

# Vowel Harmony In Korean

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## Introduction

1. Vowel harmony(VH) in Present Korean(PK)<sup>1</sup> is very difficult to analyze in a natural, simple way because of its typologically diagonal character (Aoki 1968, Kiparsky 1973, C-W. Kim 1978) and different harmonic groupings for the same vowels, depending on which environment they occur in. The aim of this paper is to present a description of Korean VH that is simpler and more natural than previous ones by examining it from a historical perspective. In this study, I will try to stick to a linear approach.

## Characteristics of Korean Vowel Harmony

2. Korean VH is manifested as noncontiguous progressive vocalic assimilation by which the vowels within a multisyllabic word share a certain common feature. However, the VH system has been difficult to describe because the vowels of each harmonic class of this language are not likely to form a natural class. Moreover, the system itself is no longer productive, operating only in limited environments.

Until the mid-fifteenth century, VH was strictly observed in Korean, but

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<sup>1</sup> I follow K-M. Lee(1982) in dividing the history of the Korean language into chronological stages: Old Korean(1st century B.C.—10th century), Early Middle Korean(10th century—14th century), Late Middle Korean(15th century—16th century), Modern Korean(17th century—19th century), and Present Korean (20th century—present).

thereafter it eroded gradually and now remains only in sound-symbolic words(SSWs) and between a verb stem and its infinitive suffix. The loss of the phonemically distinct vowel /ʌ/ and the monophthongization of what had been diphthongs are usually cited as the major causes of the disruption of VH.

## 2.1. Vowel Harmony in Late Middle Korean

In Early Middle Korean(EMK), VH is said to have been observed morpheme internally in general, as well as in the combination of stem morphemes and suffixes, with the same harmonic distinction applied in both cases. In Late Middle Korean(LMK), however, VH became less strict, and occurred in limited environments. The VH involved in the combination of stem morphemes and suffixes occurred only when the suffix initial was a vowel or, if a consonant, /n/ or /l/ (Moon 1974 : 58), in which case the suffix had another allomorph beginning with a vowel (W-J. Kim 1971 : 122). In polysyllabic suffixes, only the first qualified vowel could participate in the VH. In this respect the morpheme-internal VH was also restricted. Even within a stem morpheme, VH was restricted since there was a massive influx of Chinese words which did not undergo VH. The VH of this period was observed, as shown in (1) below, with a single harmonic division, /a, o, ʌ/ vs. /ə, ɨ, u, i/, with /i/ also serving as a neutral vowel in noninitial syllables. Traditionally, in Korean, /a, o, ʌ/ are called light vowels, and /ə, ɨ, u, i/, dark vowels.<sup>2</sup>

### (1) Vowel Harmony in Late Middle Korean<sup>3</sup>

#### a. stem internally

<i>tɨli</i>	'field'	<i>təuk</i>	'very'
<i>kulum</i>	'cloud'	<i>chəzəm</i>	'beginning'
<i>tozak</i>	'thief'	<i>namo</i>	'tree'

<sup>2</sup> The vowels whose phonetic properties carry some nuance of being big, heavy, dull, dark, etc. are called 'dark vowels'. 'Light vowels' reflect the opposite nuances.

<sup>3</sup> Throughout the paper, Korean words taken as examples are transcribed in phonetic forms using the Yale-Romanization system for consonants and the IPA (1961) for vowels, with *y*, *æ* and *j* replaced by *u*, *ɔ* and *y*, respectively, unless specified otherwise. For an MK consonant ɳ, which does not exist in PK, z will be used.

<i>malssΔm</i>	‘saying’	<i>nilkup</i>	‘seven’
<i>əmi</i>	‘mother’	<i>api</i>	‘father’
b. between a stem and a suffix			
<i>sal-a</i>	‘to live-INF’	<i>pəl-ə</i>	‘to earn-INF’
<i>tol-a</i>	‘to turn-INF’	<i>pul-ə</i>	‘to blow-INF’
<i>mom-Δlo</i>	‘body-INST’	<i>skum-ilo</i>	‘dream-INST’
<i>son-Δn</i>	‘hand-TOP’	<i>nun-in</i>	‘eye-TOP’
<i>na-nΔn</i>	‘I-TOP’	<i>nə-nin</i>	‘you-TOP’
<i>tozΔk-Δl</i>	‘thief-ACC’	<i>kulum-il</i>	‘cloud-ACC’
<i>api-lΔl</i>	‘father-ACC’	<i>səli-lil</i>	‘frost-ACC’

## 2. 2. Vowel Harmony in Present Korean

In PK, however, the intermorpheme VH shown in (1b) is further reduced to the environment of a verb stem plus an infinitive suffix morph (-a/-ə). As for the harmonic divisions, they are different, depending on whether VH is featured in sound symbolic words (Sound Symbolic Vowel Harmony : SSVH) or between a verb stem and an infinitive suffix (Suffixal Vowel Harmony: SufVH). In LMK, on the contrary, the harmonic divisions were the same regardless of where VH took place. Consider the following :

### (2) Vowel Harmony in Present Korean

#### a. Sound Symbolic Vowel Harmony

<i>ppakkom</i>	‘opening bright small eyes’
<i>ppəkkum</i>	‘opening dull big eyes’
<i>toləntolən</i>	‘in whispers’
<i>tuləntulən</i>	‘exchanging murmurs’
<i>ccəkkək</i>	‘squeaking lightly’
<i>ccəkkək</i>	‘squeaking heavily’
<i>tötəttəng</i>	‘staggering slightly’
<i>tütəttəng</i>	‘staggering heavily’
<i>kaləngkaləng</i>	‘slightly suffused with tears’
<i>kələngkələng</i>	‘fully suffused with tears’
<i>cəkkəng</i>	‘chewing cheerfully’
<i>cilkəng</i>	‘chewing unpleasantly’
<i>ppəccək</i>	‘slightly protruding’
<i>ppiccək</i>	‘considerably protruding’

<i>sængki's</i>	'smiling brightly'
<i>singki's</i>	'smiling gently'
<i>nol'is</i>	'bright yellow'
<i>nul'is</i>	'darkish yellow'
<i>holiholi</i>	'slender and small'
<i>hulihuli</i>	'slender but tall'

## b. Suffixal Vowel Harmony

<i>phal-a</i>	'to sell-INF'	<i>coch-a</i>	'to follow-INF'
<i>putcap-a</i>	'to catch-INF'	<i>sælow-a</i>	'new-INF'
<i>pəl-ə</i>	'to earn-INF'	<i>cəp-ə</i>	'to fold-INF'
<i>kətu-ə</i>	'to harvest-INF'	<i>katu-ə</i>	'to confine-INF'
<i>se-ə</i>	'strong-INF'	<i>tte-ə</i>	'to detach-INF'
<i>kanil-ə</i>	'thin-INF'	<i>kət'il-ə</i>	'to help-INF'
<i>kaci-ə</i>	'to have-INF'	<i>muti-ə</i>	'dull-INF'
<i>ppokæ-ə</i>	'to chop-INF'	<i>ponæ-ə</i>	'to send-INF'
<i>hotö-ə</i>	'severe-INF'	<i>kkö-ə</i>	'to allure-INF'
<i>tü-ə</i>	'to run-INF'	<i>nanü-ə</i>	'to divide-INF'

PK, as in (2), seems to show two different groupings: /a, o, æ, ö/ vs. /ə, ɨ, u, e, ü, i/ for the SSVH, and /a, o/ vs. /ə, ɨ, u, e, i, ü, ö, æ/ for the SufVH. As for SSVH, in PK the vowels /ɨ/ and /i/ in noninitial syllable positions behave as neutral vowels, neither undergoing nor blocking the harmony process,<sup>4</sup> whereas in LMK only /i/ was neutral. In SufVH in PK, the infinitive suffix morph, -a/-ə, is determined by the harmonic feature of the last vowel of the preceding stem. As the last vowel of a stem, /i/ always counts as a dark vowel in PK, whereas in early LMK it behaved as a neutral vowel, in which case the VH was triggered by the vowel preceding the neutral /i/.

## (3) a. Late Middle Korean

<i>hanapi-nʌn</i>	'old man-TOP'	<i>səli-nʌn</i>	'frost-TOP'
<i>kalʌchi-om</i>	'to teach-NMNL'	<i>kəlich-i-um</i>	'to save-NMNL'

<sup>4</sup> Normally the vowels that may cooccur with vowels of any harmonic set are called 'neutral', as in Vago(1973, 1976). However, vowels that do not participate in—that is, neither undergo nor block—the harmony may also be called 'neutral', as in Lieber(1987).

