /nac^h-to/ 'face-even'
- iii) /sok-pota/ 'core-than', /sok-to/ 'speed-degree', /puək^h-kawa/ 'kitchen-and', /ak-sa/ 'music-person'

b) Verb Stem Boundary Fortition (except after /l/):

- i) /ip-ta/ 'wear', /pat-ta/ 'receive', /mæk-ta/ 'eat'
- ii) /kam-ta/ 'wind', /sin-ta/ 'wear (the shoes)'

c) Modifier Boundary Fortition (after /il/):

- /mæk-il-pap/ 'rice to eat', /cæk-il-cæk/ 'the time when (it's) scarce'
- /nal-palle/ 'flying insects', /nal-sum/ 'out-breathing'

d) Sino-Korean Boundary Fortition:

- /mal-tan/ 'low-ranking', /kyəl-cəy/ 'decision', /c^hul-sæk/ 'attendance'

* After the epenthesized /t/ -- but can be subsumed under a).

Of the four kinds of cases, (34c) is of special interest to us. Cheun (1976a), in his interesting paper, discusses tensing phenomena in Korean and shows some of the problems involved in describing them. One of them concerns the modifier affix /-il/.²⁴ Considering the range of data in (35),

- (35) /ip+ta/ --> [ipt'a] 'to wear'
- /mæk+ta/ --> [mækt'a] 'to eat'
- /sin+ta/ --> [sint'a] 'to wear'

but

/tal+ta/ --> [talda] 'to weigh' cf. *[talt'a]

which show that /l/ generally cannot trigger tensing of the immediately following obstruent, the following derivations look like an exception:²⁵

(36) /mæk-il#pap/ → [mægilp'ap] 'rice to eat'
eat rice

/(ohu-e hakkyo-e) ka-il#saram/ → [ohue hak'yo'e kals'aram]
afternoon school go person
'person who will go (to school in the afternoon)'

(36) is all the more peculiar since the other type of modifier affix, /-nin/, does not trigger Tensing.

The discussion in the following section will center on the type of data in (36), for it provides a case where our theory and the standard approach to CCS make different predictions. The comparison of the two approaches is given in 4.2. But before proceeding to the question of how the surface form can be derived from the underlying one, we need to motivate, to a certain extent, the underlying representation itself since the whole picture might look quite different depending on which underlying representation one takes or how one sets up the rule.

4. 1. There are two major issues which concern us with respect to the underlying representation. The first has to do with the boundaries. Based on the assumption that the examples in (36) have relative clause construction (cf. Yang 1975), we will posit a phrase (#) boundary between the modifier /-il/ and the head noun (*pap* and *saram* in (36)). For further discussion, the reader is referred to C.W. Kim (1970).

The next thing we address ourselves to is the question of how the tensing of an obstruent to the right of the modifier /-il/ can be described. Recall that only the obstruent (i.e., in case of nouns), or, maximally speaking, every consonant except /l/ (i.e., in case of predicate stems) can trigger the tensing. We will think of three possibilities--rule change, an auxiliary rule insertion, or the reconstruction of the underlying representation, of which we will take the third.

One obvious way to attack the problem is to modify the rule itself, so that the rule may have /-il/ in its context. This, we believe, is not an elegant solution, especially because we lose the generality of the tensing. Cf. Cheun 1976:34.

Next, Hwang (1979:94) claimed that the problem can be solved by introducing an insertion rule.

(37) $\phi \rightarrow t / l]_{\text{modifier}} \dots [_{\text{tense}}$ [obstr]

The rule, which inserts /t/ after the modifier /-il/, is later followed by a tensing rule, which now can apply to the relevant obstruent.

- (38) /ip + il # paci/ 'trousers to put on'
 /ip + il # t paci/ t-insertion
 /ip + il # t p'aci/ Tensing
 /ip + il # p'aci/ SCRa
 [ibɪlp'aji]

Although Hwang's solution certainly shows us a way of treating the tensing after /-il/, one crucial point is missing in his argument, that is, the problem of how the t-insertion can be independently motivated. In fact, he introduces various kinds of t-insertion rules for most of the exceptional cases of tensing, and the single function of each of the t-insertion rule introduced for that purpose is to trigger the tensing.²⁶ Thus, his final t-insertion rule(s) looks fairly complicated and less general (Hwang 1979:95):

- (39) $\emptyset \rightarrow t / \left\{ \begin{array}{l} \left\{ \begin{array}{l} [+nas] \\ [l] \\ [+l:] \end{array} \right\} \text{---} \left\{ \begin{array}{l} [+obs] \\ [-tense] \\ [+cor] \end{array} \right\} \\ \text{---} \left\{ \begin{array}{l} [+cons] \\ [-lat] \end{array} \right\} \end{array} \right\}$

* : (Sino-Korean morpheme boundary)
 = (Compound boundary)

We are especially concerned with the upper part of the context in (39). We will not discuss the details of it, but it is not hard to see that most of the complexities which have involved the tensing are now carried over to the above rule(s) under Hwang's analysis. The original problem remains. As we have pointed out in the above, if the sole purpose of having the t-insertion rule(s) is to create a context for tensing, and nothing else, then it can hardly be called a solution.

