

The Korean Vowel Shift Revisited*

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Many linguists believe that the history of Korean vowel changes, especially those after Middle Korean, have been quite well established. However, until this point, no solid analysis of the posited historical changes of Korean vowels has been made in terms of phonetic motivations. The main purpose of this study is to provide a phonetic account of the proposed Korean vowel shift in the framework of Natural Phonology. This paper challenges the widely-accepted Korean vowel shift hypothesis, which has been advanced mainly by K. M. Lee and argues that no such vowel shift occurred in the history of the Korean vowel system.

1. Introduction

There are several studies of the Korean vowel system and historic vowel changes (e.g. K. M. Lee 1961, 1972; W. J. Kim 1963, 1978; C. W. Kim 1968; Chong 1980, Moon 1974). Some of these linguists (e.g. K. M. Lee, W. J. Kim) claim that Korean vowels underwent a shift. This paper reexamines the major phonological changes that are assumed to have occurred from old Korean to Middle Korean, as hypothesized by K. M. Lee (1961, 1972) and commonly known as the 'Korean vowel shift'.

I argue that the historical vowel chain-shift hypothesis proposed by K.M. Lee is untenable based mainly on the following factors: i) The historical data Lee provides does not support his hypothesis very well; ii) Other research such as Labov (1994) suggests that the alleged Korean vowel shift is very unusual; iii) There is no phonetic motivation for most of the

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individual changes of the proposed chain shift. Regarding this third point in particular, I use the framework of Natural Phonology to support my claim that the individual changes of the proposed Korean vowel shift are unnatural (i.e., the changes are not attested in other languages) and lack phonetic motivation.

This paper consists of five sections. Section two gives a brief synopsis of the Natural Phonology approach to sound change. Section three briefly reviews the history of vowel changes in Korean, including the predominant vowel-shift hypothesis. In section four I review the chain-shift hypothesis and evaluate it. In this section, I show what the basic problems of this hypothesis are and why the individual changes in the proposed vowel shift are unnatural in this section. Section five contains the conclusion of this paper, in which I argue that no vowel shift occurred from Old Korean to Middle Korean.

2. Sound Change and Natural Phonology

Natural phonology (NP) is a theory which postulates a phonetic basis for phonological processes or changes. According to this theory, a regular sound change not only has a phonetic causality in the sense that it reflects a change in speakers' phonetic ability but also has a phonetic teleology in the sense that its motivation lies in the perception or the production of the sound.

The general theory of NP (Stampe 1969, Donegan and Stampe 1978, Donegan 1978) maintains that every regular sound substitution – whether it is of historical origin, or whether it occurs in child speech or adult speech – is the result of the operation of one or more of a set of natural phonological processes – 'natural' in that they respond to innate limitations of the human speech capacity. Also, according to Stampe (1973), 'natural phonological processes are the natural and automatic responses of speakers to the articulatory and perceptual difficulties which speech sounds or sound sequences present to their users.' The implication is that regular sound changes arise from phonological processes which are phonetically motivated.

In NP, there are two main types of phonological processes: fortition processes and lenition processes. Fortitions are typically context-free or dissimilative, and they apply to optimize (or intensify) individual segments in some way; they overcome difficulties that are associated with simultaneous

combinations of conflicting features, or they optimize a feature of the individual segment (e.g. delabialization ([ü] > [i], [ö] > [e])). When applied, fortitions limit the possible segment inventory, so the speakers encode lexically only in terms of a limited set of relatively optimal possible segments (Donegan 1993: 109). Korean vowel loss, through merger, of /ɔ/, diphthongization and vowel merger, all of which will be discussed in later sections of this paper, result from fortition processes, since these processes in applying cause the vowel inventory to be reduced (see sections 5 and 7). Lenitions apply to optimize sequences of segments; they overcome difficulties associated with sequential combinations of features (e.g. assimilative processes: vowel nasalization, palatalization, etc.). New application of lenitions may not only cause changes in the phonological forms of words, they may also result in changes in the phonemic inventory (Donegan 1993: 119). The monophthongization in Korean vowel history is an example of this case, where addition of phonemes to the inventory occurs by the loss of a 'fortition' process as a consequence of the application of a new lenitive process (i.e. once diphthongs – which had not been vowel phonemes – entered the phoneme inventory through monophthongization; see section 6).

