

## Structured Imbalances in the Emergence of the Korean Vowel System

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**ABSTRACT.** This paper develops a structured account of the monophthongization and diphthongization processes which occurred in Korean during the 18<sup>th</sup> and the 19<sup>th</sup> centuries. These seemingly contradictory changes are seen as engendered by a persistent drive toward balance, symmetry and system optimization, with the result that Korean has come to abandon all off-glide diphthongs in favor of a rich set of (typologically less common) on-glide diphthongs. In 15<sup>th</sup> century Middle Korean, there were seven monophthongs (/i, i, u, ə, o, a, ɔ/) as well as a number of both on-glide (/wə, wa, yu, yə, yo, ya, yɔ/) and off-glide diphthongs (/iy, uy, əy, oy, ay, ɔy/). As in the modern language, off-glides with /w/ were not allowed (\*/Vw/), and central unrounded /i/ went into combination only to form the off-glide diphthong /iy/ (\*/wi/, \*/yi/), which lasted into the 20<sup>th</sup> century before monophthongizing to /i/ in most environments. By the end of the 18<sup>th</sup> century, the low rounded vowel /ɔ/ had merged with /a/, and monophthongization had changed (/ɔy/ >) /ay/ to /ɛ/ and /əy/ to /e/, thus forming a new system with eight symmetrically distributed simple vowels (/i, i, u, e, ə, o, ɛ, a/), six on-glide diphthongs (/wə, wa, yu, yə, yo, ya/), but just three off-glide diphthongs (/iy, uy, oy/). The latter two of these underwent monophthongization themselves in the 19<sup>th</sup> century, viz., /uy/ > /ü/ and /oy/ > /ö/, which resulted then in a 10-way system of monophthongs alongside the seven inherited diphthongs (/wə, wa, yu, yə, yo, ya/ and, marginally now, /iy/). The two new front rounded vowels /ü/ and /ö/ did not last long, however, soon becoming the modern on-glide diphthongs /wi/ and /we/. Overall, the result for the modern language is that historical off-glide diphthongs (all with /y/) have been abandoned in favor of a comprehensive system of on-glide diphthongs, four labial and five palatal (/wi, we, wə, wa; yu, yo, ye, yə, ya/).

## 0. Introduction\*

The basic vowel system in colloquial Korean today is symmetric. In addition to one low vowel (central unrounded /a/), there are three mid and three high monophthongs: two front unrounded (/i/, /e/), two central unrounded (/i/, /ə/), two back rounded (/u/, /o/). An additional low vowel, front unrounded /ɛ/, still prevails in the formal standard (phonemically as well as orthographically), but this is being merged with /e/ in the speech of most Koreans throughout the country now, resulting in an evenly balanced 7-vowel inventory. This symmetric system of monophthongs is complemented by a skewed set of nine on-glide diphthongs consisting of /wi/, /we/, /wə/, /wa/ with a labial onset (but no \*/wi/, \*/wu/, \*/wo/) and /yu/, /yo/, /ye/, /yə/, /ya/ with a palatal onset (but no \*/yi/, \*/yi/).<sup>1</sup> There are no off-glide diphthongs in the modern language, though several of these had been formed previously with the palatal glide.

This paper reviews how the present-day system evolved out of the seemingly odd array of vowels known to have characterized Middle Korean as spoken in the first half of the 15<sup>th</sup> century. Explicit phonological and phonetic information from this period is available based on careful commentaries and analysis associated with the new way of alphabetic writing that was introduced in Korea in 1446. In section 1, we lay out the structure of the Middle Korean vowel system and identify its peculiarities, then briefly chart its development up to the early 20<sup>th</sup> century through a series of superficially contradictory

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<sup>1</sup> Marginally, /tui/ with a central or back unrounded onset also occurs for some speakers in word-initial position, a remnant of historical /iy/; see section 3 below.

monophthongizations and diphthongizations. In section 2, we review the linguistic and philological evidence that establishes the diphthongal status in Middle Korean of orthographic <ay> and <øy>, which in Modern Korean represent /ɛ/ and /e/, respectively (recently merged as [e] for many speakers). We turn in section 3 to a feature analysis of the systems over time and show how the apparent ‘inversion’ of diphthong to monophthong to diphthong (/uy/ > /ü/ > /wi/, /oy/ > /ö/ > /we/) derives naturally from structural forces in the system itself. Here we highlight the increasing prominence of the inherited constraint against labial off-glides and its generalization to exclude off-glides of all types, palatal as well as labial. Throughout, we point toward the symmetries and balance that are achieved as a consequence of the changes under review, taking these systemic factors as structural motivations for the changes themselves. In the end, these changes lead to a rationalized simplification of the inherited vowel system, but result also in a sharp skewing of the diphthong inventory to consist now only of on-glide structures, which is perhaps surprising in view of the commonplace occurrence of off-glide diphthongs cross-linguistically. We conclude with a short summary in section 4.

### 1. The emerging resolution of asymmetries in the Middle Korean vowel system

The new means of alphabetic writing which had just been promulgated by King Sejong in 1446 is appreciated today as an ingenious linguistic invention.<sup>2</sup> With respect to the many vowels symbolized in this system, there are three ‘rudiments’ which make up each letter, either individually or in combination: a vertical stroke ‘|’, by itself representing the high front unrounded vowel /i/ (and standing for “man” in the cosmologic philosophy of the time), a horizontal stroke ‘—’ representing the high central unrounded vowel /i/ (“earth”), and a dot ‘•’ representing the low back rounded vowel /ɔ/ (“heaven”). The dot rudiment then combined with the two stroke rudiments in symmetric ways to represent an additional four ‘principle’ vowels: to the right of the vertical stroke for /a/, to the left of the vertical stroke for /ə/, above the horizontal stroke for /o/, and below the horizontal stroke for /u/. In composite letters, however, the dot (presumably for reasons of ease and efficiency in manual writing) soon came to be replaced by a short stroke oriented opposite to the long stroke with which it associated, as in Korean orthography today, but the charts below show how the dot rudiment was employed originally. Long strokes did not combine with each other in forming monophthongs, moreover, hence the graphic possibilities using just the three rudiments (—, |, •), either alone or in permitted combination, are exhaustive and represent the seven basic vowels of Middle Korean charted phonemically and orthographically in (1). That is, the seven monophthongs of 15<sup>th</sup> century Korean comprised an asymmetric system of six back vowels and just one front vowel (Huh 1965, K.-M. Lee 1972).