The other alternative to the tensing after /-il/, which we adopt here, is to assume an abstract underlying phoneme that is never realized in the surface, but nonetheless triggers the tensing. Cheun (1976a) calls this an "economic solution." We also believe it costs less compared to other possibilities. Following W. Kim (1972) and Cheun (1976a), which our ensuing discussion is much dependent on, let us assume that the underlying form of the modifier /-il/ is /-ilʔ/.²⁷ Then following the application of /ʔ/ → /t/ rule,²⁸ we will have an appropriate context for tensing.

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following:

Thus, we conclude that setting up the abstract phoneme /ʔ/ has some independent motivations.

4. 2. We have so far established the underlying representation that involves the modifier affix /-il/ as follows:

(45) /## o + ilʔ # saram#/ 'the man to come'

We now go back to our original topic, that is, the relationship between CCS and tensing with respect to (45).

The question we want to ask is: how is the correct output [ols'aram] derived from the underlying representation (45)? The first answer that comes into mind is to apply tensing and SCR's in that order.

(46) /## o + ilʔ # saram #/
 o + ʔ # saram i-deletion
 o + lt # saram Neutralization
 o + lt # s'aram Tensing
 o + l # s'aram SCRa
 [ols'aram]

However, (46) cannot be a correct derivation. In (46), it is assumed that both Tensing and SCRa apply in Postlexical Component,³³ but we do not see any reason why we need that assumption. Notice that SCRa could perfectly well have applied in Lexical Component.

What is wrong in (46) is that we have to block the application of SCRa in the lexical level in order to keep the intervening consonant /t/ till the postlexical level where it triggers Tensing.

(47) /[# [# o + ilʔ] # saram #]/

		<u>lexical component</u>
o	ʔ #	i-deletion
o	lt #	Neutralization
**	blocked **	SCRa
		<u>postlexical component</u>
o	lt # s'aram	Tensing
o	l # s'aram	SCRa
	[ols'aram]	

Although we get the intended correct output, the cost is too high. As far as we can see, there is no principled way to block the application of SCR's in the lexical component, either as cyclic rules or as postcyclic ones.

As Scott Myers (p.c.) has pointed out to me, if it can be proved that SCR's 'must' apply in the postlexical component, then

our argument does not hold and the derivation in (46) is essentially correct. One might, in favor of the standard approach, still further argue that the problem in (47) is the 'evidence' for the possible claim that SCR's must be postlexical. But we believe there is a better way to look at the distinction between lexical and postlexical rules, and that is to put the distinction on a sound and principled basis rather than on some random facts. Part of Kiparsky's recent work (1983 and 1984), for example, is specifically directed at finding out those principles.

Perhaps it is worthwhile to take a brief look at the criteria for the lexical/postlexical distinctions. According to a recent development of Lexical Phonology, and unlike in its earlier versions (Kiparsky 1982a, b), it is claimed that the lexical and postlexical phonology are "not necessarily disjoint sets of rules (Kiparsky 1984:1)." Thus a single rule may turn out to be either a lexical rule or a postlexical rule depending on the differences in mode and scope of its application.

The following are the principles or constraints that define the distinction.

- (48) a) Postlexical rules have no access to word-internal constituent structure, since this is erased at the end of the lexicon.
- b) Structure-changing lexical rules apply only in derived environments.
- c) Lexical rules are structure preserving, in the sense that they may not mark features which are non-distinctive.
- d) Grammar stipulates merely where a rule ceases to apply. Thus, all rules are potentially applicable at the first level of the lexicon, and apply there provided only that the principles of grammar permit it. (= Strong Domain Hypothesis)
- e) The domain of lexical rules is the word not the phrase.

Constraint a) is irrelevant to SCR's since they are not sensitive to word-internal constituent structure. The effects of constraint b) on SCR's are inconclusive. Even with the assumption that deletion is a feature-changing process (cf. Kiparsky 1983), it is yet to be known whether SCR's apply only in derived environments or not. (Though this cannot be a strict argument by itself, SCR's seem to apply only in the derived environment since triple consonant sequences are possible only in the morpheme edges and not morpheme internally.)

As for the constraint c) in (48), it means "any rule which introduces specifications of lexically non-distinctive features -- for example, aspiration or glottalization in English -- must be postlexical. (Kiparsky 1983:12)" Then, SCR's, deletions rules, are lexical rules, a welcome result for us. Constraint e) does

not make SCR's postlexical, either, since the scope of SCR's is at most within a word. Therefore, given the Strong Domain Hypothesis in (48d), we argue that SCR's should apply in the lexical component.

Now back to our main topic: As far as we can see, the real problem lies in the strict extrinsic ordering between tensing and SCR's, which is an unavoidable result of the standard approach to CCS. So when there appeared a case where the two apply in different components, especially where the tensing applies at the 'above-the-word' level, we come across a paradoxical situation: Tensing has to apply before SCR's, but in some cases the ordering cannot be kept that way. It seems that there is no immediate reasonable solution to this paradox in the standard approach.

