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Aspects of Korean Diachronic Phonology

By

Namgui Chang

A.B. (Seoul National University) 1949
M.A. (University of California) 1968
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0. Introduction

In this study, the historical development of several areas of Korean phonology will be examined through the past five centuries within a framework of generative phonology. The approach adopted here, however, will not be wedded to a single version of its theory, standard or otherwise. It aims, rather, to explore, refine, or modify the existing theoretical apparatuses through analyzing concrete synchronic and diachronic data and problems from a linguistic area other than those hitherto more widely known and studied. The history of Korean phonology of the past five centuries provides us with rich sources of diachronic studies, and it does not lack a number of insightful studies in this century. There are yet many areas where more rigorous analyses and critical reevaluations are desired. Some basic assumptions in the theory of diachronic phonology in spite of recent advances, also, require continuing reassessment in the light of language-specific data from wider areas. Since the advent of the generative transformational theory of grammar in the fifties, linguistic science gained a great deal of precision in analysis, but this has also created the side-effect of assuming a language to be a tightly organized body and linguistic changes as a chain of successive events that affect its organization through a series of discrete stages.

This view of linguistic structure, however, is not universally accepted. Weinreich, Labov, and Herzog (1968),

for example, argue against such a view that a language is a "homogeneous object", and present a framework in which a language is considered "the product of combinations, alternations, or mozaics of jointly available subsystems" (Ibid: 165). Similarly, C-J. N. Bailey (1970) argues that the linguistic competence of a speaker involves something more than the knowledge of his own idiolect that he uses in his production; he must recognize, understand, evaluate, project and control variant forms which he encounters. Bailey calls a linguistic system that enables such varieties of linguistic functions "polysystemic" or "polylectal." According to him (Bailey 1972), linguistic changes are due to two basic mechanisms; (1) "changes resulting from the way in which children acquire their native language, which create new sub-systems or lects within a given system, and (2) changes occurring through adult borrowing from other systems, which may create a new system(Ibid:93)." What we are concerned with here is the fundamental concept of a synchronic state at any given time as a polysystemic organization containing overlaps not only of sociological or geographical dialects, but also of styles (subsystems) representing temporal progression. In this sense, a linguistic change in time may not be conceived of as a succession of System A to System B, but rather of System A to System A/B, and then to System B, and since we would not think of a synchronic state to have a clear beginning or ending, any state must be represented by a form System A/B, namely

a "polysystemic" organization. In dealing with historical data, an analyst often encounters two or more sets of evidence which yield two or more apparently irreconcilable interpretations on one and the same linguistic process, and if we view a synchronic state of a language to be "monosystemic," he would then be forced to choose one solution over the other based on the relative weight of evidence, the economy of description, or even on some sense of elegance. Such examples are not hard to find in philological data. In Middle Korean (MK), for example, word-initial consonant clusters (graphically so represented) may be either interpreted as such or as tense obstruents depending on which set of data one chooses to cite or ignore. The interpretation of the MK vowel system involves two contradicting sets of supporting evidence; one representing a vertical alignment of the two harmonically opposing classes of vowels, and the other suggesting altered vowel relations where all vowels appear to have rotated clockwise from the earlier arrangement. Each of these, however, may be viewed as an instance of an overlap of two subsystems in transition from one state to another. The possibility and significance of diachronic processes not in a complementary (successive) relation had not been given full consideration until W. S-Y. Wang (1969) where the formal relationships between diachronic rules in various dimensions, and their effects on a synchronic state of a language were closely examined. The implemen-

tation of a sound change may be considered along several dimensions such as chronological (a period of time within which a change may take a full or partial effect), lexical (morpheme to morpheme), social (speaker to speaker), and phonetic (sound X to sound Y). In his subsequent article co-authored with M. Chen (1975), a wealth of cross-dialectal data in Chinese were quantitatively analyzed to demonstrate the correlation between two variables, the phonetic and the lexical. Their studies have shown that contrary to earlier beliefs a sound change may typically spread gradually across the lexicon, and often enters into a competing relationship with another,resulting in incomplete realization, which leaves residues. In this regard, particularly noteworthy are various irregularities and gaps in otherwise symmetric systems, or asymmetric distributions of features in philological data, which may reveal effects of partial intersects of diachronic forces in time.

Fifteenth century MK abounds with data that suggest such aspects of diachronic events "caught," so to speak, in a transitional state. The vowel system reveals both the earlier harmonic system and the altered relations between vowels, the aspiration and tenseness features of obstruents show incomplete diachronic processes, and the accentual system appears to be in its last stage of transformation immediately before its extinction as a phonemic feature, as we will closely examine them in subsequent chapters. In the first chapter, we will attempt to

briefly describe the fundamental characteristics of Korean phonology by sketching Morpheme Structure Conditions (MSC) and Surface Phonetic Constraints (SPC) of modern Korean as represented in the Seoul dialect. We consider these to be crucial components of phonology which functionally determine and motivate the existence and forms of phonological rules of all types. In the second chapter, the word-initial consonant clusters and the process of their reductions which created the modern tenseness feature for obstruents will be examined, and in the third chapter, the origin and the process of development of the aspiration feature as revealed in obstruents of MK and its subsequent cognate systems. The fourth chapter will be concerned with the MK vowel system and the character of the MK vowel harmony, and the fifth chapter with MK pitch marks represented by "side-dots" on the fifteenth and sixteenth century documents which have become a topic for intense studies in recent years.

Chapter 1. Brief Characterization of Korean phonology

1.1. The role of Morpheme Structure Conditions and Surface Phonetic Constraints. Various diachronic processes in terms of addition or loss of rules, types of rule simplification, etc. have been extensively discussed in recent years, but one aspect that is not fully explored is the effect of such processes upon the phonological structure of various units, such as morphemes, lexical units, and phonological phrases. In an early generative approach to phonology, the organization of phonology was considered to be consisting of two kinds of rules: morpheme structure rules and phonological rules (Halle 1959, Chomsky-Halle 1968). The latter expresses admissible structures of morphemes as inputs to phonological rules, and allows the phonological information in the lexicon to be redundancy-free matrices, with binary values of features that are predictable to be left unspecified. Morpheme structure rules are also viewed as reflecting the speaker's knowledge concerning what can and cannot be morphemes of his language, and thus correspond to the phonotactic statements in the Structuralist tradition. R. Stanley (1967) further refined the notion of morpheme structure rules by considering them unordered sets of conditions, which mechanically fill all blank (unspecified) values in feature matrices of morphemes before the application of phonological rules, to disallow the use of the blank in the

matrices to be used as a third value. Stanley claims that phonetic redundancies need not be separately stated, since phonetic representations obtained as outputs of phonological rules are completely determined by the two components. There are, however, a number of reasons that MSC's and phonological rules (P rules henceforth) alone do not fully reflect all significant generalizations on phonological facts about a language. Shibatani (1973) points out that adaptation of foreign loan words and the notion of "possible words" are not based on the structures of morphemes, but rather on surface phonetic structures of phonological phrases. He proposes that surface phonetic constraints (SPC) are part of the phonological component that determines the phonetic shapes of outputs of P rules. His proposal, however, entails some overlaps between MSC's, P-rules and SPC's, and an objection to this is raised by M. Clayton (1976) who claims that SPC's are sufficient and they are the only true generalizations on the phonological structures of "possible words", and MSC's play no independent role in phonological theory. