Chapter 8

Vowel Coalescence

8.0. Introduction

Discussion on Korean vowels cannot be complete without considering the vowel coalescence phenomena. In this final main chapter, I will concentrate on the vowel coalescence phenomena and how they can be analyzed in the present framework. As discussed in Chapter 5, several different changes take place when two vowels are adjacent. These include glide formation, glide insertion, vowel deletion and vowel coalescence. Following Choi (1971), Huh (1965), C-W. Kim (1971), and Kim-Renaud (1982), I assume that these changes take place in order to avoid a vowel clash. We have already discussed glide formation and glide insertion in Chapter 5, thus the main focus of this chapter will be on vowel coalescence (henceforth VC) and vowel deletion.

I include vowel deletion triggered by the presence of another adjacent vowel as a subpart of vowel coalescence. Consider the coalescence process proposed by de Hass (1988: 84):

For the purpose of discussion in this chapter I will not differentiate the terms, "coalescence", "fusion" and "merger". I will use them interchangeably.
(1) De Hass' Vowel Coalescence Rule

De Hass views VC as feature node coalescence here. Thus the (specified) features associated to different V-tiers are combined together with resultant lengthening of the merged segment. However the process is blocked if the resultant feature combination cannot be interpreted in a given language. Now suppose that either of the two vowels is featureless.

The coalescence rule in (1), in its broad sense, will predict that the coalescence rule still applies, but the result of VC is a long vowel with specified features of one vowel as schematically shown in (2):

(2) VC with Unspecified Vowel

Further if the specified features of a vowel are a subpart of the specified features of another vowel, VC will produce the following output:

(3) VC of Complex Feature Combination
If we compare the outputs with the inputs of VC in (2) and (3), we find that the result of VC looks just like deletion of one vowel with subsequent lengthening. Therefore the apparent deletion in these environments can be explained without positing another rule of vowel deletion. Thus the deletion of a vowel when it is adjacent to another vowel can be viewed as a subpart of the VC process.

In Korean, we may find three major types of vowel coalescence process as illustrated in (4):

(4) Korean VC Data

a. Merger

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ai</td>
<td>[ai], [æ:]</td>
<td>(baby)</td>
</tr>
<tr>
<td>ëiku</td>
<td>[ëigu], [e:gu]</td>
<td>(Oh!)</td>
</tr>
<tr>
<td>t'e + ø</td>
<td>[t'eø], [t'e:]</td>
<td>(to detach)</td>
</tr>
</tbody>
</table>

b. /i/ Deletion

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>mairm</td>
<td>[maim], [ma:m]</td>
<td>(mind)</td>
</tr>
<tr>
<td>yo + taim</td>
<td>[yodaim], [yodam]</td>
<td>(right next time)</td>
</tr>
<tr>
<td>chaim</td>
<td>[chaim], [chæ:m]</td>
<td>(first time)</td>
</tr>
</tbody>
</table>

There are deletion phenomena that may need a special rule of vowel deletion if the deletion process would result in the elimination of features of a vowel, which cannot be explained by VC alone as schematically shown under:

\[
\begin{array}{c}
V \\
[αF]
\end{array} \quad \begin{array}{c}
V \\
[βG]
\end{array} \quad \begin{array}{c}
V \\
[αF]
\end{array}
\]

In such a situation we clearly see that there is a need to posit a separate rule of vowel deletion or feature delinking. However, no such case is witnessed in Korean. The presence of independent vowel deletion in fast speech forms as discussed in 4.3.1, does not pose a problem to the present assumption since it is not triggered by the presence of another vowel.
c. VC without Lengthening

\[
\begin{align*}
ka + a & \quad [ka], \quad *[ka:] \quad \text{(to go)} \\
k^h_\text{hy} + \text{e} & \quad [k^h_\text{hye}], \quad *[k^h_\text{hye}:] \quad \text{(to light)} \\
ca + i\text{lo} & \quad [\text{caro}], \quad *[\text{cai}\text{ro}], \quad *[\text{ca:ro}] \quad \text{(with a ruler)} \\
ka + i\text{my}\text{on} & \quad [\text{kamy}\text{on}], \quad *[\text{kai}\text{my}\text{on}] \quad \text{(if . . . go)}
\end{align*}
\]

It should be mentioned that the VC in (4) is limited to pure Korean words. They do not apply to Sino-Korean words or loan words, just like umlaut in Korean discussed in Chapter 7, as exemplified in (5)³:

\[(5) \quad \text{Sino-Koreans and Loan Words}\]

\[
\begin{align*}
\text{k}^\text{e} + \text{in} & \quad [\text{kain}], \quad *[\text{ke:n}] \quad \text{(giant)} \\
\text{kye} + \text{om} & \quad [\text{kyeom}], \quad *[\text{kye:m}] \quad \text{(martial law)} \\
\text{s’ain} & \quad [\text{s’ain}], \quad *[\text{sae:n}] \quad \text{('sign')} \\
\text{boi} & \quad [\text{boi}], \quad *[\text{bo:}] \quad \text{('boy')}
\end{align*}
\]

Returning to the examples in (4), we observe that the VC in (4a) and (4b) seems to be optional, since the coalesced forms and noncoalesced forms coexist on the surface. Further we see that the VC is accompanied by vowel lengthening as de Hass' VC rule given in (1) predicts. I have to make note of the second example in (4b), since it does not show a long vowel in the coalesced form. However, the appearance of a short vowel is due to another independent

³However the /i/ deletion in (4b) can take place even with Sino Korean words in fast speech or casual speech forms as shown below:

\[
\begin{align*}
\text{sim} & \quad [\text{so:m}] \quad \text{(IOU note)} \\
\text{hoi\text{e}} & \quad [\text{ho:e}] \quad \text{(good response)}
\end{align*}
\]
process found in Korean. Vowel length is retained only in initial syllables. In noninitial syllables, long vowels surface as short vowels. This is captured by Kim-Renaud's (1974) vowel shortening rule as given in (6):

\[
(6) \quad \text{Vowel Shortening}
\]

\[
V \rightarrow \text{[-long]} / \# [C_o V_o C_o]_1
\]

(Every vowel becomes [-long] non-initially.)

In moraic theory, vowel length is captured by the number of mora that a vowel is associated with. Thus the rule given in (6) can be translated into moraic theory as shown in (7):

\[
(7) \quad \text{Vowel Shortening in Moraic Theory}
\]

(A long vowel is shortened in non-initial position.)

With this independent vowel shortening process, we can generalize that the examples in (4a) and (4b) always have long vowels after VC, and the long vowels in non-initial syllables are shortened by the application of the shortening rule given in (7); thus they surface as short vowels.

Another interesting observation in connection with the data in (4a) is that sometimes the vowel clash just remains unresolved, i.e. not all the vowel clashes trigger VC. Consider the following examples:
The examples in (8) clearly show that not all adjacent vowels are subject to VC, in spite of the fact that the possible output of the coalescence does not create uninterpretable feature combination in Korean. I propose that there are certain constraints on VC.

Turning to the examples in (4c), we find that the data in (4c) are different from those in (4a) or (4b) in many respects. First, there is no lengthening effect. As the monosyllabic stems in (4c) show, the initial vowels are not lengthened. If they are long, then they are ruled out as ill-formed. Second, we see that the coalescence is not optional. If the VC does take place, the resultant vowel sequence is tolerated. Third we see that there are no examples of this kind in underived words. Thus we can generalize that the obligatory VC as shown in (4c) is applicable only in the lexical derivation and that there is no lengthening effect.

The obligatory nature of vowel deletion in coalescence as in (4b) has been one of the major controversies in the study of this phenomenon in Korean. Excluding the first two examples of (4c), we find that the deleted vowel is /i/. And /i/ deletion in this environment has been extensively studied by many phonologists including, Kim-Renaud (1974, 1982), S-C. Ahn (1985), H-S. Sohn (1987b) and D-J. Lee (1989) among others. However, the rules that have been posited are either too complicated so as to lose any naturalness or they are not complete in dealing with the exceptional cases.

On the other hand, scholars such as H-B. Choi (1971), W. Huh (1965), C-W. Kim (1971) and Y-S. Kim (1984) try to explain the alternation by means of the /i/ insertion analysis instead of an /i/ deletion analysis. However such an approach has proven to be even less satisfactory because of the problem in delimiting the domain of the application of insertion and
in dealing with exceptions.

Against this backdrop, I will make a new proposal that some underlying high vowels are introduced without associated moras and that the /i/ deletion effect can be accounted for by means of the syllabification process with Stray Syllabification or Stray Erasure. To be more specific, I will argue that if /i/ appears on the surface in these examples, its appearance is due to Stray Syllabification, and if /i/ does not surface, its lack of appearance is the natural result of Stray Erasure Convention as discussed in 4.2.5.2.

In the following section, I will make a survey of VC phenomena and distinguish two different processes: optional VC and obligatory VC. I will show that there are possible and impossible types of vowel coalescences. Afterwards, I will discuss optional VC, and argue that one general rule can cover all the optional mergers with resultant lengthening. I will also discuss that there are constraints on the general rule of vowel merger. To be more specific, I will propose that there is a [round] constraint and an [RTR] constraint in optional VC. The [round] constraint disallows VC if the first vowel is not round and the second vowel is round. However if the second one is not round then the first one may be either round or unround. Further if the second vowel is [RTR] and the first vowel is not [RTR], the optional VC does not take place.

In 8.3, I will turn to the cases of obligatory VC. I will argue that the obligatory nature of a high vowel deletion comes from the underlying moraic status of these vowels. As discussed in 4.2.5.1, moras are assumed to be underlyingly present and some vowels are not moraic. In these contexts, I will propose that the stem final /i/ and affix initial high vowels in verbal morphology such as /ɪ/, /ɪ/, /u/ are underlyingly nonmoraic. Therefore they may not appear on the surface level unless they acquire moraic status by either Stray Syllabification or by a (morphological) Minimality Condition.
As such I will separate two different aspects of vowel fusion and explain that the cases in (4a) and (4b) truly reflect the merger process and the examples in (4c), though they look like VC follows an entirely different path of derivation.