## b. Present Korean

<i>machi-ə</i>	‘to finish-INF’	<i>simi-ə</i>	‘to soak-INF’
<i>kkocip-ə</i>	‘to pinch-INF’	<i>titi-ə</i>	‘to tread-INF’

**2.3. Problems in Description**

The traditional vowel grouping of light vowels vs. dark vowels has been the basic harmonic division used to analyze the Korean VH system. However, since current standard feature theories are unable to accommodate each of these harmonic groups under a natural class, the primary difficulty in the analysis of PK VH lies in the question of how to constitute natural classes for the harmonic groups. Moreover, the two different harmonic groupings in PK have complicated the analysis.

Controversies over Korean VH have become more active since Aoki (1968) referred to it as a ‘diagonal’ harmony, because the line dividing the harmonic classes runs diagonally in the vowel chart, as follows :

## (4) a. Suffixal Vowel Harmony

i	ü	ɨ	u
e	ö	ə	o
æ		a	

## b. Sound Symbolic Vowel Harmony

i	ü	ɨ	u
e	ö	ə	o
æ		a	

**Previous Analyses****3.1. Semantic Diacritic Feature Analysis**

Faced with a seemingly irregular harmonic division that made it impossible to embrace the harmonic groups in natural classes under the conventional phonetic feature system, Kim-Renaud(1976) resorts to semantic diacritic features, [light] and [dark]. She presents four phonological rules, three for the SSVH and one for the SufVH. Her explanation using semantic diacritic features for PK VH can be accepted as valuable for the SSVH, since the [light] and [dark] give different nuances in SSWs. However, we

cannot find any evidence that those features carry some semantic notion in the SufVH. Here it is doubtful whether a certain feature can be interpreted differently in different contexts. The use of [light] in her SufVH rule, therefore, has no significance at all.

### 3. 2. Underlying Vowel Analysis

In an attempt to represent the dark/light distinction under the universal distinctive feature system, McCarthy(1983), assigning respectively [-low] and [+low] to [dark] and [light], proposes an underlying vowel system of Korean as follows :

#### (5) McCarthy's Underlying Vowel System

i	ü	ɨ	u	
e		ə		dark=[-low]
æ	œ <sup>5</sup>	a	ɔ	light=[+low]

Although this system works very well in grouping the harmonizing vowels for the SSVH in natural classes, it arbitrarily sets up low vowels /ɔ/ and /œ/ as underlying forms of [o] and [ö] respectively, without providing any plausible grounds for doing so. It is also questionable whether this system can explain without difficulty other phonological phenomena related to vowel height. Since McCarthy proposes this underlying vowel system aiming only at the SSVH, he might need to revise it to cover the SufVH as well. Actually, when it comes to asking why /æ/ and /œ/ harmonize not with /a/, but with /ə/ in the SufVH, McCarthy's system does not provide a good answer.

### 3. 3. Acoustic Feature Analysis

Y-S. Kim(1985), rejecting as undesirable Kim-Renaud's use of the semantic diacritic features [dark] and [light], tries to find an acoustic basis for the harmonic distinction. His acoustic feature [Deep Voice Resonance] (DVR) works well in grouping the light vowels and the dark ones separately according to a single feature in the SSVH. But he neither describes this

<sup>5</sup> For this symbol I prefer ɨ showing its relation to ɔ, just as u is paired with ü.

feature clearly nor gives its source; nor does he provide any acoustic clue to justify its use. S-O. Lee(1984) also doubts about the justification of establishing the [DVR] as a new distinctive feature. For the SufVH, Y-S. Kim sets up a rule employing Harms's(1982) acoustic fearture system. But his SufVH rule (6b) does not work with his Korean vowel classification (6a), which adopts Harms's features.<sup>6</sup>

(6) a. Y-S. Kim's Korean Vowel Classification

	i	e	æ	ü	ö	ɨ	ə	ɑ	u	o
Dual	-	-	-	+	+	+	+	-	-	-
Rise	+	-	-	+	-	+	-	-	+	-
Drop	-	-	+	-	-	-	-	+	-	-
Rounded	-	-	-	+	+	-	-	-	+	+

b. Y-S. Kim's Rule for Suffixal Vowel Harmony

$$\begin{bmatrix} V \\ -rise \\ +cent \end{bmatrix} \rightarrow \begin{bmatrix} +drop \\ \alpha dual \end{bmatrix} / \begin{bmatrix} V \\ -rise \\ \alpha dual \end{bmatrix} \text{ Co } + \underline{\hspace{1cm}}$$

<sup>6</sup> In Kim's classification, [dual], representing 'dual resonance peak', draws a line between front and nonlow central vowels and back rounded and low central vowels. [drop] corresponds to [low], and [rise] to [high]. Therefore, /i, e, æ/ should be [+dual], not [-dual]. A better classification of the vowels, which would differentiate /e/ from /ə/ and /i/ from /ɨ/, needs more features, e. g. [± back] or [± central]. Kim's SufVH rule thus seems quite wrong. If we accept the expanded classification, the revised rule should be :

$$\begin{bmatrix} V \\ -rise \\ +cent \end{bmatrix} \rightarrow [\alpha dual] / \left\{ \begin{bmatrix} V \\ \alpha rise \\ \alpha dual \end{bmatrix} \right\} \text{ Co } + \underline{\hspace{1cm}}$$

But even this revised rule is not satisfactory, since one broken-up portion of it,

$$\begin{bmatrix} V \\ -rise \\ +cent \end{bmatrix} \rightarrow [\alpha dual] / \begin{bmatrix} V \\ \alpha rise \end{bmatrix} \text{ Co } + \underline{\hspace{1cm}}$$

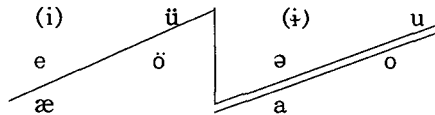
does not constitute any VH.

Y-S. Kim might have succeeded in grouping the harmonic classes for the SSVH in natural classes by adopting an acoustic feature. But he still has the problem of dual harmonic distinction—to make it worse, with the use of noncorrelated acoustic features : [DVR] for the SSVH and [Dual] for the SufVH

### 3.4. Diagonal Analysis

Ahn & Kim(1985) and Ahn(1985), preoccupied by the ‘diagonal’ character of the Korean VH, propose a complicated categorization of vowels that uses two diagonal lines, as in (7).

(7) Diagonal Vowel Harmony System of Ahn & Kim



The double line distinguishes the harmonic classes of the SufVH, while both the single and double lines together mark the harmonic division for the SSVH. Ahn & Kim and Ahn replace the [ $\pm$  low] of McCarthy with [ $\pm$  L], as the relative, not absolute, heights of the two harmonizing groups. However, they fail to place their harmonic groups in natural classes with a universal distinctive phonetic feature. Another major problem of their analysis is that the same feature refers to different vowel groups, depending on the different VH categories : [ $+$  L] covers only /a, o/ in the SufVH, but /a, o æ, ö/ in the SSVH. Thus, /æ, ö/ are [ $+$  L] in the SSVH and at the same time [ $-$  L] in the SufVH.

### 3.5. Underspecification Analysis

Sohn(1987) views the dark/light harmonic dichotomy as a phonological manifestation of the nonconcatenative association of a feature-sized morpheme [ $+$  low] that spreads from left to right. She tries to describe the synchronic Korean VH, using underspecification in an autosegmental framework. But by positing an eight-vowel system, /i, e, æ, ɨ, ə, a, u, o/, she fails to make clear how the surface [ö] of the underlying /we/ harmonizes with [a] in the SSVH. In deriving an [ö]~[a] sequence as an



output of /we/ ~/a/, as in [töcakökak] </twecaktwecak/ ‘searching for something pushing aside odds and ends’, the two concerned vowels never show true harmony at any point of the derivation. /we/ carries the two opposite values of the same feature [low]—the morphophonological autosegmental feature [+ low] and the [– low] of /e/ in the melody tier—while /a/ takes the autosegmental [+ low]. Although she finally assigns a single feature [– low] to /we/ by applying a phonetic implementation rule to get a correct output [ö], which is [– low], the [– low] of /we/ and [+ low] of /a/ cannot be said to be in harmony.