We have already, though in passing, demonstrated in section 1 that in our approach there is no strict extrinsic ordering between tensing and CCSR. We will now show in the following the derivation of [ols'aram] from its underlying representation:³⁴

(49)

[#[# o + iɿ? #] saram #]/		
-----		<u>lexical component</u>
# o + iɿ? #	----- #	i-deletion
σ	σ σ	
# o + iɿ? #	saram #	UFR
σ	σ σ	
# o + iɿ? #	----- #	Neutralization
σ	σ σ	
# o + iɿ? #	saram #	CR
-----		<u>postlexical component</u>
σ	σ σ	
## o + iɿ? #	s'aram #	Tensing
σ	σ σ	
## o + i #	s'aram #	SEC
[ols'aram]		

The above derivation makes an interesting claim with respect to SEC. If SEC has applied at the end of lexical component, we would not have gotten the correct output. SEC must come into play after Tensing in the postlexical component, and, therefore, we propose that SEC applies at the end of the postlexical component in Korean.³⁵ (Of course, we are not excluding the possibility of parameterizing SEC with respect to the point of its application.

Cf. Steriade (1982), where she argues that SEC applies at the end of the lexical component as well as at the postlexical component.)³⁶

In summary, what we have tried to do in this section is, first, to explicate the paradox the standard approach to CCS faces, which no simple minor change in the theory can resolve. Secondly, we have shown why that kind of paradox does not arise in our theory, and how our theory derives the relevant correct surface forms from their underlying forms.

5. More the factual discussion

5. 0. So far, we have drawn a rather 'ideal' picture of CCS. The 'real' one, however, is not as neat as the ideal one and contains many idiosyncrasies, basically idiolectal variations. They are the subject of this section. We will provide several idiosyncratic facts about CCS in Korean, which are not meant to be exhaustive at all, and try to see how much can they be made to fit into the theoretical framework of this paper.

5. 1. In section 3, we have taken a look at the historical change which is going on with respect to CCS in Korean phonology. There is another aspect of historical change that involves CCS. It has been observed by many linguists that some of the original double consonant bases have been simplified to single consonant bases in the underlying structure.

Among others, Cheun (1976b) is quite succinct in presenting this fact. Consider the following surface alternations that are both legitimate forms (Cheun 1976b:66).

- (50) /kaps+i/ ----- [kaps'i] or [kabi]
 /saks+i/ ----- [saks'i] or [sagi]
 /hilk+i/ ----- [h'ilgi] or [h'igi]
 /talk+i/ ----- [talgi] or [tagi]

The derivation of the phonetic forms in the middle column is straightforward. But the other set of phonetic outputs in the right column seems problematic because the rule that will derive them from the respective underlying forms in the left column (cf. /kaps+i/ → [kabi]) will have an overwhelming number of counterexamples like the following (Cheun 1976b:66):

- (51) /aps-əsə/ → *[əbasə] 'since there isn't (anything)'

This problem can be avoided if we assume, following others, that an underlying form of [kabi] is /kap+i/ rather than /kaps+i/. Therefore, we are taking a view that the underlying forms of the stems with double consonant bases have been restructured.

tured to ones with single consonant endings (ex. /kaps/ → /kap/, /saks/ → /sak/, etc.)

One interesting point to mention here is the fact that restructuring, a historical change, involves nouns rather than verbs or adjectives. Since nouns, but not the stems of the verbs or adjectives, often occur without suffixes, we would expect that they tend to be taken at their face values, and the surface forms in isolation are easily taken to be their original forms, that is, their underlying forms.

5. 2. Consider the following.

- (52) /c'alp-kin c'alp-ta/ '(it is) really short'
 /palk-kin palk-ta/ '(it is) really bright'
 /cəlm-kin cəlm-ta/ '(he is) really young'

The pattern /-kin -ta/ (cf. Appendix 2) reveals an interesting fact concerning CCS. According to the 'theories', including ours, only the following surface forms will be allowed from (52).

- (53) [c'ap-k'in c'ap-t'a] or [c'al-k'in c'al-t'a]
 [pak-k'in pak-t'a] or [pal-k'in pal-t'a]
 [cəm-k'in cəm-t'a]

However, the following is also observed among speakers.

- (54) [pal-k'in pak-t'a] '(it is) really bright'

(54) is exceptional since here we see a simultaneous realization of S-E dialect and the standard dialect in a single phrase. Hence some modification of the theory is asked for.

Suppose we want to keep the CCS rules with as little modification as possible. Then we can think of three possibilities for dealing with (54): i) exploiting the possible boundary differences between the one before /-kin/ and the one before /-ta/, ii) introducing a consonant absorption rule of the form /kk/ → /k/, and iii) assuming that (54) itself is the underlying structure and therefore is not a case of CCS.

We do not have enough information to choose one among the three, but the following array of facts seems to disqualify the second possibility.

- (55) [pak-t'i pak-t'a], [pal-t'i pal-t'a], or [pal-t'i pak-t'a]
 '(it is) very very bright.'
 [puk-t'i puk-t'a], [pul-t'i pul-t'a], or [pul-t'i puk-t'a]
 '(it is) very very red.'

