The Ongoing Monophthongization of 'ɨy' in Seoul Korean: A Sociophonological Account

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Kang, Hyeon-Seok. 1999. The Ongoing Monophthongization of 'ɨy' in Seoul Korean: A Sociophonological Account. *Studies in Phonetics, Phonology and Morphology* 5, 25-58. This paper examines the current status of 'ɨy', the only remaining one among the six Middle Korean falling diphthongs. Supporting the suggestions by Kim-Renaud (1986) and Y.C. Chung (1991), this article shows that this diphthong is also monophthongizing following the paths of the other falling diphthongs. It is also shown through quantitative evidence that the monophthongization of this diphthong involves not one diachronic change but three different changes. It is suggested that the monophthongization of 'ɨy' was mainly triggered by the structural pressure to eliminate the only remaining falling diphthong in contemporary Korean. This structural explanation is phonologically formalized within the Optimality Theory expanded by the notion of 'variable ranking' (Reynolds 1994). The phonological account also shows why the changes are under way as they are. **(Kaya University)**

Keywords falling diphthong, structural pressure, monophthongization, phonological variation, variable ranking

1. Introduction

Among the six falling diphthongs of Late Middle Korean (15-16C), 'iy', 'əy', 'ay', 'uy', 'oy', and 'ʌy' (Huh 1965; Moon 1974)[1], only 'ɨy' still remains in contemporary Seoul Korean (or Standard Korean). The current form of the Late Middle Korean diphthong 'ɨy' can have two distinct phonetic realizations. It tends to be realized as [iɨ] word-

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[1] There is a minority opinion (cf. K.M. Lee 1969) that 'ɨy' was also present in Late Middle Korean. If this is true, the number of the falling diphthongs in this period reaches seven. The status of falling diphthongs before the Late Middle Korean period is not well documented.

initially, but [ᵢi] is the form when the diphthong occurs in non-word-initial position (cf. Y.C. Chung 1991). ([ᵢ] and [ᵢ] indicate the glide (less prominent) counterpart of [i] and [i], respectively.) Further, Korean phonologists typically propose CGVC as the syllable structure of Seoul Korean, thus making the VG sequence an anomaly in the system. I, thus, represent this diphthong as 'ii'.

Previous works have suggested that 'ii' is also going through a change following the paths of the other falling diphthongs of Late Middle Korean. One extreme claim is made by S.K. Kim (1976), who argued that this diphthong has completely monophthongized and is not part of the diphthongal system of Seoul Korean any more. Y.C. Chung (1991) also made a claim that the diphthong may be present as a 'psychological' diphthong among native speakers of Seoul Korean but is rarely phonetically realized in this dialect. However, these scholars' opinions are not a majority position among Korean phonologists and dialectologists. Most scholars (e.g., Kim-Renaud 1986, C.A. Kim 1978, H.K. Choi 1991) hold the position that Seoul Korean still retains this diphthong as its vowel, though there is also general agreement among them that the diphthong is going through monophthongization in present-day Korean.

Though past studies of 'ii' (e.g., Kim-Renaud 1986, Y.C. Chung 1991) made careful and interesting observations concerning the monophthongization of 'ii', these studies were based on rather limited data, i.e., mainly based on the author's personal observations or impressions. The change and current status of 'ii' has never been investigated empirically on the basis of a large database within the framework of quantitative sociolinguistics, whose methodology is known to have a particular advantage in the investigation of linguistic changes in progress.

In light of this, this paper undertakes a quantitative analysis of the monophthongization of 'ii' in Seoul Korean. The study first shows, based on quantitative results, that the monophthongization of 'ii' involves not just a single diachronic change but several changes that occur (or have occurred) in different phonological and morphological environments. This paper also shows that only one change among these

may be currently considered as a change in progress, while the others are completed changes. This paper then addresses the "causation" problem of 'ii' monophthongization. One important internal factor that I suggest as the trigger of this change is 'structural pressure' (cf. Hock 1986) to monophthongize the only remaining falling diphthong in Korean, i.e., the language-internal pressure to eliminate the deviant element within the phonological system.

The 'structural pressure' account is given within the phonological framework of OT (optimality theory). The phonological account also attempts to provide an answer as to why the change is happening the way it is, especially why 'ii' monophthongization affects some phonological environments earlier than others and why a certain component segment of the diphthong is chosen over the other in the monophthongization process. My explanation also gives an account of the synchronic variation involving 'ii'.

This paper will proceed as follows: first, some relevant background information on the monophthongization of 'ii' will be provided; next, the changes that the diphthong has gone through in some different Korean dialects are discussed; then, the statistical analyses of the data for this study are described; then, the results of the statistical (Varbrul) analyses of the data are provided and discussed; finally, the phonological account of the monophthongization of 'ii' will be attempted.

2. Some Background

This section introduces some phonological concepts concerning Seoul Korean that are assumed by this research. These concepts will help the readers to understand the methodology, results, and interpretations of this study that are presented later on.

First the current work assumes that in the late Middle Korean period Seoul Korean had the falling diphthongs given in Figure 1. Only a minority of scholars suggest that Seoul Korean had the diphthong 'iy' as well in this period.

	[-bk]		[+bk]
(iy)	iy		uy
	əy		oy
	ay		ʌy

Figure 1. Falling diphthongs of Late Middle Korean (15C)

This study, in line with Hong (1988) and Park (1992), also assumes that contemporary Seoul Korean has the vowel system given in Figure 2. It is assumed that vowels 'e' and 'ε' have merged into the former after 'ε' has raised to 'e' and that 'ü' and 'ö' have diphthongized to 'wi' and 'we', respectively. (There is general agreement among Korean phoneticians and field sociolinguists about the raising of 'ε' to 'e' and the diphthongization of the two front rounded vowels.)