In describing vocalic phonological processes, features such as vowel height (a manifestation of sonority), color (+chromatic: palatality, labiality; -chromatic; no color)¹, tenseness/laxness, length, etc. are used in NP (see Donegan 1978: 41~104 for detailed discussion). The vocalic fortition processes and the implicational conditions of their application are illustrated in Donegan (1978: 105~221). What follows is a very brief review of points relevant to the discussion in this paper:

- 1) The motivation of a vocalic fortition process lies in the maximization or optimization of a particular phonetic property of a segment.

¹Chromatic vowels: palatal vowels (i, e, æ), labial vowels (u, o, ɒ), labio-palatal (ü, ö, œ); Achromatic vowels (ɪ, ə, ʌ). Note that ɪ, ɛ, ʌ and ʊ, ɔ, ɒ are lax counterparts for palatal and labial vowels respectively. The following vowel chart is adopted from Donegan (1978):

-chromatic		+chromatic			
-palatal / -labial		palatal / -labial		+palatal / +labial	
(-tense)		-tense +tense		-tense +tense	
High	ɪ	ɪ	I	Ü	ʊ u
mid	ə/ʌ	ɛ	e	Ö	ɔ o
Low	ʌ	a	æ	œ	ʊ ɒ

2) The phonetic motivation of tensing is the increase of color. Only chromatic vowels are tensed because achromatic vowels have no color to increase.

3) Laxing increases sonority and decreases palatality or labiality for a given degree of phonological height.

4) Lowering (V [n high; ! -chromatic; ! -tense; ! + long]² → [n-1 high]) increases sonority by decreasing the height of vowels by one degree.

5) The function of raising (V [n high; +chromatic; ! +tense; ! lower] → [n+1 high]) is the increase of palatal or labial color. This is why achromatic vowels do not undergo raising – they have no color for this fortition to increase.

6) Bleaching (delabialization: V [+labial; ! lower; ! -tense; ! mixed] → [-labial] and depalatalization: V [+palatal; ! lower; ! -tense; ! mixed] → [-palatal]) eliminates either labiality or palatality but its real function is to increase sonority.

7) Coloring (labialization: V [-palatal; ! higher] → [+labial] and palatalization: V [-labial; ! higher] → [+palatal]) ordinarily applies only to achromatic vowels and its motivation does not, in fact, lie in the increase of any phonetic property of a segment but in the increase of the perceptibility of height differences.

3. The Korean Vowel Shift

It has been claimed by several linguists (K. M. Lee 1972, 1961; W. J. Kim 1963, 1978; C. W. Kim 1978) that the major changes in the history of Korean vowels occurred from the Old Korean (OK, hereafter) to the Middle Korean (MK, hereafter). A chain shift hypothesis³ has been proposed by K. M. Lee (1972, 1961) to explain the change in vowel system from the OK

²The symbol ! has an implicational condition: ! -chromatic means that other things being equal, if a chromatic vowel undergoes the process, then an achromatic vowel must; ! lower implies that if a higher vowel undergoes the process, then a lower vowel must.

³Among several 'chain shift' hypotheses, Lee's is the most well known. It not only has been accepted widely by Korean scholars but also it has appeared in major Korean literature. It is to be noted that there are a number of serious problems with this hypothesis (see section 4). This 'chain shift' hypothesis will be evaluated in the frame of the NP and eventually rejected in this paper.

(before 13C) to LMK (after 15C) (charts a, b, c).

a. Old Kor. (OK: before 13C)			b. Early Middle Kor. (EMK: 13C)		
I[i] ⁴	WU[ü]	WO[u]	I[i]	WU[ü]	WO[u]
	U[ə]	O[ʌ]	E[e]	U[ə]	O[ʌ]
E[ä]		A[v] ⁵		A[ɑ]	
c. Late Middle Kor. (LMK: 15C)					
	I[i]	U[i]	WU[u]		
		E[ə]	WO[o]		
		A[ɑ]	O[v]		

Figure 1. Stages of Korean Historical Vowel Shifts

This chain shift, in Lee's hypothesis, takes place in two stages. The first is a *drag-chain* shift (a to b), where E[ä] was raised to [e] to fill a gap and A[v] centralized to [ɑ] – so that the vowel system became more symmetrical, and the next is the *push-chain* shift (b to c), where E[e] triggers the initial shift pushing U[ə] to the [i] position and, in turn, WU[ü] to [u], WO[u] to [o], and O[ʌ]⁶ to [v]. This push-chain hypothesis will be