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<sup>2</sup> Indeed, this celebrated alphabet — literally so, as October 9 is designated Alphabet Day (*Hangeul-nal*) in Korea — is widely acclaimed to be the phonologically most sophisticated and insightful writing system in existence, combining phonetic and syllabic properties into a composite alphabet that continues to instill admiration among professional linguists and other scholars the world over (cf. the series of articles in the Kim-Renaud 1997 anthology).

(1) Basic vowel system in the 15<sup>th</sup> century: 7 monophthongs

-back		+back	
i		ɨ	u
		ə	o
		a	ɔ

Orthographic representation

-back		+back	
		—	—̣
		·	·—̣
		·	·

The 15<sup>th</sup> century system also included a number of diphthongs, but their distribution was highly restricted phonologically, under limitations which the orthography encodes with impressive naturalness. Specifically, there were four phonemic diphthongs formed with palatal /y/ (IPA [j]) as an on-glide and six with /y/ as an off-glide, whereas there were but two on-glide diphthongs formed with labial /w/ and no off-glide diphthongs with /w/.<sup>3</sup> Figure (2) lays out how the vowels in (1) combined to form both on-glide and off-glide diphthongs with palatal /y/ (bracketed [yɔ] was marginal) and on-glide diphthongs with labial /w/. Asterisked combinations did not occur, according to the historical record, whereas those in bold face existed in Middle Korean but are absent in Modern Korean.

(2) a. On-glides (/y/ and /w/)

-back		+back	
*yi		*yi	yu
		yə	yo
		ya	[yɔ]

-back		+back	
*wi		*wi	*wu
		wə	*wo
		wa	*wɔ

Orthographic representation

-back		+back	
			—̣
		·	·—̣
		·	·

-back		+back	
		·	
		· ·	

<sup>3</sup> A fifth palatal on-glide diphthong with a low back rounded nucleus, /yɔ/, was marginal at best, and, for orthographic reasons about to be elucidated, was not even included in the 11 basic vowel letters set forth in *Hunminjeongeum* [see discussion below]. Used only in describing dialect variation or children’s speech, *Hunminjeongeum* stated that this uncommon combination could, as needed, be represented in the new writing system by a dot placed below (rather than to either side of) the vertical stroke (K.-M. Lee 1972). Similarly, the phonemically excluded palatal on-glide diphthong with a high central nucleus, /yi/, could be represented by a horizontal stroke placed below the vertical stroke; but there is no textual evidence that this diphthong occurred.

## b. Off-glides (/y/ only; boldface not in Modern Korean)

*iy		iy	<b>uy</b>	*Vw
		əy	<b>oy</b>	
		ay	ɔy	

Orthographic representation

-back		+back	
		┆	┆
		·┆	·┆
		┆	┆

Gaps in the charts in (2) reveal that, just as in Modern Korean, there was a restriction on diphthongal distribution in Middle Korean to the effect that any off-glide configuration with /w/ was not allowed. The orthographic restriction corresponding to this limitation is that only the vertical stroke rudiment | may appear to the right in combination with a fundamental vowel, hence the only permitted off-glide is /y/.<sup>4</sup> On-glides, by contrast, were represented by the symbol for either /o/ (before /a/) or /u/ (before /ə/) to the left of the nucleus in the case of the labial glide, or, in the case of the palatal glide, by an additional dot or short stroke adjacent to that already present in association with one of the two long stroke rudiments. Accordingly, of the seven monophthongs in Middle Korean, none formed off-glides with /w/ and all formed off-glides with /y/, except for /i/, whose juxtaposition to another instance of the same rudiment was not permitted. On-glide /w/ occurred only before the composite vertical letters, i.e., not before any of the three rudiments alone or before the horizontally oriented letters; hence, the only labial on-glide diphthongs were /wa/ and /wə/. (The combination of orthographic /u/ and /i/ stood for the off-glide diphthong /uy/, not \*/wi/; cf. below.)

The reasons for the systematic exclusions, of course, are phonological rather than orthographic, but it is impressive how directly (and automatically) the orthography reflects the several phonological restrictions. Thus, /i/ participated in the formation of only one diphthong, /iy/, a combination which lasted until the 20<sup>th</sup> century before monophthongizing to /i/ (or /i/, depending on the dialect; cf. Ahn & Cho 2003). Similarly, there has long been a rigorous constraint banning diphthongal configurations in which high vowel and glide share the same place of articulation, whether labial or palatal, hence \*/yi/, \*/iy/, \*/wu/; the labial glide has never occurred with rounded vowels, either, hence \*/wo/, \*/wɔ/. Each of these phonotactic restrictions (which persist to the present day) can be accounted for in a straightforward way using familiar devices and constraints to block, in particular, diphthongal combinations which share [+round] or [+high, αback]. But

<sup>4</sup> The dot+vertical stroke combination unambiguously represented both the monophthong /ə/ (dot+stroke to the right of the obligatory initial consonant symbol) and the off-glide diphthong /ɔy/ (dot below the initial consonant symbol, stroke to the right), whereas the on-glide diphthong /yɔ/ was represented by placement of the dot directly below the vertical stroke. These two diphthongs (the second of which was marginal in any case, absent from the basic vowel set in (5a) below) along with their orthographic representations were short-lived, however, as /ɔ/ soon merged with /a/, individually as well as in diphthongal combination.

their emergence in later stages of the language, as will be shown below, shows that nonhigh front vowels freely do combine to form on-glide diphthongs. Thus, these gaps in the system, though regular (missing /ye/, /yɛ/, /e/, /ɛ/, also /ü/, /ö/), may be considered to have been essentially accidental, as they were filled in consequence of subsequent events, viz., the series of diphthong developments about to be described.