8.1. Survey

Before going into the discussion of VC in Korean, I will present the facts about Korean VC and how they have been analyzed in previous research. The optional VC illustrated in (4a) and (4b) are assumed to be post-lexical rules since it applies both to derived and non-derived forms regardless of their morphological content. However there seem to be certain restrictions. VC does not readily take place in co-compounding and across phrasal boundaries as illustrated in (9):

(9) Lack of VC

a. Co-compounding

\[ \text{tæku + ŏnyang} \quad [\text{tæguśmyan}], *[\text{tægonyan}] \quad \text{(Tague and Eonyang)} \]

\[ \text{namu + ilim} \quad [\text{namuirm}], *[\text{naûirm}] \quad \text{(tree name)} \]

b. Across Phrasal Boundary

\[ \text{cipesŏpp [onta]V} \quad [\text{cibesŏnda}], *[\text{cibesonda}] \quad \text{(come from a house)} \]

\[ \text{Minki[Anta]V} \quad [\text{mingianda}], *[\text{mingænda}] \quad \text{(knows Minki)} \]

Thus I will assume that the co-compounding boundary and the phrasal boundary are strong enough to separate two vowels thus the motivation for VC, i.e. vowel clash avoidance is absent
in these environments.\(^4\)

Now consider the following coalescence chart:

(10) Vowel Coalescence Chart

\[ V_1 : \text{first vowel} \]

\[ V_2 : \text{second vowel} \]

<table>
<thead>
<tr>
<th>V1</th>
<th>i</th>
<th>i</th>
<th>u</th>
<th>o</th>
<th>ø</th>
<th>e</th>
<th>æ</th>
<th>a</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>i</td>
<td>i</td>
<td>u</td>
<td>o</td>
<td>ø</td>
<td>e</td>
<td>æ</td>
<td>a</td>
</tr>
<tr>
<td>i</td>
<td>i</td>
<td>i</td>
<td>ü</td>
<td>ö</td>
<td>e</td>
<td>e</td>
<td>æ</td>
<td>æ</td>
</tr>
<tr>
<td>u</td>
<td>u *</td>
<td>u</td>
<td>o *</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>o</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>o</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>ø</td>
<td>o</td>
<td>ø</td>
<td>e</td>
<td>e</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>e</td>
<td>e</td>
<td>e</td>
<td>ø</td>
<td>ö</td>
<td>*</td>
<td>*</td>
<td>e</td>
<td>*</td>
</tr>
<tr>
<td>æ</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>æ</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>a</td>
<td>*</td>
<td>æ</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

*: Coalescence does not take place.

O: Does not surface as a long vowel.

In the VC chart given in (10), we can immediately see that not all the vowel sequence triggers vowel coalescence. The absence of coalesced forms in some cases can be attributed to surface constraints found in Korean. In Korean a front low round vowel [ø] and a back low round vowel [œ] are not allowed even on the surface level. Therefore the sequences like /oa/,

\(^4\)Again, pause insertion between two vowels will block VC since the inserted pause already breaks hiatus or vowel clash. Following Nespor and Vogel's (1986) distinction of prosodic level, I will assume that the domain of optional VC application is "a phonological word".
/ɒ/, /æ/, or /uæ/ cannot fuse into one vowel because the resultant low round vowels are phonetically uninterpretable in Korean. In addition to such surface constraints, we might need some restrictions so as to eliminate other unattested surface forms in the coalescence process.

Any account for VC in Korean has to deal with the optionality and obligatory nature of the vowel coalescence. Consider the following examples:

(11) /ɪ/ deletion

a. Optional

mair [mai:m], [ma:m] (mind)
kaɪl [kaɪl], [ka:l] (fall)
nairi [naiɾi], [na:ɾi] (sir)

b. Obligatory

kɔnɪ + o [kɔnɔ], *[kɔnɪo] (to cross)
chiri + o [chɪɾi], *[chɪɾiɔ] (to pay)
so + iIo [soɾo], *[soɾo], *[soiɾo] (with a cow)

In (11a), the merger is optional, while in (11b), we find that the surface form without merger is rendered ill-formed. Therefore we can say that the two different examples in (11a) and (11b) should be treated differently. Another dimension that we have to think about is the output forms of the merger. We see that the output of the merger can either be long vowels or short vowels. Consider the following data:

(12) Long and Short Outputs.

a. Long Vowels

t'e + i [t'e], [t'e:] (to be detached)
k'æ + o [k'æo], [k'æ:] (to break)
b. Short vowels

\[
\begin{array}{ll}
\text{mənili} & \text{[myəniri], [meniri]} \\
\text{namu + ılo} & \text{[namuro]}
\end{array}
\]

(daughter in law) (with a tree)

Notice that the first word in (12b) is optional and the second one is obligatory. Thus here we see that the surface vowel length is another distinction. Though it may be true that all the obligatory VC results in short vowels, we see that sometimes the apparent VC is optional but the merged vowel surfaces short. Therefore we may summarize the different types of vowel coalescence as in (13):

(13) Different VC Outcomes

<table>
<thead>
<tr>
<th></th>
<th>Optional</th>
<th>Obligatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Vowel</td>
<td>A</td>
<td>Unattested</td>
</tr>
<tr>
<td>Short Vowel</td>
<td>B</td>
<td>C</td>
</tr>
</tbody>
</table>

This diagram provides comprehensive information about VC in Korean. Firstly, we find that obligatory application of VC with a resultant long vowel is not attested in Korean. However the result of the optional application of VC can be either long or short. Area (A) in (13) is the typical case of vowel coalescence which can be neatly captured by the VC rule given in (1). I assume that the appearance of short vowels in areas (B) and (C) is due to the lack of a mora of one of the fused vowels. Specifically, area (B) can be explained by onset simplification (cf. 5.1.3). For example the underlying /piə/ (rice) is realized as [pyə] or [pe] but it does not show up as [peː]. In such cases the fusion takes place between an onset element,
i.e. a glide, and a following vowel. Since onset elements do not have moras, the merger does not have two moras, thus there cannot be any lengthening effect.

In area (C), I offer a similar explanation. If one of the vowels in a two vowel sequence is not moraic, then the result of the merger is always a short vowel. Besides, the fusion process may involve delinking of a mora. For example there may be a strong segmental OCP effect that one of two identical vowels deletes in the process of lexical derivation, if the OCP induced deletion also deletes moras, then again such deletion will result in short vowels.

In the following sections, I will divide two VC phenomena on the basis of the optionality of application. Thus in 8.2, I will concentrate on optional vowel coalescence and in 8.3, I will discuss obligatory VC by positing nonmoraic vowels in the underlying representation.

8.2. Optional Vowel Coalescence

In this section, I will first consider Sohn's (1987b) rules for the optional VC, the area (A) in (13). I will show that Sohn's rules, though very comprehensive, have some undesirable aspects. Then I will combine two of Sohn's rules to propose one general rule of optional VC. It will be shown that we need some constraints on this general rule, so as to prevent wrong outputs. In 8.2.3, I will discuss the optional VC which is not accompanied by vowel lengthening. I will argue that the optional VC without vowel lengthening is different from VC and propose that the apparent VC is actually an onset simplification process. Thus since the onset element does not have moraic status in the underlying representation, the fused vowel cannot be long.
8.2.1. Sohn's Analysis

Sohn (1987b) presents a comprehensive analysis of optional vowel coalescence with Levin's (1985) style of syllable structure. She proposes two rules for VC, which she calls Nucleus Gemination and Merger as given in (14):^5

(14) Two Processes of VC

a. Nucleus Gemination (post-lexical)

\[
\begin{array}{c}
N \\
\text{\[\alpha F\]} \\
\text{\[\beta G\]} \\
\end{array}
\]

b. Merger (optional)

\[
\begin{array}{c}
N \\
\text{\[\alpha F\]} \\
\text{\[\beta G\]} \\
\end{array}
\rightarrow
\begin{array}{c}
N \\
\text{\[\alpha F, \beta G\]} \\
\end{array}
\]

(14a) subsumes Kim-Renaud's (1982) Casual /i/ Deletion^6 as well as identical vowel fusion. Thus Sohn argues that (14a) can explain two different sets of data as given in (15):

---

^5There is much previous research on vowel coalescence. However, such research focused on /i/-deletion, disregarding other types of merger. In some cases, the research is limited to certain combinations such as /V + i/ coalescence as in Ahn (1989: 172).

^6Kim-Renaud (1982: 476) formulate the casual /i/ deletion rule as shown below:

\[
\begin{array}{cccc}
X & V & i & Y \\
1 & 2 & 3 & 4 \\
1 & 2 & \text{Ø} & 4 \\
\end{array}
\]

+long

([i] is truncated when following another vowel and the remaining vowel is lengthened.)
(15) Examples of Nucleus Gemination

a. /i/ deletion

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
<th>Source</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>chɔim</td>
<td>[chɔim], [chɔ:m]</td>
<td>(first time)</td>
<td></td>
</tr>
<tr>
<td>kail</td>
<td>[kail], [kaːl]</td>
<td>(fall)</td>
<td></td>
</tr>
<tr>
<td>iikk'o</td>
<td>[iikk'o], [iikk'o]</td>
<td>(finally)</td>
<td></td>
</tr>
<tr>
<td>kis + o</td>
<td>[ki:o], [ki:]</td>
<td>(to draw)</td>
<td></td>
</tr>
</tbody>
</table>

b. Identical Vowel Fusion

<table>
<thead>
<tr>
<th>Word</th>
<th>Pronunciation</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>nach + o</td>
<td>[nach], [nɑː]</td>
<td>(to put)</td>
</tr>
<tr>
<td>tah + a</td>
<td>[taa], [taː]</td>
<td>(to reach)</td>
</tr>
<tr>
<td>cas + a</td>
<td>[caa], [caː]</td>
<td>(to spin)</td>
</tr>
<tr>
<td>cəs + o</td>
<td>[cəs], [cəː]</td>
<td>(to stir)</td>
</tr>
</tbody>
</table>

It is curious however, how Merger in (14b) is different from (14a). Ignoring the mirror image environment in (14a) for the moment, we can see that the rule given in (14a) can subsume (14b) too. Without further constraining the Nucleus Gemination, we can see that the rule in (14a) is not just restricted to /i/ deletion or identical vowel deletion. The structural description argues that any two vowel sequence is subject to Nucleus Gemination. Consider /AB/ and /BA/ sequences, where both /A/ and /B/ are vowels. The mirror image environment in (14a) predicts that both /AB/ and /BA/ sequences are subject to the same Nucleus Gemination rule. Consider the following examples:
(16) Absence of Mirror Image Effect.

a. s'a + i  [s'ai], [s'æ:]  (to be piled up)
   mian  [mian], [mya:n], *[mæ:n]  (sorry)

b. cu + ə  [cuə], [cwə:], [co:]  (to give)
   səul  [səul], *[so:l]  (the city of Seoul)

The examples given in (16) clearly show that though the /AB/ sequence undergoes Nucleus Gemination, the /BA/ sequence fails to merge together.