	[-bk]		[+bk]
i		i	u
e		ə	o
		a	

Figure 2. Monophthongs of Seoul Korean

Contemporary Seoul Korean has the diphthongs given in Figure 3; they are all rising except 'ii'. The other diphthongs shown in Figure 1 have all monophthongized in Korean. This work assumes that diphthongal sequences 'wε' and 'yε' are lost in this dialect after the merge of 'ε' with 'e'. In other words, it is assumed that 'wε' and 'yε' merged with 'we' and 'ye', respectively.

a. 'w' Diphthongs   b. 'y' Diphthongs

[-bk]   [+bk]   [-bk]   [+bk]

wi   yu
we   wə   ye   yə   yo
         wa   ya

c. isolated diphthong: ii

Figure 3. Diphthongs of Seoul Korean

3. The Different Paths of Change of Middle Korean Diphthong 'iy' in Different Dialects

Middle Korean diphthong 'iy' has already monophthongized in some dialects of Korean. In the Cholla dialect (C.S. Choi 1986) the diphthong changed to 'i' in nearly all phonological and morphological contexts (e.g., /iysa/ > /isa/ 'doctor'). In the Kyongsang dialect (Paek 1990) it changed to 'i' or 'i' (e.g., /iysa/ > /isa/ or /isa/ 'doctor'), with the morphological exception of the possessive marker 'iy', which exclusively changed to ''i' (e.g., /na-iy/ > /na-'i/ 'my (I+Pos.). In the Phyongan dialect (Y.B. Kim 1992), the change is more variable: 'iy' changed to 'i' (e.g., /iysa/ > /isa/ 'doctor') or 'i' (e.g., /iycu/ > /icu/ 'name of a city') non-post-consonantally and to 'i' (e.g., /ikiyta/ > /ikita/ 'win') or 'i' (e.g., /napiy/ > /napu/ 'butterfly') post-consonantally. The possessive marker 'iy' changed to 'e' in this dialect as in some other dialects. The exact phonological or morphological conditioning of the variable change of 'iy' in this dialect has not been well examined. It is, however, reported (Y.K. Han 1992; Y.M. Han 1992) that Kangwon and Chungchung dialects still retain this diphthong, as is the case with the Seoul dialect. The status of 'iy' in the other three major dialects of Korean, i.e., Hwanghay, Hamkyong, Cheju, is not well investigated.[2]

'Korean has roughly nine regional dialects: Seoul (or Seoul-Kyongki),

In the Seoul dialect 'ii' shows extreme variation. First this diphthong is very often produced as a monophthong. Also different monophthongs alternate with 'ii'. Different patterns of variation are observed in three distinct phonological environments and one particular morphological context. There are three important constraining linguistic factors governing the variation: 1) presence of the preceding consonant, 2) syllable position within the word (i.e., whether 'ii' occurs in a word-initial or non-word-initial syllable), 3) whether 'ii' is a possessive marker. When 'ii' is preceded by a consonant (e.g., *hiimang* 'hope'), there is variation between [i] and [ɨi]: [i] dominating the variation. When there is no preceding consonant, syllable position is an important constraint: in a word-initial syllable (e.g., *iica* 'chair') variation between [ɨi] and [i] are visible; in a non-word-initial syllable (e.g., *cuii* 'caution') [i] and [ɨi] alternate, again [i] dominating the variation. One exception to this generalization is the possessive marker 'ii' (e.g., *na-ii* 'my (*I*+Pos)), which shows variability between [ɨi] and [e], the latter variant dominating the variation.

4. Data Analysis

The data on which this work is based were collected during my fieldwork in Seoul, Korea in the summer of 1994 and the winter to early Spring of 1995. A small scale pilot study was also conducted before the start of this study. Recordings were made from 63 speakers of Seoul Korean stratified by age, social status and sex. The informants were divided into 3 age groups, 3 social status groups and 2 gender groups. Four different styles of speech were elicited -- two styles of spontaneous speech: in-group speech and interview speech; and two styles of read speech: sentence reading and word-list reading. The data were collected through the interview method and the participant observation method (Vidich 1971).

Kangwon, Chungchung, Kyongsang, Jonla, Jeju, Hamkyong, Hwanghay, and Phyongan dialects (the last three are regional dialects of North Korea).

4 1 Preliminary analysis

As introduced earlier, the variation involving the diphthong 'ïi' in Seoul Korean is subject to the following constraints: whether there is a consonant preceding the diphthong, whether the diphthong appears in a word-initial or non-word-initial syllable, and whether or not 'ïi' is used as a possessive marker.

Considering the suggestion by previous studies (Y.C. Chung 1991, Kim-Renaud 1986) that 'ïi' is dominantly produced as a monophthong and may have already monophthongized in some linguistic environments, the first issue to tackle in this study is to examine whether 'ïi' is still the underlying form in all these phonological and morphological contexts. As a first step towards settling this issue, a preliminary statistical analysis was conducted. The data were examined to check which vowel is now produced by Seoul Korean speakers in the environments where the diphthong 'ïi' would have appeared before the beginning of monophthongization (i.e., the environments where the orthographic symbol for the diphthong 'ïi' is used in the written language of present-day Korean).[3] The results of this preliminary analysis are given in Table 1.

Table 1. Results of the preliminary statistical analysis of 'ïi'

1. post-consonantally (e.g., *hïimang* 'hope')

	'ïi'	'i'	'N'	(Probable UR)
*ingroup	5	95	43	
interview	5	95	101	
sentence reading	18	82	223	/i/
word reading	72	28	175	

[3] 'ïi' is orthographically represented by the combination of a small horizontal bar for 'i' and a vertical bar for 'i' by the Korean spelling system.

2. non-post-consonantally

    a) word-initial position (e.g., *iica* 'chair')

	'ii'	'i'	'N'	
*ingroup	44	56	16	
interview	54	46	106	
sentence reading	58	42	365	/ii/
word reading	73	27	349	

    b) non-word-initial position (e.g., *cuii* 'caution')

	'ii'	'i'	'N'	
*ingroup	0	100	29	
interview	5	95	261	
sentence reading	9	91	235	/i/
word reading	64	36	247	

3. as a possessive marker (e.g., *na-ii* 'my (*I*+Pos))

	'ii'	'e'	'N'	
*ingroup	0	100	18	
interview	3	97	144	
sentence reading	26	73	834	/e/
word reading	28	71	336	

One important factor that needs to be considered in the interpretation of the results given in Table 1 is the characteristics of the orthographic system of Korean named *hankul*. *hankul* was invented in the 15th century modeling the actual pronunciations of the then Seoul Koreans (cf. C.S. Lee 1994:261). This writing system was faithful to the speakers' (presumed) actual productions, especially in its representation of vowels. There is, accordingly, general agreement among researchers that the present discrepancies between the spellings and the actual pronunciations of Korean vowels are due to linguistic change. One of the upshots of this property of the Korean spelling system being faithful

to actual pronunciations is that "spelling pronunciation" can easily occur unlike in other languages.