/-ti -ta/ pattern is a sort of reduplicated form of the corresponding simple /-ta/. The crucial difference between /-kin -ta/ and /-ti -ta/ is that the same consonant /t/ is involved in /-ti/ and /-ta/ in the latter case. Thus, among the three possibilities in the above, the second one seems rather plausible at the first glance, and is least capable of explaining (55).

5. 3. So far, we have excluded the possibility of any 'active' role by the third consonant in a sequence of three consonants; CCS does not seem to care much about the characteristics of the consonant. In other words, all we have to know is that it is a consonant, whatever other features it might have.

This is true in most cases. In some other cases, however, the characteristics of the third consonant seem to affect CCS. Consider the following:

- (56) /ilk + ta/ → [ikt'a]
 /ilk + ko/ → [ilk'o]

Some speakers tend to retain /l/, which is normally deleted by CCSR, when /lk/ is followed by /k/.³⁷⁻³⁸

This is a problem for the 'syllable approaches' to CCS in general. It goes directly against the hypothesis that CCS is related to the 'syllable-finality,' which is sometimes represented by {#, C}.

A possible direction we may look to to solve this is to take care of this exceptional case before CCS is done, for example, by setting up the following kind of hypothesis:

- (57) If there are two identical plain obstruents adjacent to each other, they become a single homophonous tense obstruent.³⁹

That is, if we assume (57) applies before CCSR, we will be able to avoid the problem in advance.

The next question is then whether the hypothesis (62) is defensible. The following facts seem to show that at least it is not totally ad hoc.

- (58) /hak-kyo/ → [hakk'yo] or [hak'yo] 'school'
 /tap-po/ → [tapp'o] or [tap'o] 'mark-time'
 /pat-ta/ → [patt'a] or [pat'a] 'receive'

Whether the outputs on the right are obtained by deletion of the relevant consonant from those on the left or by Hypothesis (57), it is not crucial. The derivation /hak-kyo/ → [hak'yo] and similar examples suggest that /ilk ko/ → [ilk'o] might not be a totally isolated phenomenon.

6. Conclusion

In conclusion, we will summarize what we have argued for in this paper. First, the CCS phenomena, or most of it, can now be interpreted as a universal process rather than a result of some language particular one. Second, the unnatural rule context {#, C} can be dispensed with in our theory.

Third, our theory is more restricted and more falsifiable than the standard approach, for it does not allow the kind of indeterminacy which the standard approach allows, on the one hand, and it makes an interesting prediction with respect to the historical change. Last, but not least, we have shown why SCR's fail in more complex cases like the ones involving Tensing, whereas in our theory they get proper treatment. If the discussion in this paper is valid, it will constitute a supporting argument for the non-exhaustive syllabification hypothesis in general, including the step-by-step syllabification. It will also constitute evidence for the significance of syllabification processes in Korean.

Throughout this paper, we have been using the terms like 'economic,' 'less expensive,' or 'cost less.' Among some alternatives or options at every point of discussion, the reason we have taken the positions defended in this paper has been to seek the most economic or the less expensive options available.

Now, the same question can be raised against our theory in this paper. Is the Korean syllabification theory assumed in this paper really valid and defensible? We, admittedly, need more in-depth study on this topic in general. Specifically, we might be interested in the phonological processes in Korean which essentially make use of the syllabification theory assumed here.

We will close our discussion with some speculative remarks that bear on the assumption of step-by-step syllabification. Suppose we have the following generalization:

- (59) Segments which are not attached to higher structure are more vulnerable to phonological change.

Intuitively, (59) says that if a segment is already linked to a higher structure, the segment will be more stable than the other non-linked segments with respect to the phonological processes.

The effect of (59) would be nil in cases where each of the relevant segments is already attached to a higher structure or where none of them is. So the derivation up to the point where UFR applies and that after the point where CR applies will be excluded from our consideration.

Now, consider the phonological processes which occur after the 'core' syllabification, that is, UFR, and before the coda incorporation, that is, CR. We would expect, according to (59), segments which have been syllabified to be more stable with respect to the phonological process than those that are not syllabified yet.

We might further expect that the 'instability' of the unlinked segments be realized in various ways--from single feature change to deletion. The following is a typical set of phonological processes that might happen with respect to any consonant:

- (60) a) assimilation
b) neutralization
c) deletion

It is surprising that in Korean most of the phonological processes in (60) are concerned with the consonants in the 'coda' position rather than the onsets. For example, there are many cases where the 'syllable-final' consonants are deleted, but there are few cases where the 'syllable-initial' ones are. Neutralization is another important feature of phonological processes in Korean, and it is well known that it concerns the 'syllable-final' consonants.⁴⁰

Finally, assimilation is very significant in the light of Hypothesis (59). Remember that in Korean, according to P. Lee (1981) (cf. Footnote 29), only regressive assimilation is observed. Given a sequence of segments as follows,

- (61) V C₁ C₂ V

there is no a priori reason why C₁ should be more vulnerable to change than C₂. It is yet to be explained why in Korean there are few cases if any at all where C₂ assimilates to C₁, while the opposite cases are abundant. The asymmetry between C₁ and C₂ with respect to assimilation, however, is a natural result of Hypothesis (59) and the step-by-step syllabification hypothesis.