The systematic absence of \*/wi/ in Middle Korean would appear to be without structural foundation, however, inasmuch as the complementary palatal on-glide diphthong /yu/ was (and still is) freely sanctioned. But as will be shown in the next section describing other relevant aspects of the Korean alphabet, the orthographic representation of \*/wi/ would have been identical to that of the off-glide diphthong /uy/ (later the monophthong /ü/) because off-glide diphthongal vowels were symbolized not explicitly as vowel plus glide or as glide plus vowel, but rather as vowel plus vowel — which of the two is vowel and which is glide was then deducible from overall constraints on the system. Specifically, because /w/ is precluded from serving as an off-glide, the sequence of [i]+[u] must represent /yu/, not \*/iw/. The reverse-order sequence [u]+[i], by contrast, could in principle represent either /uy/ (which it did) or \*/wi/ (which it did not) because /y/ was free to serve as an off-glide and /w/ was free to serve as an on-glide. The ambiguity of diphthongal [u]+[i] in Middle Korean was resolved in favor of phonemic /uy/, but perhaps only arbitrarily so, because, as we shall see below, the sequence /wi/ did emerge much later on — and, indeed, from this same source. In a sense, then, the absence of \*/wi/ in Middle Korean was both arbitrary and systematic: [u]+[i] could have stood for phonemic /wi/ at that time, but this would have left a gap in the symmetric system of back vowel plus palatal off-glide diphthongs (/uy/ would have been missing from the set) while creating an isolated labial glide plus front vowel diphthong. The phonemic resolution of [u]+[i] thus favored /uy/ over /wi/ in Middle Korean, though this interpretation was to be reversed some five centuries later as the vowel system evolved and the modern language came to develop an aversion to off-glide diphthongs generally.<sup>5</sup>

By the end of the 18<sup>th</sup> century, to lay out the chronology, then, the Middle Korean low rounded vowel /ɔ/ had been merged with /a/ (/ɔ/ > /a/) and a process of monophthongization had changed the central onset diphthongs /ay/ and /əy/ to /ɛ/ and /e/, respectively, thus forming the new eight-vowel system presented in (3) (K.-M. Lee 1972, J.-H. Park 1983, C.-W. Park 2002).<sup>6</sup>

(3) Basic vowel system in the 18<sup>th</sup> century: 8 monophthongs

-back		+back	
i		ɨ	u
e		ə	o
ɛ		a	

<sup>5</sup> A discussion of the diphthongal status of Middle Korean /uy/ will be included in the next section on /ay, əy/.

<sup>6</sup> In minor cases, however, /ɔ/ was changed to /o/ or even /i/ (K.-M. Lee 1972).

Two other off-glide diphthongs underwent monophthongization starting in the 19<sup>th</sup> century, /uy/ > /ü/ and /oy/ > /ö/, which resulted then in a basic ten-vowel system, i.e., that in (3) plus /ü/ and /ö/ (Ahn 1998).

(4) Basic vowel system in the late 19<sup>th</sup> and early 20<sup>th</sup> century: 10 monophthongs

-back		+back	
i	ü	ɨ	u
e	ö	ə	o
ɛ		a	

The new front rounded vowels /ü/ and /ö/ did not last long, however, for during the earlier part of the 20<sup>th</sup> century these typologically marked monophthongs began to be “broken” into the on-glide diphthongs /wi/ and /we/, respectively. We term the overall pattern of 18<sup>th</sup>-19<sup>th</sup>-20<sup>th</sup> century developments changing /uy/ > /ü/ > /wi/ and /oy/ > /ö/ > /we/ a “phonological inversion” (of the form, diphthong > monophthong > diphthong), and we see these particular shifts as having been precipitated by the emergence of a new restriction on the composition of diphthongs in the language which extended the extant suppression of labial off-glides (\*Vw) to palatals as well (\*Vy). Both labial and palatal on-glides were still sanctioned in the diphthong system, however, and a move to unpack the markedness inherent in the historically intermediate front rounded monophthongs induced a further shift to yield the overall series of changes just outlined: off-glide diphthong (18<sup>th</sup> c.) > complex monophthong (19<sup>th</sup> c.) > on-glide diphthong (20<sup>th</sup> c.).

## 2. On the diphthongal status of orthographic <ay, əy> in Middle Korean

The changes in the Korean vowel system over some 550 years as laid out in section 1 represent the essentially invariant philological consensus in Korean historical linguistics. Nonetheless, a question might arise as to the diphthongal status of <ay> and <əy> in the earlier period, because in Modern Korean these symbols represent monophthongal /e/ and /ɛ/; moreover, their absence from the 15<sup>th</sup> century basic vowel inventory charted in (1) results in a highly asymmetrical, perhaps even typologically unprecedented system. Conceivably, then, orthographic <ay, əy> in Middle Korean already represented the monophthongs /e, ɛ/, as these graphemes do in Modern Korean, which would have placed the vowel system in full balance even then with symmetric distribution of three front vowels, three central and three back.

This structurally appealing possibility has been addressed in the work of S.-N. Lee (1949) and Huh (1952), both of whom concluded that <ay, əy> did convey diphthongal status in the 15<sup>th</sup> century and indeed for some time afterward. S.-N. Lee (1949), for example, argued that if <ay> and <əy> (as well as <oy> and <uy>) had been monophthongs in Middle Korean, there would have been no reason not to include them in the 28-character inventory of basic symbols presented in *Hunminjeongeum* (*The Correct Sounds for the Instruction of the People*), the treatise on the Korean writing system promulgated by King Sejong the Great in 1446. Now known as *Hangeul*, the rigorously phonetic spelling system of *Hunminjeongeum* included even <yu, yə, yo, ya> as basic vowel letters, representing four palatal on-glide diphthongs which still occur today and which arguably

function phonologically as single nuclear vowels. The full set of basic vowels in the Middle Korean writing system thus consisted of the seven phonetic monophthongs listed in (1), /i, i, u, ə, o, a, ɔ/, plus the four palatal on-glide diphthongs given in (2a), /yu, yə, yo, ya/, the palatal element of which was marked in the orthography of *Hunminjeongeum* by an additional mark (dot or short stroke) next to the one already present in a composite symbol.

Symbols for the labial on-glide diphthongs in (2a) (/wə, wa/) and the palatal off-glide diphthongs in (2b) (/iy, uy, əy, oy, ay, ɔy/) were not included in the set of basic vowels, however, implying that these were perceived to be segmentally composite (i.e., /u+V/, /V+i/).<sup>7</sup> Thus, if <ay, əy> had indeed been phonetically or phonologically monophthongal already at this early stage, then it is expected that they would have been included in the set of basic vowels in (5a) rather than grouped with the “combined” vowel symbols in (5b).