⁴The trickiest problem in the discussion of OK as well as MK vowel phonology is that establishing the precise phonetic vowel qualities of some vowels is controversial among Korean linguists. Even the most prestigious work on the OK and MK vowel system done by Lee is not an exception. Capital letters indicate the Yale Romanization of the *Hangul* (Korean alphabet) vowel letters. The use of Yale Romanization to represent the Korean orthography enables us to trace the different pronunciations of vowel letters through time. Note, however, that Hangul did not exist prior to the fifteenth century; hence I use Yale Romanization for OK and EMK to clarify which OK and EMK vowels are ancestral to vowels from LMK onward. The phonetic qualities of the Hangul vowel letters (represented here in Yale Romanization) in modern Korean are: I=[i], Ey=[e], AY=[ɛ], U=[i], E=[ə], A=[ɑ], WU=[u], and WO=[o]. Note that these vowels do not necessarily have the same phonetic qualities in Lee's OK and MK vowel systems (e.g. WU=[ü], WO=[u] and U=[ə], etc.). Lee believes that the current vowel represented as WO, for example, originally was located at the [u] position in OK and moved back to the [o] position in a later stage.

⁵The assignment of the phonetic quality [v] to A in OK and [v] to O in LMK is mine, done according to their proposed location in the systems. Lee did not make clear the exact phonetic qualities but simply located A and O in the low back position respectively in OK and LMK systems.

⁶As for the phonetic quality of O, it is a bit controversial in that O is positioned

evaluated and rejected later in this paper.

4. The Evaluation of Chain Shift Hypothesis

In this section, I first examine the chain-shift hypothesis and the evidence advanced by K. M. Lee and other linguists. I show the weakness of the hypothesis by pointing out the basic problems in the evidence given for the OK vowel system and vowel shift, then evaluate each individual change of the chain shift within the framework of NP.

4.1. Great Vowel Shift from OK to LMK Proposed in the Early Literature

The supporters of the chain shift hypothesis (C. W. Kim 1978; K. M. Lee 1972, 1961; S. O. Lee 1984) have proposed several pieces of evidence both textual and nontextual, which might justify the vowel system of Old Korean and the subsequent vowel shifts (as shown in charts a, b, c of figure 1). The two main bases upon which K. M. Lee establishes his OK vowel system as shown in (a) are: vowel harmony phenomena and textual evidence. The main sources for the chain shift theory proposed by K. M. Lee as well as other supporters are as follows.

(I) 'According to the typological classification of Vowel Harmony (VH) by Aoki (1968), VH in LMK is a *palatal*, symmetric harmony (vertical VH) with front vs. back contrast like other Altaic languages. There were two series of vowels, traditionally called "dark (non-back: WU([ü]) U([ə]), E([ä]))" and "light (back: WO([u]), O([ʌ]) A([ɔ]))", respectively plus a "neutral vowel I[i]" (S. O. Lee 1984: 431).

Note that this assumption provides the basis for positing the OK vowel system as the vowel chart (figure 1a) above, pairing nonback and back as in WU vs. WO; U vs. O; E vs. A in the system.

(II) 'The original vowels [u] and [ü] (or, [iü]) in early Chinese loans

below WO[o] and back of A[a] (that is, at low back) in Lee's LMK system while it is located at the mid back position in Kim's LMK system (W. J. Kim: 1963). Lee indicates that O must have [ʌ] as its phonetic quality, following S. N. Lee's (1949) position. I argue that the phonetic quality of O in LMK was [ɔ] rather than [ʌ]. S. N. Lee (1978: 4~5) also notes that the phonetic quality of O in Cheju dialect is [ɔ]. For a further discussion, cf. Oh (1995)

were transcribed as WO and WU respectively in post-fifteenth-century Korean texts, indicating that [u] > [o] and [ü] > [u] changes occurred sometime before the fifteenth century in Korean as in O (< [u] 'crow') and WU (< [ü] 'house')' (K. M. Lee 1972: 107).

(III) 'Mongolian loan-words that came into Korean during the 13th century and were written in the Korean script in the fifteenth century show the following correspondences.