Notes

- * This is a slightly revised version of my earlier paper with the same title. I would again like to acknowledge the help and encouragements from the people mentioned there: Emmon Bach, Roger Higgins, Michael Kenstowicz, Scott Myers, and Lisa Selkirk. Comments from two anonymous reviewers of UMOF 11 have been very helpful in current revision. Finally, I would like to thank Joyce McConough for her detailed comments on the style of this paper. However, all the remaining errors are solely mine.

- 1 There is no case reported where more than a three consonant sequence can be generated in Korean phonology.
 - 2 It should be pointed out that Cheun is not referring to CCS itself but to the peculiarity in the choice of the deleting segment in Korean.
 - 3 This categorization of the literature should be understood at best as a rough one.
 - 4 An exhaustive list of words or morphemes which have a double consonant base can be found in Appendix 1.
 - 5 I have cited only the examples in which the third consonant is /t/. But it does not have to be /t/; it could be /k/, /s/, /c/, or /n/.
 - 6 /lth/ in (3a) also seems to show idiolectal variation. Cf. H. Choe (1982).
 - 7 One thing to be noted with respect to the categories of the CCS is that the nouns seem to be undergoing restructuring of the underlying forms at the present time. For example, in some dialects, some noun examples of CCS do not show alternations at all. We will discuss this in more detail later. Cf. Section 5. Another interesting thing to be noted is that in spite of the large amount of Sino-Korean vocabulary in Korean, all of the examples that have double consonant bases are native Korean morphemes.
 - 8 I will call SCR's rules despite the fact that each has a disjunctive context {#,C}, for the context {#,C} is special in some sense. Cf. Kenstowicz & Kisseberth 1979:339-42. Yet further factoring out is possible and the two SCR's can be collapsed into one as some linguists have them. See the following discussion.
 - 9 This rule apparently is sensitive to grammatical categories. In case of predicate stems, /m/ and /n/, as well as obstruents, trigger the tensing of the following obstruents. Thus the tensing rule for the predicate category will be as follows (cf. Cheun (1976a) and (35)):
- [+obst] --> [+tense] / [-cont] + _____
 [-asp]
- 10 Roger Higgins (p.c.) pointed out this to me.
 - 11 In case of /ɲ/, it is not perceptually clear whether the same principle still applies. Martin & Lee (1969) argue that /ɲ/ attaches to the following vowel to form a syllable.

On the other hand, unlike other consonants, /ɸ/ and /l/ do not occur in the word initial position.

- 12 There have been at least two attempts to link CCS to syllable structure or syllabification in Korean phonology. S.Y. Kim (1980), for example, argues for "syllable based solutions" for CCS. Kim's solution is based on the by now well known argument for the syllable approach in general: the unnaturalness of the {#, C} context in the SPE system.

S.Y. Kim adopts Kahn's syllable theory, including his Syllable-structure Assignment Rules (Kahn 1976:32) and modifies the context of the CCS rule (cf. SCR's) accordingly:

$$i) (=S.Y. Kim's (37))$$

$$C \rightarrow \emptyset / \left\{ \begin{array}{l} (a) \quad C \left[\begin{array}{c} \text{---} \\ [+cor] \end{array} \right] \\ (b) \quad \text{---} C \end{array} \right\} \begin{array}{l} x \\ S \end{array} \quad * x \text{ means 'unattached.'}$$

The other attempt to link CCS to the syllabification was done by Kim & Shibatani (1976), which was written within the framework of a 'syllable boundary' approach. They have the following "syllable-ending adjustment" rule for CCS:

$$ii) C \rightarrow \emptyset / C \text{ ---} \$ \quad * \$: \text{syllable boundary}$$

Although (ii) in its current form is not sufficient enough to deal with all CCS facts, it can easily be modified so that it may cover as many facts as (i) or SCR's can cover.

Whatever differences between their syllabification rules there may be, however, both attempts in the above, as far as CCS is concerned, are more similar than they are different from each other. If we compare S.Y. Kim's (i) or Kim & Shibatani's (ii) with SCR's, we notice that only 'minimal' changes have been made to SCR's in that the change is limited to their context {#, C}. We believe that there is a possibility of using the easily available 'power' of syllabification processes more fully in dealing with CCS. What we will pursue in this paper is reinterpretation of the nature of SCR's, so that part of them might be attributed to some universal convention.

- 13 In the least, we may need syllabification in Korean phonology for those syllable sensitive rules like neutralization that have {#, C} in their context.

- 14 Actually, /pul/ 'fire', unlike another /pul/ 'not', is a free morpheme and the examples including it might be regarded

as a result of compounding rather than affixation, thus providing a further difference between the independent /l/ Deletion and the /l/-deletion in double consonant bases.

