6.0. Introduction

In this chapter, I will investigate the vowel alternations in ideophonic expressions and in words displaying /ə/ suffixation in Korean. These vowel alternations are considered to be the result of harmony processes. Traditionally, Korean vowels are divided into three harmonic groups, neutral vowels, dark vowels and light vowels, as shown in (1):

(1) Korean Vowel Division

Neutral vowels can co-occur either with dark or with light vowels. However, an ideophonic expression may not have both light and dark vowels. Consider the following
examples:

(2) Light and Dark Ideophones

<table>
<thead>
<tr>
<th></th>
<th>Light</th>
<th>Dark</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>ḋhallal</td>
<td>ḋullal</td>
<td>splashing</td>
</tr>
<tr>
<td>b.</td>
<td>hamp'ak</td>
<td>ḋimp'ak</td>
<td>thoroughly</td>
</tr>
<tr>
<td>c.</td>
<td>posilak</td>
<td>pusilak</td>
<td>rustling</td>
</tr>
<tr>
<td>d.</td>
<td>ḍalin</td>
<td>ḍalin</td>
<td>flickering</td>
</tr>
</tbody>
</table>

The examples in (2c) and (2d) show that the neutral vowels /i/ and /i/ can co-occur either with dark or light vowels but dark and light vowels appear in mutually exclusive environments. The dark ideophones are thought to be heavier, more intensive and bigger in motion than their light counterparts.¹ For example, /ḍhallal ḋhallal/ represents a light speedy and small scale repetitive motion of water, while /ḍullal ḋullal/ expresses a heavy and big splashing motion of wave.

Vowel harmony (henceforth VH) was once a very productive phonological phenomenon in the history of Korean (S-N. Lee (1947), C-W. Kim (1978) B-H. Ahn and K-H. Lee (1990: 64-65)). However Modern Korean does not have general harmonic process like that found in many other Altaic languages. VH is merely kept in ideophonic alternations and in /a/ suffixation of verbs and adjectives.²

¹Martin (1962: 184) presents the following semantic distinction of light and dark ideophones:

Light forms:  small -- petty, paltry, insignificant, dinky
            fragile -- unsubstantial, flimsy, flighty, frivolous silly

Dark forms:  heavy -- weighty, ponderous, clumsy, unwieldy, bulky
            dark -- gloomy, inaccessible.

²It should also be noted that there are sporadic vowel harmony phenomena in different parts of the
We will return to the historical development of the vowel system shortly. But before doing that, let's consider the possible vowel alternations found in the sound symbolic expressions and in verb/adjective suffixation:

(3) Vowel Alternations in Ideophones

<table>
<thead>
<tr>
<th>a. /i/ - /e/ alternation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>pisil ~ pəsil</td>
<td>(staggering)</td>
<td></td>
</tr>
<tr>
<td>pʰi³kl ~ pəɬʰəl</td>
<td>(staggering)</td>
<td></td>
</tr>
<tr>
<td>kilc'uk ~ kəlc'uk</td>
<td>(tall &amp; slim)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b. /e/ - /æ/ alternation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>kel kel ~ kæl kæl</td>
<td>(exhaustively)</td>
<td></td>
</tr>
<tr>
<td>k'ecilək ~ kæcilək</td>
<td>(half-heatedly)</td>
<td></td>
</tr>
<tr>
<td>t'ekul ~ t'ækul</td>
<td>(rolling)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>c. /i/ - /a/ alternation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>k'itoł ~ k'atak</td>
<td>(noddling (one's head))</td>
<td></td>
</tr>
<tr>
<td>səlc'ok ~ sałc'ak</td>
<td>(stealthy)</td>
<td></td>
</tr>
<tr>
<td>hintil ~ hantil</td>
<td>(waving)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>d. /ɑ/ - /a/ alternation</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>əlluk ~ alloc</td>
<td>(colorful, stained)</td>
<td></td>
</tr>
<tr>
<td>tətək ~ tatak</td>
<td>(in clusters)</td>
<td></td>
</tr>
</tbody>
</table>

---

vocabulary. We find vowel alternations with different shades of meaning in nouns (kəcis mal ~ kəcis mal (a lie)), verbs (kincili ~ kancili (to tickle), kəlk ~ kəlk (to scratch)) adjectives (nuləh ~ nolah (yellow), məlc'əŋ ~ məlc'əŋ (neat)), and also in adverbs (silmyəsi ~ salmyəsi (stealthily)).

³There are other vowel alternations than what is listed here. I will come back to these in 6.2.3.
k'ọșcʰuŋ ~ k'aŋʃʰoŋ  
(hopping)

e. /u/ - /o/ alternation

cul ~ col  
(flowing)

pusîl ~ posîl  
(drizzling)

k'umtʰîl ~ k'omtʰîl  
(wriggling)

f. /ü/ - /ö/ alternation

hû hû ~ hô hô  
(round about)

k'ücücû ~ k'öcöcö  
(extremely shabby)

(4) Verb suffixation

a. kæ + ø  →  *kæa, kæø  
(be clear)

b. s'ø + ø  →  s'øa, *soø  
(shoot)

c. mak + ø  →  maka, makaø  
(block)

Given these vowel alternations, we come up with the following graphic representation of the vowel alternations:

(5) "Vowel Alternation" Chart (from Kim-Renaud (1976: 398))

<table>
<thead>
<tr>
<th></th>
<th>-round</th>
<th>+round</th>
<th>-round</th>
<th>+round</th>
</tr>
</thead>
<tbody>
<tr>
<td>-back</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i</td>
<td>ü</td>
<td>i</td>
<td>u</td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>ø</td>
<td>ø</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ã</td>
<td>o</td>
<td>a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Looking at (3), (4) and (5), we find that there are several interesting points that need to be addressed in the study of VH. First of all, we find that the so called neutral vowels are not
always neutral. There are /i/ - /æ/ alternations as shown in (3a) and /i/ - /a/ alternations as in (3c). A closer look at the data reveals that these neutral vowels are not neutral when they are placed in morpheme initial syllables, and they are neutral only in non-initial syllables. In addition to /i/ and /i/, we also observe that /u/ sometimes remains neutral as the third example of (3a) shows. What I mean "sometimes" here is that /u/ neutrality is much more restricted than in the case of two other unround high vowels /i/ and /i/. We will have to account for such deviant behavior of high vowels. Another problem is how to relate the vowel harmony in ideophones and verb suffixation. The harmony process in vowel harmony differs from ideophone vowel harmony in at least two points: the vowel harmony appears to be optional in some specific environments in verb suffixation and the front low vowel /æ/ is treated as a dark vowel, i.e. there is no harmony agreement between /æ/ and the following dark vowel /o/. To sum up, any study on vowel harmony has to deal with the following aspects:

(6) Problems in VH

a. What is a harmonic feature?

b. How to explain the dual status of high unround vowels: their non-neutrality in initial syllables and neutrality in non-initial syllables.

c. How to explain the /u/ - /o/ alternation in non-initial syllables.

d. How to relate affixal VH to ideophone VH.

The complexity of the harmony process in Modern Korean may be understood, if we take into consideration the historical development of the Korean language. Historically, there was a period when vowels show one-to-one correspondence between dark and light vowels in Korean. It is generally assumed that the contrast between the light and dark vowels reflect the
contrast between back vowels and central vowels\(^4\)  W-J. Kim (1963) studied *Hunminjeongeum Haerye* (a book that explains the alphabetical composition of Korean letters published in 1443) and postulated the following vowel system based on its explanation:

\[(7) \quad \text{Vowel Chart based on *Hunminjeongeum*}^5\]

<table>
<thead>
<tr>
<th>tongue unretracted</th>
<th>tongue somewhat retracted</th>
<th>tongue retracted</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>u ←→ o</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i ←→ ι</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o ←→ a</td>
<td></td>
</tr>
</tbody>
</table>

(bidirectional arrows represent harmonic pairs)

As shown in (7) the vowels were distinguished on the basis of "tongue retraction" in *Hunminjeongeum Haerye*.  W-J. Kim interpreted the tongue retraction as the tongue body retraction, so that the unretracted sounds are front vowels, somewhat retracted sounds are central vowels and retracted sounds are back vowels.  W-J. Kim (1963) further suggests that clock-wise vowel shift took place among central and back vowels, while keeping harmonic contrasts, resulting in the following vowel contrast:

\[^4\text{The back/non-back (palatal) harmony is generally assumed in Korean. The palatal harmony is a regular feature of Altaic languages to which Korean belongs (K-M. Lee (1972)). However, it should be noted that there are other proposals which assume that the light dark distinction is low and non-low distinction as in K-M. Lee (1971), and B-G. Lee (1973). Please refer to S-O. Lee (1984) for the detailed survey of Korean vowel harmony studies.}\]

\[^5\text{The phonetic value of the representation should be interpreted from their position in the chart not by the orthographic forms.}\]
The vowel shift hypothesis is generally accepted among scholars on Korean phonology (Ramstedt (1939), W-J. Kim (1963, 1967), K-M. Lee (1969, 1972), C-W. Kim (1978)), though there are differences of opinion as to when the vowel shift took place and what caused the vowel shift. In the later stage, the low unround back vowel /ʌ/, or the low /a/, merged into /a/ or /i/, depriving /i/ of its light counterpart. Such derived neutrality of /i/ adds to the complexity of VH in Korean (cf. K-M. Lee (1968: 387)). Further the historical vowel raising from /o/ to /u/ destroyed the vowel harmony regularly kept in underived nouns. The two front vowels /e/ and /æ/ derived by the monophthogization of /i/ and /ai/ respectively (cf. Huh (1952), S-N. Lee (1954)) further complicated the already skewed vowel harmony contrast.

W-J. Kim (1963) assumes that the vowel shift took place in the middle of the 18th century, while K-M. Lee (1968) argues that the vowel shift took place in as early as the 13th century. Further K-M. Lee (1972) presented a slightly different version of the earlier vowel chart and the vowel shift as shown below:

K-M. Lee explains that the centralization of /ʌ/ caused the push-chain vowel shift as shown in the chart.

W-J. Kim (1963: 226) notes that /ʌ/ merged into /a/ in initial syllables and into /i/ in non-initial syllables, though this generalization is not without exceptions.
Massive borrowing from Chinese which does not have the vowel harmony system also worsened the situation. (cf. C-W. Kim (1978))

The historical development is the reason why it is so difficult to formally capture the vowel harmony in Korean. Accordingly, S-N. Lee (1947: 109) says that VH is now disappearing from Korean phonology and will be completely gone "in a few centuries". C-W. Kim (1978) also argues that the vowel harmony in Korean is disappearing due to the disrupted vowel system in Korean. However vowel harmony is still very interesting phenomena in Korean phonology, which must be properly accounted for. In this chapter, I will attempt to present a systematic synchronic explanation to the vowel harmony in Korean within the theoretical framework laid out in Part I.