### 3.6. Pending Issues

So far I have examined previous works that are concerned with synchronic aspects of Korean VH. This examination reveals two pending issues: (a) How are the harmonizing vowels categorized? Can they be grouped in natural classes with a universal distinctive phonetic feature? and (b) Do we need different harmonic distinctions for the SSVH and the SufVH? Can we cover both VHs with the same single harmonic distinction?

## A Tentative Reanalysis of PK Vowel System and Employing Underlying Diphthongs

4. With these pending issues in mind, I will now present an alternative analysis of Korean VH. Since analyses of a VH system are, of course, dependent upon how we analyze the vowel system within which the VH occurs, I will first examine the PK vowel system to provide the proper basis for my analysis of PK VH. My analysis of PK vowel system in this section, though tentative, will reflect the currently and at the same time historically preeminent vowel-raising tendency of Korean. This reanalysis of the PK vowel system is supported by the historical development of the LMK vowel system. Through both synchronic and diachronic examination of two monophthongized vowels, [æ] and [ö], I will attempt to explain the weird behavior of these vowels, and also establish the need for underlying diphthongs in our vowel system.

### 4.1. Vowel Raising Tendency and Vowel Systems

**4. 1. 1.** Vowel raising. To begin with, I will look over some deviant forms from the regular VH of early LMK in order to determine what process is making the whole VH system look irregular. The examples in (8) below show that in VH environments in PK, [ə] and [u] are sometimes realized more often than [a] and [o], where the latter are expected by the rigid VH rule : [a] is raised to [ə], and [o] to [u].

(8) Deviation from Regular Vowel Harmony

a. Raising in Sound Symbolic Vowel Harmony environments

<i>kkang chong</i> > <i>kkang chung</i>	'in a leaping manner'
<i>kækol</i> < <i>kækul</i>	'frog's croaking'
<i>ccængkɛlang</i> > <i>ccængkɛlɛng</i>	'glass-breaking sound'
<i>ttolyat</i> < <i>ttolyət</i>	'clear, vived'
<i>soccak</i> > <i>socçək</i>	'nightingale's singing'
<i>höttok</i> > <i>höttuk</i>	'tottering'

b. Raising in Suffixal Vowel Harmony environments<sup>7</sup>

<i>mak-a</i> > <i>mak-ə</i>	'to protect-INF'
<i>anc-a</i> > <i>anc-ə</i>	'to sit-INF'
<i>olm-a</i> > <i>olm-ə</i>	'infected-INF'
<i>anikkow-a</i> > <i>anikkow-ə</i>	'disgusting-INF'
<i>cop-a</i> > <i>cop-ə</i>	'narrow-INF'
<i>nol-a</i> > <i>nol-ə</i>	'to play-INF'

In fact, this kind of phenomenon occurs even in non-VH environments as well.

(9) Raising in non-Vowel Harmony environments

a. <i>apəci</i> > <i>apici</i>	'father'
<i>əməni</i> > <i>əmɛni</i>	'mother'
<i>ciukæ</i> > <i>ciuke</i>	'eraser'
<i>chamò</i> > ( <i>chamü</i> ) > <i>chami</i>	'melon'
b. <i>po-ko</i> > <i>po-ku</i>	'to see-CNJ'
<i>na-to</i> > <i>na-tu</i>	'I-ADD'
<i>kongcca-lo</i> > <i>kongcca-lu</i>	'a thing given free-INST'
<i>-hako</i> > <i>-həku</i>	'COM'

<sup>7</sup> The raising from [a] to [ə] in suffix-initial positions is observed more often after a syllable with [a] than after one with [o]. It should be dealt with more closely under the separate subject of 'raising'.

As shown in (8) and (9), the vowel-raising process occurs in abundance in PK, irrespective of VH or non-VH environment. That is, PK has a general tendency of vowel-raising. One thing to note here is that the raised forms are in free variation with their pre-raising forms. This raising tendency is obvious in noninitial syllables, which are normally unstressed, as seen in (8) and (9). As for the stress, it falls on initial syllables in both LMK (S-N. Lee 1949) and PK (Moon 1974 : 84), although it is not contrastive. The following are historical examples of the raising process :

- (10) Raising observed historically
- |                 |   |              |         |
|-----------------|---|--------------|---------|
| a. <i>pakhö</i> | > | <i>pakhü</i> | ‘wheel’ |
| <i>namo</i>     | > | <i>namu</i>  | ‘tree’  |
| <i>maΛm</i>     | > | <i>maim</i>  | ‘mind’  |
| b. -Λn/-in      | > | -in          | ‘TOP’   |
| -nala           | > | -nəla        | ‘IMP’   |

Examples (8), (9), and (10) show that there is and has been a general tendency toward vowel raising in unstressed syllables in Korean. With this understanding I would view the disruption of VH as a reflection of that very vowel raising tendency in unstressed syllables, observed both synchronically and diachronically. Going one step further, I infer from the direction of the VH disruption the true nature of the Korean VH—horizontal harmony with height distinction.<sup>8</sup> That the decayed forms are the results of raising, not of fronting or backing, suggests that the VH is horizontal rather than vertical. In fact, if it were a vertical harmony, the decayed forms, which reflect only the height disorder, would never impair the regularity of back vs. nonback distinction.

**4. 1. 2.** Present Korean vowel system (Tentative). Keeping in mind the horizontal nature of Korean VH, I here tentatively assume (11) as the underlying vowel system of PK in order to mirror the raising tendency.<sup>9</sup>

<sup>8</sup> B-G. Lee (1985), although he advocates a horizontal harmony for Korean VH, suggests a different type of harmonic distinction, [ATR], based on his interpretation of Hunminjōngüm-haerye.

<sup>9</sup> K-W. Nam (1984) suggests that there is a ‘darkening’ phenomenon in Korean, in which light vowels tend to become dark ones. His ‘darkening’ seems similar to ‘raising,’ but raising is more comprehensive and general than darkening, in that the latter can be considered a type of the former and fails to cover the raising processes occurring between dark vowels themselves.

## (11) Present Korean Vowel System(tentative)

	-back		+back		
4 high	i	ü	ɨ	u	-low
3 high	e		ə		
2 high		ɔ̃		ɔ	+low
1 high	æ		a		
	-rnd	+rnd	-rnd	+rnd	

In fact, PK has unrounded [1 high] vowels and rounded [2 high] vowels as phonetically realized surfaces in stressed and mostly initial syllables: e.g. *pɔli* 'barley', *oppo* 'older brother of a female sibling', *kɔmul* 'monster', *chɔko* 'best'. *kæ : sɛkki* 'son of a bitch'. *assel* 'open hearted', etc. The phonemic status of those four vowels, therefore, cannot be endangered by Ahn's (1985) comment on McCarthy's /ɔ, æ/ in (5) that they are arbitrarily motivated abstract vowels since they have no phonetic import. As for the use of the n-ary height feature in (11), there is a good reason for giving a height difference between the two pairs, /ɔ, ɔ̃/ and /a, æ/. [a, æ] are lower than [ɔ, ɔ̃], which are on the same height level as [ɐ, ɛ], and if we take /ɐ, ɛ/ as the underlying forms for the unrounded [+ low] vowels under the 3-height vowel system, then we would need a very odd extra rule

$$\left[ \begin{array}{c} +\text{low} \\ -\text{rnd} \end{array} \right] \rightarrow \left[ ++\text{low} \right] / \left[ \begin{array}{c} \text{---} \\ +\text{stress} \end{array} \right]$$

like to get the phonetic surfaces like [a, æ].

In this connection and when we consider the general vowel-raising tendency, employing the n-ary four-height vowel system is worthwhile. Placing /a, æ/, the underlying forms for the unrounded low vowels, one height below /ɔ, ɔ̃/ seems more plausible than McCarthy's arrangement of the four vowels at the same height, as in (5). Actually the vowel raising has two phases. It first occurs obligatorily on the [+ low] vowels when they are unstressed. By this process [ɐ, ɛ, ɔ, ɔ̃] are derived from /a, æ, ɔ ɔ̃/. Following this first phase, another raising process affects unstressed vowels, except those belonging at the top height. Each raising process raises vowels by one height only.