(14b) is for verbal suffixation. As the rule refers to the morpheme boundary, the merger process is lexical but optional as the following examples show:

(17) Examples of Merger

pe + ə  [peə], [pe:]  (to cut)
   pe + i  [pei], [pe:]  (to be cut)
   kæ + ə  [kæə], [kæ:]  (to fold)
   kæ + i  [kæi], [kæ:]  (to be folded)

Notice that Merger is optional. Therefore a vowel sequence, for example /æə/ that meets the environment of Merger may remain unaffected in the lexical derivation, then in the post-lexical level, this sequence again meets the structural description of Nucleus Gemination and may appear as [æː] by the application of Nucleus Merger. What I am pointing out is that (14b) is totally redundant given the post-lexical Nucleus Gemination given in (14a). This gives us a hint that the rules given in (14a) and (14b) can be replaced by one general rule of vowel coalescence.
8.2.2. Coalescence as Root Deletion

We have shown that it is not unreasonable to combine Sohn's two rules into one. Thus following de Hass' (1988) formulation of VC, I propose following VC rule as a first approximation:

(18) Vowel Coalescence (post-lexical)

When two vowels are segmentally adjacent, these two vowels can optionally fuse into one vowel by forming a segment that shows the feature combination of the two vowels. However I think that this coalescence process is actually a result of two different rules. One of the vocalic roots deletes, then the features originally dominated by the deleted root node is floating unassociated. These unassociated features are then linked up to the remaining vocalic root thus changing the vowel quality of the linked vocalic segment; the empty mora is then filled by root spreading as shown in (19):

(19) VC as Two Separate Process
Seen from this viewpoint, VC is essentially a process of eliminating one of two adjacent vowels, if both of them are moraic. The root spreading to the empty mora can be viewed as a process of compensatory lengthening due to the presence of an unassociated mora and the association of the delinked features comes from general principles. Thus I assume that association and spreading are mechanical processes that need not be included in the structural description of the VC rule. I propose the following Feature Association Convention, which is applicable to unassociated features:

(20) Feature Association Convention (=FAC)

Unassociated features are locally associated.

Here local association means the association to a root node which is nearest to the floating features. Consider the schematic representation of an unassociated feature.

(21) Local Association

\[
\begin{array}{cccc}
R_1 & R_2 & R_3 & R_4 \\
| & | & | & |
\\
\end{array}
\]

Suppose that [C] is an unassociated feature. FAC allows the association of the feature [C] to R₂ or R₃ but disallows the association of [C] to either R₁ or R₄, since R₁ and R₄ are not local to [C], since there are closer root nodes such as R₂ or R₃. It should be noted that a floating feature introduced as a part of a morphological process may not be subject to the FAC. These morphological features are usually specified for the linking target in the rule description. For example the introduction of the floating feature [RTR] in light ideophone derivation and of [back] in affixal harmony discussed in Chapter 6, are immune to FAC. In this sense, we may
say that FAC is purely phonological in nature.

With these observations, we can condense the VC rule into a simpler rule of Root Deletion as given in (22):

(22) VC as Root Deletion

\[
\begin{array}{c}
\mu \\
R[\text{voc}]
\end{array} \quad \begin{array}{c}
\mu \\
R[\text{voc}]
\end{array}
\]

This rule can subsume Sohn's two rules, Nucleus Gemination and Merger. I assume that the second vocalic root deletes, for reasons that will be clear in our discussion of constraining the Root Deletion (=RD) rule in order to filter out ill-formed outputs. Let's first consider some exemplary derivations assuming the vowel specification discussed in Chapter Five:

(23) Examples of VC

a. a + i → a:

\[
\begin{array}{c}
\mu \\
R \\
[RTR]
\end{array} \quad \begin{array}{c}
\mu \\
R \\
[RTR]
\end{array} \quad \begin{array}{c}
\mu \\
\mu \\
[RTR]
\end{array}
\]

\[
\text{RD} \quad \text{FAC} \quad \text{Spreading}
\]
b. $\sigma + i \rightarrow e$

\begin{align*}
\begin{array}{c}
\mu \mu \\
R R \\
[\text{open}] [\text{front}]
\end{array} & \rightarrow & \begin{array}{c}
\mu \mu \\
R \\
[\text{open}] [\text{front}]
\end{array} & \rightarrow & \begin{array}{c}
\mu \mu \\
R \\
[\text{open}] [\text{front}]
\end{array}
\end{align*}

(c) $\alpha + \alpha \rightarrow \alpha$

\begin{align*}
\begin{array}{c}
\mu \mu \\
R R \\
[\text{RTR}] [\text{front}] [\text{open}]
\end{array} & \rightarrow & \begin{array}{c}
\mu \mu \\
R \\
[\text{RTR}] [\text{front}] [\text{open}]
\end{array} & \rightarrow & \begin{array}{c}
\mu \mu \\
R \\
[\text{RTR}] [\text{front}] [\text{open}]
\end{array}
\end{align*}

d. $\sigma + u \rightarrow o$

\begin{align*}
\begin{array}{c}
\mu \mu \\
R R \\
[\text{RTR}] [\text{rnd}] [\text{rnd}]
\end{array} & \rightarrow & \begin{array}{c}
\mu \mu \\
R \\
[\text{RTR}] [\text{rnd}] [\text{rnd}]
\end{array} & \rightarrow & \begin{array}{c}
\mu \mu \\
R \\
[\text{RTR}] [\text{rnd}] [\text{rnd}]
\end{array}
\end{align*}

(23a) and (23b) are self-explanatory. In (23c), we find that the VC process introduces the feature [open] which is redundant for /æ/. However since the addition of [open] to /æ/ can be phonetically interpretable, the presence of the redundant feature does not pose any problem. In (23d), FAC adds the [round] feature which is already present in the preceding vowels. This may not be a problem given the Redundant Feature Interpretation proposed by Buckley (1991:13), as discussed in 3.3.4.7

One more thing that should be mentioned here is the potential mirror image effect of

---

7 Notice also that the Twin Sister Convention (Clements (1986)) or the OCP fusion analysis (Mester (1986)) can achieve the same effect.
the vowel deletion rule as in the analysis of Sohn (1987b) as shown in (14). I assumed that it is the second vowel that deletes and the second vowel deletion has proven to be quite effective as shown by the sample derivations in (23). However, if we reverse the order of the vowel sequence in (23), we find that vowel coalescence does not take place. Thus /ia/, /io/, /ae/ and /uo/ sequences do not undergo VC. Surely the second sequence can be fused into /e/ but such fusion is not accompanied by a vowel lengthening effect, thus they should be treated differently from the optional VC discussed in this subsection. There really is no mirror-image effect.

Now, as I mentioned earlier, not all the vowel clashes are resolved in Korean. We will have to constrain the general rule given in (22) in order to eliminate the over-generation. First, notice how round vowels in the second position behave differently as shown in the partial reproduction of the VC chart (cf. (10)) as given in (24):

(24) Round Vowels in Coalescence

<table>
<thead>
<tr>
<th>V1</th>
<th>i</th>
<th>i</th>
<th>u</th>
<th>o</th>
<th>e</th>
<th>æ</th>
<th>a</th>
</tr>
</thead>
<tbody>
<tr>
<td>u</td>
<td></td>
<td>u</td>
<td>*</td>
<td>u</td>
<td>o</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>o</td>
<td></td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>o</td>
<td>*</td>
<td>*</td>
</tr>
</tbody>
</table>

(* represents non-occurrence of VC.)

We find that there is a generalizable tendency in this chart. If the second vowel is [round], then it refuses to merge with the preceding vowel unless the preceding vowel is also [round]. Thus we may postulate the following [round] condition on VC:

---

8Notice that the iiu/ sequence can be fused into /u/ in spite of the generalization. This merger is witnessed in the Kyeongki and Chungcheong dialects as well as in the casual speech forms of the standard dialect, where /u/ is a question marker as shown below:

| tamki + u | [tamgu], [tamgu] | (dipping?) |
| s'i + u   | [s'iu], [s'u:]    | (writing?) |
(25) **Round Condition**

If the second vowel is [round] then the first vowel should be round, too.

Also a similar pattern can be witnessed in the RTR vowels. Observe the possible and impossible VC when the second vowel is [RTR] in (26):

(26) **RTR Vowels in Coalescence**

<table>
<thead>
<tr>
<th>V1</th>
<th>i</th>
<th>i</th>
<th>o</th>
<th>o</th>
<th>e</th>
<th>ø</th>
<th>a</th>
</tr>
</thead>
<tbody>
<tr>
<td>o</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>o</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>æ</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>æ</td>
<td>*</td>
</tr>
<tr>
<td>a</td>
<td>*</td>
<td>æ</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>a</td>
</tr>
</tbody>
</table>

○ represents that the vowel is short.

*represents non-occurrence of VC.