The results given in Table 1 first reveal that there is a radical difference between spontaneous (conversational) and read speech in the speakers' production. Since we are examining the phonemic status of 'i' in different environments, it should naturally be the case that our assessment of the underlying form be based on spontaneous speech, not read speech, because the latter is generally not a true reflection of the phonological system native to the speakers. This argument is all the more valid in Korean, because in this language read speech is seriously affected by spelling pronunciations due to its orthographic symbols' close correspondence with actual pronunciations. Accordingly read speech was not considered as the basis in the assessment of the underlying form in each environment.

Let us then take a look at the results of the preliminary analysis more closely and consider what these results suggest. First, the results suggest that 'ii' has (nearly) monophthongized to 'i' in the post-consonantal linguistic context. [i] was the dominating variant in this environment: 99 percent (142/144) of the tokens found in spontaneous (ingroup + interview) speech were realized as [i]. Only two tokens were produced as a diphthongal variant. The results also suggest that non-post-consonantal 'ii' has also (nearly) monophthongized to 'i' when it appears in a non-word-initial syllable. 'i' occurs in this environment 97 percent (281/290) of the tokens found in spontaneous speech. Actually 'i' may have gone through one and the same change (not two separate changes) in these environments, where non-word-initial 'ii' has changed to 'i'. (Note that postconsonantal 'ii' is always non-word-initial 'ii') The possessive marker 'ii', which always appears in non-word-initial position, seems to have taken a different path of change. The results indicate that Seoul Korean speakers now almost categorically (97% (157/162)) use the form [e] instead of the diphthongal variant as the possessive marker.

However, there is one phonological environment where there is a strong competition between the diphthongal variant and [i]. It is word-initial position (or non-post-consonantal position in a word-initial

syllable). In this linguistic context [ij] occurs in 52% (64/122) of the tokens found in spontaneous speech. From a diachronic point of view, this result indicates that Seoul Korean still retains the diphthong 'ii' in this environment.

In sum, the results given in Table 1 can be interpreted as follows: 'ii' has changed to 'i' when it is neither a word-initial vowel nor a possessive marker, to 'e' as a possessive marker, but still remains an underlying diphthong in word-initial position. The quantitative results support C.S. Lee's (1994) passing suggestion that 'ii' remains a diphthong only in word-initial position. Based on the results shown in Table 1, I assume in this study that underlying 'ii' is present in Seoul Korean only in word-initial position and that 'ii' has already monophthongized in the other phonological or morphological contexts.

The quantitative results also provide an answer to the question as to whether the current study is dealing with one or several sociolinguistic variables. Since we assume that 'ii' has monophthongized except in word-initial position, there is no basis on which to think that this work is dealing with a single variable. It is actually concerned with three variables, which can be labelled as (ii_i), (ii_p), and (ii_e), where 'ii' represents the orthographic symbol *ii* and "ii_i", "ii_p", and "ii_e" respectively, represent 'word-initial ii', 'possessive marker ii', and 'ii elsewhere'. The only property the three have in common in present-day Seoul Korean is that they share the orthographic symbol, i.e., that they are written with the same spelling. The three variables have different sets of variants as shown in Table 2. The interest and focus of this paper will be the variable (ii_i), for the results of the preliminary statistical analysis suggest that in the other two variables alternation between their variants occur almost exclusively in read speech and may mostly represent insignificant alternation between spelling and non-spelling pronunciations.

Table 2. Variables involving 'ii'

Variables	Variants
1. (ii₍ᵢ₎)	[i] ~ [i̯i]
2. (ii₍ₑ₎)	[i] ~ [ɨi]
3. (ii₍ₚ₎)	[e] ~ [ɨi]

4.2 Variable rule analysis of (iiᵢ)

The judgement of the variants of the variable (iiᵢ) was made twice: at the time of the transcriptions and before the statistical analysis. The boundary between the monophthongal and diphthongal variants was relatively clear. Each token was judged as one of the two variants of the variable. Another Seoul Korean speaker independently judged · one hundred tokens of this variable. Her judgements and mine showed a high degree of agreement. There was 91 percent of agreement between her judgements and mine. Unread and misread potential tokens were excluded from the analysis. Since 'ii' has already monophthongized in phonological and morphological contexts other than word-initial position, the number of the tokens of the variable was not large. This study is based on 836 tokens of the variable (iiᵢ).

The tokens of (iiᵢ) were subject to Varbrul analysis (Ivarb version 2.3. Pintzul: 1988). The factor groups listed in Table 3 were considered in the analysis of the variable (iiᵢ). Only external constraints were considered in this analysis, since no linguistic constraints were predicted to play a significant role in the alternation of the two variants of (iiᵢ). (It is predicted, though, that before the monophthongization of non-word -initial 'ii' and possessive marker 'ii' (i.e., when (iiᵢ), (iiₚ), and (iiₑ) were one variable), there must have been a stage where the presence of the preceding consonant, syllable position, and the morphological status of 'ii' were important linguistic constraints on the variable (ii).)

The factor group "speech style" had four factors: ingroup speech (informants' interaction with their ingroup members), interview speech (informants' interview speech with the author), sentence reading (read

speech of a sentence list including the tokens of (ii$_i$)), and word reading (read speech of a word list including the tokens of (ii$_i$)).

The informants were divided into two "gender" groups: male and female, and three "social class" groups: upper, middle, and lower. The factor group "age" had three factors: 16-25, 26-45, and 46 or older.

Table 3. Factor groups considered in the variable rule analysis of (ii$_i$)

Factor groups: Factors:
1. speech style   ingroup, interview, sentence
                        reading, word-list reading
2. gender   male, female
3. social class   upper, middle, lower
4. age   16-25, 26-45, 46 or older

5. Results

The results of the Varbrul analysis of the tokens of (ii$_i$) are given in Table 4. In the table the percentage of application indicates the percentage of the monophthongal variant, i.e., [i] among the tokens. Three factor groups, 'speech style', 'social status', and 'age' were selected as significant in the variation involving (ii$_i$) by the stepwise regression analysis. The speakers produced the monophthongal variant clearly more often in more casual speech than more formal speech, if it is assumed that ingroup, interview, sentence reading, and word reading speech form a stylistic continuum of most 'casual' to most 'formal'. Also the frequency of monophthongal production showed a linear relationship with both the social status and age scales. The rate of monophthongal production showed an increase towards the lower end of both these scales. However, 'gender' was not chosen as a significant constraint, suggesting that the two gender groups did not show a significant difference in their behavior toward this variable.