Mong. (13C)	A	o	u	e	ö	ü	i
Kor. (15C)	A	WO	WO	E	WE	WU	I

Of the correspondences, o/WO, u/WO, and ü/WU are notable. The first two pairs show that in the thirteenth century when the loan-words were imported, there was only one high back round vowel in Korean. This kind of correspondence would never have been possible if WO was [o] and WU was [u] (i.e. only O=[u] is possible.) The correspondence ü/WU indicates that WU had [ü] for its phonetic quality in Old (and Early Middle) Korean (K. M. Lee 1972: 112).

(IV) Lee notes that E[e] in the EMK was used for originally Chinese [ä] in OK (K. M. Lee 1961: 71). This means E had [ä] for its phonetic quality in OK, according to Lee. (Here, Lee does not make clear whether [ä] is really [æ] or [œ]. He puts this vowel in the low labio-palatal vowel position in his OK system, as seen in chart (1.a.).

(V) Lee states that the characters whose vowels were either [o] or [a] in the twelfth century Chinese texts were transcribed with the now-extinct Korean vowel O, indicating that O may have had the range of [o~a], if not outright [ɔ], in the twelfth century (K. M. Lee 1972: 113; K. M. Lee 1961: 98).

(VI) 'One of the old texts, *Sasengtonghay*, where transcription of *Hphags-pa* (the short-lived official alphabet of the Mongolian empire) into the Korean alphabet system was made in the fifteenth century, shows the following correspondences:

Hphags-pa(15C)	a	o	u	e, é	ö	ü	i
Kor. (15C)	A	WO	WU	YE	WE	WUY	I

This shows that there were changes between EMK and LMK (e.g. WO [u] > [o]). In LMK, WO had [o] as its phonetic quality, and WU [u], just as in modern Korean. It also indicates [e] was transcribed as YE, but not as E, since E already had [ə] for its phonetic quality' (K. M. Lee 1961: 137).

Based on these claims, many Korean linguists support Lee's hypothesis that the following changes occurred somewhere between EMK and LMK: E[e] > [ə], U[ə] > [ü], WU[ü] > [u], WO[u] > [o], O[ɔ] > [ɒ].⁷ Lee (1972: 117; 1961: 138) claimed that the chain shift must have been a push-chain, not a drag-chain shift. His reasoning was that the instability of O, which is positioned at the end of the chain, was caused by the push chain, where the initial move was backing of [e] to a central position and that if a drag chain had occurred by lowering of O[ɔ] in order for it to have a more stable position, the subsequent changes (including loss) of O would never have occurred.

4.2. Problems in the Chain-shift Hypothesis

Although the proposed chain-shift hypothesis might look plausible when considering only the system itself and all the proposed evidence, close examination reveals that it contains a number of pitfalls which make it highly questionable.

First, there is no account of phonetic causality for this chain shift. No phonetic motivation for the individual changes of the shift has ever been proposed by any linguists, including K. M. Lee. It will be seen later (in section 4.3.) that it is difficult to establish phonetic motivations for each change of the proposed shift.

Second, the primary basis for positing the OK vowel system as shown in chart (a) is the presumably regular vowel harmony system (hereafter, VH). However, the VH system⁸ itself is a controversial issue, and no one has

⁷ Note that Lee did not make clear what the exact phonetic quality of this vowel was, simply assuming that O was [ʌ]. But I argue that the more precise phonetic quality of O is [ɔ] in OK and EMK, and that the phonetic quality of O in LMK is [ɒ], if I comply with its location in the low back position in Lee's vowel chart for LMK. Thus the assignment of [ɒ] for O is mine in this paper.

⁸ S. O. Lee (1984) notes: 'The establishment of the VH system in Korean has been a controversial issue. Historical texts indicate that it was much more regular and systematic in the fifteenth century (MK). In modern Korean it operates primarily

yet successfully established what type of VH OK maintained. The simple argument that OK must have had a palatal, symmetrical VH system (front-back opposition) because of the fact that several, presumably genetically-related, Altaic languages have it is very speculative.⁹ Even the existence of a strictly regular VH system in OK is questionable. In positing the OK vowel system (chart a in figure 1), K. M. Lee (1961: 72) admits that 'the remaining old documents do not provide good evidence for the VH system of OK and for example, a transcription system of OK, *hyangchal* (an OK writing system based on Chinese characters) does not show the VH at all.' K. M. Lee speculates without providing evidence that 'OK must have had more regular VH since MK shows much more regular VH than modern Korean'. These considerations suggest that Lee's basis for positing the OK system and for proposing the subsequent chain shift is not firmly grounded. (See section 5 for a new proposed account of Korean VH.)