We see that if the second vowel is [RTR] then the first vowel should also be [RTR]. With the exception of the circled [æ] example, we find no example of VC in Korean where the

---

Since the forms without VC is more readily acceptable and the coalescence takes place only in casual speech, I will tentatively ignore the presence of such data.

In the Kyeongsang dialect, the standard form [tao] is realized as [to:]. However this is not an exception to the coalescence chart given here, since the KS dialect forms do not show [a] in the stem as shown in the following contrasts:

<table>
<thead>
<tr>
<th>Standard</th>
<th>KS</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>[tao]</td>
<td>[to:]</td>
<td>please give.</td>
</tr>
<tr>
<td>[tallago]</td>
<td>[tollak'o]</td>
<td>give + complementizer</td>
</tr>
<tr>
<td>[tallani]</td>
<td>[tollani]</td>
<td>give? (surprise question)</td>
</tr>
</tbody>
</table>

This suggests that the underlying forms for the standard and KS dialects are different from each other. We can safely assume that the underlying forms in the KS dialect contain /o/ not /a/. Thus these are not counterexamples to the VC chart.
first vowel is not [RTR] and the second vowel is [RTR]. The circled part indicates that the surface vowel is short. This form can be explained by onset simplification. I will return to these in the following subsection. For the moment, I will concentrate on surface long vowels. This constitutes another condition on VC:

\[(27) \text{ RTR Condition} \]

If the second vowel is [RTR, x], then the first vowel should be [RTR, x].

(where x represents any feature or null.)

Putting these two conditions, the round condition and the RTR condition, we come up with the final version of VC as Root Deletion given in (28):

\[(28) \text{ Root Deletion} \]

The VC as root deletion equipped with two additional conditions can effectively explain all the possible optional VC found in Korean. These conditions can be bypassed in casual or fast speech. Consequently in fast speech the /uo/ sequence, though it violates the RTR condition, can be pronounced as [o(:)]. However how to incorporate the fast speech and casual speech phenomena in optional merger is beyond the scope of this chapter and is left open for further research.

8.2.3. Onset Simplification

In the previous subsection, I argue that one general rule of vowel coalescence with two
additional conditions can cover all the cases of optional vowel merger with subsequent lengthening. However there are some apparently exceptional cases where the apparent vowel merger does not trigger vowel lengthening as the following examples show.

(29) VC without Lengthening

\[
\begin{array}{l}
p'iam \quad [p'yam], [pæm] \quad \text{(cheek)} \\
ki\breve{o}ul \quad [ky\breve{o}ul], [keul] \quad \text{(winter)} \\
kiesan \quad [kyesan], [kesan] \quad \text{(calculation)} \\
kuemul \quad [kwemul], [k\breve{om}ul] \quad \text{(monster)}
\end{array}
\]

In order to explain such phenomena, Sohn (1987b: 157) proposed the following Nucleus Degemination rule:

(30) Nucleus Degemination

\[
\begin{array}{c}
N \\
X \quad X \\
[\alpha F] \quad [\beta G]
\end{array} \quad \rightarrow \quad \begin{array}{c}
N \\
X \quad X \\
[\alpha F] \quad [\beta G]
\end{array}
\]

Notice that Nucleus Degemination given in (30) does not refer to onset structure. Thus it predicts that the rule given in (30) is insensitive to the onset structure. However I have already shown in 5.1.2. that the fusion takes place only when there is an onset element. Therefore the fusion is not found when the sequence is not preceded by an onset consonant as the following examples show:
(31) Non-application of Nucleus Merger

| iaku   | [yagu], *[ægu] | (baseball) |
| iœca  | [yœja], *[œja] | (woman)    |
| uølle | [wølle], *[ølle] | (place name) |

In Sohn's Nucleus Degemination, we do not understand why the fusion process deletes features as well as a slot on the x-tier. However, with the onset Simplification analysis of vowel merger posited here, we can clearly show that there will not be vowel lengthening since the vowel in the onset, i.e. a glide, is underlyingly nonmoraic. Consider the following onset simplification rule:

(32) Onset Simplification (=OS)

In the OS analysis, the glide can optionally delink from the syllable node, if there is another onset within the syllable. Features of the delinked glide, [round] or [front], are associated to the following vowel by FAC. Therefore by virtue of being nonmoraic, the glide delinked from the syllable node does not leave behind any unassociated mora. Consider the following derivation.
(33) Sample Derivations.

a. Underlying Representation

\[
\begin{array}{c}
\mu & \mu & \mu & \mu & \mu \\
| & | & | & | & | \\
k & i & o & u & l & k & u & e & m & u & l & i & o & c & a
\end{array}
\]

b. Syllabification

\[
\begin{array}{c}
\sigma & \sigma \\
| & | \\
k & i & o & u & l & k & u & e & m & u & l & i & o & c & a
\end{array}
\]

c. Onset Simplification

\[
\begin{array}{c}
\sigma & \sigma \\
| & | \\
k & i & o & u & l & k & u & e & m & u & l
\end{array}
\]

d. Feature Association

\[
\begin{array}{c}
\sigma & \sigma \\
| & | \\
k & e & u & l & k & o & m & u & l & i & o & c & a
\end{array}
\]

This analysis explains two aspects that the Nucleus Degemination fails to explain: why the surface vowel is short and why it takes place only when the glide follows a consonant. We do not need an arbitrary x-tier deletion rule as in Sohn's Nucleus Degemination. Vowel length can be directly captured by a moraic analysis. Vowel length is always manifested on the moraic tier and since an onset is not moraic, the fusion between the onset and the following vowel cannot be long. Secondly, the onset simplification analysis successfully limits the occurrence to a complex onset thus establishing a more clear relationship between the merger
and onset structure.

Finally consider the following cases of three way variation:

(34) Additional Data

\begin{align*}
\text{cu} + \circ & \rightarrow \text{[cu:]}, \text{[cw:]}, \text{[co:]} \quad \text{(to give)} \\
\text{tu} + \circ & \rightarrow \text{[tu:]}, \text{[tw:]}, \text{[to:] } \quad \text{(to put)} \\
\text{nanu} + \circ & \rightarrow \text{[nanua:]}, \text{[nanw:], [nano]} \quad \text{(to divide)}
\end{align*}

In (34), the vowels are all moraic in the underlying representation. Therefore they do not meet the environment of onset simplification. However they can undergo glide formation resulting in a long vowel. Now the glide can be optionally delinked in the complex onset. Then the floating feature will be re-associated to the following vowel resulting in the long vowel \( [o:] \), as shown in the following derivation.

(35) Sample Derivation

\begin{align*}
\text{\text{cu} + \circ} & \rightarrow \text{Syll} \rightarrow \text{GF} \\
\text{\text{cu} + \circ} & \rightarrow \text{OS} \rightarrow \text{FAC}
\end{align*}

As the sample derivation in (35) shows, the three way contrasts in the examples in (34) are due to the optional nature of the merger rules discussed in this section. Since both of the vowels are moraic, the derived environment meets the environment of the optional VC rule or of glide
formation. Therefore application of either of the processes can show the surface difference. Notice that the surface form /co:/ can be derived in two different ways, one by directly applying the optional VC rule discussed in the previous subsection or by OS after glide formation. Here the interesting thing is that the vowel after the application of OS is long if it is long before the application of the OS rule. Thus it is clearly shown that vowel length can be represented only on the moraic tier.

8.3. Obligatory Vowel Coalescence

In this section, I will turn to obligatory vowel fusion found only in the lexical derivation. The discussion in this section pertains to the area (C) in the figure given in (13). Consider the following examples:

(36) Obligatory Vowel Coalescence

a. Stem Final /i/

 konuş + o [kɔnɔ], *[kɔnɔς] (to cross)
papış + o [pap'ɔ], *[pap'ɔς] (to be busy)
kipış + o [kip'ɔ], *[kip'ɔς] (to be happy)

b. Suffix Initial /i/

no + Ĩlo [noro], *[noɾo] (with an oar)
cu + ini [cuni], *[cuĩni] (to give - effective)
pata + Ĩlo [padaro], *[padaɾo] (to the sea)

c. Identical Vowels

sɔ + o [sɔ], *[sɔɔ], *[sɔː] (to stand)
ca + a [ca], *[caː], *[caː] (to sleep)
I will argue that the examples in (36a) and (36b) can be explained by positing underlying nonmoraic vowel \( /i/ \) in stem-final position or in suffix-initial position. Thus this nonmoraic vowel cannot surface when another vowel, which has a mora, is segmentally adjacent to it. However I will assume that when they are located immediately after an unsyllabified consonant, the stray syllabification process takes the CV sequence and incorporates them into a syllable. Then we can see that \( /i/ \) shows up in the surface forms.

For the data in (36c), I propose that there is a strong OCP induced delinking rule that does not allow for two identical vowels separated by a morpheme boundary.

### 8.3.1. Previous Analyses.

There are two types of \( /i/ \) deletion as exemplified by (36a) and (36b). In (36a) we find that the stem final \( /i/ \) in verbs or adjectives is deleted if it is followed by a vowel initial suffix. In (36b), the suffix initial \( /i/ \) is deleted if it is added to a vowel final stem. Kim-Renaud (1974: 61) thus proposes a mirror image \( /i/ \) deletion rule to cover both of the deletion phenomena as given in (37):

\[
(37) \quad \text{Affix - Boundary } /i/ \text{ Deletion} \\
\text{ } \quad \quad i \rightarrow \emptyset \ % V + _____
\]

(\( i \) is deleted when preceded or followed by a vowel across an affix boundary.)

However, Kim-Renaud (1982) notes that the mirror image \( /i/ \) deletion rule in (37) is not tenable because of the following examples:
Thus Kim-Renaud (1982: 475) replaces (37) with two separate /i/ deletion rules: Stem final /i/ deletion and Affix initial /i/ deletion as shown in (39):

(39) Two Rules for /i/ Deletion

a. Verb Stem Final /i/ Deletion

\[ i \rightarrow \emptyset / \_\_\_\_ & V \]

(& is a verb stem boundary)

The final /i/ of a verb stem is deleted when followed by an affix beginning with a vowel.

b. Affixal /i/ Deletion

\[ i \rightarrow \emptyset / V + \_\_\_\_ \]

The initial /i/ of an affix is deleted when following a stem ending in a vowel.