I will argue that the light vowels can be grouped into a natural class by using the feature [RTR] and that the transparency of high vowels in non-initial syllable can be deduced from the formal description of the vowel harmony itself. Following H-S. Sohn (1987b), I will assume that there are two separate processes in vowel harmony: morphemic feature linking and feature spreading. All the vowels in initial syllables including high vowels are targets for the feature size morpheme. But they are transparent to harmony feature spreading because the spreading makes reference to the Tongue Position node adjacency and high vowels do not have Tongue Position nodes.

I will also argue that the /a/ - /a/ alternation in verb suffixation is also due to the feature spreading which is similar to harmony feature spreading but it has an additional condition on the trigger that the trigger should be a back vowel.
I will briefly survey representative previous studies in vowel harmony in the next section and present the proposed analysis of the Korean vowel harmony in the following subsections.  

6.1. Previous Studies

In this section, I will introduce several representative studies on VH in Korean. The survey will be divided into two groups: the generative approach and the non-linear approach. I will discuss C-W. Kim (1973b) and Kim-Renaud (1976) for the generative account of VH. McCarthy (1983), Y-S. Kim (1988) and Sohn (1986, 1987b) will be discussed as the representative studies in the non-linear framework. The discussion will be focused on how those proposals account for the problematic aspects laid out in (6).

6.1.1. Generative Approach

One of the earliest generative accounts of Korean VH is found in C-W. Kim (1973b). He limits his discussion to affixal VH. Consider the following examples:

(9) /a/ - /a/ Alternations

a. light form /a/.
   po - ala   (look-imp.)
   pʰal - ala   (sell-imp.)

b. dark form /a/

8The discussion in this chapter is based on Y. Lee (1991) with further expansion and elaboration.
The light vowel /a/ appears if the verb stem final vowel is either /o/ or /a/. Noting that both /a/ and /o/ are back vowels, C-W. Kim (1973b) assumes that presence of the [+back] feature in the verb stem final syllable provides the environment in which /a/ appears. However one more back vowel /u/ is not followed by /a/ (see the last example of (9b)). C-W. Kim's solution to this problem is to posit the following Adjustment Rule:

(10) Adjustment Rule

u → .addRow

This rule has the effect of undoing the vowel shift in the history of the Korean vowels (cf. (7) and (8)). His idea is to reflect the regularity of vowel harmony that existed before the vowel shift to the contemporary analysis of affixal VH. By treating /u/ as non-back with the adjustment rule in (10), he was able to characterize the VH rule as referring to the natural class [+back]. The Adjustment Rule in (10) can also explain why /u/ is followed by /a/ instead of /a/. To insure the correct explanation, the rule in (10) should be crucially applied before the VH rule. The vowel /i/ which comes from /u/ by the rule (10), however, should be readjusted to /u/. Thus he proposed the following readjustment rule:

(11) Readjustment Rule

i → u
Again, this readjustment rule should be ordered after the VH rule. C-W. Kim also notes that the rule (11) applies only to /ɨ/ that is derived by the rule (10). Otherwise the powerful neutralization rule has the effect of eliminating all high unround back vowels from the surface representation. Thus though C-W. Kim presented an explanation of the affixal VH in the generative framework with the extrinsically imposed rule ordering, adjustment rule - VH rule - readjustment rule, he admits that the proposed explanation has several unsatisfactory aspects: the arbitrary nature of the adjustment and readjustment rules, the necessity of the historical trace of the rule application to deal with the non-application of the readjustment rule to /ɨ/, which is not the result of the rule (10), and so forth.

The adjustment and readjustment rules are too powerful. Kim-Renaud (1976: 404) points out that "any unnatural rules can be made natural by making certain segments temporarily something else". Another problematic aspect of C-W. Kim's proposal comes from the ideophone VH. In the sound symbolic VH, not only /a/ and /o/ but also /æ/ (and /ɨ/) are considered to be light. However, as S-C. Ahn (1985: 186) correctly points out, the proposed [+back] cannot group these four vowels, since /æ/ and /ɨ/ are truly [-back] vowels.

The major problem in dealing with VH is how to group light vowels excluding dark and neutral vowels into a natural class. Kim-Renaud (1976), noting that Korean VH may not be fully explained with the SPE style of features suggests two semantic features [±dark] and [±light]. Kim-Reanud (1976: 399) asserts that these features are "not arbitrary markers made up just to classify the vowels into two different groups". Her argument is that these are semantically justifiable features and have a fixed universal interpretation. Let's first consider her formulation of the VH rule in ideophones:
(12) Sound Symbolic Vowel Harmony

a. \([+\text{syll}] \rightarrow [+\text{light}] / C_0 \ldots \] SS

b. \([-\text{high} \rightarrow \text{-round}]/-\text{dark}/ C_0 VC_0(VC_0) \ldots \] SS

c. \([+\text{dark}] \rightarrow [+\text{light}] \ldots [+\text{light}] C_0(-\text{-light}) C_0 \ldots \] SS

(SS = a sound symbolic word)

Kim-Renaud assumes that the dark forms are basic and the light forms are derived by the three rules given in (12). (12a) is a process of converting dark vowels in the initial syllables into light. (12b) insures that high unround vowels, /i/ and /ɪ/, are specified for [-dark, -light] in non-initial syllables. Since these vowels are marked as [-dark], they will not be the inputs to the rule given in (12c). The rule in (12c) shows the process that converts all the vowels except /i/ and /ɪ/ into light vowels in ideophones. (12c) should be ordered after (12b). The three different rules in (12) thus explain (6a) and (6b).

Note that /u/ is not neutral in Kim-Renaud's explanation. The high back round vowel /u/, therefore, is subject to (12c). Consider the following examples:

(13) /u/ - /o/ Alternations

<table>
<thead>
<tr>
<th>Dark forms</th>
<th>Light forms</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. mǝlt'un</td>
<td>mǝlt'un, malt'on</td>
<td>with open eyes.</td>
</tr>
<tr>
<td>silc'uk</td>
<td>sæl'c'uk, sæl'c'ok</td>
<td>grudging</td>
</tr>
<tr>
<td>b. t'ekul</td>
<td>t'ækul, *t'ækol</td>
<td>rolling</td>
</tr>
<tr>
<td>napʰul</td>
<td>napʰul, *napʰol</td>
<td>flapping</td>
</tr>
</tbody>
</table>

As shown in the examples (13), /u/ sometimes alternates with /o/ as in (13a) or apparently
sometimes remains unchanged as in (13b). Kim-Renaud (1976) cites K-M. Lee's (1968: 387) observation that /o/ tends to become /u/ in non-initial syllables and proposed an optional /o/-raising rule. The ideophones that show the /u/ - /o/ alternation in non-initial syllables are the result of the optional /o/ raising rule. As for the words in (13b) and other similar examples which do not show the /u/ - /o/ alternation, Kim-Renaud (1976: 400) explains that they are simply not subject to the VH rule in (12c) and suggests that such information should be marked in the lexical entry of those examples.

Kim-Renaud introduces an entirely different use of the feature [light] to explain affixal VH. The feature [light] is considered to have scalar values in affixal VH where /a/ initial suffixes are added to verbs or adjectives. /o/ is [3light], /a/ is [2light] and /æ/ is [1light]. In other words, /o/ is the lightest of all the light vowels and /æ/ is the least light. With these scalar values of the feature [light], Kim-Renaud proposes the following affixal VH rule:

\[(14) \text{Affixal Vowel Harmony}^9 \]

\[\begin{array}{c}
+\text{back} \\
-\text{high}
\end{array} \rightarrow [+\text{light}] / [2\leq\text{light}] [-\text{syl}] o & \]

(where & is a verb stem boundary)

Since /æ/ is [1light], it cannot be included in the conditioning environments of the VH rule in (14). Therefore the rule in (14) correctly prevents vowel harmony from being triggered by /æ/. However we have to note that Kim-Renaud's explanation of affixal VH and ideophone VH does

---

9Kim-Renaud (1976: 401) makes use of this rule to explain the optionality of vowel harmony as illustrated in (4c), which shows that the suffix can surface either as /a/ or as /ə/ after the verb stem final vowel /a/ with the following condition to (14):

Condition: \quad \text{optional if } [2\leq \text{light}] = [2\text{light}] \text{ and } [-\text{syl}] = [+\text{cons}]

This condition added to the rule in (14) makes the rule optional if the suffix vowel is preceded by /a/, which is [2light], and one or more consonants intervene.
not satisfactorily capture the relationship between these two harmony systems. Notice that the feature [light] is binary in ideophone VH but it is multivalued in affixal VH.

One may improve the rule (14) by using binary feature [light]. The sole purpose of introducing scalar values of the feature [light] is to get rid of /æ/ from the harmony triggering vowels. A more direct way to achieve that goal may be simply limiting the triggering vowels to [+back] vowels. This can be done by postulating [+back] in the environment as shown in (15):

(15) Revised Affixal VH

\[
\begin{bmatrix}
  +\text{back} \\
  -\text{high}
\end{bmatrix} \rightarrow [+\text{light}] / \begin{bmatrix}
  +\text{back} \\
  +\text{light}
\end{bmatrix} [-\text{syll}] & \&
\]

(Where & is a verbal stem boundary)

Now with the slight revision in the affixal VH rule, we can do away with the ill-motivated scalar values for the feature [light]. Truly Kim-Renaud's treatment of VH in Korean is the most comprehensive done in the framework of generative phonology. Her analysis covers all the important aspects of VH as shown in (6), though there is no explanation about the relationship between ideophone VH and affixal VH.

One major criticism levied on her analysis is the introduction of two semantic features, which do not have any role to play outside of VH in Korean. Anderson (1977: 7) regards highly the phonetic motivation in the theory of VH by saying that "vowel harmony processes stipulate requirements of identity with respect to features that have independent phonetic motivation and validity." Y-S. Kim (1988: 453) in a similar context points out that it would be much more desirable if we can find a solution to VH "without resorting to such an undesirable move", meaning without unmotivated semantic features.
6.1.2. Non-linear Approach

Recent studies on VH strongly argue that VH can be best explained by an autosegmental analysis (Anderson (1977), Clements (1981), McCarthy (1983), Archangeli (1985), Ringen (1988b) and others). The basic idea of the autosegmental analysis is to represent the harmonic feature on a separate tier and operate autosegmental linking and/or spreading of the feature within specified domains.

McCarthy (1983) deals with VH in Korean by taking such an autosegmental approach. The first thing he has to do is to define the harmonic feature. McCarthy (1983: 145-146) starts with straightening out the curved division line between light vowels and dark/neutral vowels in (16a) to make a somewhat abstract division with a straight line as in (16b):

\[(16) \quad \text{Surface and Abstract Representation} \]

a. Surface Representation

\[
\begin{align*}
\text{dark vowels} & \quad \text{light vowels} \\
i & \quad \ddot{u} & \quad \ddot{i} & \quad \ddot{u} \\
\ddot{e} & \quad \ddot{\ddot{o}} & \quad \ddot{\ddot{e}} & \quad \ddot{o} \\
\ddot{\dddot{e}} & \quad \ddot{a}
\end{align*}
\]

b. Abstract Representation

\[
\begin{align*}
\text{dark vowels \([-\text{low}]\)} & \quad \text{light vowels \([+\text{low}]\)} \\
i & \quad \ddot{u} & \quad \ddot{i} & \quad \ddot{u} \\
\ddot{e} & \quad \ddot{o} & \ddot{\dddot{e}} & \ddot{\dddot{a}} & \ddot{\dddot{e}} \\
\ddot{\dddot{e}} & \ddot{\dddot{a}} & \ddot{a}
\end{align*}
\]
The representation in (16b) is "abstract" in that there is an underlying segment /ɔ/ which never surfaces in Korean and in that the front non-low vowel /ø/ is represented as [+low]. McCarthy (1983: 146) deals with the problem of abstractness by setting up a context free neutralization rule that changes [+round] to [-low] after the application of the VH rule.\textsuperscript{10}

McCarthy views the harmonic feature [low] as a feature size morpheme, i.e. a morpheme which is smaller than a segment (cf. Diffloth (1976: 261)). This morphemic feature is introduced as part of the morphological derivation. Since the feature is viewed as constituting a different morpheme, it is represented on a separate tier. In other words, all vowels in ideophones are specified for [high], [back] and [round] but they are not specified for [low]. These vowels receive specification of [low] by means of autosegmental linking and spreading. An exemplary representation from McCarthy (1983: 146) is shown in (17):

\begin{align*}
\text{(17)} & \quad \text{Light and Dark Ideophone Derivation –I} \\
& \quad \text{a. Light ideophone} \quad \text{b. Dark ideophone} \\
& \quad \begin{array}{c}
\begin{array}{c}
\text{V} \\
\text{[+low]} \\
\text{V} \\
\text{[-low]} \\
\text{V} \\
\text{[-low]} \\
\text{s} \\
\text{+back} \\
\text{-high} \\
\text{-round} \\
\text{p} \\
\text{+back} \\
\text{-high} \\
\text{-round} \\
\text{k} \\
\text{+back} \\
\text{-high} \\
\text{-round} \\
\text{s} \\
\text{+back} \\
\text{-high} \\
\text{-round} \\
\text{p} \\
\text{+back} \\
\text{-high} \\
\text{-round} \\
\text{k} \\
\end{array}
\end{array}
\end{align*}

\begin{align*}
& \quad \text{sapak/} \\
& \quad \text{sapak/}
\end{align*}

\textsuperscript{10}Such an absolute neutralization rule is generally disfavored in phonological theory (Kiparsky (1968)). Ahn (1985: 189) suggests the relative vowel height feature [±L] instead of the actual vowel height feature [±low] in order to obviate the problem of the absolute neutralization. However this is criticized by H-S. Sohn (1987b: 178) who notes that though [±L] eliminates the absolute neutralization rule, it does so at the cost of using "a phonologically unmotivated feature". Kiparsky (1968: 18) also argues that "the purely diacritic use of phonological features and the phonological use of diacritic features" should be excluded.
McCarthy assumes that both values of the feature \([\text{low}]\) are harmonic features. There is no derivational relationship between light and dark ideophones. The underlying representation is neutral and they surface as light ideophones if \([+\text{low}]\) is associated to them and as dark ideophones if the associated morphemic feature is \([-\text{low}]\). McCarthy shows that the harmony process and harmony feature can be simply derived out from the abstract vowel representation in (16b) and the autosegmental operation in (17).

McCarthy's autosegmental analysis of VH results in the feature contradiction that in the ideophones, high vowels in the light ideophones are specified for both \([+\text{high}]\) and \([+\text{low}]\) by means of \([+\text{low}]\) association. Consider (18) which shows the light and dark form derivation of an ideophone that has a high unround vowel in the initial syllable:

\begin{equation}
(18) \quad \text{Light Ideophone Derivation -II}
\end{equation}

- a. Light ideophone
  \[
  \begin{array}{c}
  [+\text{low}] \\
  \text{k} \quad \text{back} \\
  \text{V} \quad \text{c} \quad \text{back} \\
  \text{V} \\
  /\text{kæcak}/
  \end{array}
  \]
  \[
  \begin{array}{c}
  [+\text{high}] \\
  \quad \text{km} \\
  \end{array}
  \]

- b. Dark ideophone
  \[
  \begin{array}{c}
  [-\text{low}] \\
  \text{k} \quad \text{back} \\
  \text{V} \quad \text{c} \quad \text{back} \\
  \text{V} \\
  /\text{kicok}/
  \end{array}
  \]

The first vowel of the light ideophone /æ/ is specified as \([+\text{high}, +\text{low}]\). To resolve the feature incompatibility, McCarthy (1983: 146) assumes that the newly introduced feature \([+\text{low}]\) "overrides an incompatible lexical specification of \([\text{high}]\)". Therefore the autosegmental association of \([+\text{low}]\) to high vowels changes \([+\text{high}]\) to \([-\text{high}]\). However, as Y-S. Kim (1988: 454) points out, McCarthy's proposal for dominance of the spread feature over
the prespecified feature may not be well-motivated in light of the data from Akan reduplication, which show that the pre-attached feature wins out. (cf. Marantz (1982: 449))

McCarthy further assumes that high unround vowels are not specified for [-low] in initial syllables but they are specified for [-low] in non-initial syllables. With this context sensitive feature specification (cf. Ao (1991)), McCarthy argues that fully specified vowels will not associate with the autosegmental feature values and remain neutral (cf. Clements (1981)).

As to the relationship between ideophone VH and affixal VH, McCarthy (1983: fn 13) abandons establishing a relationship between the two by saying that the affixal harmony is "not accountable as an assimilation rule."


By using [+DVR], Kim can eliminate the abstract vowel representation, offering a more realistic account for the harmonic feature. Note also that Y-S. Kim's analysis is not free from

---

11 The term "deep voice resonance" comes from *Hunminjeoneum Haerye* (1443). "Deep voice resonance" is equated to "tongue retraction" in that book. Y-S. Kim interprets the term "tongue retraction" as the tongue root retraction instead of tongue body retraction (cf. (7)) and explains that [+DVR] can be used interchangeably with [+RTR].
the problematic feature conflict. The high front vowel, /i/, after harmony feature spreading will be specified for [+DVR, +high], a feature combination which does not exist in the Korean vowel inventory. Y-S. Kim proposes an interpretive rule as shown in (20) to provide the correct vowel height to [+DVR] vowels:

(20) Vowel Height Interpretive Rule (Y-S. Kim (1984: 180))

\[
\begin{align*}
V & \quad \begin{array}{c}
-\alpha \text{ rnd} \\
\end{array} \\
\rightarrow & \quad \begin{array}{c}
\text{ -high} \\
\alpha \text{ low} \\
\end{array} \\
& \quad \begin{array}{c}
\text{ [+DVR]} \\
\end{array}
\end{align*}
\]

This rule nonetheless does not make Y-S. Kim's analysis any better than McCarthy's spread feature dominance convention. The rule in (20) cannot be understood as a simple interpretive rule. It is a feature changing rule. Notice that the rule (20) takes [+back, -rnd, +high] as input and produces [+back, -rnd, -high] if it is linked to [+DVR]. What the rule actually does is to change the value of the feature [high].

J-S. Lee's (1992) version of ideophone VH is more elaborated than McCarthy (1983) or Y-S. Kim (1988). She uses two monovalent features [RTR] and [ATR] instead of [±low], thus satisfying Anderson's (1977:7) phonetic motivatedness. J-S. Lee adopts Calabrese's (1988) Underlying Filters, which define possible and impossible sounds for each language. The Underlying Filters virtually have the same function as language particular co-occurrence restrictions. Calabrese (1988) further suggests that clean up rules or repairing rules, such as fission, delinking and negation, are invoked to "repair" ill-formed outputs.\(^{12}\)

---

\(^{12}\)It should be noted that Calabrese's proposal of Underlying Filter is criticized by Myers (1991). Myers (1991: 336) contends that restrictions on prosodic units are due to "persistent rules", which are not accountable by filters.
J-S. Lee (1992) is different from McCarthy and Y-S. Kim in dealing with high vowels in non-initial syllables. Both McCarthy (1983) and Y-S. Kim (1984, 1988) assume context-sensitive feature specification, i.e. high vowels in non-initial syllables are fully specified for the harmony feature and therefore is not subject to harmony feature spreading. However, J-S. Lee assumes that the harmony feature is linked and spread to all the syllables in ideophones. Such an approach creates the ungrounded feature combination [(+) high, (+) RTR].

J-S. Lee (1992: 253-254) proposes two different repair strategies to deal with the ungrounded feature combinations as shown in (21):

(21) Repair Strategies
   a. Linking Process
      [(+) high] delinking
   b. Spreading Process
      [(+) RTR] delinking

What the strategies in (21) does is to change [+high, +RTR] into [-high, +RTR] in initial syllables and into [+high, -RTR] in non-initial syllables. As for the /u/ - /o/ alternation in non-initial syllables (see examples (2c) and (2d)), J-S. Lee (1992: 250) argues that the alternation is achieved by a lexically marked process. The normal clean-up process in

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13In Pulleyblank (1991) and Archangeli and Pulleyblank (1991), the phonetic relations between features are expressed as "grounded conditions". The relevant conditions are RTR/hi and ATR/hi conditions which are reproduced below:

RTR/hi condition: if -ATR then not +hi
                if -ATR then -hi
ATR/hi condition: if +ATR then not -hi
                 If +ATR then +hi
harmony spreading is to delink [(+) RTR] as shown in (21b). However in some lexically marked cases, the repair strategy set for the linking process, delinking [(+) high], operates on the spreading process to make potential /u/ into /o/. While the strategies in (21) correctly describe the different behavior of high vowels, these strategies seems to be merely stipulative. The different repair strategies for the same feature combination in different processes of vowel harmony are further weakened by the lexically marked strategies.

All the three analyses given above, McCarthy (1983), Y-S. Kim (1984, 1988) and J-S. Lee (1992) do not discuss the derivational relationship between light and dark ideophones. The base forms are neither light nor dark. And two harmony features are linked to the base forms by two separate processes, light form derivation and dark form derivation. However, H-S. Sohn (1986, 1987b) proposes the derivational relationship between light and dark forms. She argues that the dark forms are basic and light forms are derived by light form derivation.