The two phases of raising can be formularized as follows :

## (12) a. Raising I (obligatory)

$$\left[ \begin{array}{c} +\text{syl} \\ +\text{low} \\ \text{n high} \end{array} \right] \rightarrow \left[ \text{n+1 high} \right] / \left[ \begin{array}{c} \text{---} \\ -\text{stress} \end{array} \right] \quad (\text{n} < 3)$$

b. Raising II (variable)<sup>10</sup>

$$\left[ \begin{array}{c} +\text{syl} \\ \text{n high} \end{array} \right] \rightarrow \quad [n+1 \text{ high}] \quad / \quad \left[ \overline{\text{-stress}} \right] \quad (n < 4)$$

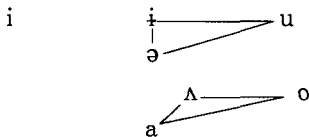
(Raising I precedes Raising II)

Forms that deviate from the regular VH, as in (8), as well as other outputs of vowel-raising as a whole, as in (9) and (10), are all clearly explained by the two rules presented in (12), given the underlying vowel system (11).

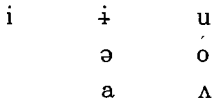
What then is the nature of the raising processes? It is a lenition that reduces the sonority of a vowel in an unstressed syllable. This is also true of the historical development of the controversial vowel / $\Lambda$ /, as we will see in 4. 1. 3. By leaving the back unrounded [2 high] slot vacant, the underlying vowel system for PK given in (11) even reflects the historical fact that this slot was once occupied by a sound, / $\Lambda$ /, the unrounded counterpart to the back rounded [2 high] vowel, / $\omega$ / (see below). Now I turn to the LMK vowel system to see how that system and the VH in that period were inter-related, and how the VH began to be broken down. This examination will show that the instability of the vowel system and vowel raising were the main causes of the start of the disruption of VH.

4. 1. 3. Late Middle Korean vowel system. Although it is agreed that LMK had a seven-vowel system of /i,  $\dot{i}$ ,  $\text{\textcircled{a}}$ , a, u, o,  $\Lambda$ /, the relative positions in the system of the vowels to one another have been in dispute (S-N. Lee 1955, K-M. Lee 1968, etc.). Different interpretations of *Hunmin-jeongeum haerye*<sup>11</sup> have produced different analyses of the LMK vowel system. Two major analyses are as follows :

(13) a. S-N. Lee's Late Middle Korean Vowel System



b. K-M. Lee's Late Middle Korean Vowel System



<sup>10</sup> Within the range of its application, it is optional.

<sup>11</sup> The explication of *Hunminjeongeum*, the name of the Korean alphabetic system invented by King Sejong in 1443.

K-M. Lee places /ʌ/ in the low back slot and explains the later loss of this vowel as the result of its instability in being cornered. According to him, there was a vowel shift in EMK: /u/ was pushed back from its original high central position, /o/ and /ʌ/ were pushed downward from their original high back and mid back positions, and the cornered /ʌ/ thus became unstable.<sup>12</sup> But this is not convincing; why was another cornered vowel /u/ not lost and why couldn't /ʌ/ be fronted to a low central position instead of being lost? This analysis cannot even reflect the correct relative height among /a/, /o/, and /ʌ/. In this context, S-N. Lee's model has an advantage over that of K-M. Lee. His interpretation of *Hunminjeongeum-haerye* shows better the unstableness of /ʌ/ by displaying its relative height in relation to /a/ and /o/ and its relative backness in relation to /ɨ/, as in (13a).

Similarly, Y-S. Moon(1974) posits a four-height vowel system for LMK, using two height features, [high] and [mid], as follows :

(14) Moon's Late Middle Korean Vowel System

	-back	+back		
+ high	i	ɨ	u	-rnd
		ə		+ mid
-high		ʌ	o	
		a		-rnd
		-rnd	+rnd	

Although this vowel system shows very well the relative heights between vowels, according to *Hunminjeongeum-haerye*, it is still unable to account for why /ʌ/ was so unstable as to die out. To answer that question I would suggest an alternative LMK vowel system, with some modifications on that of Moon.

(15) Reanalyzed Late Middle Korean Vowel System

	-back		+back		
	+front	-front			
4 high	i		ɯ	u	-low
3 high		ə			
2 high			ʌ	ɔ	+low
1 high		a			
		-rnd		+rnd	

<sup>12</sup> Because of the supposed vowel shift, a 'quasi-diagonal' but virtually 'vertical' harmony should be suggested, according to S-O. Lee (1984).

In order to maintain the more plausible relative heights between vowels, as in (13a) and (14), and shun [mid] feature because it sometimes fails to represent a natural class (e.g. we cannot describe correctly with this feature a palatalization which occurs before /i, e, ε/, but not before /æ/, as can be seen in some languages), I suggest (15). This reanalyzed system shows very well not only the then correct opposition pairs involved in VH, /ə/ vs. /a/, /u/ vs. /ʌ/, and /u/ vs. /ɔ/, which others fail to indicate visually in their vowel systems, but also the unstableness of  $\mathbb{V}^{13}$  (/ʌ/) and  $\mathbb{I}$  (/u/). It is not difficult to see that /u/ and /ʌ/ are the most unstable vowels in the system. The system typology reveals the relative markedness of the interior vowels /ə, u, ʌ/, compared with the peripheral vowels, and we observe that /u/ and /ʌ/ share their heights with another in the same back slot, while /ə/ does not. In addition, because /ʌ/ did not have a long counterpart while others did (Moon 1974:122), it was the first vowel that began to lose its place. It became raised by a vowel raising process in noninitial syllables, which were unstressed, and thus lost the high vs. nonhigh opposition between /u/ and itself. That is why this vowel became neutralized with /u/ in noninitial syllables. On the other hand, in initial syllables, which were stressed, it changed to /a/ or /ɔ/, assimilating with the vowel in the following syllable. Considering the possibility of fortition in stressed syllables, the change of /ʌ/ to /a/ or /ɔ/ can be understood as increasing the sonority in the fortis position. After the neutralization of /ʌ/

<sup>13</sup> When phonemic or phonetic transcriptions of vowels are uncertain or ambiguous, hereafter orthographic forms will be used instead, in italicized uppercase letters. The following shows (a) the orthographic forms of the Korean vowels and their corresponding romanizations that I employ in this paper for the sake of convenience, and (b) the romanized orthographic forms and their phonemic and phonetic realization. Those in parenthesis are LMK forms.

- |   |   |
|---|---|
| a) ㅏ··A, ㅑ··0, ㅓ··O, ㅕ··U, ㅡ·· $\mathbb{E}$ (··· $\mathbb{V}$ ), ㅣ··I,<br>ㅸ·· $\mathbb{A}$ , ㅻ·· $\mathbb{O}$ , ㅼ·· $\mathbb{O}$ , ㅽ·· $\mathbb{U}$ , ㅿ·· $\mathbb{E}$ (· ·· $\mathbb{V}$ ) |   |
| b) A··/a/··[a, ɐ]<br>o··/ə/··[ə]<br>O··/ɔ/··[ɔ, ɒ]<br>U··/u/··[u]<br>$\mathbb{E}$ ··/[uɪ], $\mathbb{I}$ ··/[(uɪ), ɨ]<br>( $\mathbb{V}$ )··/ʌ/··[ʌ]<br>I··/i/··[i]                           | $\mathbb{A}$ ··/ai/··[(ay), æ, ε]<br>$\mathbb{O}$ ··/ai/··[(əy), e]<br>$\mathbb{O}$ ··/ɔi/··[(ɔy/ɔy), ɜ, ɔ̃]<br>$\mathbb{U}$ ··/ui/··[(uy), ü]<br>$\mathbb{E}$ ··/[uɪ], $\mathbb{I}$ ··/[(uɪy), ɨy]<br>( $\mathbb{V}$ )··/ʌi/··[ʌy] |

with /u/ as a result of raising, /u/ was centralized and became /ɨ/, whereby /ɨ/ began to compose a new opposition pair with /a/. Thus /a/ came to show an opposition to both /ə/ and /ɨ/ : e. g. *salsal* vs. *səlsəl* ‘(light vs. dark nuance of) crawling slowly’, and *salsal* vs. *sɨlsɨl* ‘light vs. dark nuance of) stealthily’. Placing /u/ in the high back slot instead of the high central and assuming the centralization of /u/ to /ɨ/ can also be supported by the historical fact that the rounding from ɨ to U after labial consonants took place prior to the fronting of ɨ to I after sibilants.

## 4.2. The Need for Underlying Diphthongs

In 4.1. we came to understand how Ä and Ö harmonize with the low vowels in the SSVH, by setting up a four-height underlying vowel system with the two vowels belonging to the [+low] group. But we still left unsolved the problem of these two vowels in SufVH, where they harmonize with nonlow vowels. Thus, in this section, we will first make clear through the examination of the historical change in their behavior why this seemingly irregular phenomenon takes place, and on the basis of this finding we will suggest that the problems concerned here are better explained by employing underlying diphthongs in our vowel system.