However, Kim-Renaud also finds that there are exceptions to the rule given in (39a), in monosyllabic verbs and adjectives as shown in (40):

(40) Monosyllable Stems

\[ s'i + i \rightarrow [s'ii], [s'i:], *[si] \]

(to be used)
Thus Kim-Renaud (1982: 475) proposes that monosyllabic verbs should be marked in the lexicon that they have the rule feature [Verb Stem Final /i Deletion], which prevents the stems given in (40) from undergoing the rule in (39a). However not all the monosyllabic stems that end in /i/ belong to this category. If the suffix /iu/ is added to monosyllabic stems, we find that they undergo stem final /i/ deletion as shown in (41):

\[
\begin{align*}
&\text{t'ì} + i \quad [t'ìi], [t'ì:], *[t'ì] \quad \text{(to be found)} \\
&tì + i \quad [tìiì], [tìi:], *[tìi] \quad \text{(to be opened)}
\end{align*}
\]

Thus Kim-Renaud (1982: 475) proposes that monosyllabic verbs should be marked in the lexicon that they have the rule feature [Verb Stem Final /i Deletion], which prevents the stems given in (40) from undergoing the rule in (39a). However not all the monosyllabic stems that end in /i/ belong to this category. If the suffix /iu/ is added to monosyllabic stems, we find that they undergo stem final /i/ deletion as shown in (41):

\[
(41) \quad /iu/ \text{ Suffixation}
\]

\[
\begin{align*}
&sì + i + u \quad [sìiu], *[sìiu] \quad \text{(let . . . be worn)} \\
&tì + i + u \quad [tìiu], *[tìiu] \quad \text{(let . . . be opened)} \\
&tì + i + u \quad [tìiu], *[tìiu] \quad \text{(let . . . float)}
\end{align*}
\]

Thus only a small number of /i/ final monosyllables carry the rule feature [Verb Stem Final /i Deletion]. Sohn (1987b: 128) noting that the three words in (40) along with the first word in (38) are the only exceptions to the general rule of /i/ deletion suggests one rule of /i/ deletion, ignoring the exceptional nature of these words. Thus Sohn (1987b: 129) propose the following Empty Nucleus Deletion rule:

\[
(42) \quad \text{Empty Node Deletion (=END)}
\]

\[
\begin{array}{c}
\begin{array}{c}
N \\
| \\
| \\
\end{array} \quad N \\
\begin{array}{c}
x \rightarrow \emptyset \% \ x \} \quad \text{______} \\
\begin{array}{c}
\begin{array}{c}
[ ]
\end{array}
\end{array}
\end{array}
\end{array}
\]
Though this might be a significant generalization of /i/ deletion phenomena, I do not see any improvement from the Affix-boundary /i/ deletion rule in (37) proposed by Kim-Renaud (1974) except that the rule is written in a syllabic framework. The exceptions to (37) are still exceptions to (42). Another theory internal observation we can make is that END given in (42) is in conflict with another similar rule given for the optional vowel merger. Compare the following two rules:

(43) Comparison of END and Merger

a. END

<table>
<thead>
<tr>
<th>N</th>
<th>N</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>% → x</td>
</tr>
</tbody>
</table>

b. Merger

<table>
<thead>
<tr>
<th>N</th>
<th>N</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

[αF] [βG] [αF, βG]

I have slightly changed Sohn's END rule to show the similarity of the structural description of these two rules. (see (42)) Now in the absence of a further restriction on (43b) to the effect that the features should not be null, we see that these two rules can be applicable to the same string of words. Thus these two rules predict that Merger, which is lexical according to Sohn, can be applicable instead of END. However, as the ill-formedness of long vowels in /i/ deletion shows, the prediction is not born out. We will have to make reference to the absence of feature in order to differentiate (43a) from (43b). This certainly is not a desirable move.¹⁰

One radically different approach to /i/ deletion is to propose an /i/ epenthesis analysis so

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¹⁰There are other /i/ deletion analyses. The complicated rule of /i/ deletion proposed by B-G. Lee (1979b) is discussed and criticized in S-C. Ahn (1985) and Ahn's proposal is criticized in H-S. Sohn (1987b). Please refer to these three papers for other previous analyses on obligatory /i/ deletion.
as to stay away from the problems caused by the /i/ deletion analysis. Researchers such as H-B. Choi (1971), Huh (1965), C-W. Kim (1973a) and Y-S. Kim (1984) proposed the /i/ insertion hypotheses. However, as pointed out by S-C. Ahn (1985: 203), the /i/-epenthesis analysis is untenable given the fact that there are two different suffixes, aspect suffix, /iNi/ and interrogative suffix /ni/ in Korean. Consider the following examples:

(44) Aspects and Interrogatives

<table>
<thead>
<tr>
<th>Stem</th>
<th>Aspect</th>
<th>Interrogative</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>po</td>
<td>poni</td>
<td>poni</td>
<td>see</td>
</tr>
<tr>
<td>ka</td>
<td>kani</td>
<td>kani</td>
<td>go</td>
</tr>
<tr>
<td>cap</td>
<td>capni</td>
<td>capni</td>
<td>catch</td>
</tr>
<tr>
<td>cuk</td>
<td>cukni</td>
<td>cukni</td>
<td>die</td>
</tr>
</tbody>
</table>

Notice that the aspect suffix surfaces as /ni/ after vowel final stems and /iNi/ after consonant final stems, while the interrogative suffix always surfaces as /ni/ regardless whether the stem final segment is a vowel or a consonant. If we take the /i/ insertion approach, the two suffixes are thought to have the same underlying form, /ni/. Then /i/ is inserted between two consonants. That will neatly explain all the variation found with the aspectual suffix. However, we also find that /i/ is not inserted between two consonants, if /ni/ is the interrogative suffix. Therefore we are faced with the problem of delimiting the application of /i/ insertion. However we cannot decide the application domain of /i/ insertion solely on the bases of phonological information.

Further, we find that /i/ epenthesis might be too strong, since it might wrongly insert /i/ in between two consonants as in some of the following words:
We see that the examples given in (45), focusing on the last two examples, are not affected by the /i/ insertion rule. Therefore it would make it extremely complicated to add phonological and morphological restrictions on /i/ epenthesis. As such, /i/ epenthesis seems to create more problems than it solves.

8.3.2. Nonmoraic Vowels

Given the complexity of /i/ deletion and the untenability of the /i/ insertion analysis, we find that neither of the approaches captures the /i/ deletion phenomena found in Korean. I will make another proposal in this subsection that the deletion phenomena can be captured more neatly not by rules but by representation. Specifically I will argue that stem final /i/ and affix initial high vowels /i/, /i/, and /u/ are underlyingly not associated to moras, i.e. they are nonmoraic. And the syllabification process may or may not take the nonmoraic vowels as a head of a syllable.

If these nonmoraic vowels are not linked to the head of a syllable, they will either appear as glides or they will be erased by the Stray Erasure Convention. However, if these nonmoraic vowels are preceded by an unsyllabified consonant than such a CV sequence meets the structural description of Stray Syllabification. Thus they may gain moraic status by
undergoing Stray Syllabification. They then can appear on the surface as full-fledged vowels:

Consider the following examples:

(46) Surfacing /i /

<table>
<thead>
<tr>
<th>Word</th>
<th>Surface Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>camki</td>
<td>[camgi]</td>
<td>(lock and)</td>
</tr>
<tr>
<td>sisli</td>
<td>[silpi]</td>
<td>(sad?)</td>
</tr>
<tr>
<td>tamki</td>
<td>[tami]</td>
<td>(in order to dip)</td>
</tr>
</tbody>
</table>

In these examples we see that /i/ shows up on the surface. I attribute these to Stray Syllabification. Consider the sample derivation of the first word in (46):

(47) Sample Derivation of /camki + ko/

The stem final vowel /i/ is underlyingly nonmoraic. Then the suffix /ko/ is added to form a connective. The syllabification takes a moraic segment and the preceding consonant to form a syllable.\(^{11}\) Now after the syllabification, we find that three segments /mkí/ are left

\(^{11}\)I assume that the coda elements are linked to the syllable in the process of Syllable Incorporation. However as will be discussed in 8.4, I assume that one consonant /l/, which is the most sonorous consonant in Korean is syllabified to the coda in the syllabification process.
unsyllabified. Since there are unsyllabified segments, the Stray Syllabification process will be invoked. Notice that not all the consonants are subject to SS. There is another phonological change of coda simplification in Korean. When two consonants are left unsyllabified, one of them is deleted by the coda simplification process. The inputs to Cluster Simplification are in (48):

(48) Inputs of Cluster Simplification

<table>
<thead>
<tr>
<th></th>
<th>ps</th>
<th>ls</th>
<th>ks</th>
<th>nc</th>
<th>lth</th>
<th>lh</th>
<th>nh</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>lk</td>
<td>lp</td>
<td>lph</td>
<td>(lm)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The result of the cluster simplification in (48a) is the loss of the second consonant, but the realization of the clusters in (48b) varies from dialect to dialect.\(^\text{12}\) These sequences are not subject to Stray Syllabification though they may be left unsyllabified in the process of syllabification. Looking closely at the data of coda simplification given in (48), ignoring the sonority difference between stops and fricatives, we find that all the clusters have decreasing sonority.\(^\text{13}\) There is no example of cluster simplification when the second one is more sonorous than the first member. Thus we find that coda simplification and Stray Syllabification operates in mutually exclusive environments. Stray Syllabification is restricted to apply to a sequence of unsyllabified segments where the second one is more sonorous. Otherwise cluster simplification will apply.

Therefore I add a sonority condition to the stray syllabification process as in (49):

---

\(^{12}\)It is not the purpose of the discussion here to formulate the cluster simplification process. Please refer to B-G. Lee (1976), Whitman (1985), and Y. Y. Cho (1988) for data and analyses. Roughly, the second consonant surfaces in the standard dialect, but the first one survives in the KS dialect.

