A CONTRASTIVIST VIEW OF THE EVOLUTION OF THE KOREAN VOWEL SYSTEM*

SEONGYEON KO
Cornell University

1 Introduction

This paper aims to provide a formal account of the historical development of the vowel system in Korean, from Late Middle Korean through Early Modern Korean to modern regional dialects.[1] It will be one of the rarest attempts, if not the first, to give a unified analysis of both the diachrony and synchrony of the vowel systems in Korean.

The account to be presented in this paper is based on what I call the *Contrastive Hierarchy* theory (Dresher 2009 and references therein), which views contrastive specifications as a hierarchical ordering of distinctive features. This view will shed new light on a variety of controversial issues in the historical phonology of the vowels in Korean such as the asymmetry of the vowel inventory in Middle Korean, the nature of vowel harmony, discrepancy between the vowel system and harmony, the neutrality of the vowel /i/, the two-step loss of the vowel /ʌ/ (so-called *alay a*), and the synchronic variations in the vowel systems of modern dialects. I will show that all these issues can be nicely resolved together within the contrastive hierarchy that I establish on the independent basis of phonological patterning. Furthermore, I will also show that the changes in the Korean vowel systems are best accounted for in terms of the changes in the contrastive hierarchy.

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[1] The periodization for Korean adopted here is as follows (K-M Lee 1972b):

Old Korean	Before 10th century
Early Middle Korean	10th-14th centuries (918-1392)
Late Middle Korean	15th-16th centuries (1392-1592)
Early Modern Korean	17th-19th centuries
Modern Korean	20th century

The organization of the paper is as follows. Section 2 briefly introduces the theoretical framework and presents Dresher and Zhang's (2005) analysis of Manchu vowel systems. Then, section 3, 4, and 5 will be devoted to the analysis of the vowel systems of Middle Korean, Early Modern Korean, and Modern Korean dialects, respectively. Section 6 concludes the paper.

2 Theoretical Framework

2.1 The Contrastive Hierarchy in Phonology

Contrast, 'the opposition between distinctive sounds in a language' (Dresher 2009), has been recognized as one of the most fundamental concepts in phonological theory since Ferdinand de Saussure, while no consensus has been reached yet on how to compute contrast. There are two competing approaches, one based on pairwise comparisons between segments and the other based on a hierarchical ordering of features (contrastive hierarchy), and it is argued on logical as well as empirical grounds that the latter approach is superior to the former (Dresher 2008, 2009).

The contrastive hierarchy theory is based on the assumption that only contrastive features are *active* in the phonology.

(1) Contrast and phonological activity (Dresher 2009: 74)
Only contrastive features are *active* in the phonology.
System-redundant features are *inert*.

If we reverse this assumption, it follows that we can decide whether a feature specification for a phoneme in a given language is contrastive or redundant by means of looking at the phonological patterning of the phoneme.

Contrastive specifications are determined by applying the Successive Division Algorithm (SDA), whereby the phonemic inventory is successively divided into a marked and an unmarked subset with respect to a selected feature, until every set has only one member. If a feature has not been designated as contrastive for a phoneme, then it is redundant for that phoneme.

(2) Successive Division Algorithm (SDA) (Dresher 2009: 16)
a. Begin with *no* feature specifications:
assume all sounds are allophones of a single undifferentiated phoneme.
b. If the set is found to consist of more than one contrasting member,
select a feature and divide the set into as many subsets as the feature allows for.
c. Repeat step (b) in each subset: keep dividing up the inventory into sets,
applying successive features in turn, until every set has only one member.

Since the ordering of the features is determined, at least partly, by language-particular evidence, it can vary from one language to another, allowing for variability (Avery et al. 2008: 1). Thus, for instance, two languages with the same inventory /i, a, u/ and the same set of features [high] and [labial] can be differentiated by their contrastive hierarchies ([high] > [labial] vs. [labial] > [high]), to the extent that the difference in the ordering is supported by the difference in the phonological patterning.

2.2 Contrast in Manchu Vowel Systems

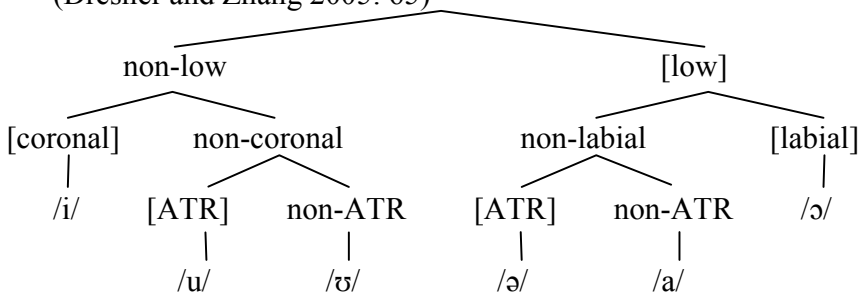
To see how a contrastive hierarchy actually works in the phonology of a language, let us first consider the analysis of Manchu vowel systems presented in Dresher and Zhang (2005).