(5) a. 11 vowels included in the basic 28 letters of *Hunminjeongeum*<sup>8</sup>

·	—		⊥	┆	┆	┆	⊥	ㅍ	ㅑ	ㅓ	ㅕ
ɔ	i	i	o	a	u	ə	yo	ya	yu	yə	

b. Some vowels NOT included in the basic 28 letters

·	—	⊥	ㅍ	ㅑ	ㅓ	ㅕ	ㅍ	ㅑ	ㅓ	ㅕ	ㅑ	ㅓ	ㅕ
ɔy	iy	oy	ay	uy	əy	yoy	yay	yuy	yəy	wa	wə	way	

Huh (1952) cites other types of evidence pointing toward diphthongal status for <əy, ay> and <oy, uy>. The major arguments can be summarized as follows. First, according to *Hunminjeongeum Haerye*, the commentaries and examples portion of *Hunminjeongeum*, <ay, əy, oy, ɔy> belonged to the same category as <uy, iy>. The commentaries indicate that these vowels all terminate in the sound marked by a single vertical stroke |, i.e., [i] (palatal /y/), which is strongly indicative of their diphthongal status. Second, the

<sup>7</sup> It is perhaps curious that the basic vowels of *Hunminjeongeum* per se included only those on-glide diphthongs beginning with /y/ (i.e., /yo, ya, yu, yə/). That the two on-glide diphthongs with /w/ (/wa, wə/) were not grouped with the 11 basic vowel letters (these two combinations and their phonetic values were included in the *Commentaries* portion of *Hunminjeongeum*) indicates their psychologically derivative status as compared with the palatal on-glide diphthongs. As (2a) and (5) show, the orthography encodes this distinction by representing the labial on-glide structures as a combination of the symbol for an independent back rounded vowel followed by the diphthongal nucleus (/u+/ə/ for /wə/, /o+/a/ for /wa/), whereas the palatal on-glide diphthongs, which King Sejong apparently conceived of as units rather than combinations, are marked merely by a diacritic short stroke (originally a dot) on the nuclear vowel symbol.

<sup>8</sup> In *Hunminjeongeum* as promulgated in 1446, there were basic letters for 17 consonants and 11 vowels. The consonant letters are listed below, of which the three in the shaded area are now extinct, the velar nasal now represented by the symbol for a phoneme which no longer exists in the language, voiced *h*.

letter	ㄱ	ㄴ	ㄷ	ㄹ	ㅁ	ㅂ	ㅅ	ㅇ	ㅈ	ㅊ	ㅋ	ㆁ	ㅌ	ㅍ	ㅑ	ㅓ	ㅕ
phonetic value	k	n	t	l	m	p	s	fi (∅)	c	c <sup>h</sup>	k <sup>h</sup>	t <sup>h</sup>	p <sup>h</sup>	h	ŋ	z	?

nominative marker /i/ underwent contraction or deletion after vowels ending in a similar or identical sound, viz., after /i, uy, iy/, and the same process took place following <ay, əy, oy> as well, implying that all of these were palatal articulations at their right edge. Third, the Chinese sound [ai] in borrowed words was transcribed as <ay> in works of literature such as Sejin Choi's *Saseongthonghae*. Finally, even today when reciting Korean poetry in the conservative style known as *Sijo*, orthographic <hay> is pronounced as [hai] rather than [hɛ], pointing back to the earlier diphthongal pronunciation.

In addition to these arguments advanced by previous scholars, we find further evidence illustrating that <ay> and <əy> were genuine diphthongs in Middle Korean, not monophthongs. First, we look again at the *Commentaries and Examples* portion of *Hunminjeongeum*,<sup>9</sup> especially the part describing Medials (i.e., vowels).

- (6) 一字中聲之與 | 相合字十 |, ㄱ, ㅋ, ㆁ, ㆁ, ㆁ, ㆁ, ㆁ, ㆁ, ㆁ, ㆁ  
 The combination of a medial and ‘|’ make 10 (items) which are  
 /əy, iy, oy, ay, uy, əy, yoy, yay, yuy, yəy/.

This commentary indicates that the vowels listed in (6) are combinations of a monophthong, or ‘medial’, and the vocalic element /i/ (or glide /y/), represented orthographically by a long vertical stroke |. As there was no structural basis in *Hunminjeongeum* for combining medials with other vocalic elements to make still other monophthongs, it can be inferred that <ay, əy> along with <oy, uy> were diphthongs rather than monophthongs in Middle Korean.

Second, the examples in (7) illustrate some lexically restricted changes in Middle Korean by which /-ahi-/ and /-əhi-/ became /ay/ and /əy/, respectively.

- (7) *kahi* > *kai* > *kay* (> *kɛ* in Modern Korean) “dog”  
*pəhi-ta* > *pəi-ta* > *pəy-ta* (> *pe-ta* in Modern Korean) “to cut”

If <ay> and <əy> had represented the monophthongs [ɛ] and [e] at this point in Middle Korean, as in Modern Korean, the reduction of /a+i/ to /ay/ and /ə+i/ to /əy/ presumably would not have occurred, and we should have expected Modern Korean \**kai* rather than *kɛ* “dog”, \**pəi-ta* rather than *pe-ta* “to cut”.<sup>10</sup>

Third, there is direct evidence for the diphthongal status of <ay> and <əy> in an early literary work written by a Middle Korean phonologist in 1678, Seok-Jeong Choi. In this book, *Kyeongse Jeongun*, Choi transcribes the phonetic values of the Middle Korean vowels using Chinese characters. He included vowels of both types, monophthongs and diphthongs, and we note especially his diphthongal rendering of orthographic <ay> and <əy>.

<sup>9</sup> It was written as 訓民正音解例 中聲解.

<sup>10</sup> Even in present-day Korean, dialectal alternations occur between monosyllabic and disyllabic words, e.g., /say/ *sai* ↔ *se* ‘gap’.