\(^{13}\)I will not be concerned with the /ps/ cluster which shows increasing sonority. I assume that the relevant sonority distinction is as follows:

obstruents < nasals < liquids < vocalic
Now with the Stray Syllabification process given in (49), we return back to the derivation given in (47). There are three unsyllabified segments /m/, /k/, and /i/. Notice that the first two segments /mk/ does not satisfy the structural description of Stray Syllabification due to the fact that the second segment /k/ is not more sonorous than the first segment /m/. However the next two segments /ki/ meet the environment of Stray Syllabification and a mora is projected from the syllable to make the syllable well-formed. Then finally, the unsyllabified segment /m/ appears as a coda segment by Syllable Incorporation.

The surfacing of /i/, therefore, is due to the presence of another unsyllabified segment, which meets the environment of Stray Syllabification. Now consider how such a nonmoraic analysis of affix final /i/ can explain the non-appearance of /i/ or the obligatory nature of /i/ deletion. Consider the following derivations:

(50) Derivation of /i/ Deletion Phenomena

a. /camki +o/  
\[\text{[camg}\sigma\text{], *[camg}i\text{]}\]  (to lock)
In (48a), the stem final vowel /i/ is nonmoraic, but the affix initial vowel is moraic. Thus the syllabification process for the second mora will take the preceding consonant /k/ as the onset, since the back unround high vowel is not a candidate for the onset segment.\(^{14}\) Then Syllable Incorporation will take the unsyllabified consonant /m/ to the coda of the first syllable. Therefore /i/ is left unsyllabified. However since /i/ here is not the target of Stray Syllabification, it will eventually be erased by the Stray Erasure Convention.

I further extend the nonmoraic analysis to suffix initial high vowels. Thus as shown in (50b), my argument for affix initial /i/ deletion is exactly same as the stem-final /i/ deletion. Affix initial high vowels are considered to be nonmoraic. Thus /i/, /i/, and /u/ in affix initial position will be introduced in the underlying representation without moras. Consider the following additional data:

\[
(51) \quad \text{Affix Initial High Vowels}
\]

1. cip + i\hskip-2pt o  \hskip-2pt [cibiro], *[ciplo] (to the house)
   pata + i\hskip-2pt o  \hskip-2pt [padaro], *[patairo] (to the sea)
2. cuk + i + \e  \hskip-2pt [cugyo], *[cugio] (to kill)
   t'e + i + \e  \hskip-2pt [t'eyo], *[t'eio] (to be cheated)
3. k'æ + u + \e  \hskip-2pt [k'aewo], *[k'aeu] (to awaken)\(^{15}\)

\(^{14}\)Korean do not have an unround back glide.

\(^{15}\)There is no example of the /u/ suffix on a consonant final stem. H-B. Choi (1971: 413) cites two
As predicted if /i/ is placed after a consonant, Stray Syllabification will take the two to form a syllable. However if /i/ is placed after a stem final vowel, then /i/ alone cannot trigger Stray Syllabification and thus will not show up on the surface. Again if /i/ or /u/ is added to a stem and they are followed by a moraic segment, they never appear as full-fledged vowels. They surface as glides as the examples in (51b) and (51c) shows. Consider the derivation of the first words of (51b) and (51c):

(52) Exemplary Derivations

a. / cuk + i + ə / → [cugyə], *[cugiə]

b. / k'æ + u + ə / → [k'æwə], *[k'æuə]

As the derivations given in (52) show, the high vowel /i/ or /u/ can never appear as a full vowel when they are followed by moraic segments. They will be incorporated to onsets of the following moraic segments.
Therefore the nonmoraic analysis of stem final /i/ and affix initial high vowels are motivated. Now I will return to the exceptions of END rule and how they may be explained. Consider the following three examples:

(53) Comparison of Different /i/’s

a. pap’i + ə [pap’ə], *[papia] (to be busy)
b. ki + eke [kiege], [ke:ge] (to him)
c. simisi + e [simisie], *[simise] (Smith’s)

In (53), we see that /i/ in (53a) and (53b) and (53c) behave differently. In (53a), /i/ is deleted obligatorily and there is no lengthening effect. In (53b), /i/ can optionally delete with subsequent lengthening. And (53c) shows neither the obligatory deletion nor the optional deletion. In other words, these three /i/’s show mutually exclusive behaviors. My explanation is that /i/ in (53a) is nonmoraic, but /i/ in (53b) is moraic. Notice that the stem /ki/ (him) is introduced with a mora in the underlying representation, since the distribution of nonmoraic segment is restricted to the stem final vowels of verbs and adjectives as well as to affix initial high vowels. Finally in (53c), we find that /i/ is the interpretation of an unassociated mora which is introduced by Stray Syllabification. Therefore we can make a three way contrast of /i/ as shown in (54):

(54) Underlying Contrasts


\[
\begin{array}{c}
\mu \\
R[\text{voc}] \\
\end{array}
\quad
\begin{array}{c}
\mu \\
R[\text{voc}] \\
\end{array}
\]
It is only the nonmoraic vowel in (54a) that fails to surface before or after a vowel. In (53b), /i/ is represented as in (54b). This time /i/ is moraic and therefore /i/ does not obligatorily delete and the optional VC will result in vowel lengthening. In (53c), there is no melodic representation at all. This representation arises epenthetically through the syllabification process and it will be interpreted as the least specified segment [i] in Korean.

Consider the following derivation:

\[(55) \text{ Derivation of } [\text{simisi}]\]

Now in (55) we see that the moras in the first and the third syllables are introduced in the process of Stray Syllabification.\(^\text{16}\) They are not initially linked to any element on the segmental tier. Consequently, such sequences do not satisfy the structural description of the optional VC, which crucially refers to two adjacent vocalic roots. Thus the /i/ in (53c) shows different behavior than the /i/’s in (53a) or (53b).

Notice that we can predict which /i/ will have which representation given in (54). The representation in (54a) is found only in verb stem final syllables or suffix initial vowels. The unassociated mora in (54c) is found only in the Stray Syllabification process in loan words.

Finally consider the following surface vowel alternations:

\[^{16}\text{Stray Syllabification given in (55) applies only to loan words. It does not apply to pure Korean or Sino-Korean words.}\]
(56) Surface Vowel Length Contrasts

a. Vowel final stem + vowel initial suffix

na + imyən  [namyən], *[naimyən] (if ... be born)

s'a + imyən  [s'amyən], *[s'aimyən] (if ... wrap)

i + imyən  [imyən], *[iiimyən] (if ... carry (on the head))

ca + imyən  [camyən], *[caimyən] (if ... sleep)

b. Consonant final stem + vowel initial suffix

nah + imyən  [naimyən], [na:myən] (if ... deliver a baby)

s'ah + imyən  [s'amimyən], [s'a:myən] (if ... pile up)

is + imyən  [iiimyən], [i:myən] (if ... connect)

cas + imyən  [caimyən], [ca:myən] (if ... spin)

We observe that in (56a), the suffix initial /i/ obligatorily deletes without lengthening. However the suffix initial vowels can optionally surface or delete with subsequent lengthening of stem vowels in (56b). Notice that the examples in (56b) are either h-irregular or s-irregular verbs. In these irregular verbs the stem final segments are deleted, but only in the onset position. For these consonants to be deleted, syllabification should precede consonant deletion. However since the verbs in (56b) are consonant final, the consonant and the following nonmoraic /i/ undergo Stray Syllabification. Consider the derivation of the first words in (56a) and (56b):

(57) Comparison of Derivation

a.

\[
\text{na + imyən} \quad \text{[namyən], *[naimyən]} \quad (\text{if ... be born})
\]

\[
\text{s'a + imyən} \quad \text{[s'amyən], *[s'aimyən]} \quad (\text{if ... wrap})
\]

\[
\text{i + imyən} \quad \text{[imyən], *[iiimyən]} \quad (\text{if ... carry (on the head)})
\]

\[
\text{ca + imyən} \quad \text{[camyən], *[caimyən]} \quad (\text{if ... sleep})
\]

\[
\text{nah + imyən} \quad \text{[naimyən], [na:myən]} \quad (\text{if ... deliver a baby})
\]

\[
\text{s'ah + imyən} \quad \text{[s'amimyən], [s'a:myən]} \quad (\text{if ... pile up})
\]

\[
\text{is + imyən} \quad \text{[iiimyən], [i:myən]} \quad (\text{if ... connect})
\]

\[
\text{cas + imyən} \quad \text{[caimyən], [ca:myən]} \quad (\text{if ... spin})
\]
As shown in (57b), the Stray Syllabification process takes /h/ and the following nonmoraic vowel into a syllable and /i/ acquires moraic status in the process of Stray Syllabification. Therefore we can explain how the words in (56a) are different from those in (56b).

In this subsection, I argued that we do not need any deletion rule at all. As already noted in 5.3, the high vowels /i/, /i/, /u/ (and even /o/)\footnote{These vowels cannot surface as heads of syllables, though they may show up as glides. However, if the nonmoraic vowel is preceded by another unsyllabified consonant, the CV sequence is subject to Stray Syllabification and a mora is projected to meet the syllable well-formedness condition. Thus /i/ deletion is the result of Stray Erasure and /i/ appearance is due to Stray Syllabification.} can be underlingly nonmoraic. These nonmoraic vowels cannot surface as heads of syllables, though they may show up as glides. However, if the nonmoraic vowel is preceded by another unsyllabified consonant, the CV sequence is subject to Stray Syllabification and a mora is projected to meet the syllable well-formedness condition. Thus /i/ deletion is the result of Stray Erasure and /i/ appearance is due to Stray Syllabification.