The vowel system and the contrastive hierarchy of Written Manchu are given in (3) and (4), respectively.

(3) Written Manchu vowel system (Zhang 1996, as cited in Dresher and Zhang 2005)

i	u
	ʊ
ə	
	ɔ
a	

(4) Written Manchu contrastive hierarchy: [low] > [coronal] > [labial] > [ATR] (Dresher and Zhang 2005: 65)



The six vowel phonemes are divided first into two height classes by the feature [low], as indicated by the horizontal line in (3). Next, the feature [coronal], whose contrastive status is supported by its palatalizing effect on consonants, applies only to /i/ and distinguishes it from /u/ and /ʊ/. Then, the feature [labial] distinguishes /ɔ/ from /ə/ and /a/. Finally, [ATR] distinguishes /u/ from /ʊ/ and /ə/ from /a/. The contrastive status of [labial] and [ATR] is supported by labial harmony, triggered by two successive /ɔ/ vowels, and ATR harmony, triggered by /u/ and /ə/, respectively.[2]

The proposed contrastive hierarchy gives account for the rather peculiar phonological patterning of Written Manchu vowels /i/, /u/, and /ʊ/ with respect to vowel harmony. For example, /i/ does not receive a specification for [ATR] despite the fact that it is phonetically [ATR], which explains its neutrality to ATR harmony. This is because its [coronal] specification is enough to distinguish it from other non-low vowels and does not require further contrastive specification. In a similar vein, the failure of /u/ and /ʊ/ to trigger labial harmony receives a comparable explanation: they lack contrastive specification for [labial], although they are phonetically [labial]. Note also that the proposed contrastive hierarchy distinguishes only two height classes using a contrastive feature [low], although the vowel system can be analyzed as having as many as five vowel heights from the phonetic perspective.

[2] See Zhang (1996), Zhang and Dresher (2004), and Dresher and Zhang (2005) for the relevant data and Dresher and Zhang (2005) for the evidence for the proposed hierarchy.

3 Middle Korean

3.1 Vowel System and Vowel Harmony in Middle Korean

Let us now consider Korean vowel systems. First, we begin with the vowel system of Late Middle Korean (henceforth Middle Korean, MK) given in (5).

(5) (Late) Middle Korean vowel system (K-M Lee 1972b: 137):

ㅣ i	ㅡ ɨ	ㅜ u
	ㅓ ə	ㅗ o
	ㅏ a	ㆍ ʌ

In Middle Korean, there are seven monophthongs, /i, ɨ, u, ə, o, a, ʌ/, which are juxtaposed with their Korean alphabet equivalents in (5) for expository purpose. The vowel chart in (5), although relevant distinctive features are not explicitly given, represents an implicit phonological analysis of the MK vowel system based on the estimated phonetic value of each vowel.[3] Of our particular concern here is the apparent three-way height distinction among vowel phonemes. We will see how this causes a problem in the proper analysis of the phonological patterning in MK such as vowel harmony.

The MK vowels can be divided into three harmonic sets based on their harmony pattern: traditionally called *Yang* vowels /ʌ, o, a/, *Um* vowels /ɨ, u, ə/, and a neutral vowel /i/.

(6) Three harmonic sets in Middle Korean
   a. *Yang* (= RTR) vowels: /ʌ, o, a/
   b. *Um* (= non-RTR) vowels: /ɨ, u, ə/
   c. neutral vowel: /i/

I assume, along the lines of J Kim (1988, 1993) and J-K Kim (2000) among many others, that the MK vowel harmony is based on the contrast in tongue root position,[4] more specifically, the feature RTR (Retracted Tongue Root).[5]

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[3] For example, the position of the vowel *alay a* /ʌ/ as a low vowel seems to be a result of systematic consideration rather than a pure phonetic property. In previous literature, it has been more or less vaguely described as a sound falling in between /a/ and /o/ (K-M Lee 1972b: 137). Taking into consideration the fact that /ʌ/ has changed into /ɨ/, /a/, /o/, and sporadically /ə/, and the fact that Jeju Korean /ɔ/, the sole Modern Korean equivalent to the MK vowel /ʌ/, is low back rounded, J Kim (1993: 81) located /ʌ/ as a mid vowel which is close enough to all the other vowels it changed into. I agree with J Kim as far as it is about the 'phonetic' location of /ʌ/.

[4] Another prevailing view is that the vowel harmony is based on the front-back contrast, which is not quite obvious from the vowel system in (5). One famous solution for this seeming 'discrepancy' between the vowel harmony and the vowel system in MK is the *Great Vowel Shift hypothesis* (K-M Lee 1972a, b), which holds that the vowel harmony in 'Middle' Korean reflects the vowel system in 'Old' Korean that is based on the front-back contrast. See J Kim (1993: 14-24) for the research history of this hypothesis and J Kim (1993), Oh (1998), Martin (2000), and Vovin (2000) for its theoretical and empirical problems.