Sohn (1986, 1987b) presents the most comprehensive non-linear analysis of VH in Korean. She adopts radical underspecification of Korean vowels based on the observation that /i/ is the least specified vowel in Korean. Her vowel specification is given in (22):

(22) Radical Underspecification of Korean Vowels

```
  i  e  æ  ø  a  i  u  o
high  -  -  -  - 
low    +  +  
round    +  +  
back   -  -  -
```

One interesting observation we can see from the vowel specification in (22) is that the radical underspecification is not compatible with J-S. Lee's (1992) analysis. The radical
underspecification does not allow [+high] to be specified in the underlying representation. Eliminating [+high] from the underlying representation is well motivated from the phonology of Korean. [+high] is a feature which characterizes the least specified vowel /i/. Vowel coalescence data from Korea, which will be discussed in Chapter 8, also strongly argues that [+high] should not be specified in the underlying representation. However J-S. Lee's repairing strategies crucially rely on the existence of [+high]. With J-S. Lee's feature specification, we lose our account of the fact that the inserted or deleted vowels in normal speech Korean are almost always /i/, thus arguing against her feature specification.  

With the vowel specification in (22), Sohn argues that the morpheme-size feature is [+low]. For Sohn (1986, 1987b), light and dark ideophones are in a derivational relation. To be more specific, Sohn (1987b) argues that dark ideophones are basic and light forms are derived by introducing a feature-size morpheme [+low]. This is a very meaningful departure from McCarthy (1983), S-C. Ahn (1985), Y-S. Kim (1984) and J-S. Lee (1992). The reason why she assumes that dark ideophones are basic is twofold. First, the radical underspecification of Korean vowels does not allow the presence of [-low]. Therefore the underlying forms of neutral ideophones are indistinguishable from dark forms both of which are not specified for [+low]. This naturally predicts that the underlying forms, forms without [+low], are dark forms. Second, another piece of supporting data for the derivation of light forms from dark forms comes from a rather systematic distributional asymmetry between dark and light ideophones. Sohn (1986: 167) observes that "there are dark ideophones that do not have light counterparts, but there are no light ideophones that do not have dark counterparts." Though this claim is too strong, Sohn's assumption that dark forms are basic is in the right field.

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14 Though J-S. Lee does not deal with this incompatibility, it may be possible to argue that the ideophone feature system may be different from the "regular" lexical feature system. This can be deducible from J-S. Lee's (1992: 49, 298-299) proposal of different syllable structures for ideophones and for regular lexical words.

15 J-S Lee (1992:107-108) observes that there are light ideophones that do not have dark counterparts and claims that the existence of such ideophones weakens Sohn's (1987b) argument for the derivational analysis. Some examples of light ideophones that do not have corresponding dark forms are given.
direction in that the ideophonic variations can be explained by one process instead of two separate nearly identical processes.

We see that the proposed feature [+low] does not group all the light vowels in (22). This is because adding [+low] to the high round vowel /u/ does not produce /o/ which is neither high nor low. In order to solve the feature contradiction, Sohn (1987b: 184) proposes the following phonetic implementation rule:

(23) Phonetic Implementation

\[ [+\text{low}] \rightarrow [-\text{low}] / [\text{+round}] \]

below:

<table>
<thead>
<tr>
<th>Word</th>
<th>Proposed Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>hantil</td>
<td>*hantil hantil</td>
<td>moving lightly</td>
</tr>
<tr>
<td>nakis</td>
<td>*nakis nakis</td>
<td>tender and soft</td>
</tr>
<tr>
<td>os’ak</td>
<td>*us’ak us’ak</td>
<td>filling chilly</td>
</tr>
<tr>
<td>kalki</td>
<td>*kalki kalki</td>
<td>torn into pieces</td>
</tr>
</tbody>
</table>

However, the presence of the light ideophones which do not have dark forms does not necessarily invalidate the assumption that light forms are derived from dark forms. We can simply specify [+low] in the underlying representations of these ideophones. Since they are already specified for [+low], we observe that they are not subject to light ideophone derivation or that they have undergone the light ideophone derivation vacuously.

Likewise, there are some ideophones which do not have light counterparts as shown below (data from J-S. Lee (1992: 108)):

<table>
<thead>
<tr>
<th>Word</th>
<th>Proposed Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>nilis</td>
<td>*nilis nilis</td>
<td>slowly</td>
</tr>
<tr>
<td>musi</td>
<td>*mosi mosi</td>
<td>spooky</td>
</tr>
<tr>
<td>апен</td>
<td>*апен</td>
<td>timid, dumb</td>
</tr>
</tbody>
</table>

J-S Lee argues that the absence of the light forms of these ideophones is due to "the intrinsic AUGMENTATIVE connotation that these expressions possess." I agree with her that there can be semantic restrictions on the morphological derivation.
This rule makes the round low vowel into /o/. Sohn argues that the rule (23) applies very late, i.e. at the phonetic level. In other words, the light vowel /o/ is regarded as [+low] in the course of ideophone derivation.\footnote{Notice that the rule (23) has the effect of making round vowels non-low, which is quite equivalent to McCarthy's absolute neutralization (or Y-S. Kim's Interpretive rule) which was subject to Sohn's (1987b: 178) criticism.}

Sohn then proposes that there are two distinct stages in the light ideophone derivation. First the feature [+low] is introduced as part of the morphological process of light form derivation. The newly introduced feature [+low] is associated to the leftmost vowel of the base by the Universal Association Convention (Archangeli (1985: 339)) as shown in (24):

\begin{equation}
\text{(24) Universal Association Convention (=UAC)}
\end{equation}

Map a sequence of melody elements onto a sequence of anchors,

\begin{itemize}
  \item a. one - to - one
  \item b. left - to - right
\end{itemize}

The UAC has the effect of linking the floating [+low] feature to the vowel in the first syllable. The next stage is spreading. Sohn (1987b: 182) formulates the following Harmony Spreading Rule:

\begin{equation}
\text{(25) Harmony Spreading (=HS)}
\end{equation}
By positing two separate processes in VH in ideophones, linking and spreading, Sohn can offer an account of the asymmetric behavior of high unround vowels. Since these two are different rules, we can say that these rules may have different conditions. All vowels in initial syllables, including high unround vowels, are subject to the linking process, but high vowels are transparent in spreading. Given the fact that the harmonic feature [+low] is linked to vowels in the first syllable and the feature is associated to vowels in non-initial syllables by spreading, we can understand why the high unround vowels change in initial syllables (in linking) and remain unchanged in non-initial syllables (in spreading).

Now let's consider how Sohn (1987b) explains the transparency effect of high vowels in non-initial syllables. As observed by many researchers on VH (Vago (1977), Clements (1977, 1981), Archangeli and Pulleyblank (1987), etc.) some vowels may remain unaffected by the harmony process. Sohn (1987b: 191), proposes the Neutral Blocking filter as shown in (26):

(26) Neutral Blocking

\[
\begin{array}{c}
\sigma \\
\sigma \\
\wedge \\
\{ [-\text{back}] \\
[ ] \\
\times \\
[+\text{low}] \\
\end{array}
\]

The Neutral Blocking in (26) says that [+low] should not be linked to [-back] vowels and [ ] vowels. [-back] represents /i/ and [ ] represents /i/. However given that not only
/i/ but also /e/ is [-back], we may need an additional condition that [-back] is the exhaustive specification in order to prevent the wrong prediction that /e/, which is [-back, -high] according to Sohn's feature specification given in (22), is also transparent in a non-initial syllable.

The empty matrix [   ] presents another problem. [   ] means a segment without any specified feature. Here, Sohn refers to the absence of the feature in defining the rule application environment. However, referring to the absence of features may constitute "the misuse of blanks" as mentioned by Ringen (1975). Moreover, Sohn does not discuss the /u/-/o/ alternation in non-initial syllables in light ideophones.

Regarding the affixal vowel harmony, VH in verb suffixation, Sohn (1987b: 198) gives us the following spreading rule:

(27)  [+low] spreading

\[
\begin{array}{c}
N \quad N \\
| \quad | \\
x \quad x \\
| \quad | \\
[+low] \ Y & [-high] \\
\end{array}
\]

where Y is a verbal stem.

Sohn sees that there are two possible problems in the spreading rule in (27). The rule wrongly predicts that [+low] will spread from a front low vowel /æ/. Secondly since /o/ is not a [+low] vowel (see Sohn's vowel specification in (22)), it is predicted from the rule in (27) that the suffix /æ/ will remain unchanged if the verb stem final vowel is /o/. Both of these problems are dealt with in Sohn (1987b).

In order to exclude /æ/, Sohn (1987b: 199) proposes her feature geometry model as given in (28):
With the feature geometry given in (28), Sohn assumes that vowel place features are on the same tier (Back-tier) which is dominated by the Round-tier which has the round feature. Sohn argues that unlike in Ideophone VH, where [low] is represented on a separate tier, [low] is specified on the same tier with other place features such as [high] and [low] for affixal vowel harmony.

With the geometry model given in (28), /æ/ is different from /a/ in that /æ/ is specified for [+low, -back] while /a/ is specified only for [+low]. Since [low] and [back] are on the same tier, the spreading rule in (27), if applied from the stem final vowel /æ/, spreads not only [+low] but also [-back] since both of the features are specified on the same tier. Sohn (1987b: 199) maintains that due to "the free ride spreading" of [-back], the spreading of [+low] from a vowel which is specified for another Back-tier features is prohibited.17

Elaborate as her explanation may be, the rule in (27) still fails to explain the lack of vowel alternation in /køla/ suffixation. Consider the following examples:

(29) Lack of Vowel Alternation in /køla/ Suffixation

ka (go)+ køla (imp) → kakøla, *kakala (Go!)

can (sleep) + køla (imp.) → cakøla, *cakala (Sleep!)

---

17Sohn (1987b) invokes the same feature geometry and the prevention of free-ride spreading in her explanation of consonant palatalization, and glide formation in Korean.
The situation worsens as we consider her explanation of vowel alternation after verb stem final vowel /o/. Sohn says that the appearance of /a/ after the stem final vowel /o/ is not related to the [+low] spreading rule given in (27). Instead Sohn (1987b: 201) proposes another rule of /a/ lowering after /o/ as given in (30):

\[
(30) \text{Vowel Lowering} \\
\left[ \begin{array}{c}
\end{array} \right] \rightarrow [+\text{low}] / o \}_{X} \begin{array}{c}
-\text{high}
\end{array}
\]

(where X is a verbal stem)

By posing two rules [+low], spreading in (27) and /a/ lowering in (30), Sohn's analysis results in the loss of a unified account of affixal harmony.\(^{18}\)

As discussed above, in spite of the comprehensiveness of the analysis, Sohn (1987b) does not provide satisfactory answers to the problematic aspects of VH pointed in (6). In the following sections, I will present a unified analysis of vowel harmony phenomena in ideophones and in verb-suffixation.

\(^{18}\)It would have been much simpler to simply put /a/ in the environment of the vowel lowering rule in (30) instead of positing two different rules to explain the affixal vowel alternation as given below:

\[
\left[ \begin{array}{c}
\end{array} \right] \rightarrow [+\text{low}] / \{a, o\}_{X} \begin{array}{c}
-\text{high}
\end{array}
\]

(where X is a verbal stem)

The rule given above, a variant of Kim-Renaud's affixal harmony rule, can at least offer a unified account for affixal VH.
6.2 Vowel Harmony in Ideophones

In the preceding section, we have seen that the previous studies fail to account for one or more problematic aspects of VH as pointed out in (6). In this section I will show that the VH in ideophones can be explained systematically with the theoretical assumptions laid out in Part I. The feature specification of Korean discussed in 2.4 and the feature geometry model presented in 3.2.4 will be combined in this section to present a straightforward analysis of VH in ideophones. The discussion in this section will also provide additional evidence for the Tongue Position node in Feature Geometry.