Third, the OK vowel system K. M. Lee proposed (1972: 122; 1972: 71) can be challenged in many respects. With little textual evidence¹⁰ (as noted earlier in 4.1.) he reached the conclusion that each individual Korean vowel symbol had the proposed phonetic quality in OK. He relied almost entirely on two sources – Mongolian loan-word transcription into the MK Korean script and Chinese loans – in assigning the phonetic qualities of OK vowels (refer to 4.1. from (II) to (VI)). We should note that the correspondences of Mongolian vs. Mongolian loan-words in Korean, as shown in vowel chart (1.d), are not phonetic ones, because loanwords themselves do not tell the precise phonetic qualities, even if they do give some clues to them. This means that we can not know the precise phonetic qualities of OK vowels by looking only at Mongolian loan-words borrowed in the thirteenth century

between verb roots and certain suffixes and in mimetic words.' Three types of vowel harmony, i.e. horizontal, vertical, and diagonal, have been proposed by many linguists. The main reason S. O. Lee prefers choosing the vertical (palatal) system for Korean VH is that most Altaic languages to which Korean seems to belong have the same system.

⁹ According to Alexander Vovin (personal communication 1996), a number of Altaic languages have ATR (Advanced Tongue Root) VH system.

¹⁰ Note that the Korean script was not invented until the fifteenth century and the controversy over the OK vowel system derives from the fact that there existed few materials to rely on in reconstructing the OK vowel system and that even those materials were written with a makeshift transcription system, which was not phonologically precise.

and transcribed into Korean in the fifteenth century when Hangul, the Korean alphabet, was invented. There was a two hundred year span between the time of the borrowing and the orthographic representation in Hangul, which means that we can hardly expect the precise phonetic qualities of the original loans to have been preserved. In addition, according to Alexander Vovin (personal communication, 1996), the Mongolian writing system in the thirteenth century did not distinguish between [u] and [o]. Namely, both [u] and [o] were represented by a single vowel symbol. If Mongolian words were borrowed in the written forms – K. M. Lee was clear on this point, it is possible that there was a confusion in distinguishing the phonetic qualities of these two Mongolian vowels.¹¹

Furthermore, regardless of the reliability of the source, Lee was not precise in determining the phonetic quality of each vowel, even in his own data. One example is his assigning [u] for WO in OK with the two correspondences WO:[o] and WO:[u], which he set up based on the transcription of Mongolian loan words in Korean. There is no way of telling whether the real phonetic quality of WO is [o] or [u] by looking at these correspondence sets, and Lee makes no strong claim as to their accuracy, but rather states only: 'I speculate that WO was [u]...' (Lee 1992a: 112). On the other hand, Lee does provide additional evidence (4.1. (II)), in citing the Chinese loan-characters transcribed after the fifteenth century (e.g. Chinese [u] in as Korean <WO> 'crow'), in assigning [u] for the Korean vowel letter WO as its phonetic quality, and in indicating that the [u] > [o] shift in Korean occurred some time before the fifteenth century. But the change may actually be just the reverse, in that Korean preserves the more conservative (original) Chinese vowel system in Chinese loan-words whereas Mandarin Chinese has gone through a series of vowel shifts, in which [o] became [u]. This was pointed out not only by H. M. Sohn and Marc Miyake (both in personal communication, 1996) but also by Karlgren (1915; 1923), Todo (1957; 1978), Cheng (1995), and Pulleyblank (1984, 1991). For example, Karlgren (1923: 15) explicitly states that Middle Chinese [uo] >

¹¹ One would expect Koreans to replicate Mongolian vowels correctly if the borrowing was from spoken Mongolian. Then again, if Koreans were not in close contact with Mongolians and did not respect the Mongolians highly enough – which were what really happened, then one would expect some degree of distortion. Accurate borrowings, such as Sino-Korean, are the products of close contact and a high degree of respect for the source language.

Mandarin [u] and Todo (1957: 221~25) claims that Middle Chinese [o] > Mandarin [u]. Pulleyblank (1984) also claims that Early Middle Chinese [ɔ] > Mandarin [u]. Although these linguists do not all agree on the exact phonetic quality of the mid back vowel (I think Todo is correct and Pulleyblank is wrong, because Pulleyblank's [ɔ] is never reflected in Sino-Korean as O[ɔ] but Todo's [o] is always reflected in Sino-Korean as WO[o]), they all do all agree that Middle Chinese mid back vowel has shifted to a high back position in Mandarin Chinese.