(8) Chinese transcriptions for Middle Korean vowels in *Kyeongse Jeongun* (1678)

ㅏ 阿	ㅑ 也	ㅓ 於	ㅕ 與
ㅓ 烏阿	ㅑㅑ 要也	ㅓㅓ 于於	ㅕㅕ 由與
ㅗ 兒	ㅓㅓ 伊兒	ㅡ 應	ㅓㅓ 伊應
ㅓ 烏	ㅑㅑ 要	ㅓㅓ 于	ㅕㅕ 由
ㅓ 阿伊	ㅑㅓ 也伊	ㅓㅓ 於伊	ㅕㅓ 與伊
ㅓㅓ 烏阿伊	ㅑㅑㅓ 要也伊	ㅓㅓㅓ 于於伊	ㅕㅕㅓ 由與伊
ㅓㅓ 兒伊	ㅓㅓㅓ 伊兒伊	ㅓㅓ 應伊	ㅓㅓㅓ 伊應伊
ㅓㅓ 烏伊	ㅑㅓ 要伊	ㅓㅓ 于伊	ㅕㅓ 由伊

In this 17<sup>th</sup> century document, all of the off-glide diphthongs (those with a single vertical stroke at the right edge of the Korean symbol) end with the Chinese character 伊. If they had been monophthongs at this time, they should have been represented as a single Chinese letter without 伊 instead of being marked by two (or even three) letters. We thus infer that the orthographic off-glide diphthongs did not undergo monophthongization until, at the earliest, the latter part of the 17<sup>th</sup> century, as these were still valued as phonetically diphthongal in 1678. Based on these arguments in addition to those put forth in previous scholarship on the question, we conclude that <əy, ay> as well as <oy, uy> diphthongal in Middle Korean, whose system of basic monophthongs, then, despite the structural oddity of including only one front vowel out of seven total, was the skewed pattern given in (1).

### 3. Feature analysis of the historical monophthongization/diphthongization events

#### 3.1. Decline of the off-glides

As described previously, Middle Korean in the 15<sup>th</sup> century had four phonemic *y* on-glide diphthongs and just two *w* on-glide diphthongs, while there were six *y* off-glide diphthongs but none with a *w* off-glide.<sup>11</sup> Thus, *y* off-glides were quite common and combined to form all logical possibilities, except for \*/iy/, which was blocked by the Obligatory Contour Principle (OCP) restriction banning two essentially identical vocalic segments in a row, which also excludes \*/wu/. On-glides did not occur in combination with the high central unrounded vowel /i/ (\*/yi/, \*/wi/), apparently in reflection of an OCP-related restriction against high vocalic sequences of glide+vowel in which both segments are either unrounded or back, and an OCP restriction against diphthongal elements both having the feature [+round] blocked \*/wo/ and \*/wɔ/. The labial on-glide diphthong \*/wi/ did not occur as a phoneme, either, and there were no labial off-glide structures at all (\*Vw), either now or at the time of Middle Korean. In the charts below summarizing the varied possibilities, precluded combinations are placed in parentheses and actual diphthongs highlighted with shading (with marginal [yɔ] indicated in brackets).

<sup>11</sup> The triphthongs /yoy, yuy,/ were rare, used chiefly in representing Chinese sounds, and appear not to have undergone the expected reductions (/yoy/ > /yö/, /yuy/ (> /yü/).

## (9) Middle Korean diphthongs

## a. On-glides

-back	+back	
(*yi)	(*yi)	yu
	yə	yɔ
	ya	[yɔ]

-back	+back	
(*wi)	(*wi)	(*wu)
	wə	(*wɔ)
	wa	(*wɔ)

## b. Off-glides

(*iy)	iy	uy
	əy	oy
	ay	ɔy

(\*Vw)

By the 18<sup>th</sup> century, however, the low back rounded vowel /ɔ/ had disappeared from the phonemic inventory (Huh 1965, K.-M. Lee 1972, W.-J. Kim 1996, Ahn 2002, etc.), chiefly via merger with /a/. Further, /ay/ (original as well as any instances deriving from phonetic [ɔy]) monophthongized to /ɛ/, and a parallel monophthongization process affected Middle Korean /əy/ to produce /e/. The forms in (10), which underwent intermediate changes as well, exemplify these historical shifts (Ahn & Cho 2003:fn 6), where the period indicates syllable divisions as spaced in the orthographic representation.

- (10) *pɔy.yam* > *pɛ.yam* “snake” (> *pyam* ~ *pɛm*)  
*say.kyon* > *sɛ.kyon* “remember” (> *sɛ.ki-ta*)  
*cəy.pi* > *ce.pi* “swallow” (< \**cyəy.pi*)<sup>12</sup>

Thus, early Modern Korean, i.e., Korean in the 18-19<sup>th</sup> centuries, had the diphthongs charted in (11), where /ye/ < /yəy/, /yɛ/ < /yay/, /we/ < /wəy/, /wɛ/ < /way/.

(11) 18<sup>th</sup>-19<sup>th</sup> century Korean diphthongsa. On-glides (boldface new in the 18<sup>th</sup> century)

-back	+back	
		yu
<b>ye</b>	yə	yɔ
<b>yɛ</b>	ya	

-back	+back	
<b>we</b>	wə	
<b>wɛ</b>	wa	

## b. Off-glides

	iy	(uy)
		(oy)

The new additions are the result of the unrounding of /ɔ/ to /a/ along with the subsequent

<sup>12</sup> We posit an intermediate stage /cye.pi/ (from earlier /cyəy.pi/), which became the present form *ce.pi*, the apparent result of an OCP-related ban against two coronal segments /c/ and /y/ in a row. Refer to C.-W. Kim (1968) for the formulation of the earlier intermediate form /cyəy.pi/.

monophthongization of /ay/ and /əy/, producing, respectively, /ɛ/ and /e/. At about the same time, /uy/ and /oy/ (as indicated by the parentheses in (11b)) embarked on their path of monophthongization to /ü/ and /ö/, and were not articulated as off-glide diphthongs at all after the 19<sup>th</sup> century. Therefore, the only off-glide diphthong extant after the 19<sup>th</sup> century was one composed of the high central unrounded vowel plus palatal glide, /iy/ (C.-W. Kim 1968, Ahn 1998, etc.).