6.2.1. Harmony Processes

The first thing we are faced with is to identify the common characteristics of light vowels in terms of features. As discussed in the previous section, both the semantic feature [±dark] and [±light] and the phonetic feature [±low] have internal defects in their application to the explanation of VH in Korean. Consider the monovalent feature specification in Korean discussed in 2.4, reproduced in (31) and the schematized vowel alternation from (5) given in (32):

(31) Underspecification of Korean Vowels

<table>
<thead>
<tr>
<th></th>
<th>i</th>
<th>e</th>
<th>æ</th>
<th>ə</th>
<th>a</th>
<th>i</th>
<th>u</th>
<th>o</th>
</tr>
</thead>
<tbody>
<tr>
<td>open</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>front</td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>round</td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>RTR</td>
<td></td>
<td></td>
<td>+</td>
<td>+</td>
<td></td>
<td></td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>
Given the feature specification in (31)\(^{20}\) and the dark and light vowel correspondences in (32), we can immediately notice that what is common in all the vowels used in the light ideophones, /æ/, /a/ and /o/, is that they can be understood as being [RTR] vowels. This has three implications: first, it is [RTR], not [low] that is responsible for VH in the spreading analysis. Second, since [ATR] ([\-RTR] in a binary feature system) is not specified, the underlying forms are indistinguishable from dark forms as Sohn (1987b) correctly observes. Third, we cannot ignore the historical aspects of the vowel harmony. In *Hunminjeoneum Haerye*, the VH in Korean is explained as the opposition of central and back vowels, which can be explain by the degree of tongue retraction.

Characterizing the VH in modern Korean by tongue root retraction has some implication for the vowel shift in Korean. The occurrence of vowel shift in Korean may have been concomitant with the change from tongue body retraction contrast to tongue root retraction

\(^{19}\)There are alternations other than those listed here such as the /u/ - /a/ alternation and the /i/ - /a/ alternation. I will discuss these cases in 6.2.3.

\(^{20}\)Note that the feature [palatal] is used here instead of [front]. As discussed in 3.3.3., the feature [palatal] groups alveopalatal consonants and front vowels.
Following Sohn's (1987b) analysis of VH, I will propose that dark ideophones are basic and light ideophones are derived from dark ideophones by adding the feature-size morpheme [RTR]. The floating feature [RTR] is linked to the first moraic segment, a non-glide vocalic segment, by the Universal Association Convention and then the second process is Harmony Spreading. I assume that the Harmony Spreading works on Tongue Position (=TP) node adjacency. The harmonic feature [RTR] spreads to a segment which is adjacent to the trigger on the TP tier. Therefore any intervening segment without a TP node will be skipped in the spreading processes. These two rules are formulated in (33) and (34):

(33) Light Ideophone Derivation

Morpheme: floating [RTR] (meaning "lightness" of ideophone)

Linking target: First moraic segment.

(34) Harmony Spreading (= HS) in Ideophones

21J-W. Kim (1988) suggests that "the tongue retraction" in Hunminjeoneum Haerye should be interpreted as "tongue root retraction". He surveys the vowel harmony systems found in the West African and Altaic languages and suggests that the "tongue root retraction" feature can relate all these vowel harmonies.

22I use a rectangle to graphically indicate the adjacency condition. This rule can be rewritten in the framework developed by Archangeli and Pulleyblank (1991) as given below. However I will continue to present the rules in graphic forms which I think is easier to see how the rule works.

<table>
<thead>
<tr>
<th>Harmony Spreading</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Argument</strong></td>
</tr>
<tr>
<td><strong>Target</strong></td>
</tr>
<tr>
<td><strong>Mode</strong></td>
</tr>
<tr>
<td><strong>Direction</strong></td>
</tr>
<tr>
<td><strong>Condition</strong></td>
</tr>
</tbody>
</table>

---

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22I use a rectangle to graphically indicate the adjacency condition. This rule can be rewritten in the framework developed by Archangeli and Pulleyblank (1991) as given below. However I will continue to present the rules in graphic forms which I think is easier to see how the rule works.
Linking is done by creating necessary higher nodes for anchoring the feature [RTR], as discussed in Part I. (See Node Convention (34) in Chapter 3 and the relevant discussion there). For example, /i/ is not specified in terms of [open] or [RTR] and therefore by the Principle of Simplicity, it should not have a TP node. If a TP node is present it violates the Node Convention by making the organizational node terminal. However, [RTR] needs an anchor. Here it is assumed that the TP node creation is the natural consequence of linking [RTR] to /i/.

Then the second process is the harmony spreading. As the rule in (34) shows, the harmony feature is spreading rightward under the condition of TP node adjacency. Let's take a look at the sample derivation as in (35):

(35) Example of Light Ideophone Derivation

a. pitʰiḷ piṭʰiḷ ~ pætʰiḷ pætʰiḷ (staggering)
In (35a), [RTR] is introduced as a part of the morphological process, and the [RTR] linking results in the creation of the TP node. However, the harmony feature cannot spread, because there is no segment which is adjacent to the first vowel with respect to the TP node. In (35b), the second vowel has the [open] feature, and therefore it has a TP node, and so the first and second vowels are adjacent on the TP tier. [RTR] then spreads to the second vowel to make
it /a/. (35c) is an interesting case. The [RTR] introduction is the same as the previous examples, but the harmony spreading process is not like the (35b) example. The second vowel /i/ does not have any TP feature, and therefore it does not possess a TP node. But the third vowel /a/ has a TP node and this vowel is adjacent to the first vowel on the TP tier. Thus the harmony feature [RTR] can spread through the second vowel to the third vowel as predicted by the harmony feature spreading rule as given in (34).

The common characteristic of high vowels, according to the Feature Specification in (31) is that they have neither [open] nor [RTR]. Those two features are dependent upon the TP node. The absence of both [open] and [RTR] on high vowels naturally means they do not have the TP node as discussed with the Node Convention in 3.2.4. and the Inherent Underspecification in 3.3.1. And if the spreading is done on the TP tier, it is only natural that the segments without a TP node, all consonants and high vowels, should be transparent.

The HS rule in (34) can successfully explain the different behavior of high vowels from non-high vowels. A vowel, whether it be high or non-high, is the target for the anchoring of a floating [RTR] feature. Anchoring results in the creation of a TP node, if the target does not already have one. However, HS is operated under TP node adjacency as shown in (34), and therefore it skips over all the consonants and high vowels, both of which do not have TP nodes.

6.2.2. High Vowel Transparency.

So far, we have talked about the transparency of high unrounded vowels in non-initial positions and under the present framework, their transparency is attributed to the lack of a TP node. We do not need the context sensitive feature specification as in McCarthy (1983) or in Y-S. Kim (1988) or the Neutral Blocking rule as in Sohn (1987b). With the vowel specification in (31) and the harmony processes given in (33) and (34), we see that the
transparency effect of high vowels in non-initial syllables naturally falls out from the feature geometry proposed for Korean.

Now we will turn to the behavior of /u/ in ideophone VH. We see that the high round vowel, /u/, lacks the TP node because it neither has [open] nor [RTR] specifications. Therefore the HS rule (34) predicts that even the high round vowel should also be transparent in non-initial position. Consider the data in (36):

(36) /u/ Transparency

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>kilc'uk  ~  kælc'uk, ?kælc'ok</td>
<td>(tall &amp; slim)</td>
<td></td>
</tr>
<tr>
<td>p'it'ul  ~  p'æt'ul, *p'æt'ol</td>
<td>(in zigzags)</td>
<td></td>
</tr>
<tr>
<td>kəmus  ~  kamus, *kamos</td>
<td>(black)</td>
<td></td>
</tr>
</tbody>
</table>

As expected, non-initial /u/ remains unaffected by the spreading rule and they are transparent in HS. The transparency of /u/ has been a major problem for all the analyses that I have discussed in 6.1. The traditional three way distinction, light, neutral, and dark, which classifies /u/ as a dark vowel, fails to capture the seemingly strange behavior of the high round vowel /u/. The explanation in the present framework is pretty straightforward: they are transparent because they have no TP node.

What may be apparently problematic in the present analysis is the fact that sometimes high round vowels seem to be affected by the harmony processes. Sometimes there are two light counterparts to one dark ideophone which contains /u/. These are illustrated in the following data:
(37) /u/-/o/ alternation in non-initial positions

a. /o/ Only

hululuk ~ hololok, *holulok, *hololuk  (sipping)
supuk ~ sopok, *sopuk  (heaping fully)
sukun ~ sokon, *sokun  (whispering)

b. Both /u/ and /o/

silc'uk ~ sælc'uk, sælc'ok  (grudging)
k'æŋch'ʊŋ ~ k'æŋch'ʊŋ, k'æŋch'ʊŋ  (hopping)
pøtʊŋ-pøtʊŋ, pøtʊŋ  (struggling)
umpb'uk ~ ompb'ok, ompb'uk  (dented)

c. /u/ Only

t'ekul ~ t'ækul, *t'ækol  (rolling)
hicuk ~ hæcuk, *hæcok  (grinning)
pupb'ul ~ popb'ul, *popb'ol  (swelling)
napb'ul ~ napb'ul, *napb'ol  (flapping)

The data in (37c) does not need further explanation since they show the predicted behavior of /u/. Let's first consider the data given in (37a). There are many examples of this type. In order to understand the data in (37a), we will have to discuss briefly about the partial reduplication phenomenon found in Korean. Consider the examples of partial reduplication in (38):
The most recent analysis of (38) as in McCarthy and Prince (1986, 1990) is the reduplication of a core syllable (a CV syllable) as a suffix at the end of a word with the final consonant being extraprosodic. In the terminology of McCarthy and Prince (1990), the final consonant in the base form, if any, is "circumscribed" and a CV syllable or a core syllable is reduplicated as a suffix to the "residue of the circumscription. The step by step derivation of the first word in (38) is given in (39):

(38) Partial Reduplication

asak → asasak (munching)
huluk → hululuk (devouring)
culuk → cululuk (dripping)
utuk → ututuk (crunching)

(39) Partial Reduplication Derivation

The circumscribed stem final consonant /k/ is marked as extraprosodic in (39a). To the residue a monomoraic syllable template is introduced as a suffix in (39b). (39c) shows the reduplication process. The melodic tier of the base is reduplicated to the attached suffixal template with the association from right to left. Finally the extraprosodic segment /k/ is
reassociated to the coda of the reduplicated syllable to produce /asasak/.