- 15 For a discussion of syllable sensitive rules, see Kahn (1977) or Lowenstamm (1981).
- 16 I am grateful to Gert Webelhuth (personal communication) for his comments which helped me to correct the defect in the original formulation of the rule.
- 17 Essentially the same position can be found in a recent paper by Hyman (1984). But, the step-by-step syllabification is not the only option we could take in this paper. As Lisa Selkirk (p.c.) has pointed out to me, cyclic syllabification hypothesis seems equally compatible with the discussions of this paper. Under the latter hypothesis, the rule in (26) would be slightly revised so that the consonant to be deleted may be already associated with a syllable. However, see the discussion in section 6, where we speculate that the onset-coda asymmetry in Korean phonology might be explained in terms of 'associated' vs. 'unassociated.'
- 18 This is a simplified version of Steriade's original rule, which is as follows:
- $$\begin{array}{ccc}
 (C)V \Rightarrow (C)V & O: \text{onset}; R: \text{rhyme} \\
 \vdots & \\
 O \ R & \\
 \swarrow & \\
 \text{ } &
 \end{array}$$
- 19 At a later point, we will argue that in Korean SEC applies at the end of the postlexical level. Cf. Section 4.
- 20 See especially the discussions in H. Lee (1980) and Hong (1982).
- 21 A brief look at the literature on historical linguistics reveals us a couple of ways in which the historical change of grammar can undergo. According to King (1969), the "standard reference for generative historical linguistics (Jeffers & Lehiste 1979:82)," there are four major types of (phonological) rule change--rule addition, rule loss, rule reordering, and (rule) simplification.

Our prediction, though, fits into none of these four. Rule simplification looks like the most likely candidate at first glance but actually is not, since simplification is defined "in terms of the notational conventions employed in phonological description, conventions which are claimed to make significant generalizations about phonological struc-

tures (Bynon 1977:123)," i.e., the number of features.

22 In some cases, Sino Korean words and native Korean ones show phonologically different behavior from each other. Cf. (34d).

23 Although we will not discuss it, (34d) is quite interesting since tensing after /l/ is freely allowed, which is opposite to the more general cases in (34a, b). One possible way to explain this is to treat this in the same way as we treat (34c). See the following discussions.

For the (34b ii) cases, see Footnote 9.

24 /-il/ is usually called the future or present modifier (affix). Sometimes it is also called anticipatory modifier affix. In this paper, we will call it a modifier (affix).

25 The issues surrounding the single # boundary in Korean phonology—how it is generated and why it should be so—remain unclear in most cases (cf. C.W. Kim (1970), and Cheun and others (1976)). And we do not intend to give any clear solution in this paper. We assume that the tensing across the # boundary is possible as the data in (34c,d) suggest. That is, the obstruent to the right of /l/ has apparently undergone tensing.

26 There is a generally accepted t-insertion rule for compound nouns (cf. the bottom part of (39)).

27 Cheun (1976a:34) actually sets up /-ilt/ as the underlying form and suggests that /-ilt/ may be the "reflection of /-il2/ of Middle Korean." Although he does not specify the reason for taking /-ilt/, it is not difficult to find one: for avoiding the abstract phoneme /2/. (The morpheme final sequence /lt/ is an abstract one, though, as is pointed by Cheun). See the following discussion.

28 We may assume a kind of neutralization rule like /h/ → /t/. Cf. Cheun 1976:24-6.

29 This view is more true of the consonants than of the vowels. For the discussion of the underlying vowel system of Korean, the readers are referred to C.W. Kim (1968) and B. Lee (1976, especially chapter 2).

30 There is an alternative view on this rule in which (40) is a part of the following rule:

n → l % l

For a discussion on this subject, see P. Lee (1981: 137).

Incidentally, in the same article, he makes an interesting observation that all the direct assimilation (i.e., assimilation without any intervening segment between the focus and the determinant of the rule) rules in Korean are regressive ones, rather than progressive like (40).

- 31 The terms like 'direct' or 'indirect' are translations from Korean which the paper was written in. They can be equally read 'contiguous' or 'contact' for 'direct', or 'non-contiguous' or 'distant' for 'indirect'. Cf. Crystal (1980:36).
- 32 Neutralization is a quite general rule in Korean, and only seven consonants out of eighteen are allowed in the coda at the surface level. In the above derivation, Neutralization affects the application of SCR's since it changes [-cor] to [+cor].
- 33 Here and hereafter, I assume some familiarity with Lexical Phonology on the part of the reader. I especially depend on the discussions in Kiparsky 1982a, b, 1983, 1984 when I refer to Lexical Phonology.
- 34 A note is in order with regard to the ordering relationships between the rules other than the tensing and CCSR. In (49), we have put the seemingly non syllable-sensitive rules before the syllabification rules for obvious reasons. Neutralization, since it contains {#, C}, is assumed to be syllable sensitive. Cf. Lowenstamm 1981. See H. Choe (1981:15-7) for a counter-argument. However, whether the assumption about the ordering between syllable sensitive rules vs. syllable non-sensitive ones is valid or not, as well as whether a certain rule is syllable sensitive or not, is certainly an open issue and needs further study.
- 35 I am grateful to Lisa Selkirk and Scott Myers for bringing this point to my attention.
- 36 Notice that in her (cf. Steriade 1982:369) analyses of Attic, there appeared some exceptions to SEC at the lexical level, which necessitate an introduction of the "required extrametrical position," so that "the stray consonants at the beginning and end of a word or compound member[may] be explicitly exempted from the application of Stray Erasure [at the end of Lexical Component]."
- 37 H. Lee (1980) has introduced a rule exactly for this sort of example:

$$l \rightarrow \emptyset / \text{---} k \begin{Bmatrix} t \\ c \end{Bmatrix} \begin{Bmatrix} \# \\ c \end{Bmatrix}$$