[5] I assume that ATR (Advanced Tongue Root) and RTR are 'two distinct privative features rather than two values of the same feature' (Steriade 1995: 149-152, fn. 34; see Hulst and Weijer 1995 for more discussion) and, contra Dresher and Zhang (2004, 2005) who select ATR for Manchu, I choose RTR over ATR as the harmonic feature,

The MK vowel harmony rule dictates all the vowels in a word share the same specification for [RTR], both stem-internally (7) and across morpheme boundaries (8).[6]

(7) Stem-internal vowel harmony
   a. Stems with RTR vowels only
      /sarʌm/ 'person', /barʌl/ 'sea', /kʌrʌm/ 'river', /narah/ 'nation', /tasʌs/ 'five',
      /tocʌk/ 'thief', /tarʌ-/ 'different', /pʌra-/ 'look at', /kap^{h}-/ 'repay'
   b. Stems with non-RTR vowels only
      /jərɨm/ 'fruit', /njərɨm/ 'summer', /kurək/ 'mesh bag', /tɨrɨh/ 'field',
      /həmɨl/ 'drawback', /ətɨp-/ 'dark', /nurɨ-/ 'yellow', /pɨrɨ-/ 'call'

(8) Vowel harmony across morphological boundaries
   a. verb/adjective stem + conjunctive suffix '-a/-ə'

RTR vowel stem		non-RTR vowel stem	
/mak-a/	'block'	/mək-ə/	'eat'
/kot-a/	'straight'	/kut-ə/	'solid'
/sʌl-a/	'burn'	/sɨl-ə/	'disappear'

   b. verb/adjective stem + adnominal suffix '-on/-un'

RTR vowel stem		non-RTR vowel stem	
/mak-on/	'block'	/mək-un/	'eat'
/kot-on/	'straight'	/kut-un/	'solid'
/sʌl-on/	'burn'	/sɨl-un/	'disappear'

   c. noun + particle (accusative particle '-ʌl/-ɨl' or locative particle '-aj/-əj')

RTR vowel stem		non-RTR vowel stem	
/sarʌm-ʌl/	'person'	/jərɨm-ɨl/	'fruit'
/tocʌk-ʌl/	'thief'	/kurək-ɨl/	'mesh bag'
/barʌl-aj/	'sea'	/njərɨm-əj/	'summer'
/narah-aj/	'nation'	/tɨrɨh-əj/	'field'

The vowel /i/ is neutral, in the sense that it can co-occur in roots with either RTR vowels or non-RTR vowels, as illustrated in (9).

(9) The neutral vowel /i/ can co-occur with either RTR vowels or non-RTR vowels.

a. with RTR:	/tʌri/	'bridge'	/tari/	'leg'	/kirʌma/	'packsaddle'
b. with non-RTR:	/məri/	'head'	/turumi/	'crane'	/mɨcikəj/	'rainbow'

Interestingly, some neutral stems containing only the neutral vowel /i/ takes both RTR and non-RTR suffixes as in (10).

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based on the neutralization pattern of the tongue root contrast in non-initial syllables whereby a marked RTR vowel /ʌ/ neutralizes into an unmarked non-RTR /ɨ/ (the first merger of /ʌ/, see §4.1.2 for the detail). Lǐ (1996: 318-324) discusses some attested differences between ATR and RTR systems, but this issue needs further research.

[6] The vowel harmony data presented here are taken from Song (1999: 138-9) and Lee & Ramsey (2000: 287-8).

(10) Neutral stem: either RTR or non-RTR vowel suffix is attested. (Park 1994: 150)

RTR vowel-initial suffix			non-RTR vowel-initial suffix		
isy-a[7]	/isja/	<Wel-Chen 135>[8]	*isy-e*	/isjə/	<Wel-Chen 135>
cih-oni	/cihʌni/	<Sek-Sang 19:32>	*cih-uni*	/cihɨni/	<Sek-Sang 11:24>
pih-omye	/pihʌmjə/	<Wel-Sek 2:39>	*pih-umye*	/ pihɨmjə/	<Wel-Sek 10>
kilh-ol	/kilhʌl/	<Wel-Sek 10>	*kilh-ul*	/kilhɨl/	<Sek-Sang 6:19>
him-ol	/himʌl/	<Wel-Chen 39>	*him-ul*	/himɨl/	<Wel-Sek 10>
ciz-a	/ciza/	<Wel-Chen 76>	*ciz-e*	/cize/	<Wel-Chen 98>

The apparent three-way height distinction in (5) seems to logically require two height features, [high] and [low]. In addition, [coronal], [labial], and [RTR] features are used in order to distinguish front/back, rounded/unrounded, and RTR/non-RTR vowels, respectively. With these five features, the feature specifications will be as follows:

(11) Full feature specifications for the MK vowels[9]

	/i/	/ə/	/a/	/ɨ/	/ʌ/[10]	/u/	/o/
[coronal]	+	-	-	-	-	-	-
[high]	+	-	-	+	-	+	-
[low]	-	-	+	-	-	-	-
[labial]	-	-	-	-	-	+	+
[RTR]	-	-	+	-	+	-	+

If we view a vowel harmony as spreading of a single harmonic feature, however, the above feature specifications are unsatisfactory in capturing the contrast between the two vowels in each harmonic pair, /ə/ and /a/, /ɨ/ and /ʌ/, and /u/ and /o/ because there are more differences than necessary. Rather, the feature specifications make a wrong prediction that the ideal RTR harmonic counterpart to /ʌ/ would be /ə/, not /ɨ/, because /ʌ/ and /ə/ have the same values for all the features other than [RTR]. This can be ascribed to the problem of 'too many features' (Hall 2007), specifically too many 'height' features. There is indeed, no positive evidence that both the two height features play a role in the MK phonology.

Another undesirable consequence is that (11) does not properly reflect the fact that the vowel /ɨ/ (and maybe its RTR counterpart /ʌ/ too) is the most unmarked vowel in Korean. Rather, given the feature specifications in (11), the vowel /ə/, not /ɨ/, would be taken for the most unmarked one.

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[7] I use italicized Yale Romanization for Middle Korean. Note that ㅗㅡ and ㆍ are transliterated as *wo* and *o*, respectively, to distinguish each other.

[8] The MK texts cited here are as follows:

Abbreviation	*Date*	*Title*	*Author*
Sek-Sang	1447	Sekpo sangcel	Swuyang (> Seyco)
Wel-Chen	1449	Wel.in chenkang ci kok	Seycong
Wel-Sek	1459	Wel.in sekpo	Seyco

The dates are based on Martin (1992: 397) and may be cited differently by other scholars.

[9] Here I use binary specifications for expository purpose.

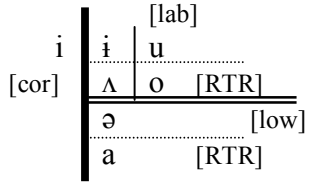
[10] Refer back to fn. 2 for the reason /ʌ/ is specified [-high, -low] here.

3.2 Contrastive Hierarchy in Middle Korean

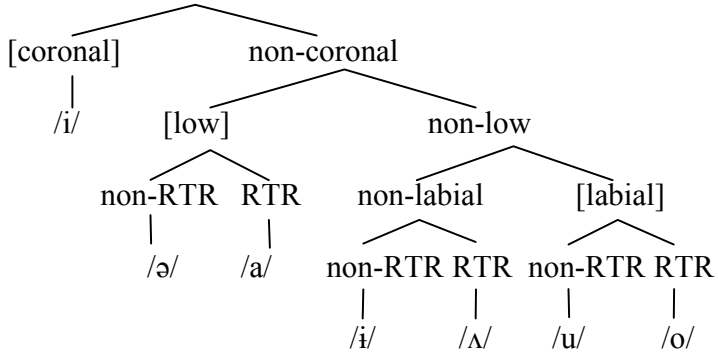
In the present study, the MK vowel system is analyzed as an RTR-based two-height vowel system with the contrastive hierarchy [coronal] > [low] > [labial] > [RTR], as shown in (12).

(12) MK vowel system and contrastive hierarchy: [coronal] > [low] > [labial] > [RTR]

a. vowel system[11]



b. contrastive hierarchy



Phonological activities such as palatalization (=coronalization, e.g., *kilum* > *cilum* 'oil'), the phonotactic constraint against the sequence of $C_{[lab]}V_{[lab]}$ (Clements and Hume 1995), and the RTR vowel harmony serve as evidence for the contrastive status of [coronal], [labial], and [RTR], respectively. With no positive evidence in favor of the assumed-to-be three-way height distinction, only one height feature is considered to be contrastive.

Under the proposed contrastive hierarchy, the neutrality of the vowel /i/ in the MK vowel harmony receives a plausible explanation, as in the case of Written Manchu: for the vowel /i/, the feature [coronal] alone is contrastive, while all the other feature specifications are redundant. Thus, the redundant (phonetic) value of [RTR] for /i/ cannot trigger the vowel harmony.

The unmarkedness of /ɨ/ and /ʌ/ as epenthetic vowel also receives proper treatment: they always belong to the unmarked set when SDA applies with respect to [coronal], [low], and [labial]. The hierarchical ordering of features also ensures that the RTR-ness of the unmarked vowel /ʌ/ is less contrastive than the coronality of /i/, the lowness of /ə/, the labiality of /u/, though they all share the property of having only one positive feature specification.