According to Miyake, who did comparative studies between Chinese and Chinese loans in non-Chinese languages, (Mandarin) Chinese underwent a vowel shift, while the Chinese loans in non-Chinese languages, e.g. Vietnamese (VT), Japanese (JP), and Korean (KR) and Taiwanese (TW), an outlier conservative Chinese language, preserve the original Chinese vowels as shown in figure 2. (All the vowels are modern reflexes and CH stands for Mandarin Chinese):

CH	TW	VT	JP	KR	
u	o	o	o	o	'crow'
u	go	ngo	go	o	'country name/surname'
ü	u	vu	u	u	'universe'

Figure 2. Vowel Correspondence¹²

This simple sound correspondence set shows that the loans retain the same original Chinese vowels, and that only Chinese underwent a shift, in which o > u and u > ü. Miyake suggested that in the history of the Chinese vowel system there was a series of vowel shifts: i.e. ə > a > o > u > ü (> i > i > ë). K. M. Lee mistakenly believed Mandarin Chinese to be conservative and Korean to be innovative. Non-Chinese languages and Taiwanese did not independently undergo chain shifts. It was Mandarin Chinese, neither Korean nor Chinese outlier languages, which underwent a chain shift. In a word, in the data Lee provides there is no clear evidence which supports the view that changes such as [u] > [o], [ü] > [u], etc. took place in the history of Korean vowels.

Fourth, K. M. Lee places too much trust in the theory that the motivation

¹² These vowel corresponds were provided by Miyake, who drew them from Karlgren (1923), Cheng (1995), and Todo (1957).

for change lies within the phonological system. This theory was originally proposed by Martinet (1955: 44) and was very popular when Lee proposed this hypothesis for the first time in 1961. It is, however, risky to posit phonological changes by only considering a system itself without providing sufficient real data to support the changes and, just as important, without providing phonetic motivations for the individual changes. Furthermore, Lee is not consistent in applying the chain-shift theory to Korean as shown in figure 3:

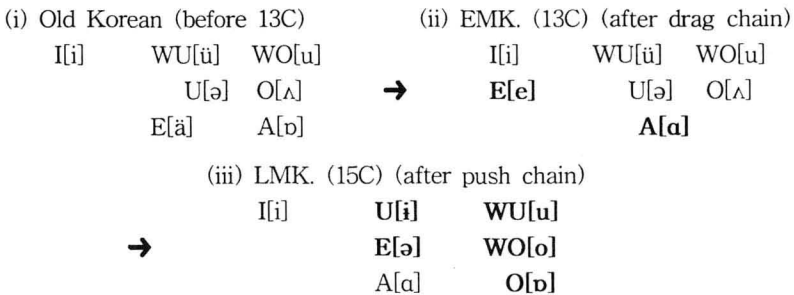


Figure 3. Drag and Push Chains in Lee's Hypothesis

As we can see, regardless of the precise phonetic quality of each vowel, there are some inconsistencies in these two chain shifts. The first shift from OK to EMK, a drag chain, according to Lee, occurred to fill the gap of the asymmetrical OK vowel system by raising of E[ä] to the position of [e]. Hence the cause of the shift is the pressure of the system itself. But this leaves Lee without a motivation for positing the subsequent push chain shift (EMK to LMK), because it causes the accomplished symmetrical system (of EMK) to be asymmetrical again (i.e. the same gap as in the OK system). The notion of 'overcrowding' as a possible cause for push chain shift (Hock 1986: 157) does not seem to work in this case, either. Hence, Lee's reasoning, which on the one hand is based on the attainment of system symmetry for the motivation of the vowel shift of one stage (OK to EMK) and on the other hand disregards the same motivation for the other stage of the vowel shift (EMK to LMK), is not persuasive.

In addition, the hypothesized Korean vowel shift does not fit into the general patterns¹³ of vowel shift which Labov (1994: 116~39) have found,

¹³ Labov (1994: 116) notes the following three principles of vowel shifting.

if we assume that the latter shift (EMK to LMK) was a drag chain, rather than a push chain. Labov states that 'the development of Korean vowels from the thirteenth century onward [based on K. M. Lee (1961)] shows an even more extensive set of counterexamples [to the principles of vowel shift]' (Labov 1994: 138) and 'there is no doubt that the history of Korean vowels is different from all the other languages considered so far' (Labov 1994: 139). Labov's comment on the Korean vowel shift is very important in that it can be considered to support my argument that there was no vowel shift in the history of Korean vowels.