This rule has some obvious errors in it, and we believe it should read as follows:

$l \rightarrow \emptyset / _____ k \{t, c, \#\}$

- 38 In a survey on CCS done in 1978, I noticed that, among the seven subjects with varying dialectal backgrounds whom I interviewed, one showed this tendency consistently. However, the survey was not extensive enough and I have not checked whether it is lexically sensitive or not.
- 39 By 'plain', we mean 'non-tense' and 'non-aspirated'.
Cf. /p/, /t/, /k/.
- 40 In our hypothesis, 'syllable-final' will be replaced by 'not-syllabified.'

REFERENCES

- Bynon, T. (1977) *Historical Linguistics*, Cambridge Univ. Press, London.
- Cheun, S.B. (1976a) "Tensing phenomena in Modern Korean (in Korean)," *Linguistic Journal of Korea* 1, 22-35.
- Cheun, S.B. (1976b) "Phonological interpretations of variants (in Korean)," *Language and Linguistics* 4, 59-77.
- Cheun, S.B. & others (1976) "The problem of boundaries in Korean (in Korean)," *Language Research* 12, 307-23.
- Choe, H.S. (1982) "Syllable sensitive rules in Korean," ms., Univ. of Connecticut.
- Chomsky, N. (1981) *Lectures on Government and Binding*, Foris Publications, Dordrecht.
- Chomsky, N. & M. Halle (1968) *The Sound Pattern of English*, The MIT Press, Cambridge.
- Clements N. & J. Keyser (1983) *CV Phonology*, The MIT Press, Cambridge.
- Crystal, D. (1980) *A First Dictionary of Linguistics and Phonetics*, Andre, Deutsch, London.
- Feinstein, M.H. (1979) "Prenasalization and syllable structure," *Linguistic Inquiry* 10, 245-78.

- Harris, J. (1983) *Syllable Structure and Stress in Spanish: A NonLinear Analysis*, The MIT Press, Cambridge.
- Hyman L.M. (1984) "On the weightlessness of syllable onsets," *BLS* 10, 1-14.
- Hong, C.S. (1982) "A study of syllable-final double consonants in Korean (in Korean)," *Emun Nonjip* 23, 475-93.
- Hwang, K.C. (1979) "Tensing in Korean (in Korean)," *Inmungwahak Nonchong* 12, 81-97, Seoul.
- Jeffers R.J. & Lehiste I. (1979) *Principles and Methods for Historical Linguistics*, The MIT Press, Cambridge.
- Kahn D. (1976) *Syllable-Based Generalizations in English Phonology*, Doctoral Dissertation, MIT.
- Kahn D. (1977) "Syllable-structure specifications in phonological rule," ms.
- Kenstowicz M. & C. Kisseberth (1979) *Generative Phonology*, Academic Press, New York.
- Kim, C.K. (1974) "The system of Korean consonants (in Korean)," *Hangil* 153, 63-86, Seoul.
- Kim, C.W. (1968) "The vowel system of Korean," *Language* 44, 516-27.
- Kim, C.W. (1970) "Boundary phenomena in Korean," *Papers in Linguistics* 2, 1-26.
- Kim, C.W. (1972) "Two phonological notes: A-sharp and B-flat," in *Contributions to Generative Phonology*, ed. M.K. Brame, Univ. of Texas Press, Austin, Texas.
- Kim, C.W. (1973) "Gravity in Korean phonology," *Language Research* 9, 274-81.
- Kim, K.O. and M. Shibatani (1976) "Syllabification phenomena in Korean," *Language Research* 12, 91-8.
- Kim, S.Y. (1980) "A study of consonant cluster simplification," MA thesis, Ewha Womans Univ., Seoul.
- Kim, W.C. (1972) "Phonological interpretation of morphological issues (in Korean)," *Dong-A munhwa* 11, 271-300, Seoul.
- Kim-Renaud, Y.K. (1974) *Korean Consonantal Phonology*, Doctoral Dissertation, Univ. of Hawaii.