**4.2.1.** Problems of Ä and Ö. In 4.1. we examined the vowel-raising tendency observed both synchronically and diachronically in Korean, and on that basis we set up LMK, and PK underlying vowel systems with which we could easily group the harmonizing vowels in natural classes. In LMK, which had the same single harmonic distinction for both the SSVH and the SufVH, the feature [low] divided the vowels into two groups, with /a, ʌ, ɔ/ as [+low] and the rest as [-low]. Similarly, for the SSVH in PK, with the tentatively established underlying vowel system given in (11), we can classify the four light vowels, /a, æ, ɔ, ɔ/, as [+low] and the remaining vowels as [-low]. But even with this system we are still unable to account for why /æ, ɔ/ harmonize not with the low form, -a, but with the nonlow form, -æ. In what follows, by examining what actually triggers the VH and by setting up a revised underlying vowel system, I will show that PK also has a single, not double, harmonic distinction, and that we can, notwithstanding, neatly solve the SufVH problem related to the two troublesome vowels, Ä ([æ̃]) and Ö ([ö̃]).



4.2.2 The behavior of Ä and Ö in Present Korean. With regard to Raising II in (12b), we have to note that it does not occur when no consonants intervene between the target vowel and the vowel in the preceding syllable. Consider the following:

## (16) a. Impossible Raising

$po + -a / -\partial > poa > *po\partial > (pwa)$	'to see-INF'
$sso + -a / -\partial > ssoa > *sso\partial > (sswa)$	'to shoot-INF'
$ka + -a / -\partial > kaa > *ka\partial > (ka)$	'to go-INF'
$ca + -a / -\partial > caa > *ca\partial > (ca)$	'to sleep-INF'

## b. Possible Raising

$mak-a > mak-\partial$	'to protect-INF'
$anc-a > anc-\partial$	'to sit-INF'
$olm-a > olm-\partial$	'infected-INF'
$anikkow-a > anikkow-\partial$	'disgusting-INF'
$cop-a > cop-\partial$	'narrow-INF'
$nol-a > nol-\partial$	'to play-INF'

(16a) shows that [a] is not raised to [ə] because it is not preceded by an intervening consonant, whereas (16b) shows that all the raised vowels are preceded by a sequence of a vowel and one or more consonants. Raising II in (12b) should thus be revised as follows:

## (17) Raising II .....revised

$$\left[ \begin{array}{c} V \\ n \text{ high} \end{array} \right] \rightarrow [n+1 \text{ high}] / C_1 \left[ \begin{array}{c} \text{---} \\ \text{---stress} \end{array} \right]^{14} \quad (n < 4)$$

However, (17) still seems incorrect when we consider the examples in (18) below, where the suffix initial is realized as [-low] [ə] instead of [+low] [a] even though there are no intervening consonants.

<sup>14</sup> Stress is not contrastive in Korean, and PK seems to be losing its word-initial stress, so that vowels in the initial syllables often get raised: e. g.  $pek\ae > pike$  'pillow',  $t\partial\partial pta > tilitpa$  'dirty',  $\partial lin > ilin$  'adult',  $\partial tt\partial ni > itini$  'how',  $hol\ae(casik) > hule(casik)$  'badly brought-up person,' etc. In order to cover this under the Raising II, (17) should change to

$$\left[ \begin{array}{c} V \\ n \text{ high} \end{array} \right] \rightarrow [n+1 \text{ high}] / \left\{ \begin{array}{c} C_1 \\ \# \end{array} \right\} \left[ \begin{array}{c} \text{---} \\ \text{---stress} \end{array} \right]$$

- (18)  $k\text{æ} + -a/-\text{ə} > *k\text{æ}a > k\text{æ}\text{ə}$                     ‘to become clear-INF’  
 $t\text{ö} + -a/-\text{ə} > *t\text{ö}a > t\text{ö}\text{ə}$                     ‘to become-INF’

However, judging from the fact that the suffix initial in this case is never realized as [a], whereas in (16b) the raising from [a] to [ə] is merely optional, the realized surface [ə] in (18) cannot be regarded as raised from [a].<sup>15</sup> Rather the form remains unchanged through the raising process. The reason why the nonlow surfaces, such as [u] and [ə] preceded by [æ] or [o] in the SSVH, as in the examples of (8a), e. g. *kæ̀kuk*, *ccæ̀ngkilang*, and *höttuk*, are thought to have been raised from [ɔ] and [a], which were once in harmony with the preceding [æ] or [ö], is that they have intervening consonants before themselves and are in free variation with their low counterparts, just like the suffix initial [ə] in (16b).

Traditionally the two vowels, [æ] and [ö], have been considered light vowels for the SSVH and dark vowels for the SufVH. But since the psychological/emotive feature of a sound is derived from its phonetic properties, and not vice versa, we may well say that the so-called semantic features, [light] and [dark], are redundant; that is, those features are determined automatically by the phonetic properties of a given sound, if in the same speech community. And since it is hardly imaginable that the same sound can carry different phonetic properties in different environments, such that they take two opposite psychological/emotive features, I would label the two trouble-making vowels, /æ/ and /ö/, as always light vowels. However, I would discard the dark/light feature as a harmonic distinction, and instead substitute a purely phonetic feature. Indeed, it is not the case that the harmonic feature for the SufVH has any psychological or semantic effect. Furthermore, if we use those semantic features to describe the SufVH, then we cannot avoid having dual harmonic distinctions in the whole VH system in Korean, as seen in section 2. Keeping the same low/nonlow harmonic distinction for both the SSVH and the SufVH, I will seek a solution to this problem by putting it in its historical perspective.

#### 4. 2. 3. Change of harmonic status of Ä and Ö. In the SufVH of early

<sup>15</sup> Any lexical item to which Raising II as a variable rule is potentially applicable can be indexed with respect to the range of applications, mainly in terms of degree or frequency. However, the infinitive suffix following a stem-final syllable with [æ] or [ö] never shows such a variation as observed in the examples (8) and (9); it always occurs as [ə], never as [a].

LMK, if the stem-final syllable had a diphthong,  $\ddot{A}$  ([ay]) or  $\ddot{O}$  ([ɔy]), the following suffix-initial vowel should be a low vowel, according to the then strict VH rule. That is, the target vowel was rendered the harmonic feature of the first element of the diphthong.

However, with the gradual loss of the rigidity of the rule, shortly after the very first stage of LMK, disorder arose in relation to which vowel, low or nonlow, the diphthongs should harmonize with in the SufVH. The disorder became worse in Modern Korean, and now in PK,  $\ddot{A}$  ([æ]) and  $\ddot{O}$  ([ö]), the monophthongized counterparts to the same orthographical forms of LMK, harmonize only with a nonlow vowel [ə] in the SufVH. That is why those vowels are currently classified as dark for the SufVH. The traditional explanation of those vowels,  $\ddot{A}$  and  $\ddot{O}$ , is that they were originally light vowels—thus, low vowels—but that they later changed to dark vowels—thus, nonlow—due to the monophthongization known to have occurred by the end of the eighteenth century. But this explanation is not convincing, since many examples showing the disorder of the two vowels with regard to their behavior in the SufVH processes are found in texts published far earlier than the 18th century. Furthermore I cannot find through the monophthongization any remarkable evidence of split of sounds or the like which could affect the regrouping of the two vowels in the sufVH environment, but not in the SSVH environment. Thus I will try to find a more feasible account of the disorder by looking into the changes undergone by the monophthongal /i/ at first, and then those undergone by the problematic diphthongs,  $\ddot{A}$  and  $\ddot{O}$ , which end with a similar sound value to /i/, in the stem-final syllable in SufVH.

**4.2.4.** Loss of neutrality and underlying diphthongs. In LMK, the monophthongal *I* (/i/) in the stem-final syllable functioned as a neutral vowel at first, as we have already seen in (3a), but it soon began to lose its neutral character and changed to [–low]. The following is an illustration of this change:

(19) a. Late Middle Korean

*hanabi-lΔl* > *hanabi-l̄l*                    ‘old man-ACC’

*kΔlΔchi-ɔm* > *kΔlΔchi-um*                ‘to teach-NMNL’

b. Present Korean

*kali-ə* (\**kali-a*)                                ‘to cover-INF’

*noli-ə* (\**noli-a*)                                ‘to aim at-INF’

As seen in (19), the /i/ as the last vowel of a stem in SufVH already began to lose its neutral character in LMK and take up a [–low] feature. This /i/ completely lost its neutrality in Modern Korean and now in PK functions only as a [–low] vowel.