All of the problems that I have discussed so far suggest that K. M. Lee's chain-shift hypothesis lacks a solid basis. Lee designed the OK vowel system almost entirely to explain the not-firmly-established vertical VH but there is little evidence for his hypothesis. This hypothesis will be further criticized by evaluating the individual changes of the shift in the following section.

4.3. Evaluation of the Individual Changes of the Proposed Vowel Shift

According to the NP theory, as we noted earlier, every regular sound change (or substitution) is the result of the operation of one or more of a set of natural phonological processes. This amounts to saying that every regular sound change must be explained in terms of its phonetic motivation since natural phonological processes are the natural or automatic responses of the speakers to articulatory and perceptual difficulties. Individual changes of a chain shift cannot be excluded from this principle, as is the case with the English Great Vowel Shift.

In what follows, I show the unnaturalness of Lee's hypothesis by evaluating each individual change of the proposed chain shifts in the framework of NP theory. To do this, I tabulate the individual vowel changes

Principle I : In chain shifts, long vowels rise.

Principle II : In chain shifts, short vowels fall.

Principle IIa: The nuclei of upgliding diphthongs fall.

Principle III : In chain shifts, back vowels move to the front.

Labov (1994: 138) states that 'Korean does not have a contrast between long and short vowels, so the single series of vowels would be expected to follow Principles I and III, moving up and to the front, but in the development of Early Middle Korean (the thirteenth century) to Late Middle Korean (the fifteenth century), we see extended chain shifts to the back and downward'.

in the two stages (from OK to EMK and EMK to LMK) of Korean vowel history, as in table 1.

Table 1. The Individual Changes in the Korean Vowel Shift (Proposed by Lee)

OK(before13C)	EMK(13C)	LMK(15C)
I [i]		i
WU [ü]	ü ➡ (depalatalization)	u
U [ə]	ə ➡ (raising)	ɪ
E [ä] ➡ (raising)	e ➡ (depalatalization)	ɐ
O [u]	u ➡ (lowering)	o
O [ɔ]	ɔ ➡ (lowering)	ɒ
A [ɔ] ➡ (delabialization)	ɑ	ɑ

There are two changes from OK to EMK by drag chain and five changes from the EMK to LMK by push chain. The first two changes can be represented as in figure 4:

- 1. ä → e : raising
- 2. ɒ → ɑ : delabialization (*bleaching*)

Figure 4. Changes from OK to EMK

As far as the proposed ‘drag’ chain shift (i.e. from OK to EMK) is concerned, we can say that the two individual changes are phonetically well-motivated. Each change is what we expect in vocalic fortition processes:

- 1. A palatal vowel must be nonlabial (or a labial vowel must be nonpalatal) (: a mixed-color, labiopalatal must get bleached), i.e. ä → æ
- 2. A palatal vowel must be nonlow, i.e. æ → e
- 3. A low vowel must be nonlabial, i.e. ɒ → ɑ

The phonetic motivation of the first bleaching (1) and the second bleaching (3) are to increase sonority of the labiopalatal and of the low labial. Raising (2) is to increase the color (palatality) of the palatal. In this sense, all these changes are legitimate in the frame of NP (i.e. they commonly occur in language change, child substitution, and synchronic alternations). However, there are problems in explaining the changes of the proposed push chain

shift in this framework, as we see in figure 5.

1. $\ddot{u} \rightarrow u$: depalatalization (bleaching)
2. $e \rightarrow \text{ə}$: depalatalization (bleaching)
3. $\text{ə} \rightarrow i$: **raising(??)
4. $u \rightarrow o$: *lowering(?)
5. $\text{ɔ} \rightarrow \text{ɒ}$: *lowering(?)

Figure 5. Changes from EMK to LMK

As indicated above, though the first two changes can be viewed as natural phonological processes (that is, bleaching processes), the rest of the changes are relatively rare (4 and 5) or unattested (3) in other languages, and the cooccurrence of these three (4, 5, and 3) processes is odd in the perspective of NP. (Note also that Labov (1994) regards these changes as quite unusual, not following established patterns.)