- King, R.D. (1969) *Historical Linguistics and Generative Grammar*, Englewood-Cliffs: Prentice-Hall.
- Kiparsky, P. (1982a) "Lexical and postlexical phonology," in *Linguistics in the Morning Calm*, Seoul.
- Kiparsky, P. (1982b) "Word-formation and the lexicon," ms., MIT.
- Kiparsky, P. (1983) "Some consequences of Lexical Phonology," ms., MIT.
- Kiparsky, P. (1984) "On the Lexical Phonology of Icelandic," ms.
- Lee, B.-G. (1976) *A Generative Phonology of Modern Korean* (in Korean), Ilcisa, Seoul.
- Lee, H.S. (1980) "Stem-final consonant clusters in Korean (in Korean)," *Linguistic Journal of Korea* 5, 1-15.
- Lee, P.K. (1981) *Constraints on Phonological Processes* (in Korean), Tower Press, Seoul.
- Lowenstamm, J. (1981) "On the maximal cluster approach to syllable structure," *Linguistic Inquiry* 12,
- Martin, S.E. & Y.C. Lee (1969) *Beginning Korean*, Yale U. Press, New Haven.
- McCarthy, J. (1979) *Formal Problems in Semitic Morphology and Phonology*, Doctoral Dissertation, MIT.
- Park, Y.S. (1983) "Korean Consonant rules revisited (in Korean)," in *The Journal of Korean Language Institute* 8, 97-107, Yonsei University, Seoul.
- Selkirk, E.O. (1982) "The syllable," in *The Structure of Phonological Representations* (Part II), ed. by H. Hulst & N. Smith, Foris Publications, The Netherlands.
- Seong, W.K. (1978) "A study on syllables used in Korean Language (in Korean)," *Inmungwahak Nonchong* 11, 11-33, Seoul.
- Steriade, D. (1982) *Greek Prosodies and the Nature of Syllabification*, Doctoral Dissertation, MIT.
- Yang, D.W. (1975) *Topicalization and Relativization in Korean*, Ph.D. Dissertation, Indiana Univ.

Appendix 1

An exhaustive list of double consonant base morphemes
in Korean

* This list is largely based on Seong (1978) and Hong (1982).

** We have excluded the cases which were used only in Middle Korean and has since been obsolete.

- /ps/ N(ouns): /kaps/ 'price',
P(redicates): /aps-/ 'there is none', /kayaps-/ 'pitiful'
- /ks/ N: /naks/ 'soul', /moks/ 'share', /saks/ 'wage rate',
/s'aks/ 'wage rate', /saks/ 'mooring'
- P: ---
- /nc/ N: ---
P: /anc-/ 'sit', /anc-/ 'put on (sth)'
- /lth/ N: ---
P: /halth-/ 'lick', /holth-/ 'hackle', /hulth-/ 'hackle'
- /ls/ N: /kols/ 'fixed direction', /tols/ 'one full year', /ols/ 'merits'
- P: ---
- /lk/ N: /c'ilk/ 'arrowroot', /hilk/ 'dirt', /c'hilk/ 'arrowroot',
/talk/ 'hen', /salk/ 'wildcat', /k'atalk/ 'reason',
/kisilk/ 'foot'
- P: /kalk-/ 'scratch', /kulk-/ 'thick', /kilk/ 'scratch',
/nalk-/ 'wornout', /nilk-/ 'old', /malk-/ 'clear',
/mulk-/ 'thin', /palk-/ 'bright', /pulk-/ 'reddish',
/p'ulk-/ 'reddish', /alk-/ 'pockmarked', /lk-/ 'pockmarked',
/olk-/ 'tie up', /ulk-/ 'impetuous',
/ilk-/ 'read'
- /lp/ N: /yadalp/ 'eight', /yadilp/ 'eight'
- P: /kalp-/ 'defy', /nəlp-/ 'wide', /ɹdalp-/ 'heart-rending',
/t'ulp-/ 'pierce', /palp-/ 'step on', /səlp-/ 'sorrowful',
/yalp-/ 'thin', /yəlp-/ 'thin', /c'alp-/ 'short', /t'əlp-/ 'astrigent'
- /lp^h/ N: ---
P: /ilp^h-/ 'recite'
- /lm/ N: /salm/ 'life', /alm/ 'knowledge'
- P: /kolm-/ 'fester', /kulm-/ 'starve', /talm-/ 'look alike',
/palm-/ 'measure in pace', /salm-/ 'boil', /s'alm-/ 'boil',
/olm-/ 'infected', /cəlm-/ 'young', /cilm-/ 'loaded'
- /nh/ N: ---
P: /k'inh-/ 'cut', /manh-/ 'abound', /anh-/ 'not',
/kwenc anh-/ 'all right', /hinh-/ 'common', /k'onh-/ 'give marks'
- /lh/ N: ---
P: /kolh-/ 'starve', /kulh-/ 'half empty', /k'ulh-/ 'kneel',
/k'ilh-/ 'boil', /talh-/ 'wear down', /t'alh-/ 'wear down',
/t'ulh-/ 'bore', /alh-/ 'sick', /silh-/ 'dislike',
/l^hh-/ 'night', /il^hh-/ 'lose'

Appendix 2

A look at some possible combinations of
the double consonant morphemes and
the morphemes with different initial consonant

	-a/-ə DCL.	-nin IND.	-so DCL.	-taga while	-ciman though	-ko and	-ki NOM.
kolm							
cəlm		-----		-----			-----
nəlp		-----		-----			????
c'alp		-----		-----			-----
palp							
ɪlp							
halt							
hult							
kilk							
k'ɪlh							

* DCL.= declarative, IND.= indicative, NOM.= nominalizer

** Adjectives are not allowed to combine with /-nin/,
/-taga/, or /-ki/.

	-kin	-ta (Concession)	-ti	-ta (Redup.)
cəlm				
nəlp				
c'alp				
pulk				
palk				
silh				?

* Only adjectives can combine with /-kin, -ta/ or /-ti, -ta/.