**8.3.3. Minimality Condition**

In the previous subsection, I have argued that obligatory /i/ deletion can be best explained by positing nonmoraic vowels in the underlying representation. In this subsection, I will discuss how the present approach can deal with the exceptional cases. As we have already observed, monosyllable stems that end with /i/ show different behavior, which have
remained exceptional to all previous analyses. This subsection will introduce another way that a nonmoraic vowel gets moraic status. Consider the following data again:

(58) Mono-syllable Stems

a. /i/ Suffixation

\[ s'i + i \rightarrow [s'i], \quad [s'i:] \rightarrow [si] \quad \text{(to be used)} \]

\[ t'i + i \rightarrow [t'i], \quad [t'i:] \rightarrow [ti] \quad \text{(to be found)} \]

\[ th'i + i \rightarrow [th'i], \quad [th'i:] \rightarrow [thi] \quad \text{(to be opened)} \]

b. /iu/ Suffixation

\[ s'i + i + u \rightarrow [s'iu], \quad *[s'iu] \quad \text{(let . . . be worn)} \]

\[ th'i + i + u \rightarrow [th'iu], \quad *[th'iu] \quad \text{(let . . . be opened)} \]

\[ t'i + i + u \rightarrow [tiu], \quad *[tiu] \quad \text{(let . . . float)} \]

As shown in (58), /i/ undergoes obligatory deletion in the examples of (58b) but it remains undeleted in the examples of (58a). Sohn (1987b: 133) notes that since these are the only exceptions their presence as exceptions does not harm the general rule of END. However, from a slightly different perspective, we see that /i/ suffixation to /i/ final monosyllabic stems all show uniformed behavior that should not be ignored. We can deduce a very strong generalization from the fact that they always fail to undergo the /i/ deletion rule.

Note also that the examples in (58a) cannot be explained simply by positing a nonmoraic vowel in the stem final position and the suffix initial position. However I argue that the examples in (58) illustrate an independent morphological constraint. McCarthy and Prince (1986, 1990, 1991) argue that there is a minimal word length condition which is definable by morphological templates in languages. The minimal word length, if there is such

\[ \text{See the discussion in 5.3 for non-moraic /o/.} \]
a morphological constraint, should be at least of a foot. And a foot is binary under moraic and syllable analysis. The corollary of these observations is that a minimal word should be at least bimoraic or disyllabic. The minimality condition can be imposed on such morphological category as roots or derived words.

The minimality condition once operative in a given language can either block certain rules or augment the base by insertion. For example in Estonian (see Prince (1980) for data), the final vowel deletion rule does not apply to disyllabic words. McCarthy and Prince (1991) attribute the blocking effect of the apocope rule to the minimality condition that the output should be a prosodic word (=PrWd), and minimality is imposed on the PrWr so that it should at least be of two moras. Again in Shona (see Myers (1987: 128-130) for data), unaffixed monosyllabic bases are augmented to bimoraic words by inserting prothetic /i/. Such an insertion rule is triggered by the minimality condition.

Returning to Korean, we find that though there are monomoraic roots such as /so/ (cow) or /kam/ (persimon), there are no monomoraic derived words. Thus, following McCarthy and Prince (1991), I propose that there is a morphological condition, Morphological Category Minimality Condition, on derived words in Korean:

(59) (Morphological Category) Minimality Condition (=MC)

Derived words are PrWd (=prosodic words).

PrWd is minimally bimoraic.

The Minimality Condition given in (59) is assumed to strongly interact with the morphological derivation. Now I argue that the Minimality Condition is directly responsible for the surface forms of the examples given in (58). Consider the derivation of the first word in (58):

```plaintext
```
In morpheme concatenation, we find that both the stem final /i/ and the suffix vowel /i/ are moraless. Therefore the string cannot be syllabified. The morphological derivation violates the MC. Thus the minimality condition adds two moras, or a bimoraic foot, to remedy the violation. Then the floating moras are associated to melodic tiers. I assume the following association convention:

\[
\begin{align*}
\text{(61) Association of Mora} \\
\text{Association} & : \text{mora driven.} \\
\text{Direction} & : \text{right to left.}
\end{align*}
\]

Thus the two moras are associated to two moraless vowels and the subsequent syllabification gives the correct output [s'ii] on the surface. The sequence of two vowels, by virtue of being moraic, can undergo the optional VC, discussed in 8.2.2, and produce [s'i:].
Here we see that the exceptional behavior of a monosyllabic stem in Sohn's framework is not exceptional at all. The appearance of [i] on the surface, even before another vowel, is due to the fact that it becomes moraic in the course of morphological derivation by the minimality condition. Thus both of the nonmoraic vowels are associated to moras and therefore they can surface as full-fledged vowels. Consider more examples of morphological derivation:

(62) More examples of Morphological Derivation

a. Passive/Causative

mæ + i   [mæi], [mæ:] (to be tied)
camki + i [camgi], *[camgii] (to be locked)
k'æ + u [k'æu] (to let .. wake up)

b. Passive/Causative + Infinitive

t'i + i + u + œ [t'iwœ], *[t'iua] (to let ... float)
s'i + i + u + œ [s'iwœ], *[s'iwa] (to let ... worn)
sœ + i + u + œ [sewœ], *[seuœ] (to let ... stand)

One thing we can notice immediately from the examples given in (62) is that the outputs are all bi-moraic, regardless how many nonmoraic vowels may appear in the underlying representation. This generality offers relative strong support that MC is at work in the morphological derivation. Observe also that in the first two examples of (62b), /i/ does not surface though it can optionally surface in the examples given in (58). Here we can clearly see that simply saying that the stems are exceptional as in Kim-Renaud (1982) and H-S. Sohn (1987b) does not explain the /i/ deletion effect in these examples. Consider the derivation of the first two examples in (62a):
As shown in the exemplary derivation in (63), we see that the syllabification and the MC can produce the right output, without assuming a rule-based approach for the /i/ deletion phenomena. The same is also true for words in (62b). Consider the derivation of the last two examples in (62b):
In (64a), the infinitive suffix /ə/ is moraic, since it is not one of the high vowels. Therefore MC introduces only one additional mora and the right to left association links the mora to the vowel /i/. The syllabification process then will skip the featureless vowel /i/ in selecting an onset. Thus the stem final /i/ cannot surface. In (64b), we find that the result of the derivation already has two moras, since the stem final vowel is moraic and the final infinitive suffix is moraic. Therefore it satisfies the minimality condition and no additional moras are introduced. The syllabification process leaves /i/, the passive suffix, unassociated. Thus the feature [front] under the unassociated root will be locally re-associated to the preceding vowel by the Feature Association Convention given in (20).

Notice that the rule based approach to /i/ deletion fails to explain why the causative suffix /u/ before /ə/ cannot surface as a head of a syllable. This makes it imperative to posit another rule of obligatory glide formation for the suffix /u/. Further in the exemplary derivation in (64b), the obligatory nature of /ə/ and /i/ fusion, as witnessed in the ill-formedness of such forms as *[səiwa], *[səyuə] or *[səiuə] cannot be explained without another obligatory fusion rule. As such, the rule based approach of vowel deletion phenomena should be patched up with at least two more obligatory rules, which lack independent motivation, and it would still
be unable to explain the monosyllabic stems ending in /i/.

Thus in this section, I have shown that the obligatory nature of /i/ deletion is neither the result of obligatory vowel coalescence nor of obligatory /i/ deletion. The peculiarity of stem final /i/ and the affix initial high vowels are captured not by rules but by their representational characteristics, i.e. they are not associated to moras in the underlying representation.

8.3.4. Vowel Contraction

In addition to the data presented in the previous subsection, we find that there is another type of vowel deletion as shown in the following examples:

(65) Obligatory Vowel Deletion

a. ka + a  [ka], *[kaa], *[ka:]  (to go)
na + a  [na], *[naa], *[na:]  (to be born)
s'a + a  [s'a], *[s'aa], *[s'a:]  (to wrap)
b. pʰyə + ə  [pʰyə], *[pʰyəə], *[pʰyə:]  (to unfold)
sə+ ə  [sə], *[səə], *[sə:]  (to stop)
kʰyə + ə  [kʰyə], *[kʰyəə], *[kʰyə:]  (to light)

These examples show the obligatory fusion of two identical vowels separated by a morpheme boundary. Given the fact that the output of such fusion, or contraction, is a monomoraic syllable, I posit that the rule is applicable after syllabification in the lexical derivation.\footnote{Since MC interacts with syllabification and Vowel Contraction applies after syllabification, I assume that the MC does not interfere with the Vowel Contraction.}

Following Sohn (1987b: 148), I propose the vowel contraction rule given in (66):

\[ \text{Following Sohn (1987b: 148), I propose the vowel contraction rule given in (66):} \]
Vowel Contraction

Notice that the rule environment is very similar to the vowel coalescence rule except that there is a morpheme boundary and that the dependent features are identical. This vowel contraction rule seems to indicate that there is a strong tendency to avoid two identical vowels in the lexical derivation. The vowel contraction interacts with other rules to show different surface forms. Consider the following data:

Contrast of Surfacing Vowels

<table>
<thead>
<tr>
<th>Word</th>
<th>Surface Form</th>
<th>(to deliver a baby)</th>
<th>(to reach)</th>
<th>(to put in)</th>
<th>(to stir)</th>
</tr>
</thead>
<tbody>
<tr>
<td>nah + a</td>
<td>[naa], [naː], *[na]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>tah + a</td>
<td>[taa], [taː], *[ta]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nəh + o</td>
<td>[nəʊ], [nəː], *[nə]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cəs + o</td>
<td>[cəʊ], [cəː], *[cə]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the examples given in (67), we find that the Vowel Contraction in (66) does not apply. Notice that at the derivational stage before the deletion of the final consonant /s/ or /h/ in the irregular verbs, the input does not satisfy the structural description in (66) because of the presence of the intervening stem final consonants. Thus the words in (67) have long vowels on the surface. Here we see that the Vowel Contraction, just like Stray Syllabification as discussed in the examples of (56) and their derivation in (57), is ordered before the stem final consonant deletion in irregular verbs.
One problematic aspect of this approach is the apparent \(/i/\) deletion, observable in the following examples:

\[(68)\] Apparent Exceptions

\[
\begin{align*}
  s' + \sigma & \rightarrow [s'\sigma], *[s'\sigma], *[s'\sigma:] \quad \text{(to write)} \\
  k' + \sigma & \rightarrow [k'\sigma], *[k'\sigma], *[k'\sigma:] \quad \text{(to extinguish)} \\
  t' + \sigma & \rightarrow [t'\sigma], *[t'\sigma], *[t'\sigma:] \quad \text{(to float)}
\end{align*}
\]

We may expect that the surface forms of the examples in (68) are the asterisk-marked ones, since the nonmoraic high vowel \(/i/\) should acquire moraic status due to MC. However the surface forms are monomoraic and such deletion of \(/i/\) may be explained by Sohn’s (1987b) END rule (given in (42)).