First of all, the depalatalization processes from the first two changes are natural fortitive processes and their phonetic motivations are to optimize the intrinsic intensity (sonority) of each vowel:

1. A labial must be nonpalatal (or a palatal must be nonlabial),
i.e. $\ddot{u} \rightarrow u$
2. A nonhigh palatal must be achromatic (neither palatal nor labial),
i.e. $e \rightarrow \text{ə}$

Here, the first bleaching maximizes labial color as well as sonority, while the second bleaching process, where mid-palatal loses its color, is rare (because it maximizes sonority only without changing vowel height), but it is not too conjectural when we consider that there is no 'low' palatal in the EMK system and that the depalatalization condition is as follows: V [+palatal; ! **lower**; ! -tense; ! mixed] \rightarrow [-palatal]. (The lower, the laxer, or the more mixed a palatal vowel is, the more likely that it undergoes depalatalization.)

However, the interaction between the raising of an achromatic vowel (3) and the lowering of two labial vowels (4 and 5) is not natural. What we expect, in vocalic fortitive processes, is almost the opposite of those changes, i.e. 'lowering' of an achromatic vowel and either 'raising' or 'lowering' of the two labial vowels. The interaction between the raising and lowering in this case is odd in that the lowering of chromatic (labial and

palatal) vowels must imply the lowering of an achromatic vowel (that is, plain vowels; i, ə, a) by the lowering condition: V [n high; ! -achromatic; ! -tense; ! +long] → [n-1 high]. In this sense, the raising of /ə/ with the lowering of /u/ and /o/ is unnatural. As noted in section 2, the function of raising is the increase of palatal or labial color and this is why achromatic vowels do not undergo raising. That is, achromatic vowels have no color for this fortition process to increase. The natural processes which we expect can be summarized as follows:

1. An achromatic vowel must be lowered to increase sonority,
i.e. ə → ɐ
- 2 a. A labial vowel must get raised to increase its color,
i.e. o → u; ɒ → ɔ OR
- b. A labial vowel must get lowered to increase sonority, i.e. u → ɔ;
ɔ → ɒ (but if a labial vowel is lowered, the corresponding nonlabial vowel is lowered, too)

As we have just seen, the individual changes of the proposed push-chain hypothesis cannot be explained in the NP theory very well. This fact, together with the problems pointed out in 4.2., suggest that the proposed chain-shift hypothesis is not plausible.

5. Conclusion

In this paper, I attempted to show that the historical vowel chain-shift hypothesis proposed by K. M. Lee is untenable in consideration of the following facts that: (i) The historical data Lee provides does not support his hypothesis; (ii) Lee's explanation of vowel shift in terms of system symmetry is not consistent; (iii) Other research on vowel shift (e.g., Labov (1994: 138)) suggests that the proposed Korean vowel shift does not follow the general principles of vowel shift; (iv) The NP theory suggests that there is no phonetic motivation for most of the individual changes of the proposed chain shift. Given all the facts considered here, I argue that there was no chain shift in the history of the Korean vowel system.

It is to be noted that if we can explain the Korean VH system as something other than a vertical (palatal) system, there will be no need whatsoever for positing vowel chain shifts. In claiming that no vowel shift occurred from OK to MK, I propose an alternative vowel harmony¹⁴ system

in MK. Consider the following the MK vowel system, which is established in the literature:

I[i]	U[i]	WU[u]
	E[ə]	WO[o]
A[a]	O[ɔ]	

Figure 6. The Middle Korean Vowel System

I hypothesize that the MK VH system was a 'sonority' opposition system, in which /o/, /ɔ/, /a/ respectively have more sonority than /u/, /i/, /ə/. On this view, it is no surprise that this grouping (more sonority vs. less sonority) corresponds to the traditional *semantic*¹⁵ grouping ('bright' vowel (o, ɔ, a) vs. 'dark' vowels (u, i, ə), which were modeled on the 'yin' and 'yang' philosophy), i.e. more sonority corresponds to a bright feature and less sonority to a dark feature. In this sense, these features, 'bright (or light)' and 'dark' are not in fact purely semantic, but they are, to a great extent, phonetically bound.

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¹⁴ According to Alexander Vovin (p.c. 1996, 1997, 1998), there is no evidence for vowel harmony in OK. He states that vowel harmony system in Korean developed after OK.

¹⁵ It is Youngkey-Renaud (1986) who first used the term 'semantic' [feature] to refer to this traditional grouping of bright vs. dark vowels.

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