If we adopt this approach, we can immediately see why the /o~/u/ alternations in the non-initial syllable are illformed in these words. "hololok" comes from "holok" by partial reduplication: It does not come from "hululuk" by the spreading of the harmony feature. Thus the base forms of the first two words are disyllabic as the rest of the words in (37a). The interesting thing about the base forms given in (37a) then is that there is just one vowel in each of the base forms. The simple explanation is that these words have unspecified vowel slots in non-initial positions and acquire their phonemic content by root spreading from the initial position as illustrated with the last word of (37a), "sukun":

(40) Root Spreading

23The second mora is underlyingly present. Following Archangeli (1984: 34) I use a circle to represent an unliked element. Therefore the surface form of the dark ideophone will be [sukun] and not *[suukn]. Further it should be noted that I do not assume that all the disyllabic ideophones with identical vowels have such linked structures. Notice that the second vowel /u/ in /umpuhuk/ or /puphul/ is not obligatorily changed into /o/ in these words, which is evidence that they should not have the linked vowel structure. J-S. Lee (1992: 216) criticizes this approach as "problematic" because the postulation of linked and unlinked structure is set by "looking ahead to the morphological behavior" and there is "not any clear way to determine (the structure) beforehand" However this may not be a valid criticism because we cannot do any phonological analysis without "looking into" the phonological behavior, and nothing, neither rules nor representations, can be fixed before considering the data. (See principles in selecting underlying features given in (17) in Chapter 2.)
(40) shows that Root Spreading is operating on the moraic tier adjacency, or on the maximal scansion in Archangeli and Pulleyblank's (1987: 21) terms. Consequently the analysis can be falsified if the second vowel is obligatorily changed into /o/ after a geminate consonant, because the intervening geminate will have moraic status and as a result, the first and the second vowel is no longer adjacent on the moraic tier. But as far as I know, there is no ideophone data of this kind that has a moraic segment between two high round vowels.24

Further, there is one piece of supporting evidence for this analysis. Root Spreading is not the only option allowable for /sukun/. What I mean is that the second mora can just remain unfilled. Then this maximally underspecified vowel slot will be interpreted as /i/ according to the feature specification given in (31). Then we may expect that /sukin/ and /sokin/ should be also acceptable as Korean ideophones and truly these forms co-exist with the alternations given in (37a).

Now the final problem: the marginal cases in (37b) need to be explained here. Excluding the ideophones with a linked vowel structure in (37a), we find that there is an implicational relationship between forms with non-initial /u/ and those with non-initial /o/. There is no ideophone which has /o/ only in the non-initial syllable except when the non-initial vowels show the doubly linked structure as in (37a). In other words, the fact that a light ideophone has /o/, which is derived from /u/ in non-initial syllables, implies that it also has the

24 J.-S. Lee (1992: 217) presents two words that have the same round high vowel in the first and second syllables separated by a moraic consonant as shown below:

| pulluk | ~ | pollok, | *polluk | (burging) |
| k\textsuperscript{4}ulluk | ~ | k\textsuperscript{4}ollok, | *k\textsuperscript{4}olluk | (coughing) |

She uses these data to argue against the proposal made here. I do not have an explanation for these data. However I would like to add that I do not agree with her judgments especially for the second word. *[k\textsuperscript{4}olluk] seems to be well-formed and [polluk] is also marginally acceptable for me especially with an initial tense consonant as in [p\textsuperscript{o}olluk]. If my judgement on the well-formedness of these two words is not wrong, these do not constitute a counter-example to the present analysis.
/u/ variant, but not vice versa as (37c) shows. It should also be noted that the light forms with /u/ are more widely accepted and more frequently used than those with the /o/ forms. I assume that this constitutes evidence that there is another ideophone specific optional rule applicable to a handful of light ideophones, excluding the words in (37c) that lowers round vowels in the final position, which is reminiscent of the high vowel lowering in Tiv as given in Archangeli and Pulleyblank (1991). The vowel lowering can be formulated as in (41):

(41) [open] Insertion

```
  \( \mu \)
  \( R \ [\text{voc}] \)
  \( \text{PL} \)
  \( A \)
  \( [\text{labial}] \)
  \( [\text{round}] \)
  \( [\text{open}] \)
```

Now, since there is just one round open vowel in Korean, the phonetic component will correctly interpret the [open, round] combination as /o/. This solution allows us to maintain the consistency in using the TP node as the target of spreading. This analysis will be falsified if there is any /u/ to /o/ alternation in morpheme internal position, in other words, the

---

25 I do not have any objection to treat (41) as a morphological rule as J-S. Lee (p.c.) points out. Consider that [k'ang'oŋ] is even lighter than [k'ang'unɡ], it is not unreasonable to treat (41) as another subsidiary morphological rule of light form derivation which is applicable only to light ideophones. If we suppose that the rule is morphological in nature, we may say that the inserted feature is [RTR] instead of [open] in order to keep the morphosemantic consistency of the feature [RTR].
non-initial and non-final position. In initial syllables of ideophones, the high vowels are the target of [RTR] linking, and in final syllables, /u/ is subject to the lowering rule as described in (41). Therefore, the rule given in (41) will predict that /u/ in morpheme internal position, i.e. in neither initial nor final syllables, is always transparent. Interestingly this prediction is born out in the actual data as shown in (42):

(42) /u/ Transparency in Ideophone Internal Syllables.

<table>
<thead>
<tr>
<th>Syllable</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>cumullałk ~ comullak, *comollak</td>
<td>cumullałk ~ comullak, *comollak</td>
<td>(kneading)</td>
</tr>
<tr>
<td>k’upucan ~ k’opucan, *k’opocaŋ</td>
<td>k’upucan ~ k’opucan, *k’opocaŋ</td>
<td>(hunch backed)</td>
</tr>
<tr>
<td>hapucak ~ hapucak, *hapocak</td>
<td>hapucak ~ hapucak, *hapocak</td>
<td>(floundering)</td>
</tr>
<tr>
<td>umullałk ~ omullak, *omollak</td>
<td>umullałk ~ omullak, *omollak</td>
<td>(chewing)</td>
</tr>
</tbody>
</table>

The data given in (42) truly show that the high round vowel /u/ is always transparent when it is placed in non-marginal (neither initial nor final) syllables, thus they provide supporting evidence for the vowel lowering rule given in (41).

Here we will have to think about the historical implication of the vowel lowering rule given in (41). Historically we find that /o/ is raised to /u/, as K. M. Lee (1968) observes, which is reflected by Kim-Renaud's explanation of the /u/-/o/ alternation. Some examples of historical back round vowel raising are given in (43):

(43) Historical Round Vowel Raising

<table>
<thead>
<tr>
<th>Syllable</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>namọ &gt; namu</td>
<td>namọ &gt; namu</td>
<td>(tree)</td>
</tr>
<tr>
<td>salkọ &gt; salku</td>
<td>salkọ &gt; salku</td>
<td>(apricot)</td>
</tr>
</tbody>
</table>

I consulted *A Dictionary of Yi Dynasty Korean* by C-D. You (1964) for the data given here.
konota > k'onuta (to aim)
koltoki > k'olt'uki (a small squid)

The rule given in (41) runs counter to the historical development as illustrated in (43). One may conclude that the rule (41) is totally unmotivated given the fact that the direction of change is quite opposite to the historical change. However we find that such reversed direction of change is fairly prevalent in historical linguistics. Vennemann (1972b) named such reversal of the direction of change "rule inversion" (see also Schuh's (1972) discussion of Chadic rule inversion). In short rule inversion takes place when a historical change $A > B / X \_ Y$ is reflected by a synchronic rule $B \rightarrow A/ X \_ Y$.27

I argue that the reversed description of the vowel height change given in (41) is not unmotivated in the study of phonology. As a matter of fact, I argue that the /u/ - /o/ alternation in Korean ideophones can be explained only by positing /u/ in the underlying representation28. Consider Kim-Renaud's vowel raising again. Though she did not give us the exact rule formulation of the vowel raising rule, the rule somehow has to incorporate information that the vowel raising is obligatory in non-marginal syllables for the data in (42) and optional in ideophone final syllables as in (37b), and back to obligatory in final syllables in some cases shown in (37c).

However by positing /u/ - lowering rule as given in (41), the analysis given here can explain the historical change of the status of VH and high vowels in Korean, and also explains the status of /u/ as becoming a neutral vowel in Korean (cf. J-S. Lee (1992: 252)).

27I thank P. Newman for bringing rule inversion to my attention. Vennemann (1972b) argues that rule inversion takes place not only in phonology but in other areas including morphology and syntax.

28Vennemann (1972b) quotes from Andersen (1968) and presents a case of rule inversion in Slavic. Historically Slavic /x/ is derived from /s/ ($s \rightarrow x / \{r, u, k, i\}$). However with the subsequent historical changes that includes palatal k's merger with /s/, the /x/ - /s/ alternation is predictable from an underlying /x/ but not from /s/. Vennemann also notes that the rule inversion has another effect of simplifying the morphophonemic system of Slavic, which is also true in Korean.
Finally, Y-S. Kim (1988) has maintained that [-RTR], or [-DVR] in his feature system, is specified for high unrounded vowels if they are not in the initial position. Such a view is problematic in our analysis since it would not allow us to account for the transparency of high unrounded vowels in non-initial positions. According to him, high unrounded vowels are not specified in terms of [RTR] in initial position but [-RTR] is specified in non-initial position. His explanation is problematic in translating the observation into the present framework in two ways. First, his explanation makes use of the three way contrasts of binary features. By positing [+RTR] for light ideophones, [-RTR] for dark ideophones and non-initial high unround vowels and [¬RTR] for high unround vowels in initial syllables, he is subject to the criticism of the ternary use of binary features. (cf. Archangeli (1984)).

Further there is no explanation why only the high vowels are subject to context sensitive underspecification of [RTR]. Notice that the absence of a TP node is witnessed only in high vowels in the present analysis. Moreover the special behavior of high vowels naturally falls out from the fact that VH operates on the TP tier adjacency. Therefore we do not need any stipulation about the specificity of these vowels.