Table 4. Goldvarb probabilities for factors for (ii)

Factor groups	Factors	Weight	% Applications	Total N
*Speech Style	ingroup	.70	56	16
	interview	.63	46	106
	sentence R	.56	42	365
	word list R	.39	28	349
Gender	male	.52	39	427
	female	.48	34	409
*Social Class	upper	.43	30	293
	middle	.51	38	306
	lower	.57	44	237
*Age	16-25	.58	43	263
	26-45	.52	39	268
	46+	.41	29	305

Input = 0.36, loglikelihood = -523.473
Total chi-square = 77.392, Chi-square/cell = 1.248

*The starred factor groups indicate those selected as significant in the stepwise regression analysis.

6. Discussion

The results given in Table 4 can be taken as suggesting that 'ii' is currently going through monophthongization in word-initial position following its prior monophthongization in the other linguistic contexts. Both age group and social class distribution of the two variants of the variable (ii) exhibit the patterns that can be typically observed in phonological changes in progress. The fact that the diphthongal, not

monophthongal, variant is orthographically represented by the spelling, i.e., by the combination of orthographic symbols for 'i' and 'i', can be taken as additional evidence supporting the claim that the diphthong is monophthongizing. (The Korean orthographic system was invented, as mentioned earlier, modeling the actual pronunciations of 15C Seoul Korean speakers.) The two variants seem to be in close competition with each other. In spontaneous (ingroup + interview) speech, the diphthongal and monophthongal variants occur about 52% and 48% of the time, respectively. This result suggests that the diphthong 'ii' is still present in Seoul Korean as an underlying vowel (despite its limited phonological distribution), refuting some researchers (e.g., S.K. Kim 1976) claim that the diphthong has completely monophthongized.

However, 'ii' seems to have already monophthongized in other linguistic contexts. The monophthongization of 'ii' after consonants 'k, p, s, ch' was officially acknowledged in 1933 with the publication of *cosene chelcapep thongilan* ("A Unification Proposal for the Spelling of the Korean Language"), which contains an article saying that 'ii' should be orthographically written as *i* when 'k, p, s, ch' precede 'ii'. *pyocwun palumpep* ("Standard Pronunciation of Korean") published in 1988 by the Ministry of Education now stipulates that 'ii' should be produced as [i] after all consonants, acknowledging the total monophthongization of post-consonantal 'ii'.

The publication also contains an article saying that non-post-consonantal 'ii' appearing in a non-word-initial syllable can be produced as [i], though it also states that the diphthongal production is, in principle, the standard pronunciation. (Readers are reminded of the common wisdom that prescriptive grammar follows actual production by the members of a speech community only reluctantly when that production is predominant in the community: in Seoul Korean, 'ye' is also currently monophthongizing to 'e' (Nam 1975); the production of (non-post-consonantal) 'ye' as [e] in a non-word-initial syllable, which is observed approximately 85% of the time in spontaneous speech (see chapter 5 of Kang 1997), is still not allowed by the same (prescriptive) publication.) The results of the current quantitative study (see Table 1), however, suggest that 'ii' has completely monophthongized to 'i' in this

environment as well as in the post-consonantal environment.

The results of the preliminary analysis discussed earlier also indicate that the monophthongization of the possessive marker 'ii' is completed as well. This change is not a sound change in its proper sense, but a morphological (or morphologically conditioned) change. This alleged change gets external support once again from *phyocwun palumpep* ("Standard Pronunciation of Korean"), which contains an article that allows for the production of possessive marker 'ii' as [e] by speakers of Standard (Seoul) Korean.

7. A Structural Explanation of *iy* Monophthongization

This paper now attempts an explanation of the monophthongization of the diphthong 'ii'. It proposes one system-internal factor as the trigger of this change: (internal) structural pressure to monophthongize the last remaining falling diphthong in Korean. The structural pressure explanation is given formalized within the correspondence model of Optimality Theory (McCarthy & Prince 1995).

In this paper the correspondence model is extended by the notion of "variable ranking" (Reynolds 1994), which Reynolds proposes as possible devices to overcome the categorical nature of OT and explain phonological variation within the theory. He (1994) proposes that the presence of competing forms of a linguistic variable can be accounted for by assuming that some OT constraints are variably ranked with respect to one another.[4] For instance the following ranking indicates that constraints CONX and CONY are variably ranked but that both are dominated by CONW and dominate CONZ.

'Another proposal that was made for the explanation of variation within OT is the grammar competition model (Kiparsky 1993), which holds that more than one grammar coexists in cases where there is phonological variation. The current study, however, rejects this proposal as inadequate in the explanation of 'intrasystemic' variation, though it may well be a viable model for cases of 'intersystemic' phonological variation such as creole or AAVE situations (see Singler 1996 for the use of the grammar competition model in his attempt to explain phonological variation in Vernacular Liberian English.).

(1)

$$\text{CONW} >> \begin{Bmatrix} \text{CONX} \\ \text{CONY} \end{Bmatrix} >> \text{CONZ}$$

*possible dominance relationships
1) CONW >> CONX >> CONY >> CONZ
2) CONW >> CONY >> CONX >> CONZ

Reynolds' proposal is that there are some OT constraints which are in variable ranking with one another. The most simple case was shown in (1) above, where in some cases constraint X dominates Y, choosing variant A as an optimal form and in other cases constraint Y dominate X, choosing variant B as the output. More complex cases include those instances where more than two constraints are variably ranked (and so more than two ranking hold) and more than two different variants can be realized as an output (see Chapter 3 of Reynolds 1994 for a detailed discussion of his proposal).

This paper does not attempt the phonological account of the linguistic change where the possessive marker 'ii' changes to 'e' because it is not a sound change in its proper sense but rather a morphological change. The constraints used in my phonological account of the monophthorgization of 'ii' are listed in (2).