A widespread development in Modern Korean today is the ‘decay’ of that sole off-glide diphthong, /iy/. Although its diphthongal orthographic representation remains intact parallel to that of other monophthongized diphthongs, the phonetic realization of this vowel varies from context to context, both phonological and dialectal. Outside of word-initial position, such as in /hiy.maŋ/ “hope” or /min.cu.cu.iy/ “democracy”, /iy/ is often blended and reduced to [i], i.e., [himaŋ] or [minjujui]. It can show up even as [e] when used as the genitive suffix, e.g., /uli-iy/ [urie] “our”. In word-initial position the vowel is seldom realized as the off-glide diphthong [iy], either, whose nucleus is the high central unrounded vowel [i],<sup>13</sup> but rather occurs in a new diphthongal form consisting of a high central unrounded on-glide followed by the high front nucleus [i], i.e., [ɿi], which we shall represent phonemically as /ɿi/ using the IPA symbol [ɿ] to stand for this third kind of on-glide. Thus, a simple shift in syllabic prominence reverses the vowel-glide sequence /iy/ to glide-vowel /ɿi/, with the result then that there really is no phonetic off-glide diphthong remaining in Modern Korean. To complete the picture of current vowel articulations, it should be pointed out that another development dominant in most dialects now is the raising of the low front vowel /ɛ/, which causes /ɛ/ (orthographic <ay>) and /e/ (orthographic <əy>) to be pronounced the same, as [e].

The tables in (12) and (13) lay out the vowel system which has emerged in today’s Korean. The parenthetical monophthongs with question marks no longer appear as such phonetically, having been broken into new on-glide diphthongs with *w*, and the parenthesized on-glide diphthongs with nuclear /ɛ/ are, like /ɛ/ itself, undergoing merger with the next higher vowel in the chart; symbols with asterisks represent long-standing illegitimate combinations. Finally, the new diphthong /ɿi/ has come into existence in word-initial position, but its status in the system remains marginal and so is indicated below in brackets.

(12) Modern Korean monophthongs

-back		+back	
i	(ü)?	ɿ	u
e	(ö)?	ə	o
(ɛ)		a	

<sup>13</sup> Depending on the dialect, /iy/ generally appears as either [i] (in the south-east) or [i] (in the south-west). For example, *hapiy* ‘agreement’ is realized as [habi] in the south-east dialect, whereas it is [habi] in the south-west.

## (13) Modern Korean diphthongs

## a. On-glides

-back	+back	
*yi	*yɨ	yu
ye	yə	yo
(yɛ)	ya	

-back	+back	
wi	*wi	*wu
we	wə	*wo
(wɛ)	wa	

-back	+back	
[ɰi]		

## b. Off-glides: None

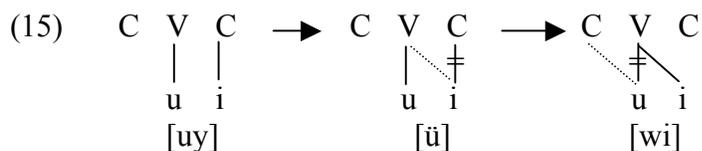
## 3.2. Feature description of the inversion

A result of this series of changes is that all the off-glides of Middle Korean have been lost, whereas the number of on-glide diphthongs has been increased. A prominent historical trend in the Korean vowel system is thus the restriction — indeed, elimination — of off-glides, generalizing on a property in the system that dates back to Middle Korean of the mid-15<sup>th</sup> century, viz., the preclusion of the particular off-glide /w/. In this section, we show how the overall process of the monophthongization and diphthongization events can be better understood in terms of systematic feature changes.

To recapitulate, the effects of the diachronic monophthongization and diphthongization processes are as summarized in (14).

- (14) a. 18<sup>th</sup> century: (ɔy >) ay > ε, əy > e  
 b. 19<sup>th</sup> century: uy > ü (> wi), oy > ö (> we)<sup>14</sup>  
 c. 20<sup>th</sup> century: ü > wi, ö > we

The monophthongizations of the 18<sup>th</sup> and 19<sup>th</sup> centuries can be viewed as manifestations of a general phonological preference which had developed in the language to avoid off-glides of all types, /y/ as well as /w/. The figure in (15) portrays how sub-optimal off-glide diphthongs like /uy/ were shifted to monophthongs during this period.

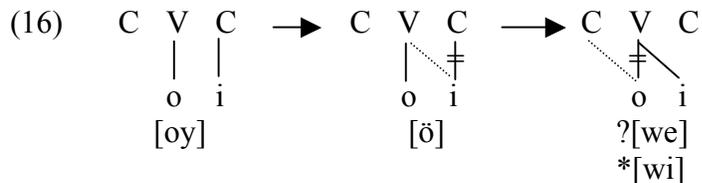


The 19<sup>th</sup> century developments would seem to have arisen from the earlier and parallel monophthongization that had changed /ay/ to /ε/ and /əy/ to /e/ in the 18<sup>th</sup> century. That is, both periods of monophthongization involved blending the backness feature of the off-glide into the nuclear vowel as the glide came to be eliminated. But (15) also illustrates that the typologically marked front rounded monophthongs that emerged from diphthongs in the 19<sup>th</sup> century went through a kind of inversion in the 20<sup>th</sup> century, becoming diphthongs again via the factoring out of their roundness in the form of the labial glide

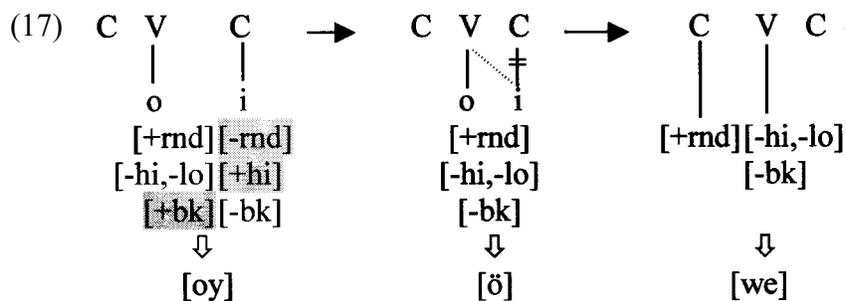
<sup>14</sup> Again with some dialectal variation, the monophthongization of /uy/ > /ü/ may have been taken place earlier than that of /oy/ > /ö/, as it is often claimed that the former process was completed by the 19<sup>th</sup> century, while the latter was still in progress until the early 20<sup>th</sup> century (Ahn & Cho 2003: fn 8).

/w/. As the outcome of this last change is an on-glide diphthong, however, the emergent restriction seeking to avoid off-glides remains in force. Moreover, the directional particulars of this development resolve the apparent paradox of phonological inversion as well because the (off-glide) diphthong of the earlier stage is not the same as the (on-glide) diphthong of the present.