6.2.3. Additional Vowel Alternations

So far we have discussed five different vowel alternations in VH. The schematized light and dark vowel pairs discussed in 6.2.2. are given in (44):
However, we find that there are other light and dark pairs in Korean ideophones as illustrated in (45):

(45) Additional Vowel Alternation

a. /u/-/a/ Alternation

<table>
<thead>
<tr>
<th>Dark/Neutral</th>
<th>Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>/u/</td>
<td>/a/</td>
</tr>
<tr>
<td>pulk'ìn</td>
<td>palk'ìn</td>
</tr>
<tr>
<td>(in a fit of passion)</td>
<td></td>
</tr>
<tr>
<td>/æ/</td>
<td></td>
</tr>
<tr>
<td>mulløŋ</td>
<td>mallaŋ</td>
</tr>
<tr>
<td>(flabby)</td>
<td></td>
</tr>
<tr>
<td>/pʰalc'ak</td>
<td>/pʰalc'ak</td>
</tr>
<tr>
<td>(jumping)</td>
<td></td>
</tr>
</tbody>
</table>

b. /i/-/a/ Alternation

<table>
<thead>
<tr>
<th>Dark/Neutral</th>
<th>Light</th>
</tr>
</thead>
<tbody>
<tr>
<td>/i/</td>
<td>/a/</td>
</tr>
<tr>
<td>cilkin</td>
<td>calkin</td>
</tr>
<tr>
<td>(chewing)</td>
<td></td>
</tr>
</tbody>
</table>

There might be other vowel alternations as given below:

<table>
<thead>
<tr>
<th>/æ/</th>
<th>/o/</th>
</tr>
</thead>
<tbody>
<tr>
<td>yoki</td>
<td>(here)</td>
</tr>
<tr>
<td>koki</td>
<td>(there)</td>
</tr>
<tr>
<td>coki</td>
<td>(over there)</td>
</tr>
<tr>
<td>yokøt</td>
<td>(this thing)</td>
</tr>
<tr>
<td>kokøt</td>
<td>(the thing)</td>
</tr>
<tr>
<td>cokøt</td>
<td>(that thing over there)</td>
</tr>
</tbody>
</table>

Here we find /æ/-/o/, /i/-/o/ and /i/-/o/ alternations. However I do not think these alternations are due to VH, since these alternations clearly do not show the semantic contrast of light and dark pairs and the second vowel does not show vowel alternations thus showing quite deviant behavior from other harmonic pairs. We see that the second vowel does not change at all as illustrated by the last example. These are examples of what J-S. Lee (1992) calls "the ideophonization of prosaic words".
Apparently the light forms /\(y\)a/ is not derivable from /u/ or /i/. However, following Y-S. Kim (1988), I argue that these can also be explained within the present framework. I rely on Y-S. Kim for the analysis of the data given in (45). Y-S. Kim (1988: 458 - 459) observes the distributional restrictions of these vowel alternations. Let's first discuss (45a) and (45b). Notice that all the ideophones given in (45a) begin with a labial consonant and all the dark forms in (45b) begin with an alveopalatal consonant. In other words, we find that the examples in (45a) and (45b) show that the initial consonant and the following vowel share the same place features.

Y-S. Kim accordingly suggests that the underlying vowels in the initial syllable of (45a) and (45b) are /i/. Therefore the apparently irregular vowel alternations, {/i/, /u/} → /a/, is the surface manifestation of the underlying /i/ → /a/ alternation. Given that /i/ is the maximally underspecified vowel in Korean, we can easily understand that the place of articulation feature from the consonant can be spread to the unspecified vowel slot as shown in (46):
In (45a), the place feature [labial] is spread to the unspecified vowel and the labial vowel will be interpreted as /u/. Also in (45b), the rule will spread [coronal] along with its dependent feature [palatal] turning the unspecified vowel into /i/.

Once we accept the analysis given for (45a) and (45b), the rest of the data in (45) can also be systematically explained. We may assume that the surface /i/ - /ya/ and /u/ - /wa/ alternation is the realization of /yi/ - /ya/ and /wi/ - /wa/ alternations respectively. Therefore these can be viewed as the regular /i/ - /a/ alternation. Given that /w/ is labial and /y/ is palatal, we see that (45c) and (45d) are the extensions of (45a) and (45b) respectively. The same rule given in (46) will also be applied to these words to produce /wu/ and /yi/ in the dark ideophones. However these forms are not well-formed as discussed in 5.1.5. I propose the following delinking rule as the repair strategy for the string that violates the OCP:

---

30Y-S. Kim (1988) posits two rules, the /i/ rounding rule and /i/ fronting rule. He argues that these two rules have independent motivation. For example /phi/ + /i/ becomes [pha] not * [phu] or [phwi]. One viable explanation is to say that the underlying form is /phi/ and /i/ subsequently becomes /u/ by /i/ rounding. We can also find the historical change from /i/ to /u/ after labial consonants as noted by W-J. Kim (1963: 229). However the rule should somehow be restricted in its application so that it may not be applicable to such lexical words as /cilpi/ (abundant) or /cilkii/ (enjoy) in the standard dialect of Korean.
The rule is obligatory because not applying the rule results in a sequence that violates the phonotactic constraints of Korean as discussed in Chapter 5. The stray root node will be erased by the Stray Erasure Convention. Therefore the derived /wu/ and /yi/ will surface as /u/ and /i/ respectively.\(^\text{31}\)

Thus it is shown in this subsection that the apparent irregular vowel alternation shown on the surface is actually a reflection of the underlying regular dark - light alternation affected by other rules such as place feature spreading and glide delinking which are independently motivated in Korean phonology.

Finally, in some cases we see that there are two different vowel alternation pairs with different meaning as exemplified in (48):

\begin{enumerate}
\item[(48)] Different Surface Pairs
\begin{enumerate}
\item a. putil \quad patil \quad (trembling)
\item putil \quad potil \quad (soft)
\item b. kuŋ \quad kwaŋ \quad (exploding)
\item kuŋ \quad koŋ \quad (hitting)
\item c. mulləŋ \quad mallaŋ \quad (flabby)
\end{enumerate}
\end{enumerate}

\(^{31}\)Notice that (47) can also explain the non-appearance of /wo/ on the surface.
With the preceding discussion, we may simply say that the underlying forms of these pairs are different, the first of each example with the /i/ vowel in the first syllables. The underlying representations of the examples given in (48a) are illustrated in (49):

(49) Different Underlying Representations
a. pičil - trembling
b. putčil - soft

With these different representations we see that (49a) belongs to the examples given in (45a), while (49b) shows the regular /u/ - /o/ alternations as discussed in the preceding subsection. The same explanations can also be given to the rest of examples in (48).32

32There are examples that show three way contrasts like the following:

pusilčik posilak ~ pasilak

For these alternations I assume that these are due to the light form derivation either before or after the place spreading given in (46) as illustrated below:

Sohn (1987b: 185-186) explains these alternations in a slightly different way. She posits /pusilčik/ as the underlying form and /posilak/ is derived through the regular process and a [round] delinking rule is applied to /posilak/ to produce /pasilak/. However, her explanation cannot be incorporated to the present analysis since her geometry as given in (28) shows that place features are dependent on [round] features and the delinking of round from the feature geometry automatically results in the delinking of the dependent place features, which would wrongly predict that the result of round delinking from /o/ is /u/ instead of /a/.
6.3. Vowel Harmony in Affixation

In previous studies, the affixal vowel harmony which can be witnessed in /ə/ suffixation in Korean has been dealt with separately from ideophone VH. The vowel harmony process in verb/adjective suffixation is very similar to the ideophone vowel harmony discussed in the preceding subsections. One major difference is that the front light vowel /æ/ does not trigger harmony feature spreading. However as discussed in 6.1, the affixal VH has been generally ignored or it has been treated quite differently from ideophone VH. In this subsection, I will show that the affixal vowel harmony can also be analyzed within the same principle laid out for ideophone vowel harmony. Let's first observe the data given in (50):

(50) Vowel Harmony in Suffixation

<table>
<thead>
<tr>
<th>Infinitive</th>
<th>past</th>
<th>(to)</th>
</tr>
</thead>
<tbody>
<tr>
<td>cip-ə</td>
<td>cip-əs'</td>
<td>(to pick)</td>
</tr>
<tr>
<td>pe-ə</td>
<td>pe-əs'</td>
<td>(to cut)</td>
</tr>
<tr>
<td>kæ-ə</td>
<td>kæ-əs'</td>
<td>(to fold)</td>
</tr>
<tr>
<td>ki -ə</td>
<td>ki -əs'</td>
<td>(to draw)</td>
</tr>
<tr>
<td>cuk-ə</td>
<td>cuk-əs'</td>
<td>(to die)</td>
</tr>
<tr>
<td>mək-ə</td>
<td>mək-əs'</td>
<td>(to eat)</td>
</tr>
<tr>
<td>k'op-a</td>
<td>k'op-əs'</td>
<td>(to insert)</td>
</tr>
<tr>
<td>mak-a</td>
<td>mak-əs'</td>
<td>(to block)</td>
</tr>
</tbody>
</table>

33The data given here are simplified. It should be also noted that the stem can be polysyllabic. There are optional variations between /ə/ and /a/, which will be dealt with later.
Both the infinitival forms and past tense forms of verbs and adjectives normally take the suffix vowel /ə/. But if the stem final vowels are /o/ or /a/, the infinitive or past suffixes appear as [a], as shown in (50).

We can make an assumption that the underlying forms of the suffixes are /ə/ (infinitive) or /əs/ (past) but the suffix initial vowel /ə/ is changed into [a] if the stem-final vowel has the [RTR] feature. Given that /a/ is [RTR], while /ə/ is not, we may explain the vowel change as the result of spreading [RTR] from the stem final vowel onto the target vowel in the suffix. An interesting diversion from the ideophone harmony is that the front RTR vowel /æ/ does not trigger [RTR] spreading as the third word in (50) shows. The process is very similar to that of Harmony Spreading in ideophones except that the front open RTR vowel /æ/ does not participate as a trigger.

There is a simple historical reason why /æ/ is excluded. As explained earlier in 6.0, Middle Korean has only one front vowel which is /i/, two other front vowels /e/ and /æ/ are derived from the historical coalescence of /ə + i/ and /a + i/ respectively. (cf. Huh (1952)) Therefore if we see the affixal vowel harmony in the Middle Korean vowel system, we can easily understand that all the [RTR] vowels triggered the affixal vowel harmony and that regularity is kept in spite of the presence of another newly introduced [RTR] vowel /æ/.

The simplest way for the contemporary explanation of the affixal VH is to limit the triggers to /o/ and /a/ by positing a condition that the triggers should be back vowels. But in our feature specification for vowels we did not posit the [back] feature in the underlying representation, and referring to the absence of the feature is generally disfavored in phonology. Here, I will assume that the infinitive suffix actually consists of two parts: the vowel /ə/ and the floating [back] feature:
(51) Infinitive suffix derivation
   i) Morpheme : floating [back] + /α/
   ii) Linking target : last moraic segment of a stem.
   iii) Condition: if [front], then not [back]

The past suffix derivation is exactly like (51) except that the morpheme is the floating [back] feature and /ɔs′/. The condition here is functioning as a co-occurrence restriction. This condition will prevent the linking of [back] to stem-final front vowels. The unassociated [back] feature, then, will be erased by the Stray Erasure Convention (It™ (1986)) before moving onto the next cycle. Now with the introduction of the [back] feature we can formulate the affixal harmony as an assimilation rule. As with ideophones, the feature that spreads is assumed to be [RTR] as shown in (52):

(52) [RTR] Spreading

[Diagram]

Now, we can see that the spreading of [RTR] is virtually identical in both the verbal affixation and in ideophones. The only difference is that in the former, the trigger should be a

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34This rule crucially is non-iterative as the perfective forms given below illustrates.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>po - ա<code>ռ</code> ա<code>ռ</code></td>
<td>→</td>
</tr>
<tr>
<td>naka - ա<code>ռ</code> ա<code>ռ</code></td>
<td>→</td>
</tr>
</tbody>
</table>
[back] segment. The analysis given here may be problematic. The feature which is introduced by morpheme concatenation is [back], which was not necessary in the underlying representation, and which is supposedly redundant given that [back] is identical to the negative value of [front].

One may suggest that [back] should be specified in the underlying representation rather than introducing it in the process of morphological derivation. However positing [back] in the underlying representation causes several problems. First the underlying presence of [back] would play havoc with the vowel coalescence analysis. As will be discussed in Chapter 8, whenever back and front vowels are fused, the outcome is a front vowel. If there is [back] we have to posit a coalescence-cum-delinking rule that delinks the [back] feature. And still, we are left with the problem to explain why it is [back] but not [front] which is delinked. A more serious problem comes with the spreading rule. There is no clear evidence of [RTR] spreading in underived words as shown in (53):

(53) Lack of [RTR] Spreading in Underived Words

<table>
<thead>
<tr>
<th>Word</th>
<th>Underived</th>
<th>Derived</th>
</tr>
</thead>
<tbody>
<tr>
<td>apəm</td>
<td>*apam</td>
<td>(father)</td>
</tr>
<tr>
<td>tocəhi</td>
<td>*tocahi</td>
<td>(by no means)</td>
</tr>
<tr>
<td>tasəs'</td>
<td>*tasas'</td>
<td>(five)</td>
</tr>
<tr>
<td>mochələm</td>
<td>*mochalam, *mochaləm</td>
<td>(after a long time)</td>
</tr>
</tbody>
</table>

If [back] is underlingly present, the words in (53) meet the environment of [RTR] spreading given in (52). But the resultant forms are ill-formed. My explanation here is that the first vowels in (53) do not have the [back] feature and therefore it does not meet the environment of [RTR] spreading. Here we see that the introduced feature [back], though phonetically motivated, has a diacritic function that only the derived words are subject to the
spreading rule.

Consequently, under the present analysis, one can ask why shouldn't [back] be inserted to all the vowels in the derived environment or by the Redundancy Rule Ordering Constraint. Here again, the evidence against inserting [back] to all vowels is that vowel harmony takes place only in the infinitive and past forms but not in other types of verbal suffixation; e.g. when the suffix begins with a consonant, as shown in (54):

(54) Lack of [RTR] Spreading in Derived Words

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>ka(go)-kɔla(imp.)</td>
<td>*kakala</td>
</tr>
<tr>
<td>po(see)-kɔla(imp.)</td>
<td>*pokala</td>
</tr>
<tr>
<td>tʰa(get on)-kɔtʰɪn (if)</td>
<td>*tʰakatʰɪn</td>
</tr>
<tr>
<td>ca(sleep)-tʰən(rel-past)</td>
<td>*catan</td>
</tr>
<tr>
<td>kap(pay)-tʰəla(recollection)</td>
<td>*kaptala</td>
</tr>
</tbody>
</table>

As clearly seen in (54), the [RTR] spreading takes place between the stem-final vowel and the suffix, if the suffix starts with /o/. (51) and (52) successfully capture the limited distribution of vowel harmony in regular lexical derivation without losing the uniformity of explanation of vowel harmony in general in Korean. Therefore I argue that the introduction of [back] is lexically marked for these suffixes, and it serves as a diacritic function to the effect that only those marked as such are subject to [RTR] spreading. Notice that the analysis provides evidence that some features such as [back] in Korean are active only in derivational processes while remaining inert, and therefore unspecified, in the underlying representation.

One final remark should be made on the optionality of the [RTR] spreading in verb/adjective suffixation. Consider the following examples:
(55) Optionality of [RTR] Spreading

a. Stem final front vowels and non [RTR] vowels

\[ \text{salli} + \text{ə} \quad \text{salliə} \quad \text{(sallyə)}, \quad \text{*sallia} \quad \text{(save)} \]

\[ \text{me} + \text{ə} \quad \text{meə} \quad \text{(meː)}, \quad \text{*mea} \quad \text{(carry on the back)} \]

\[ \text{c'okæ} + \text{ə} \quad \text{c'okæə} \quad \text{(c'okæ)}, \quad \text{*c'okæa} \quad \text{(chop)} \]

b. Stem final [RTR] Back Vowels

\[ \text{k'op} + \text{ə} \quad \text{k'opa}, \quad \text{?k'opə} \quad \text{(insert)} \]

\[ \text{s'o} + \text{ə} \quad \text{s'oa} \quad \text{(s'waː)}, \quad \text{*s'oə} \quad \text{(shoot)} \]

\[ \text{naka} + \text{ə} \quad \text{naka}, \quad \text{*nakaə} \quad \text{(go out)} \]

\[ \text{mak} + \text{ə} \quad \text{maka}, \quad \text{makə} \quad \text{(block)} \]

Only /ə/ forms are allowed in (55a) and some variation between /ə/ and /a/ is witnessed in (55b). The data in (55a) provide indirect evidence that the VH in suffixation is derived by [RTR] spreading. It is clearly shown that in all the examples in (55a) /a/ suffixes are ruled out without any exception. In (55b) we find an interesting observation that the [RTR] spreading seems to be optional if the verb stem ends with a consonant, and obligatory if the stem ends with a vowel, as correctly noted by K-M. Lee (1972: 11) and Kim-Renaud (1976: 398).

My explanation is that the [RTR] spreading is optional in contemporary Korean. The apparent obligatory nature of [RTR] spreading as shown in the second and third examples in (55b) can be explained by referring to other independently motivated processes in the vowel phonology. Notice that as explained in 5.1.1, Korean strongly disfavors vowel clash and if there is an option to do away with vowel clash, it is usually taken in Korean. As explained in 5.1.1, Korean has several options, two of the most popular being glide formation and vowel coalescence. We see both of the processes with suffixation. In the second example of (55b) we find a glide formation process, and in the third example in (55b) we find a coalescence
process to which I will return in Chapter 8. It may suffice to say that /a/ which is [RTR] and /a/ [open] are fused into an [RTR, open] segment which is again /a/. Thus it is shown that the apparent obligatory nature we see in the third example in (55b) is actually a case of coalescence since either /a/ - /a/ or /a/ - /a/ sequence can be fused into /a/ with subsequent shortening in non-initial syllables.  

6.4 Conclusion

Though vowel harmony in Korean has been predicted to disappear from the language, it is still a very interesting phenomenon that should be properly explained. However all the previous studies in Korean VH discussed in this chapter do not offer a comprehensive account for the phenomena.

Vowel harmony in Korean is analyzed as a combination of two different processes in this chapter: linking a floating [RTR] feature and the subsequent spreading of the harmony feature [RTR]. The target of the morphemic feature linking is the first syllable in ideophones. Therefore all vowels in initial syllables, regardless of their vowel height, are subject to [RTR] linking. However the second process the Harmony Spreading operates on the TP node adjacency. There are two underlying features under the TP node in Korean: [open] and [RTR]. High vowels, /i/, /i/ and /u/, do not have either [open] nor [RTR], and therefore, according to unexplained here. One may speculate that the application of [RTR] spreading makes the second vowel more sonorous than the first, thus the first vowel /o/ can turn into a glide. In this sense the application of [RTR] spreading feeds glide formation which successfully eliminates the vowel clash. Seen from this perspective, [RTR] spreading helps to resolve hiatus. Thus we might say that the avoidance of vowel clash forces the application of [RTR] spreading in the second word in (55b) to produce a wellformed sequence.

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35 The obligatory nature of the affixal VH between a stem that ends in /o/ and the suffix initial /a/ is left unexplained here. One may speculate that the application of [RTR] spreading makes the second vowel more sonorous than the first, thus the first vowel /o/ can turn into a glide. In this sense the application of [RTR] spreading feeds glide formation which successfully eliminates the vowel clash. Seen from this perspective, [RTR] spreading helps to resolve hiatus. Thus we might say that the avoidance of vowel clash forces the application of [RTR] spreading in the second word in (55b) to produce a wellformed sequence.
Inherent Underspecification embodied in the Principle of Simplicity, those vowels do not have TP nodes in the underlying representation. Since VH requires the condition that the trigger and the target should be adjacent on the TP tier, it is only natural that these high vowels are transparent to HS.

The analysis given in this chapter says that the high round vowel /u/, which is traditionally thought to be a dark vowel in the VH system, is also neutral because it does not have a TP node by virtue of being a high vowel just like /i/ or /i’. Truly it is shown that the high round vowel /u/ behaves as if it is neutral with respect to HS. There are, however, a handful of exceptions to the generalization about the VH: the apparent effect that HS has on the high round vowel /u/. It is suggested in this paper that such exceptional cases can be accounted for by introducing ideophone-specific [open] insertion, or vowel lowering, which applies to the high round vowel /u/ in the final syllable of a light ideophone. This enables us to maintain the unified and simple explanation of VH in Korean as well as to correctly explain that /u/ will not be affected by Harmony processes, if it is neither the first nor the last vowel in an ideophone.

The vowel harmony in verb/adjective suffixation is slightly different from that in ideophones in that the front low vowel, /æ/, does not trigger [RTR] spreading, another problematic aspect of VH. In this paper, the introduction of a redundant feature [back] as a part of the morpheme concatenation process and subsequent condition of [RTR] spreading that only the [back] segment triggers the [RTR] spreading are shown to interact with each other to give a proper explanation of VH in verbal morphology and the difference from VH in ideophones.

In spite of the above-mentioned differences, we find that there are many things in common between HS in ideophones and [RTR] spreading in suffixation. Both processes can be explained by [RTR] spreading, the same kind of assimilation rule is in operation for both HS and [RTR] spreading. The spreading of [RTR] operates on the TP tier adjacency and the
spreading is non-iterative both in ideophones and verbal suffixation. These common characteristics which have been ignored or left undiscussed in previous studies are captured in the analysis presented in this chapter.

To recapitulate, the analysis presented in this chapter properly deals with the four problematic aspects in the discussion of VH as pointed out in (6). The harmony feature is [RTR]. The different behavior of high vowels in initial and non-initial syllables is due to their lack of TP features and the TP node. The difference of /u/ from the other high vowels is that there is another process that lowers the ideophone final vowel /u/. Thus the analysis given in this chapter correctly explains that /u/ behaves just like dark vowels in initial syllables, and it is subject to a lowering rule in final syllables but will remain unchanged in non-initial and non-final syllables. Further the connection between ideophone VH and affixal VH is established in this chapter by identifying similarities and differences of these two harmony phenomena.

The interactions of the different theories of feature geometry and under-specification are shown to be indispensable in explaining VH in Korean correctly and coherently. What is crucial for the explanation given in this chapter is the separation of the TP node from the Place node. Seen from the Korean VH data, the notion of the TP node is absolutely essential for a unified account for VH.