(2) Constraints

1. *F-Diph: Falling diphthongs are prohibited.
2. *i̯: 'i̯' is prohibited.
3. MAX(i): Every 'i' in underlying representation has a
          correspondent in surface representation.
4. MAX(i̯): Every 'i̯' in underlying representation has a
          correspondent in surface representation.
5. L-Anchor: The leftmost element of underlying representation
          has a correspondent at the leftmost position of
          surface representation.
6. *Coda: A coda is prohibited.

As discussed earlier, the falling diphthongs of Late Middle Korean have all monophthongized except 'ii'.[5] The diphthong 'ʌy' was lost with the loss of the monophthong 'ʌ', which began in the 16th century (K.U. Kang 1993). The diphthongs 'ay' and 'əy' changed, respectively, to the monophthongs 'ɛ' and 'e' (in the period from the end of 18C to the beginning of 19C: K.W. Nam 1975). These changes were followed by the (respective) monophthongization of 'uy' and 'oy' into 'ü' and 'ö' in the middle of 19C (Y.S. Moon 1974). (The monophthongization of the last four diphthongs were motivated by the lack of [-hi] front vowels in the monophthongal system of the 18-19C period (See Kang 1996:4 ff. for a full discussion).)
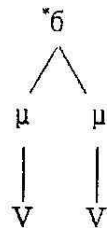
Researchers (e.g., Hock 1986:151 ff.; Anderson 1973:127ff.) have suggested that languages have a tendency to simplify their phonological structure and sustain a consistent phonological pattern by eliminating phonological elements that show behavior deviating from the system. This indicates that the structural pressure to monophthongize 'ii' has been present for a rather long time in Seoul Korean (cf. Y.C. Chung 1991) and can be considered a strong motivating factor for the monophthongization of 'ii'. The constraint *F-Diph (cf. Rosenthall 1994) as given in (3) is used in this study to represent this system-internal pressure toward the monophthongization of 'ii' in Seoul Korean. The diphthongal realization of 'ii' has a duration considerably longer than the monophthongs of Seoul Korean, supporting the standard assumption held by phonologists that falling diphthongs are associated with two moras (cf. Schane 1995, McCarthy 1995, Rosenthall 1994).[6] Accordingly, it is assumed in this study (also following Y.S. Lee 1993 and Kim-Renaud 1986) that the onset and the offset of 'ii' are linked to

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[5] 'iy' (which I represent as 'ii' in this study) and 'uy' are different from the other falling diphthongs (cf. Figure 1) in that they are composed of two high vocoids, thus making their status as a falling diphthong rather dubious. However, it is agreed that the two diphthongs have shown a consistent phonological pattern with the other diphthongs. Also, if we assume that the sonority (or intensity) of vowels are determined chiefly by the frequency of F1, 'i' and 'u' have a larger F1 value than 'i' in Seoul Korean (Yang 1993:237).

[6] I assume here following Kenstowicz (1994:45) that a mora is, as least for vowels, a unit of metrical time.

two separate moras.

(3) *F-Diph (No Falling Diphthongs)

*σ

μ   μ

V   V

The high central unrounded glide 'ɨ' is rarely found in the world's languages. Few languages surveyed by Maddieson (1984) have this glide. The markedness constraint, *ɨ, is motivated by this observation. The MAX family of constraints, proposed by McCarthy & Prince (1995) as language-universal, penalize the deletion of segments or autosegments. The explosion of MAX(V) into MAX(V[+hi]) and MAX(V[-hi]) is motivated by a difference in deletability between high and nonhigh vowels, as evidenced by processes of vowel deletion in Yawelmani (Donegan 1985) and Old English (Dresher & Lahiri 1991), where only high vowels delete.

A further division of MAX(V[+hi]) is required because in some languages not all high vowels show identical behavior toward deletion. For instance, in Yoruba 'i' is subject to deletion in contexts where 'u' and the other vowels do not delete (Folarin 1987); in northern dialects of Greek 'unstressed high vowel deletion' was initiated with 'i' and was only later extended to 'u' (Dressler & Acson 1985). Accordingly, the present study explodes MAX(V[+hi]) into three separate constraints, MAX(i), MAX(u), and MAX(ɨ). MAX(i) and MAX(ɨ) penalize the deletion of underlying 'i' and 'ɨ', respectively.

L-Anchor penalizes the deletion of a word-initial segment, which is rarely observed across languages. L-Anchor is a member of the Anchor family of constraints proposed by McCarthy & Prince (1995) as operative cross-linguistically. Languages, as well documented, prefer an open syllable to a closed one. This general cross-linguistic tendency is

represented by the constraint, *Coda, which penalizes candidate forms with a coda.

As shown in the previous section, the monophthongization of 'ii' has been heavily influenced according to whether the diphthong appears in word-initial or non-word-initial position. Accordingly it will be appropriate to consider the change of 'ii' in these two positions separately throughout this section. A phonological description of each diachronic phase in the monophthongization of 'ii' is provided below. Two words, *iisa* 'doctor' and *koii* '(willful) intention', are used as examples for the illustration of 'ii' monophthongization in word-initial and non-word-initial positions, respectively.

Let us first consider the stage before the beginning of the monophthongization of 'ii', i.e., the diachronic stage when the diphthong was the underlying vowel in all contexts. Since a falling diphthong is chosen as an optimal form over monophthongized (vowel-deleted) forms at this stage, *F-Diph must have been dominated by MAX(i) and MAX(ɨ) as illustrated in Tableaux 1 and 2. If *F-Diph had dominated either MAX(i) or MAX(ɨ), candidate (b) or (c) would have been chosen as optimal in the two tableaux. Since candidates (d) and (e), which do not violate any constraint other than *ɨ and *Coda (respectively), are not optimal forms either, *ɨ and *Coda are also supposed to have dominated *F-Diph at this stage. As a result, candidate (a) is selected as the optimal form in both tables. (In the representation of candidates, a vowel indicates a vocoid associated to a mora; 'i̯' and 'ɨ̯' represent the moraless counterpart of 'i' and 'ɨ', respectively.) Only diphthongs associated to two moras are interpreted as a falling diphthong because of the standard phonological assumption (Schane 1995, McCarthy 1995, Rosenthall 1994) that falling diphthongs are linked to two moras. The sequence 'i̯ɨ' of candidate (e) shown in the two tableaux is interpreted as a sequence of 'V + C' for this reason. The sequences, 'oi̯' and 'oɨ̯', of candidates (f) and (g) are also interpreted in an identical manner.[7]

As an alternative to the constraint *Coda (cf. Tableaux 1 and 2) a well-formedness constraint regarding a falling diphthong can be used as well, which will penalize the forms (e), (f), and (g) associated with only one mora.

Tableau 1.

μ μ μ 　｜ ｜ ｜ ⟨o i i	*i̯	*Coda	MAX(i)	MAX(i̯)	*F-Diph
a ☞ ko.ii					*
b ko.i			*!		
c ko.i				*!	
d ko.i̯i	*!				
e ko.ii̯		*!			
f. koi̯	*!	*	*		
g. koi̯		*!		*	

Tableau 2.

μ μ μ 　｜ ｜ ｜ 　i i s a	*i̯	*Coda	MAX(i)	MAX(i̯)	*F-Diph
a ☞ ii.sa					*
b i.sa			*!		
c. i.sa				*!	
d i̯i.sa	*!				
e. ii̯.sa		*!			
f. i̯sa	*!		*		
g i̯sa				*!	

In the two tableaux, candidates (b) and (c) are, respectively, ruled out by constraints MAX(i) and MAX(i̯). Candidates (d) (f), and (e) are eliminated due to their (respective) violation of *i̯ and *Coda. (Candidate (f) actually violates a plural number of constraints that are unranked with regard to one another; in this paper I will mark only the first violation of unranked constraints as 'fatal', in the sense that the candidate is already eliminated from further consideration.) However, candidate (g) is ruled out by two different constraints in the two tableaux: in Tableau 1 it is eliminated for its violation of *Coda, while its counterpart in Tableau 2 is ruled out for the violation of MAX(i̯). The constraint ranking at this diachronic phase is given in (4), which shows that *F-Diph is dominated by all the other constraints shown in

the hierarchy.

(4) Constraint ranking before the beginning of the monophthongization of 'ii'

$$*i, *Coda, MAX(i), MAX(i) >> *F-Diph$$

However the subsequent gradual monophthongization of 'ii' indicates that the strength of *F-Diph has become increasingly more powerful. Monophthongization of a diphthong is a weakening process, which typically affects phonologically weak positions first and then stronger positions (cf. Foley 1977:44). This is the reason why the 'ii' to 'i' change in non-word-initial position began before the 'ii' to 'i' change in word-initial position. It is not clear, however, whether the former preceded the latter completely or whether there was any overlap in the two changes. No conclusive evidence that supports either of the two is provided by the literature or previous studies. (Y.C. Chung (1991: 400) suggests without providing decisive evidence that the 'ii' to 'i' change was probably completed before the beginning of the 'ii' to 'i' change in word-initial position.) In the present study I will attempt a phonological account of the monophthongization of 'ii' assuming that there was no overlap between the two changes. If there was an overlapping period between the two changes, the account given below would be based on a rather idealized linguistic situation.

Let us consider the change from 'ii' to 'i' first, the first phase of the monophthongization of 'ii'. This change must have begun with a stage where [i] and the diphthongal form coexisted in competition, i.e., where MAX(i) and *F-Diph were variably ranked. At this stage, the word *koii* '(willful) intention', for instance, must have two alternating forms, (a) *koii* and (c) *koi* as shown in Tableaux 3 and 4, while retaining the same underlying form as in the previous stage. Since *F-Diph and MAX(i) are in a variable dominance relationship, the constraint ranking at this stage is conjectured as given in (5); no other change from the previous stage has happened. The arrow indicates that *F-Diph is gaining strength relative to MAX(i), which means that 'ii' is monophthongizing to 'i'. Both the constraint hierarchies given above

Tableaux 3 and 4 are possible at this stage because *F-Diph and MAX (i) are variably ranked. In the two tableaux, candidate (b) is eliminated for its violation of MAX(i); candidates (d) (f), and (e) (g) are ruled out for their violations of and *ɨ, *Coda, respectively.

(5) Constraint ranking when the monophthongization of 'ɨi' to 'i' in non-word-initial position was in progress (Provisional)

$$*\underset{\,}{ɨ} \ \ *Coda, \ MAX(i) >> \left\{ \begin{array}{c} *F\text{-}Diph \\ MAX(ɨ) \end{array} \right. \hspace{-1em}\blacktriangleleft$$

Tableau 3. *ɨ, *Coda, MAX(i) >> MAX(ɨ) >> *F-Diph

μ μ μ | | | k o ɨ i	*ɨ	*Coda	MAX(i)	MAX(ɨ)	*F-Diph
a. ☞ ko.ii					*
b. ko.i			*!		
c. ko.i				*!	
d. ko.ɨi	*!				
e. ko.ɨi		*!			
f. koɨ	*!	*	*		
g. koɨ		*!		*	

Tableau 4. *ɨ, *Coda, MAX(i) >> *F-Diph >> MAX(ɨ)

μ μ μ | | | k o ɨ i	*ɨ	*Coda	MAX(i)	*F-Diph	MAX(ɨ)
a. ko.ii				*!	
b. ko.i			*!		
c. ☞ ko.i					*
d. ko.ɨi	*!				
e. ko.ɨi		*!			
f. koɨ	*!	*	*		
g. koɨ		*!			*

However, a consideration of words where 'ɨi' occurs in word-initial

position, reveals that another constraint, i.e., L-Anchor, was also active at this stage. (We do not know from what point in time this constraint was part of Seoul Korean grammar; however, it can be conjectured that this constraint was active for a long period of time because Seoul Korean had few, if any, documented synchronic or diachronic processes where a word-initial segment was deleted.) The presence of L-Anchor is inferred from the fact that the alternation between the diphthongal form and [i] apparently did not occur in word-initial position at this stage. Cross-linguistically deletion of the word-initial segment is not observed often. This phonological strength of word-initial position (Foley 1977; Hyman 1975) is presumed to be the main reason for this lack of variation in this position. Tableaux 5 and 6 illustrate with *iisa* 'doctor' as an example. Though both the hierarchies shown above Tableaux 5 and 6 are possible at this stage, candidate (c) *isa* is not selected as optimal in Tableau 6 (unlike in Tableau 4) because it violates the constraint L-Anchor, which dominates both the constraints, *F-Diph and MAX(ɨ).