I tentatively propose an obligatory \([\text{open}]\) spreading rule as in (69):\(^{10}\)

\[(69)\] [\text{open}] Spreading

\[
\begin{array}{c}
  \mu \\
  R[\text{voc}] \quad R[\text{voc}] \\
  [\text{open}]
\end{array}
\]

This rule specifically says that the feature [open], if it is the only feature, obligatorily spread to the preceding vowel which is adjacent to the trigger on the root tier, if the preceding vowel is the least specified vowel.

\(^{10}\) I am aware that the rule proposed here is quite \textit{ad hoc} in nature. However I do not have any other explanation for the examples given in (68).
Therefore this rule applies only between /ître/ and /ître/, if they are separated by a morpheme boundary. Notice that the rule results in two identical vowels which are separated by a morpheme boundary. However the sequence of two identical vowels separated only by a morpheme boundary is not tolerated in Korean. Therefore the examples given in (68) first undergo spreading and the result is subject to the Vowel Contraction rule. This explains why only short vowels appear in the examples in (68).

8.4. Interconsonantal /ître/ Deletion

Now I will briefly discuss another case of /ître/ deletion found in Korean, which Kim-Renaud (1982) named Interconsonantal /ître/ Deletion. It is not the manifestation of vowel coalescence, it is therefore not the main concern of this chapter. However, since the interconsonantal /ître/ deletion might pose problems in the analysis given in this chapter I will deal with it so as to show that the nonmoraic analysis proposed in this chapter also holds for interconsonantal /ître/ deletion. Consider the examples of interconsonantal deletion given in (70):

(70) Interconsonantal /ître/ Deletion\(^{20}\)

<table>
<thead>
<tr>
<th>Example</th>
<th>Phonetic Form</th>
<th>(if ... cry)</th>
<th>(in order to cry)</th>
<th>(if ... blow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>u:ル＋iמשל</td>
<td>[u:ルmeשל], ʔ[urimeשל]</td>
<td>(if ... cry)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>u:ル＋iיל</td>
<td>[ullił], ʔ[urilא]</td>
<td>(in order to cry)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pull＋iמשל</td>
<td>[pullמשל], ʔ[purim snel]</td>
<td>(if ... blow)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{20}\)The second forms in each of the words given here is rarely found among native speakers of Korean. They are more readily witnessed in the language of children or those who learned Korean in non-native environments. In this sense the variations given here is different from other variants in the examples given in this chapter. That is why I put question marks in each of these forms, though Kim-Renaud (1982) assumes that they are fully acceptable.
Kim-Renaud (1982: 481) proposed the following /i/ deletion rule to account for the data given in (70):

\[(71) \text{Interconsonantal /i/ Deletion (optional)}^{21}\]

\[
i \rightarrow \emptyset / l & \underline{\text{m}} \{ \begin{array}{l} m \end{array} \}
\]

(& is a verb stem boundary)

An important generalization we can make from the examples in (70) is that the Interconsonantal /i/ Deletion applies when a verb stem ends in /l/ and the suffix starts with a nonmoraic vowel. Then the best way to capture the generalization is to say that /l/ is already in the coda of the stem final syllable, thus it blocks the environment for resyllabification. This assumption is reasonable given that /l/ is the most sonorous segment among the Korean consonants. Actually scholars such as B-G. Lee (1979b) and D-J. Lee (1989) even suggest that /l/ should be considered as a [+voc] segment. I will propose that the most sonorant consonant /l/ can be syllabified as a coda in the process of syllabification in the lexical derivation. Accordingly I propose the following stem-final coda well-formedness condition:

\[\text{[Pull]o}, \, ^{2}[\text{pur}i\text{ra}] \quad \text{(in order to blow)}\]

\[\text{[Celmyn]}\, \, ^{2}[\text{c}e\text{r}i\text{my}n] \quad \text{(if ... walk lame)}\]

\[\text{D-J. Lee (1989) proposes to include /n/ in the conditioning environments. But Kim-Renaud (1982) has pointed out problems of including /n/}.\]
Notice that the CWC allows /l/ to be syllabified as a coda of a syllable in the syllabification process. If the stem final consonant is not /l/, then it will remain unsyllabified in the lexical derivation and may show up on the surface as an onset by Stray Syllabification or as a coda by Syllable Incorporation in the post-lexical domain, where the CWC in (72) is no longer operative. With the CWC, we can see that /i/ deletion phenomena in (70) are due to Stray Erasure. Consider the derivation of the first word in (70):

(73) Derivation of /u:l + i myɔn/ and /u:l + i lɔ/

a. u:l + i myɔn  →  [u:lmyɔn]

b. u:l + i lɔ
In (73a), we find that stem final /l/ is syllabified as a coda, and the featureless vowel /i/ is left unsyllabified. However, since the featureless vowel /i/ alone does not meet the environments for Stray Syllabification, it will eventually be erased. In (73b), just like in (73a), the stem final /l/ is syllabified as a coda and /i/ is erased. Then the two identical sonorant consonants are combined to form a geminate. Since geminate consonants are moraic and a tri-moraic syllable is not allowed, the gemination of sonorants results in shortening the stem vowel.

I have explained when /l/ is syllabified into the coda of the stem final syllable. The CWC is a language particular condition that should be learned by a language learner. Thus I assume that in the initial stage of language learning, the CWC is not readily reflected in the phonological process. Thus often we find that the variant forms [urîni] or [urîrɔ] appears. These variants reflect that the CWC is not operative, and predictably these forms occur more readily among the younger speakers and those who learned Korean in non-native environments.

The brief discussion in this section shows that all the vowel deletion phenomena can be explained without resorting to specific rules for each of the deletion phenomena. The proposal for underlying nonmoraic vowels is shown to have a consistent effect on the deletion phenomena in Korean. It is once again shown that the representation-based approach is more explanatory than the rule-based approach in explaining the vowel phonology of Korean.
8.5. Conclusion

In this chapter, we have seen that there is optional vowel coalescence and obligatory vowel coalescence in Korean. In optional VC, we observe two different results: the resultant vowel can be either long or short.

I have proposed one general rule of vowel coalescence for optional VC with vowel lengthening. Optional Root Deletion with Feature Association Convention (=FAC) explains all the subcases of optional VC in Korean. However it is also shown that such a VC rule should be constrained. We find that if FAC results in an uninterpretable combination of features, then such a form is filtered out and it does not surface. Further the VC chart shows that if the second vowel is round, it is fused into the preceding vowel only when the first vowel is also round. And if the second vowel is [RTR], then it should be identical to the preceding vowel to meet the structural description of VC. Thus this one general rule with two conditions can replace the previous proposals on optional VC.

The second type of VC, an optional VC without lengthening, is analyzed as the result of the onset simplification process. If a glide is preceded by another onset consonant, the glide is optionally delinked to simplify the onset. Then the delinked feature is linked up to the following vowel by FAC. Thus we find that the result is very similar to the optional VC discussed above. But since onset segments are not moraic, it does not lengthen the following vowel.

In obligatory VC, I made two different proposals: a nonmoraic vowel analysis and an OCP induced vowel contraction rule. I have proposed that high vowels can be moraless in the underlying representation. Specifically, I have proposed that the stem final /i/ in verbs and adjectives are not moraic and that the affix initial high vowels /i/, /i/ and /u/ are all nonmoraic, i.e. they are not associated to moras in the underlying representation. Thus they can appear
only as a glide in the process of syllabification unless there are other mechanisms which hook up these vowels to moras. I proposed that there are two such mechanisms: Stray Syllabification and the Minimality Condition.

Stray Syllabification is invoked when two segments are left unsyllabified if the second one is more sonorous. Two unsyllabified segments can also be subject to the cluster simplification process in Korean. Thus we see that the presence of two unsyllabified segments is not a sufficient and necessary condition for Stray Syllabification. We see that there is a clear difference between the input to cluster simplification and that to Stray Syllabification with respect to their sonority sequencing. No input to Cluster Simplification shows a rising sonority contour between the two segments. Thus the sonority relation between the two unsyllabified segments decides whether they will be subject to Cluster Simplification or Stray Syllabification. If the moraless high vowel is preceded by a consonant, these two segments are subject to Stray Syllabification with a mora being projected to a vowel to satisfy the Syllable Well-formedness Condition.

Another way for a nonmoraic vowel to acquire moraic status is by the Minimality Condition on derived words. All the derived words in Korean should be bimoraic. Therefore if there are less than two moras in a derived word, one or two additional moras are introduced to satisfy the Minimality Condition. Then the association of the introduced moras to the melodic tier can give moraic status to underlying nonmoraic vowels. It is shown that such an approach can cover all the examples covered by a rule-based approach of /i/ deletion along with their exceptions.

Finally we find that there is another very specific obligatory VC without lengthening. Such VC is only witnessed when two identical vowels are adjacent on the root tier separated by a morpheme boundary. I simply suggest that the VC can be explained by an obligatory vowel contraction rule.

Thus in this chapter, I have argued that all the optional cases of VC are triggered to
break vowel clash and that the obligatory nature of /i/ deletion is the natural result of syllabification. The appearance of stem final /i/ and suffix initial high vowels are attributed to Stray Syllabification or the Minimality Condition. Here again I have shown that the peculiarity of high vowels can be better-captured by considering the nature of the representations rather than by implementing a series of unmotivated rules for Korean vowel coalescence.