Now let us take a look at what kind of changes the diphthongs in question underwent. Consider the LMK examples first :

- (20) *kay-a* > *kay-ə* (*kĀ-ə*)                      ‘to become clear-INF’  
*tʌɔy-a* > *tʌɔy-ə* (*tVŎ-ə*)                      ‘to become-INF’

In order to explain (20), I will first examine the structure of the LMK diphthongs with an off-glide. In LMK there were three different allomorphs of the locative suffix –[ay] and [əy], when the last vowel of a stem was [+low] and [–low], respectively, and [yəy] when a stem ended with [i]. In case the last vowel of a stem was a diphthong with a high-front off-glide, the following locative suffix was realized as [yəy]. That is, the highfront off-glide behaved the same way as the monophthongal high-front vowel /i/ did, such that it needed an epenthetic segment before the following vowel to avoid a hiatus. The initial [y] of [yəy] must have functioned as such an epenthetic consonant-like glide. In this respect, the off-glide, though nonsyllabic, would better be treated as underlyingly a vowel, because if it had been underlyingly a glide, there would have been no need to have another glide after it to avoid a hiatus (cf. Choe 1977). From this understanding I would take a diphthong with an off-glide as a sequence of two vocalic segments with a single syllable peak on the first segment, and therefore use /a<sub>i</sub>, ə<sub>i</sub>, i<sub>i</sub>, ʌ<sub>i</sub>, ɔ<sub>i</sub>, u<sub>i</sub>/ as the underlying representations of [ay, əy, iy, ʌy, ɔy, uy] (in order to differentiate the underlying representations of a high-front off-glide and a high-front simple vowel, ‘i’ will be used hereafter for the former). However, I would take the on-glides as semiconsonants which can be inserted intervocalically to avoid a hiatus. Bloch & Trager (1942) also treat on-glides as consonantal and off-glides as vocalic, on the basis of the difference in their phonetic peculiarity.

With /-i̯/ as the underlying nonsyllabic vocalic element for the high-front off-glide of a diphthong, we can explain the behavior of the diphthongs in (20) like this: the /-i̯/ of / a<sub>i</sub> / and / ɔ<sub>i</sub> / in the stem-final syllable behaved at first as a neutral vowel, and the following vowel-initial suffix took a harmonic shape after the /a/ or /ɔ/ preceding /-i̯/ :e.g. *ka<sub>i</sub>* +

$-a/-\partial > kai_a$ ,  $t\Lambda\partial_i + -a/\partial > t\Lambda\partial_i a$ . But just like the monophthong /i/, /-i/ soon lost its neutral character and behaved as a [-low] vowel, whereby the following suffix-initial vowel turned [-low] : e.g.  $kai_k + -a/-\partial > kai_k\partial$ ,  $t\Lambda\partial_i + -a/\partial > t\Lambda\partial_i\partial$ .

In PK, as shown in (21) below, if /æ/ and /ɔ̃/ fall in the stem-final syllable, the following infinitive suffix always takes the [-low] form, -ə, even though their own harmonic features, given in (11), are [+low].

- (21)  $k\text{æ}-\partial$  (\* $k\text{æ}-a$ ) ( $k\text{Ä}-\partial$ )                    'to become clear-INF'  
 $t\ddot{o}-\partial$  (\* $t\ddot{o}-a$ ) ( $t\ddot{o}-\partial$ )                    'to become-INF'

Here, I would again pose /ai/ and /ɔ̃i/, instead of /æ/ and /ɔ̃/, as the underlying vowels of Ä and Ö, respectively. By posing these underlying vowels for both LMK and PK, the change in behavior of the nonsyllabic element of the diphthongs /aị/ and /ɔ̃ị/ parallels the earlier presence and later absence of the neutral character of the monophthongal /i/ as the last vowel of a stem in the SufVH. To illustrate this, let us rewrite the examples in (20) and (21), replacing the phonetic forms of the vowels by their underlying phonemes:

(22) a. Late Middle Korean

$kai_k - a > kai_k - \partial$   
 $t\Lambda\partial_i - a > t\Lambda\partial_i - \partial$

b. Present Korean

$kai_k - \partial$  (\* $kai_k - a$ )  
 $t\partial_i - \partial$  (\* $t\partial_i - a$ )

The off-glide of /aị/ and /ɔ̃ị/ worked like a neutral vowel at an early stage of LMK, so that the vowel-initial suffix took [+low] feature of the syllabic segment preceding the off-glide. Before long in the same LMK period, this neutral character of the off-glide began to be lost, and in PK its complete loss makes the off-glide participate in the SufVH as a [-low] vowel. This explanation is exactly parallel to that of the monophthongal /i/ in the stem-final syllable, as in (19). So it follows that the reason why the infinitive suffix in PK takes a [-low] form when it is preceded by a stem of which the last vowel is seemingly a [+low] vowel, [æ] or [ö] phonetically, is that the high-front nonsyllabic element of the underlying diphthong of the [+low] surface lost its previous neutral character and now functions as a [-low] vowel, shedding its influence on the next vowel.

## Vowel System and Vowel Harmony Rules of Present Korean

5. In this section I will set up a revised underlying vowel system of PK, a four-height system with underlying diphthongs, mirroring what we observed in section 4, and will present VH rules of PK on the basis of that vowel system.

### 5.1. Underlying Vowel System

With respect to /ai̯/ and /ɔi̯/ as the underlying forms for [æ] and [ö], one might suspect that it would be abstract to set up the underlying diphthongs, claiming no phonetic off-glides exist in PK. However, though in limited environments,<sup>16</sup> we still have [ɨy] as a surface form, as seen below :

(23)	<i>ɨysa</i>	‘opinion’	<i>suiy</i>	‘shroud’
	<i>ɨysu</i>	‘artificial arm’	<i>sinɨy</i>	‘faith’
	<i>ɨymi</i>	‘meaning’	<i>akɨy</i>	‘malice’

Besides, monophthongization of the diphthongs of LMK has not been completed, nor has the thorough lexical restructuring expected as a result of the monophthongization (Moon 1974). Vacillation between [æ] and [ay], [e] and [əy], [ö] and [oy], and [ü] and [uy] is found in abundance in PK :

(24)	a.	<i>say-sæ</i>	‘interval, distance’
		<i>ay-æ</i>	‘child’
		<i>sanay-sanæ</i>	‘boy, manly person’
	b.	<i>səy-se</i>	‘three’
		<i>nəy-ne</i>	‘four’
		<i>kikəy-kike</i>	‘that thing-NOM’ (<kikəs-i)
	c.	<i>ssoyta-ssöta</i>	‘to expose to wind or light’
		<i>oyta-öta</i>	‘to memorize’
		<i>oy-ö</i>	‘cucumber’
		<i>moy-mö</i>	‘grave’
	d.	<i>suy-sü</i>	‘easily’
		<i>onuy-onü</i>	‘brother and sister’
		<i>huy-hü</i>	‘whistling, swishing’

<sup>16</sup> Although [ɨy] does not seem to occur any longer in pure Korean words in normal speech, it definitely still exists in Sino-Korean words.

(23) and (24) suggest that we have a good reason for positing underlying diphthongs for the monophthongal phonetic surfaces, [æ̃, e, ö, ü].

On the basis of the arguments developed thus far, I will posit a revised underlying vowel system for PK as follows, replacing (11) :

(25) Underlying Vowel System of Present Korean

a. Simple vowels

	-back	+back		
4 high	i	ɨ	u	-low
3 high		ə		
2 high			ɔ	+low
1 high		a		
		-rnd	+rnd	

b. Diphthongs

a<sub>i</sub>, ə<sub>i</sub>, ɨ<sub>i</sub>, ɔ<sub>i</sub>, u<sub>i</sub>

## 5.2. Glides in Syllable-internal Structure

To recapitulate : in PK SufVH, the shape of the infinitive suffix morph is determined by the last vowel of the preceding stem, and if an underlyingly represented diphthong falls in that last vowel position, its second, nonsyllabic element triggers the VH. However, when the diphthong is the last vowel of a stem, it is not easy to separate the two elements and single out the second one in order to mark it as the sole conditioner, because a diphthong, due to its sequential character, is sometimes represented in a linear framework as one set of features in which two sequential features are placed on the same line : e. g.,

$$\left[ \begin{array}{l} -\text{cons} \\ -\text{back} \\ +\text{low}, +\text{high} \end{array} \right]$$

for /ai/.<sup>17</sup> This seems to be an extremely ad hoc way of handling diphthongs, and I would suggest taking up a syllable-internal structure to extract the nonsyllabic segment of a diphthong.