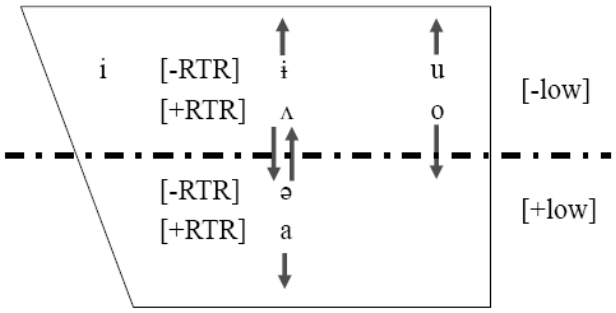
If the current analysis with only one height feature is correct, then how can we explain the apparent three-way height distinction given in (5)? The answer is that the MK vowel system is *phonologically* a two-height system but *phonetically* a three-height system. This difference between phonetics and phonology is attributed to the phonetic effect of *sympathetic/antagonistic feature combination* between tongue root and height features (J-K Kim 2000 based on Archangeli and Pulleyblank 1994).

When applied to the MK vowels, the sympathetic combination between [-low] and [-RTR] of /ɨ/ and /u/ results in additive F1 lowering, producing canonical high vowels. Similarly, the combination between [+low] and [+RTR] of /a/ results in additive F1 raising, producing canonical low vowel. By contrast, the antagonistic combination found in [-low, +RTR] of /ʌ, o/

[11] The same vowel system has been proposed earlier by J Kim (1999: 337, fn. 17) and J-K Kim (2000: 184). However, the present analysis advances this line of research by providing answers as to how we arrive at these specific contrastive specifications as well as what role the contrast plays in the synchronic and diachronic phonology.

and [+low, -RTR] of /ə/ results in lowered high vowels and raised low vowels, respectively, yielding the three-height distinction in the phonetics out of the two-height contrast in the phonology. This is depicted in (13) with the side effect of phonetic overlap between /ʌ/ and /ə/.

(13) Phonetic overlap between /ʌ/ and /ə/ of the MK vowel system (J-K Kim 2000: 189)



This phonetic overlap receives support from the sporadic change of /ʌ/ into /ə/ illustrated in (14) and (15).

(14) Sporadic change of /ʌ/ into /ə/ in Middle Korean
(W-J Kim 1978: 132, cf. Jung 1994 for relevant examples in Jeju Korean)

thok	/t^{h}ʌ̲k/	>	*thek*	/t^{h}ə̲k/	‘jaw’
pol	/pʌ̲l/	>	*pel*	/bə̲l/	‘punishment’
ilkhot-	/ilk^{h}ʌ̲t-/	>	*ilkhet-*	/ilk^{h}ə̲t-/	‘call’

(15) /jə/ < */jʌ/ (K-M Lee 1972a)

yela	/jəra/	<	*/jʌra/ ‘several’
yetolp	/jətʌlp/	<	*/jʌtʌlp/ ‘eight’
pwosyen	/posjən/	<	*/posjʌn/ ‘Korean socks’
myenoli	/mjənʌri/	<	*/mjʌnʌri/ ‘daughter-in-law’

At first glance, the data in (15) looks exceptional in terms of vowel harmony. However, the seemingly disharmonic roots in (15) can be understood to have been originated from harmonic roots, if the reconstruction by K-M Lee (1972a) is correct.

4 Early Modern Korean

4.1 Vowel System in Early Modern Korean

The vowel system of Early Modern Korean (EModK hereafter) is shown in (16) with the MK vowel system on its left for the purpose of comparison.

(16) a. Late Middle Korean (K-M Lee 1972b: 137)

ㅣ i	ㅡ ɨ	ㅜ u
	ㅓ ə	ㅗ o
	ㅏ a	ㆍ ʌ

b. Early Modern Korean in 19th century (K-M Lee 1972b: 202)

ㅣ i	ㅡ ɨ	ㅜ u
ㅖ e	ㅓ ə	ㅗ o
ㅐ ɛ	ㅏ a	

The differences between the MK and the EModK vowel system are summarized in (17):

(17) Characteristics of the EModK vowel system in comparison with that of MK
- a. Loss of /ʌ/ by the so-called two-step merger
- b. Creation of non-high front vowels by the monophthongization of /əj, aj/ to /e, ɛ/
- c. Collapse of vowel harmony

It is generally accepted that /ʌ/ in MK undertook two distinct steps of merger in the course of its complete disappearance in EModK: the first merger with /ɨ/ in non-initial syllables in the sixteenth century, as in (18), and the second merger with /a/ in initial syllables in the mid-eighteenth century, as in (19) (K-M Lee 1972b: 200-1).