Tableau 5. L-Anchor, *ɨ, *Coda, MAX(i) >> MAX(ɨ) >> *F-Diph

ɨ μ μ ɨ i s a	L-Anchor	*ɨ	*Coda	MAX(i)	MAX(ɨ)	*F-Diph
a. ☞ ii.sa						*
b. i.sa				*!		
c. i.sa	*!				*	
d. ɨi.sa		*!				
e. iɨ.sa			*!			
f. ɨsa		*!		*		
g. ɨsa	*!				*	

Tableau 6. L-Anchor, *į, *Coda, MAX(i) >> *F-Diph >> MAX(į)

μ μ μ ⎸ ⎸ ⎸ l s a	L-Anchor	*į	*Coda	MAX(i)	*F-Diph	MAX(į)
a. ☞ ii.sa					*	
b. i.sa				*!		
c. i.sa	*!					*
d. ii.sa		*!				
e. ii.sa			*!			
f. isa		*!		*		
g. isa	*!					*

Accordingly, we have to add another constraint, i.e., L-Anchor, to the hierarchy given in (5). The revised constraint ranking at this stage is given in (6). This ranking produces both the constraint hierarchies shown above Tableaux 5 and 6, given the variable ranking of *F-Diph and MAX(į). In the two tableaux, candidates (b) and (e) are eliminated by MAX(i) and *Coda, respectively; candidates (c) (g), and (d) (f) are ruled out for their (respective) violation of L-Anchor and *į.

(6) Constraint ranking when the monophthongization of 'ii' to 'i' in non-word-initial position was in progress

$$\text{L-Anchor, }{}^*\text{į, }{}^*\text{Coda, MAX(i)} >> \left\{ \begin{array}{l} {}^*\text{F-Diph} \\ \text{MAX(į)} \end{array} \right.$$

It is also conjectured that the constraint ranking right after the 'ii' to 'i' change was as shown in (7): *F-Diph comes to dominate MAX(į) after its gradual acquisition of strength relative to MAX(į). The ranking selects only the diphthongal form in word-initial position and [i] elsewhere, as exemplified by Tableaux 6 and 7, respectively. It is not certain, though, for how long this ranking held in Seoul Korean phonology.

(7) (Proposed) constraint ranking following the completion of the monophthongization of 'ii' to 'i' in non-word-initial position

L-Anchor, *ɨ, *Coda, MAX(i) >> *F-Diph >> MAX(ɨ)

Tableau 7. L-Anchor, *ɨ, *Coda, MAX(i) >> *F-Diph >> MAX(ɨ)

μ μ μ | | | k o i i	L-Anchor	*ɨ	*Coda	MAX(i)	*F-Diph	MAX(ɨ)
a. ko.ii					*!	
b. ko.ɨ				*!		
c. ☞ ko.i						*
d. ko.ɨi		*!				
e. ko.ɨi			*!			
f. koɨ		*!	*	*		
g. koɨ			*!			*

Let us move on to consider the change of 'ii' to 'i' in word-initial position. One explanation that has to be given is why 'ii' is changing to 'i' in this context, while the change was 'ii' to 'ɨ' in non-word-initial positions. Kim-Renaud (1986) makes the following observations regarding the cause of the splitting of 'ii'. First, she (1986:128) insightfully suggests that the change of 'ii' to 'i' in word-initial position is primarily attributable to the 'strength of word-initial position', i.e., that the word-initial segment 'i' is retained because of the phonological strength of this position. She (1986:127) also notes that the change of 'ii' to 'ɨ' (the choice of 'ɨ' over 'i') in non-word-initial positions is natural since 'ɨ' is a more sonorous and more typologically natural vowel than 'i'.[8]

I attempt a partially similar line of explanation to that of Kim-Renaud (1986) in the current study. I suggest, like Kim-Renaud (1986), that the reason why 'ii' is monophthongizing to 'i' in word-initial position (unlike in other positions) is due to languages'

'This is my interpretation of Kim-Renaud's (1986:127) statement, "It is naturally the front vowel [i] that is chosen over the least sonorous high back vowel [ɨ]."

(universal) tendency to preserve a word-initial segment. The 'ii' to 'i' change is, presumably, a result of the currently examined language's (or Seoul Korean speakers') efforts to retain the word's most phonologically strong segment (or the most important segment in word recognition: cf. Luce 1986, Pisoni & Luce 1987) while succumbing to the irresistible structural (system-internal) pressure to monophthongize the falling diphthong. The same explanation was proposed earlier to the question why the monophthongization of 'ii' is happening in word-initial position later than in the other positions: the lagging of monophthongization in word-initial position is again due to the strength of this environment, which is especially resistant to weakening processes.

I propose an account that is rather different from Kim-Renaud's (1986) for the explanation of the 'ii' to 'i' change in non-word-initial positions. The now lost vowel 'ʌ' has changed to 'a' when it was a word-initial vowel and to 'ɨ' in other contexts in Seoul Korean. (The former and the latter changes were respectively completed at the late 18 century and the early 17 century (K.U. Kang 1993), the former lagging behind the latter.) The splitting of 'ʌ' into 'a' and 'ɨ', which are, respectively, a more sonorous (and thus stronger) and less sonorous (and thus weaker) vowel than 'ʌ', is one of the examples in Seoul Korean which shows that word-initial and non-word-initial positions are, respectively, a strengthening and a weakening environment in this dialect (as in many other languages). There is yet another piece of evidence revealing the phonological strength of word-initial-position. The fortition or strengthening of word-initial lenis obstruents (e.g., /toŋklami/ > /t'oŋklami/ 'circle', /seta/ > /s'eta/ 'strong'), another change in progress in Seoul Korean, is occurring only in word-initial position, not in any other positions.

On the basis of these observations, I propose the following answer to the question why 'ii' changed to 'i' in non-word-initial positions. My proposal is that the monophthongization of 'ii' to 'i' in non-word-initial positions is also a reflection of the (weaker) phonological strength of this position. This proposal is based on the fact that the vowel 'i' has greater sonority (or intensity) than 'ɨ' contrary to Kim-Renaud's suggestion mentioned earlier. (I assume here following Lindblom (1979)

that the sonority (or intensity) of vowels is chiefly determined by their F₁ values.) Actually 'i' has the largest F1 value among the three high vowels of Seoul Korean (see B.G. Yang 1993:237; see also H.B. Lee & M.J. Zhi 1987:39)

Foley (1977:107) claims that weakening processes occur 'preferentially' and 'more extensively' in phonologically weak environments (such as word-medial and -final positions) as opposed to in strong environments (such as word-initial or post-nasal positions). Preferential weakening is supported by the aforementioned split of 'ʌ' to 'a' and 'ɨ' in Seoul Korean: only in non-word-initial positions, weakening to 'ɨ' happened. On the other hand, the monophthongization (which is a weakening process) of 'ii' to 'i' over 'ɨ' in non-word-initial position exemplifies more extensive weakening in weak environments. Among the two possible options, 'i' and 'ɨ', the less sonorous vowel 'i' was obviously chosen over 'ɨ' in non-word-initial position thus undergoing more extensive weakening.

Now let us go back to our earlier discussion. The constraint ranking right before the beginning of the monophthongization of 'ii' in word-initial position is conjectured as identical to the one given in (7): no change in the ranking is needed to explain the linguistic situation at this stage. Again Tableau 6 given earlier can illustrate this period.

The monophthongization of 'ii' in word-initial position is presumed to have started with another change in constraint ranking in Seoul Korean phonology. The change would have taken the following form: *F-Diph has come to acquire a constraint strength comparable to that of MAX(i), the two variably dominating one another as a consequence. The constraint ranking that held at this stage is given in (8). The ranking indicates that the strength of *F-Diph, i.e., the pressure to monophthongize 'ii', has become so strong as to make the deletion of underlying 'i' possible in Seoul Korean phonology.

(8) Constraint ranking that began to hold from the beginning of the monophthongization of word-initial 'ii'

$$\text{L-Anchor, } {}^*\text{i, } {}^*\text{Coda} >> \overset{\curvearrowleft}{\left\{\begin{array}{l} {}^*\text{F-Diph} \\ \text{MAX(i)} \end{array}\right\}} >> \text{MAX(i)}$$

As a result of this change in grammar, both the constraint hierarchies shown on Tableaux 8 and 9 have become possible in Seoul Korean phonology as part of a single grammar, selecting both (a) *iisa* and (b) *isa* as optimal forms. In case MAX(i) dominates *F-Diph, candidate (a) is chosen; in the opposite case, candidate (b) is selected. The constraint ranking given in (8) is also the current synchronic grammar of the Seoul dialect. The statistical results given in Table 4 suggest that the two forms are now closely competing with each other and that the 'ii' to 'i' change is an active process. In the tableaux below, candidates (c) (g), and (d) (f) are ruled out for their violation of L-Anchor and *i, respectively; candidate (e) is eliminated because of its violation of *Coda.

Tableau 8. L-Anchor, *i, *Coda>> MAX(i) >> *F-Diph >> MAX(i)

	L-Anchor	*i	*Coda	MAX(i)	*F-Diph	MAX(i)
a. ☞ ii.sa					*	
b. i.sa				*!		
c. i.sa	*!					*
d. ¡i.sa		*!				
e. ¡i.sa			*!			
f. ¡sa		*!		*		
g. ¡sa	*!					*

Tableau 9. L-Anchor, *ɨ, *Coda >> *F-Diph >> MAX(i) >> MAX(ɨ)

μ μ μ ɨ i s a	L-Anchor	*ɨ	*Coda	*F-Diph	MAX(i)	MAX(ɨ)
a ɨi.sa				*!		
b ☞ i.sa					*	
c i.sa	*!					*
d ɨi.sa		*!				
e ɨi.sa			*!			
f ɨsa		*!			*	
g ɨsa	*!					*

The ranking given in (8), which has held in Seoul Korean phonology since the beginning of 'ɨi' to 'i' monophthongization, is expected to change to the ranking shown in (9) eventually, though it is an open question when the change will be completed.

(9) Constraint ranking expected to hold at the completion of the monophthongization of word-initial 'ɨi'

L-Anchor, *ɨ, *Coda, *F-Diph >> MAX(i) >> MAX(ɨ)

The changes in constraint ranking that have occurred in Seoul Korean phonology are summarized in Figure 4. The constraint, L-Anchor, is assumed here to have been active since the earliest stage (i.e., since before the beginning of the monophthongization of 'ɨi'). The figure shows clearly that *F-Diph, i.e., the structural pressure to monophthongize 'ɨi', has been gaining strength through the different phases of the monophthongization of this diphthong and has been a strong motivating factor in this diachronic process.

Stage 1: before the beginning of the monophthongization of 'ɰi'

L-Anchor, *ɰ, *Coda, MAX(i), MAX(ɨ) >> *F-Diph

↓

Stage 2: during the monophthongization of 'ɰi' to 'i' in non-word-initial position

L-Anchor, *ɰ, *Coda, MAX(i) >> { *F-Diph / MAX(ɨ) }

↓

Stage 3. during the monophthongization of 'ɰi' to 'i' in word-initial position

L-Anchor, *ɰ, *Coda >> { *F-Diph / MAX(ɨ) } >> MAX(i)

↓

Stage 4. at the expected completion of the monophthongization of 'ɰi'

L-Anchor, *ɰ, *Coda, *F-Diph >> MAX(i) >> MAX(ɨ)

Figure. 4. Changes in the constraint ranking involving the monophthongization of 'ɰi' in Seoul Korean

8. Conclusion

This paper has examined the current status of the diphthong 'ɰi', the only remnant of the six Late Middle Korean falling diphthongs. In this paper, I first showed based on quantitative evidence that 'ɰi' still remains in Seoul Korean as an underlying vowel contrary to some

researchers' claim. It was also shown that the distribution of 'ii' is limited only to word-initial position though the diphthong retains its traces in orthographical representations in other phonological environments as well. I also suggested (on the basis of quantitative evidence) that non-word-initial 'ii' has changed to 'i', and that the possessive marker 'ii' has monophthongized to 'e' through a morphological change, while the diphthongal variant and [i] are in close competition with each other in word-initial position.

Then an attempt was made to provide a phonological explanation of the monopthongization of 'ii'. It was suggested that one important factor has played an important role in the change. It was the internal structural pressure to monophthongize 'ii', which is the only remaining falling diphthong in Seoul Korean. This factor was formalized as the OT constraint, Fall-Diph, in my phonological account. It was shown that the pressure toward the monophthongization of 'ii', i.e., the strength of the constraint *Fall-Diph, has been growing increasingly stronger in this dialect.

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