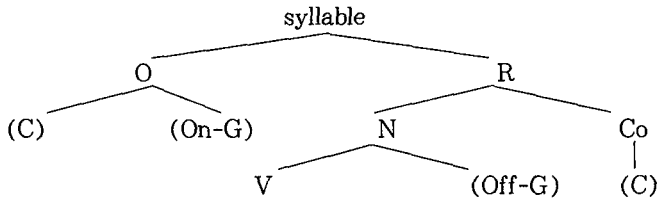
<sup>17</sup> The general point here is that a diphthong is a single segment having more than one value for a single feature. Feature sequence is thus specified in the same set of features. This kind of feature sequence is also found in the description of consonants : e. g. [-continuant, +continuant] for affricates (Lass 1984).

On-glides in PK are consonant-like elements, as already mentioned, and thus can be onset components, not nucleus components (cf. B-G. Lee 1982, Ahn 1985). Although Sohn(1987) claims it as part of the nucleus, providing evidence from a language game, her observation seems wrong. Let us consider the language game Sohn uses, in which we insert after each CV a simulated prosodic unit : a CV composed of a /p/ plus a copy of the vowel of the preceding syllable. According to Sohn, the inserted copy of the preceding vowel freely includes both the on-glide and the true vowel, since the on-glide is part of the nucleus. However, contrary to her claim, it is more likely that Koreans copy only the true vowel in the language. A test of sixteen Korean native speakers revealed the following, with no exceptions :

- |   |              |
|---|--------------|
| (26) <i>ihokki-ya</i> > <i>ihopokkipi-yap</i> (*y)a | ‘rabbit-VOC’ |
| <i>kyocang</i> > <i>kyop</i> (*y) <i>ocapang</i>    | ‘principal’  |
| <i>kwasil</i> > <i>kwap</i> (*w) <i>asipil</i>      | ‘fruit’      |
| <i>twæci</i> > <i>twæp</i> (*w) <i>æcipi</i>        | ‘pig’        |

This strengthens our decision to treat an on-glide as part of the onset, not part of the nucleus. Thus the syllable-internal structure of PK will be shaped as follows.

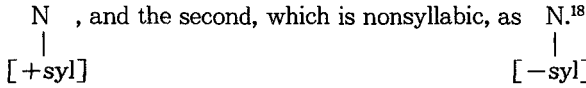
(27) Syllable Structure of Present Koren



### 5.3. VH Rules

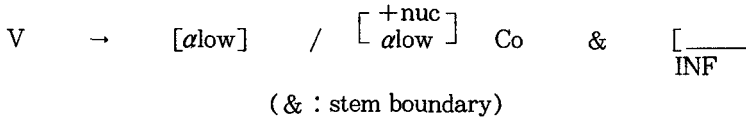
With the syllable-internal structure above we can pick out the syllabic and the nonsyllabic elements of a diphthong separately, with both branched from the same nucleus. The first element, which is syllabic, is represented as





Here I suggest that we use a new feature [Nucleic], in order to make the above representations look simpler and more pertinent to a linear model. Thus, simple vowels and off-glides are [+nucleic], and consonants and on-glides, [-nucleic]. The SufVH can now be stated as follows :

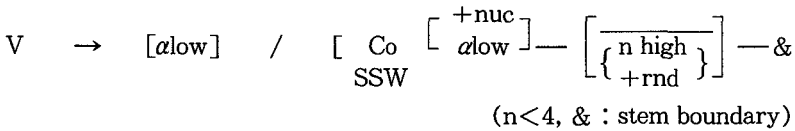
(28) Suffixal Vowel Harmony



This rule is interpreted as “the infinitive suffix initial vowel takes the same low feature that the last nucleic element of its stem carries, regardless of whether that nucleic element is syllabic.”

Then does our analysis of diphthongs work for the SSVH, too? Yes. If we describe the conditioning vowel in the SSVH as the first nucleic element of the SSW, when /ai/ or /ɔi/ occurs in the first syllable, then the vowels in the following syllables take the same harmonic feature as that of the first element of the diphthong. The rule for the SSVH will, therefore, be like this :

(29) Sound Symbolic Vowel Harmony



This rule is interpreted as “a vowel in the stem (see below) of a sound symbolic word, if it is not neutral (4 high and unrounded), takes the same low feature as that of the first nucleic element of the word, regardless of what intervenes.”

Here some might raise a question with regard to color-related SSWs.

<sup>18</sup> N  $\left[ \begin{array}{c} | \\ \quad \end{array} \right]$  is used to represent a feature bundle as being directly linked to the nucleus.

Color-related SSWs in Korean are often initiated by a prefix /si(s)-/ (for dark nuance) or /sai(s)-/ (for light nuance). In this case, all the nonneutral vowels after /si(s)-/ are [-low], and those after /sai(s)-/ are [+low]: e.g., /si-khəməh/ vs. /sai-khamah/ 'black,' /sis-nuləh/ vs. /sajs-nolah/ 'yellow.' This naturally results from rule (29). That is, even when an SSW has an affix boundary within itself, we can still claim that VH is triggered by the first nucleic element of the word. For example, in /sajs-nolah/ (\* /sajs-nuləh/) /o/ and /a/ in /nolah/ harmonize with /a/, the first nucleic element of the word, not with /i/, the nucleic element immediately preceding the affix boundary. This seems to contradict the SufVH in which the target vowel harmonizes with the nucleic element immediately preceding the affix boundary. The question arises here why the conditioning vowels differ, if the two VHs involve similar affix boundaries. We can answer this question by clarifying the different characters of the two boundaries.

The affixes /si(s)-/ and /sai(s)-/ are derivational, whereas the infinitive suffix -ə/-a is inflectional. Derivational affix boundaries are weaker than inflectional ones: a stem includes both a root and its derivational affixes, but not inflectional affixes. The bond between a root and its derivational affixes is so tight that the target vowel in the SSVH does not react as sensitively to the preceding boundary as in the SufVH. That is why 'the first nucleic element of a word still properly describes the conditioning vowel in the SSWs beginning with /sai(s)-/ or /si(s)-/. Now consider the following:

(30) Boundaries in Vowel Harmony

Stem			Infl suf.	After VH
Deriv. Pref.	Root	Deriv. Suf.		
/sis-/	/n{o/u}	-	/-ko/(CNJ)	sisnuləh-ko
/sajs-/	l{a/ə}h/	-		sajsnolah-ko
-	/mak/	-	/{-ə/-a}/ (INF)	mak-a
		/-hi/(PAS)		makhi-ə

This chart not only presents a clear view of the difference in triggering elements between the two VHs, but also shows us that the SSVH occurs only within stems and the SufVH only across stem boundaries. Therefore, the term ‘sound symbolic word’ used in the discussion of SSVH should refer only to the stem of the word. With this understanding there will be no problem under rule (29) dealing with the SSWs beginning with /si(s)-/ or /sai(s)-/.

To obtain the correct phonetic surfaces of the forms undergoing VH, we need more rules to apply to the output of the two VH rules, (28) and (29). The processes by which the surfaces [æ, ε] of /ai/ and [ɔ̃, ɔ̆] of /ɔi/ are generated can be illustrated as in (31a), and the derivation of deviated forms from the regular VH, as in (31b) :

(31) Sample Derivation

a.			/ai/		/ɔi/
	Gliding(G)		ay		ɔy
	Monophthongization(M)		æ		ɔ̃
	Raising I (R. I)		ε		ɔ̆
b.	anc -a/-ə	tɔ̃ <sub>i</sub> -a/-ə	tt{ai/əi}k{ɔ̃/u}l		
	‘to sit	‘to become	‘rolling’		
	-INF’	-INF’			
	VH	anc -a	tɔ̃ <sub>i</sub> -ə	ttajkɔl /	ttəjkul
	G	---	tɔy -ə	ttaykɔl /	ttəykul
	M	---	tɔ̃ -ə	ttækɔl /	ttəkul
	R I	anc -a	tɔ̃ -ə <sup>19</sup>	ttækɔl /	---
	R II	anc -ə	---	ttækul /	---

**Conclusion**

6. So far we have seen that the VH in PK can be explained without invoking the diagonal harmonic division and the dual harmonic distinctions that are the two major problems in analyzing the VH in a natural way.