(18) The first merger of /ʌ/ with /ɨ/ in non-initial syllables in 15th-16th century (MK)

/han̲ʌ̲l/ > /han̲ɨ̲l/	'sky'	/nak̲ʌ̲naj/ > /nak̲ɨ̲ne/	'wanderer'
/tar̲ʌ̲-/ > /tar̲ɨ̲-/	'different'	/kʌr̲ʌ̲cʰi-/ > /kar̲ɨ̲cʰi-/	'to teach'

(19) The second merger of /ʌ/ with /a/ in initial syllables in 18th century (EModK)

/pʰa̲ʌ̲ri/ > /pʰa̲r̲i/	'fly'	/pʰa̲ʌ̲ram/ > /pa̲r̲am/	'wind'
/ha̲ʌ̲-/ > /ha̲-/	'do'	/ta̲ʌ̲l/ > /ta̲l/	'moon'
		/ka̲ʌ̲rʌcʰi-/ > /ka̲r̲ɨ̲cʰi-/	'to teach'

4.2 Contrastive Hierarchy in the EModK Vowel System

4.2.1 Change of Contrastive Hierarchy and the Two-Step Merger of /ʌ/

In the present analysis, the first and the second merger receive a unified analysis in terms of phonological neutralization of the lowest ranked contrast. The different merger pattern is due to a change in the contrastive hierarchy.

First of all, I analyze the first merger as positional RTR neutralization under the MK contrastive hierarchy [coronal] > [low] > [labial] > [RTR] given in (12). This analysis gives an account of why the merger was with /ɨ/, not with /ə/ despite the phonetic overlap, nor with /a/ or /o/ as in the second merger. Under the MK contrastive hierarchy, the vowel /ɨ/ is the only phoneme that /ʌ/ *minimally contrasts* with, that is the only phoneme that /ʌ/ can phonologically merge into. This reasoning is based on the following hypothesis on the notion of *minimal contrast* and *phonological merger*.

(20) Minimal Contrast (Cf. Campos-Astorkiza 2007)
Minimal contrast is the contrasts between pairs of segments that differ only in the value of the lowest-ranked contrastive feature.

(21) Minimal Contrast and Phonological Merger (a hypothesis)
A *phonological* merger operates based on a minimal contrast.[12]

The first merger of /ʌ/, the RTR neutralization between /ʌ/ and /ɨ/ in weak positions (non-initial syllables), resulted in the loss of RTR contrast in the entire phonology, and caused the collapse of vowel harmony in the end.[13] Without RTR contrast, the vowels cannot be fully distinguished by the remaining three features, [coronal], [low], and [labial], calling for the introduction of a new contrastive feature [high] to the hierarchy.

As a result, the RTR-based, two-way height system turns into a labial contrast-based, three-way height system (22) with the contrastive hierarchy [coronal] > [low] > [high] > [labial] (23), where the previous 'phonetic' three-way height distinction becomes a 'phonological' one.

(22) EModK vowel system[14]

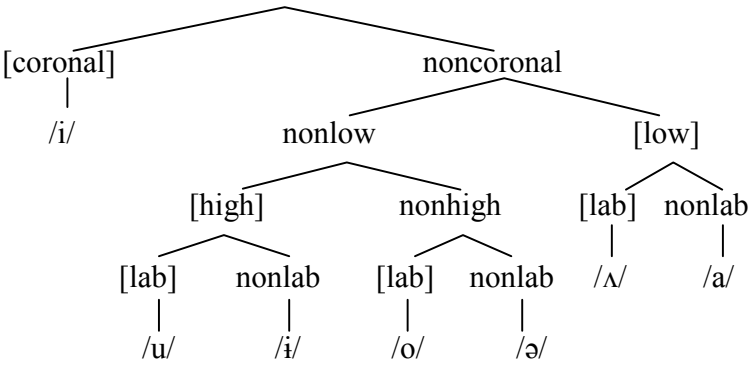
a. initial position

[cor]	[lab]	
i	ɨ	u [hi]
ə	o	
a	ʌ	[low]

b. non-initial position

[cor]	[lab]	
i	ɨ	u [hi]
ə	o	
a		[low]

(23) EModK contrastive hierarchy: [coronal] > [low] > [high] > [labial]



Under the new contrastive hierarchy, the vowel /ʌ/ might have been reinterpreted as 'rounded' low back vowel /ɔ/, which is supported by the fact that the retained /ʌ/ in modern Jeju Korean is indeed /ɔ/ (Hyeon 1992). This reinterpretation of /ʌ/ into /ɔ/ is probably the only actual change in the phonetic value of any vowel descendants from MK. Thus, the second merger of /ʌ/ into /a/ can be analyzed as a labial neutralization, which marks the completion of the

[12] This hypothesis does not exclude the possibility of a phonetically-driven merger.
[13] Han (1990) claims that the collapse of the vowel harmony is the cause, rather than the result, of the loss of /ʌ/.
[14] This is the vowel system right after the first merger of /ʌ/, but before the second merger and the creation of mid and low front vowels. Note that I assume two minimally different systems which are sensitive to syllabic position.

development of a labial contrast-based vowel system. A further development in this direction will be instantiated in §5.1 by the loss of the entire labial contrast in modern Northwest Korean.