An apparent challenge to this analysis, indicated in (16), is to derive the correct diphthong [we], which involves extracting the roundness of /ö/ into an interpolated on-glide /w/.



But the difficulty disappears under closer inspection. The feature conflicts which arose between the two components of the /oy/ diphthong when undergoing monophthongization are highlighted in (17), which illustrates that the (shaded) [+high] and [-round] specifications of the glide gave way to the [-high] and [+round] values of the nucleus, while the (shaded) [+back] specification of the nucleus deferred to the [-back] value of the glide, all resulting in the mid front rounded vowel /ö/. Under diphthongization, subsequently, the [+round] property of /ö/ was factored out in the formation of a new glide, which is predictably [+high] and, when [+round], also [+back] in Korean, leaving the nuclear front vowel to default to [-round] status. In sum, the height and roundness properties of the nuclear vowel (i.e., head) remained intact under monophthongization while nuclear roundness transferred to the new glide that was created in the later change of diphthongization.



For ease (or at least familiarity) of exposition, we do not pursue a unary feature presentation here, though it would perhaps be illuminating to do so inasmuch as the singular properties which emerge from the blending of vowel and off-glide are consistently [round], [mid] and [front], suggesting that these are the marked vowel features in Korean. Their absence from the representation would then encode the ‘negative’ values, with /ö/ ([round], [mid], [front]) thus characterized as more complex than /e/ ([mid], [front]), /ü/ ([round], [front]) as more than /i/ ([front]), etc. The merger of /o/ ([round], [mid]) and /i~y/ ([front]) into /ö/ would then involve merely removal of the

segmental boundary between them. Under the conventional binary interpretation adopted here for convenience, the dominance relations of the features for roundness, height and backness in the nucleus vis-à-vis the glide are similarly determined by the values which survive under monophthongization, as presented in (18).

- (18) Nucleus: roundness, height > backness  
 Glide: backness > roundness, height

This same generalization extends to the earlier monophthongization of /ay/ and /əy/, as illustrated in (19). Again, suppressed features are represented with shading, survivors without.

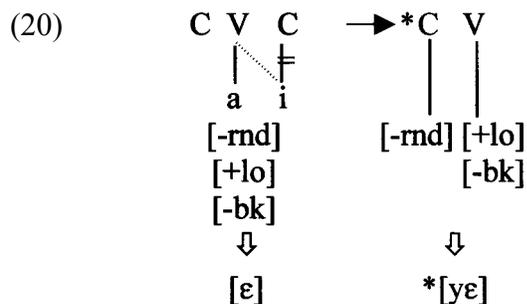
- (19) a.  $\begin{array}{ccc} \text{C} & \text{V} & \text{C} \\ | & | & \\ \text{a} & \text{i} & \\ \text{[ay]} & & \end{array} \rightarrow \begin{array}{ccc} \text{C} & \text{V} & \text{C} \\ | & | & \text{†} \\ \text{a} & \text{i} & \\ \text{[ε]} & & \end{array}$
- b.  $\begin{array}{ccc} \text{C} & \text{V} & \text{C} \\ | & | & \\ \text{a} & \text{i} & \\ \text{[-rnd]} & \text{[-rnd]} & \\ \text{[+lo]} & \text{[+hi]} & \\ \text{[+bk]} & \text{[-bk]} & \\ \downarrow & & \\ \text{[ay]} & & \end{array} \rightarrow \begin{array}{ccc} \text{C} & \text{V} & \text{C} \\ | & | & \text{†} \\ \text{a} & \text{i} & \\ \text{[-rnd]} & & \\ \text{[+lo]} & & \\ \text{[-bk]} & & \\ \downarrow & & \\ \text{[ε]} & & \end{array}$

In the 18<sup>th</sup> century monophthongization charted in (19b), the [-round] ([    ]) and [+low] ([low]) properties of the nucleus /a/ along with the [-back] ([front]) property of the glide /y/, from which rounding is absent in any case, survive into the resulting monophthong /ε/. This foreshadows the way that nuclear roundness and height values blended with the specification for glide backness to form the feature content of the monophthongs that emerged from diphthongs later on in the 19<sup>th</sup> century, viz., /ö/ < /oy/ and /ü/ < /uy/. Unlike /ü/ and /ö/, however, these products of 18<sup>th</sup> century off-glide monophthongization did not undergo on-glide diphthongization later on (\*[yε] < /ε/, \*[ye] < /e/), in part, perhaps, because the Modern Korean diphthong inventory in (13) already included /yε/ and /ye/, but likely in larger measure because front unrounded monophthongs are more fundamental types of vowels than front rounded ones, which are highly marked in the familiar, typological sense. Indeed, the history of English shows a similar response to the markedness of /ü/ and /ö/, which were simply unrounded in the transition from Old to Middle English (cf. *goose* with back rounded vowel, but *i*-umlauted *geese* < pre-OE \**go:si*, now with front unrounded rather than rounded vowel, or, similarly, *i*-umlauted *fill* < OE *fyll(i)an* vs. *full*). The unrounding of front vowels in English resulted in merger with extant /i/ and /e/, of course — a price that language evidently was willing to pay to rid itself of these complex segments.

Korean, conversely, removed these marked vowels by factoring their roundness out in the form of a *w* on-glide to now unrounded nuclear front vowels. This produced a new

diphthong in the form of /wi/ as well as new instances of the labial glide+mid front vowel /we/, which had already come into existence via the reduction of /wəy/. Interestingly, as previously described, the possibility of a labial glide+high front vowel diphthong had been rather arbitrarily phonemicized out of the Middle Korean inventory in favor of /uy/, which now comes to be replaced by the very configuration it had won out over before, viz., /wi/.

The conceivable diphthongization of front unrounded vowels mapped out in (20), however, did not take place because there was no motivation for it to have occurred: its inputs were not particularly marked in comparison to other vowels in the system, and, unlike /wi/ < /ü/, its outputs already existed in the system.