<sup>19</sup> The trend of the loss of word-initial stress in PK, as stated in fn. 14, can be considered to affect this raising.

In seeking a solution to the problems of VH in PK, I reached several related conclusions. First, the disruption of Korean VH is merely a reflection of the overall historical tendency of vowel raising in the language, through the long period from LMK to PK. The true nature of Korean VH can thus be considered a horizontal harmony with a high vs. low distinction, since the decayed forms are the results of this vowel raising, not of fronting or backing which would hint at a palatal harmony. Second, I posit a four-height underlying vowel system for PK, with /a/ and /ɔ/ as [+low], but at different heights, reflecting the general vowel-raising tendency and the LMK vowel system. And then I set up /ai/ and /ɔi/ as the underlying diphthongs of *Á* and *Ö*, respectively, on the grounds that monophthongization has not yet been completed. The two elements of a diphthong, syllabic and nonsyllabic in sequence, are branched from the same nucleus. The postvowel off-glide is taken as a nucleic element, whereas the prevowel on-glide as an onset component. Here a new feature[Nucleic] is employed to accommodate nucleic/nonnucleic character of glides, in a linear framework. As for the conditioning element of the VH, it is the first nucleic element of a sound symbolic word in the SSVH, and the last nucleic element of a verb stem in the SufVH, regardless of its syllabic value. It follows from this that on-glides do not participate in either VH, while off-glides participate in the SufVH. Therefore, in the SufVH, when the last vowel of a verb stem is *Á* or *Ö*, the final element /i/ of the underlying diphthong /ai/ or /ɔi/ of the vowel determines the following suffix morph. In this case the /i/ now works as a dark vowel, which is [-low], not as the neutral vowel that it once was historically. It thus chooses the [-low] from, -ə, for the following infinitive suffix morph. The phonetic surfaces of the underlying diphthongs are obtained through monophthongization and raising, after VH processes have been completed. By the analysis proposed in this study, the long-standing problems created by the diagonal grouping of the harmonizing vowels and the duality of harmonic distinctions are resolved without destroying the traditional concept of psychological/emotive features, [dark] and [light].

The proposed analysis, which sticks to a linear approach under the Standard Generative Phonology (SGP) framework, also shows that Korean VH can be neatly described without recourse to the autosegmental or other post-SGP frameworks.

**ABBREVIATIONS**

ACC :	accusative	INF :	infinitive
ADD :	additive	INST :	instrumentive
CNJ :	conjunctive	NMNL :	nominalizer
COM :	comitative	PAS :	passive
END :	ending	TOP :	topic marker
IMP :	imperative	VOC :	vocative

**References**

- Ahn, Sang-Cheol (1985) *The Interplay of Phonology and Morphology in Korean*. Ph.D. dissertation, University of Illinois.
- Ahn, Sang-Cheol & Chin-Wu Kim (1985) 'Vowel harmony in Korean : a multi-tiered and lexical approach,' *Linguistics and Poetics*, eds. by G.Youmans & D.M. Lance, 134-54. Columbia, MO : University of Missouri.
- Aoki, Haruo (1968) 'Toward a Typology of Vowel Harmony,' *International Journal of American Linguistics* 34, 142-45.
- Bloch, Bernard and George L. Trager (1942) *Outline of Linguistic Analysis*. Baltimore : Linguistic Society of America at the Waverly Press, Inc.
- Choe, Se-Hwa (1977) *Sibosegi Kugŏ ūi Chungmoŏm Yŏngu (A Study on the Diphthongs of the Fifteenth-century Korean)*. Seoul : Asea Munhwasa.
- Harms, Robert T (1982) 'What Helmholtz Knew about Neutral Vowels,' *Texas Linguistic Forum* 19, 67-90.
- Kim, Chin-Wu (1978) 'Diagonal Vowel Harmony? : Some Implications for Historical Phonology,' *Recent Developments in Historical Phonology*, ed. by Jacek Fisiak, 221-36. The Hague : Mouton.
- Kim, Wan-Jin (1971) *Kugŏ ūmun Ch'egye ūi Yŏngu (A Study on the Korean Phonemic System)*. Seoul : Iljogak.
- Kim, Young-Seok (1985) *Aspects of Korean Morphology*. Ph.D. dissertation, University of Texas, [Reproduced by Pan Korean Book Corporation, Seoul.]
- Kim-Renaud, Young-Key (1976) 'Semantic Features in Phonology : Evidence from Vowel Harmony in Korean,' *Chicago Linguistic Society* 12, 397-412.

- Kiparsky, Paul (1973) 'How Abstract is Phonology?' *Three Dimensions in Linguistic Theory*, ed. by O. Fujimura, 5-56. Tokyo : TEC.
- Lass, Roger. (1984) *Phonology : an Introduction to Basic Concepts*. New York : Cambridge University Press.
- Lee, Byung-Gun (1982) 'A Well-formedness Condition on Syllable Structure,' *Linguistics in the Morning Calm*, ed. by In-Seok Yang, 489-506. Seoul : Hanshin Publishing Co.
- Lee, Byung-Gun (1985) 'Moŭmjohwa ũi Tuksŏng (Some Tangible Properties of Vowel Harmony),' *Inmun-nonch'ong* (Inmun-gwahak yŏnguso, Seoul National University) 15, 1-36.
- Lee, Ki-Moon (1968) 'Moumjohwa wa Moŭmch'egye (Vowel Harmony and Vowel Systems),' *A Festschrift for Dr. Soong-Nyong Lee's 70th Birthday*, 377-89. Seoul : Ŭlyumunhwasa.
- Lee, Ki-Moon (1982) *Kugŏsa Kaesŏl (Introduction to the History of the Korean Language)*. Revised edition. Seoul : Tower Press.
- Lee, Sang-Oak (1984) 'An Overview of Issues in the Vowel System and Vowel Harmony of Korean—disharmony among the Hypotheses of Vowel Harmony,' *Language Research* (Seoul) 20(4), 417-51.
- Lee, Soong-Nyong (1949) 'Chosŏn Ŭmunnon Yŏngu, Che Ilchip : ÷ Ŭm Ko(Studies in Korean phonology ( I ) : on the (Λ) sound),' *Chosonmunh-wach'ongso Series*, 7. Seoul : Ŭlyumunhwasa.
- Lee, Soong-Nyong (1955) *Ŭmunlon Yŏngu (Studies in Phonology)*. Seoul : Minjungsokwon.
- Lieber, Rochelle (1987) *An Integrated Theory of Autosegmental Processes*. Albany : SUNY Press.
- McCarthy, John J (1983) 'Phonological Features and Morphological Structure,' *The Interplay of Phonology, Morphology, and Syntax*, 135-61. Chicago : Chicago Linguistic Society.
- Moon, Yang-Soo (1974) *A Phonological History of Korean*. Ph.D. dissertation, University of Texas.
- Nam, Kwang-Woo (1984) *Hangugŏ Ŭi palŭm Yŏngu (A Study on Pronunciations in the Korean Language)*. Vol. 1. Seoul : Iljogak.
- Sohn, Hyang-Sook (1987) *Underspecification in Korean Phonology*. Ph.D. dissertation, University of Illinois. [Reproduced by Hanshin Publishing Co., Seoul.]
- Vago, Robert M (1973) 'Abstract Vowel Harmony Systems in Uralic and Altaic Languages,' *Language* 49, 579-605.

Vago, Robert M (1976) 'Theoretical Implications of Hungarian Vowel Harmony,' *Linguistic Inquiry* 7, 243-63.

## **ABSTRACT**

### Vowel Harmony In Korean

Sayhyon Park

This paper aims at presenting an alternative analysis of Korean vowel harmony that is simpler and more natural than previous ones. Through the examination of various factors from a historical perspective, the vowel system of present Korean is reanalyzed. By placing both  $A(\uparrow)$  and  $O(\perp)$  as harmonically [+low] in the four-height vowel system, and by analyzing  $\ddot{A}(\#)$  and  $\ddot{O}(\downarrow)$  as underlyingly diphthongs, the longstanding problems created by diagonal harmonic division and dual harmonic distinctions are resolved without destroying the traditional concept of emotive features, [dark] and [light].

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