4.2.2 Evidence for the Contrastive Hierarchy in EModK

The labial contrast between vowels is further substantiated by the labialization of /ɨ/ to /u/ and the anti-labialization of /o/ to /ə/ after a labial consonant, as illustrated in (24).

(24) Labialization and Anti-labialization

a. Labialization: high V /ɨ/ becomes /u/ after a labial consonant.

/mɨl/	> /mul/	'water'	/mɨsɨm/	> /musɨn/	'what kind of'
/pɨl/	> /pul/	'fire'	/pɨlk-/	> /pulk-/	'red'
/pʰɨl/	> /pʰɨl/	'grass'	/pʰɨzəŋkuj/	> /pʰusəŋkwi/	'vegetables'

b. Anti-labialization: mid V /o/ to /ə/ in late 18th century (P-G Lee 1970)

/moncjə/	> /məncə/	'ahead; first'	/moncʌj/	> /mənci/	'dust'
/posjən/	> /pəsən/	'Korean socks'	/pondoki/	> /pənteki/	'pupa'
/posnamo/	> /pəsnamu/	'cherry tree'	/spom/	> /p'jəm/	'span of a hand'

What is of particular interest is the newly-made labial contrast between /ə/ and /o/, which indicates the EModK /ə/ is reinterpreted as contrastively non-labial mid vowel. Recall that the MK /ə/ minimally contrasted with a low vowel /a/ in terms of RTR and lacked a specification for [labial]. Also, the difference in the direction of structural changes in the above two rules might indicate that there is a high vs. mid distinction with the relative hierarchy [high] > [labial].

However, more convincing evidence for the three-way height distinction is the creation of new mid and low front vowels by the monophthongization of /əj, aj/ into /e, ɛ/.

(25) Monophthongization of /əj, aj/ to /e, ɛ/

a. ə i → e i
[-hi,-lo] [+cor] [-hi,-lo] [+cor]

b. a i → ɛ i
[-hi,+lo] [+cor] [-hi,+lo] [+cor]

5 Modern Korean

5.1 Two Directions in the Change of Vowel Systems in Modern Korean

In this section, we move on to Modern Korean and see how the contrastive hierarchy theory explains the synchronic variations in Modern Korean vowel systems.

According to Kwak (2003), there are two conspicuous directions in the development of modern dialects with respect to the vowel system. One extreme case in one direction is the vowel system of the Northwest dialect with a rather vertical '3‖3' system and the other extreme case in the opposite direction is the vowel system of the Southeast dialect with a rather horizontal '2‖2-2' system, as shown in (26).

(26) The two directions in the development of modern dialects (Kwak 2003)

a. Northwest Korean: 3‖3 system

ㅣ i	ㅜ u	
ㅖ e	ㅗ ɔ	
ㅐ ɛ	ㅏ a	

b. Southeast Korean: 2‖2-2 system

ㅣ i	ㅡ ɨ	ㅜ u	
ㅐ ɛ	ㅏ a	ㅗ o	

Other dialects are in the middle of changing into one or the other, with the observed tendency that North Korean dialects follow the path of Northwest Korean and South Korean dialects follow the path of Southeast Korean.

I propose the following contrastive hierarchies for the vowel systems of NW and SE dialect:

(27) Contrastive hierarchies of Modern Korean dialects

a. NW dialect: [cor]>[low]>[hi]~~>[lab]~~

[cor]		
i	u	[hi]
e	o (ɔ)	
ɛ	a	[low]

b. SE dialect: [cor]>[low]>[labial]~~>[hi]~~

[cor]			
		[lab]	
i	ɨ	u	
ɛ	a	o	[low]

All North Korean dialects seem to retain the EModK hierarchy [coronal] > [low] > [high] > [labial]. However, the difference between EModK and modern North Korean is that the labial neutralization, which was applied only to the contrast between /ʌ/ and /a/ in EModK (the second merger), is now being applied across-the-board. Therefore, NW dialect, the most advanced case in this direction, where the feature [labial] is not contrastive any more, allows for non-labial allophones of /u/ and /o/ (Kwak 2003: 66).

By contrast, South Korean dialect is characterized by the loss of three-way height contrast. If the hypothesis of minimal contrast and phonological merger in (21) is correct, it should follow that a height feature should be the lowest-ranked one, thus, [labial] > [high] rather than [high] > [labial]. This means that there must have been a flux in the relative hierarchy between [high] and [labial] sometime between EModK and modern South Korean. This received support by the mid-vowel raising in late 19th century.