We conclude that the suite of vowel changes which took place in the lengthy transition from Middle to Modern Korean were predetermined, as it were, by the striking asymmetries that were present in the system at the close of the 15<sup>th</sup> century. Our knowledge of Korean vowel architecture before this time, i.e., before the introduction of King Sejong's phonetically sophisticated alphabet, is not sufficient to comment authoritatively on what gave rise to the odd Middle Korean system or how long it had been in this unbalanced state. But it seems apparent now that, in particular, the unusual paucity of front vowels in the seven-way system in (1) invited the creation of /ɛ/ and /e/ during the 18<sup>th</sup> century via monophthongization of /ay/ and /əy/, and that the overall absence of labial off-glides (\*Vw) invited the gradual extension of this prohibition to palatals as well (\*Vy), a process which is just now being completing with the monophthongization (or, word-initially, reversal in syllabicity) of /iy/, leading to the structural absence of all off-glide diphthongs (\*VG) in the modern language.

Although the removal of off-glides in the 19<sup>th</sup>-20<sup>th</sup> century via monophthongization of /uy/ > /ü/ and /oy/ > /ö/ imposed two typologically marked front rounded vowels on the system, a simplification or demarking of these was effected in the 20<sup>th</sup> century via the measure of 'breaking' them into the labial on-glide diphthongs /wi/ and /we/. This development was further motivated, we believe, by the fact that there has been a structural ambiguity with respect to /wi/ ever since the 15<sup>th</sup> century, a combination which presumably could have existed even then were it not for the competition from /uy/ in the system of that time. The diphthong /we/, of course, did not occur prior to the 18<sup>th</sup> century, either, simply because there was no /e/ up to that time, a vowel which arose only later with the monophthongization of /əy/. In Middle Korean, accordingly, the front unrounded palatal glide did not combine with front unrounded vowels, just as the back rounded

labial glide did not combine with back rounded vowels. In modern times, however, the vowel /e/ does exist, a product of the 18<sup>th</sup> century reduction of /əy/ > /e/ (as well as of the 20<sup>th</sup> century raising of /ɛ/ < /ay/ to /e/), and throughout this modern period combinations of the palatal glide with non-high front vowel — diphthongal /ye/ (and earlier /yɛ/) — have been fully sanctioned. This suggests then that the OCP limitation even in earlier stages of Korean did not hold systematically against juxtaposition of the palatal glide to front vowels generally, because the creation of /ye/ < /yəy/ and /yɛ/ < /yay/ in the 18<sup>th</sup> century was not inhibited. But OCP restrictions in the system still militate against high vocalic sequences which share the same value for backness (blocking \*/yi/, \*/iy/, \*/wu/ and even \*/uw/ [out in any case because of the labial off-glide]) or any vocalic sequences which share roundness (blocking \*/wo/ and [15<sup>th</sup> century] \*/wɔ/ as well as \*/wu/).

With the 18<sup>th</sup> century monophthongizations of /wəy/ to /we/ and /way/ to /wɛ/, moreover, /w/ came into position before front as well as back unrounded vowels, two new combinations whose previous absence appears to have been only accidental in the system and whose very creation may have primed the pump in the 19<sup>th</sup>-20<sup>th</sup> century to break /ö/ into /we/ and /ü/ into /wi/. The modern emergence of /wi/, too, takes advantage of a structural peculiarity in the system, for with the metamorphosis of Middle Korean /uy/ (orthographic <ui/>) into /ü/, the door was opened for this vowel to follow the alternative diphthongal interpretation of its components, viz., /wi/.

The last step in these several historical changes, the widespread and on-going raising of /ɛ/ to /e/, reduces markedness and skewing in the basic vowel inventory even further, finally giving rise to the symmetric 7-way system of monophthongs (less those in parentheses) of Modern Korean that is charted in (12).<sup>15</sup> Throughout this history, then, prominent phonological changes in the Korean vowel system have been determined naturally, with one development leading to the next in a progression that reflects the ‘ingenerate’ or built-in character (Iverson & Salmons 2003) of the basis for the changes, viz., the structural instabilities and distributional peculiarities which inhered in the asymmetric systems of the initial state in (1) and (2).

#### 4. Concluding summary

This paper has sought to unify the monophthongization events of the 18<sup>th</sup> (/ay/ > /ɛ/, /əy/ > /e/) and 19<sup>th</sup> centuries (/uy/ > /ü/, /oy/ > /ö/) with the diphthongizations of the early 20<sup>th</sup> century (/ü/ > /wi/, /ö/ > /we/). Both monophthongizations are shown to have consisted in a merger of features in vocalic sequences that was motivated by a developing aversion to off-glides. The later breaking or diphthongization of resultant front rounded vowels /ü/ and /ö/ to /wi/ and /we/, in turn, was facilitated by the absence of these output sequences in an otherwise largely symmetric system of on-glide diphthongs, a change set off by the same markedness considerations as caused front vowels to unround in the history of English. A key property of the historical developments in Korean, moreover, is that the

<sup>15</sup> In casual speech, there is an incipient parallel raising of /a, ə, o/ to [ə, i, u] in many common words, e.g., *ha-ko* “do and” → [həku], *əlin* “adult” → [irin], *sə-ta* “stand up” → [sida], as well as raising of [e] to [i] in *ne-ka* “you (subject)” → [niga]. Still limited to certain lexical items and styles of speech, these processes are not nearly as widespread or frequent as the raising of [ɛ], though they may portend a future direction the vowel system is likely to take.

height and roundness qualities of the nucleus vowel in diphthongs remained intact under monophthongization and survived as well into the new nucleus that emerged in the later change of diphthongization. Throughout its vocalic history of the past 550 years, then, Korean has moved progressively from a sharply asymmetric 7-way system of monophthongs in the 15<sup>th</sup> century to the symmetric 7-way system of today, and from a widely distributed system of 13 diphthongs to one of 9 on-glide structures (or 10, with marginal /tʷi/) today. The latter development was precipitated by the emergent prominence of increasingly general limitations against off-glide diphthongs, there having been none formed with *w* even in Middle Korean; today, through the progression of changes charted here, there are none formed with *y*, either. Other sequential (notably, OCP-related) constraints have been dominant in the system since the 15<sup>th</sup> century, whereas novel segmental limitations have arisen with the promotion, over time, of markedness constraints against low rounded vowels, front rounded vowels and now, increasingly, low front vowels. The interplay of these developments with both original (e.g., exclusion of *w*-off-glides) and novel systemic factors (prohibition of all off-glides) has led directly to the symmetrically arranged array of vowels and the seemingly skewed set of phonemic diphthongs that comprise the vowel system of Modern Korean.

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