(28) Mid vowel raising in the late 19th century (P-G Lee 1970, Kwak 2003: 77-79)

a.

iː	ɨː	uː
↑	↑	↑
eː	əː	oː
ɛː	aː	

b. examples

eː>iː /seːsaŋ/ > /siːsaŋ/ ‘world’, /ceːsa/ > /ciːsa/ ‘a religious service’,
əː>ɨː /əːpsta/ > /ɨːpsta/ ‘not exist’, /pəːlta/ > (/pɨːlta/) > /puːlta/ ‘earn’,
oː>uː /toːn/ > /tuːn/ ‘money’, /oi/ > /ui/ ‘cucumber’,

5.2 Jeju (Cheju) Korean

Modern Jeju dialect, the language of Jeju island off the southern end of the Korean peninsula, is particularly interesting, because it retains the Middle Korean vowel /ʌ/ (reanalyzed as /ɔ/) and the newly-created front vowels /e/ and /ɛ/. It does not seem to follow the typical directions of the other dialects.

The vowel system of Jeju Korean in (29a) looks inventory-wise identical to that of EModK in (22) with 9 vowels including the two new front vowels. However, it is reported that Jeju Korean is currently changing into a 7 vowel system in the speech of younger generation (Jung 1994).

(29) The ongoing change of vowel system in Jeju Korean (Jung 1994: 15)

a. 9 vowel system

ㅣ i	ㅡ ɨ	ㅜ u
ㅖ e	ㅓ ə	ㅗ o
ㅐ ɛ	ㅏ a	ㆍ ʌ (=ɔ)

b. 7 vowel system

ㅣ i	ㅡ ɨ	ㅜ u
ㅖ e	ㅓ ə	ㅗ o
	ㅏ a	

Note in particular that the retained /ʌ/ is in the process of merging into /o/ in Jeju Korean, which is a new type of second merger. Actually, there have appeared more than one type of second merger, as summarized in (30).

(30) Three types of the second merger of /ʌ/

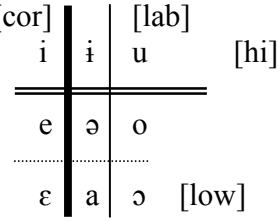
		Merger pattern	Dialect
a.	Type 1:	/ʌ/ > /a/	most dialects including Central dialect
b.	Type 2:	/ʌ/ > /o/	modern Jeju dialect
c.	Type 3:	/ʌ/ > /o/ after a labial C /ʌ/ > /a/ elsewhere	South Jeolla and Yukjin dialect[15]

(31) shows the contrastive hierarchy of Jeju vowel system with the feature [low] being outranked by all the other contrastive features. Another ongoing merger between the mid front vowel /e/ and the low front vowel /ɛ/ seems to support this analysis.

[15] South Jeolla and Yukjin dialect have a mixed merger pattern where (i) /ʌ/ assimilates to the preceding labial consonant (becoming /o/) and (ii) merges with /a/ elsewhere. The labial assimilation in S. Jeolla and Yukjin is exemplified in Lee and Ramsey (2000: 318-320).

i.		*Yukjin*	*Middle Korean*	*Seoul Korean*
	'horse'	/mol/	/mʌl/	/mal/
	'fly'	/pʰori/	/pʰʌl/	/pʰari/
	'arm'	/pʰol/	/pʰʌl/	/pʰal/
	'redbean'	/pʰocʰi/	/pʰʌsk/	/pʰat/
ii.		*South Jeolla*	*Middle Korean*	*Seoul Korean*
	'village'	/mosil/	/mʌzʌl/	/maɨl/
	'bright'	/polk-/	/pʌlk-/	/palk-/
	'dry'	/molli-/	/mʌrʌ-/	/mari-/
	'sell'	/pʰol-/	/pʰʌl-/	/pʰal-/

(31) Jeju Korean contrastive hierarchy: [coronal] > [high] > [labial] > [low]



6 Conclusion

This paper provided a contrastivist account (Dresher 2009) of the evolution of the Korean vowel system, which illuminates the crucial role of contrast in phonology. It is argued that the major changes in the Korean vowel system are well accounted for in terms of changes in the *contrastive hierarchy* of distinctive features. I analyzed the MK vowel system as an RTR-based two-height system rather than a three-height system, which explains the seeming discrepancy between the vowel system and the vowel harmony in MK. By contrast, the EModK vowel system was analyzed as a labial contrast-based three-height system. Under this framework, the first and the second merger of /ʌ/ received a unified analysis: both are analyzed as neutralization between two minimally contrastive segments. Also, this account was extended to the development of the modern vowel systems.

The present approach, inspired by the analysis of Manchu vowel systems in Dresher and Zhang (2005), seems to provide a typologically plausible treatment of the Korean vowel system within the areal context of Northeast Asia, particularly in relation to Tungusic. Thus, it would be fruitful if we can further extend our research into other NE Asian languages such as Mongolic.

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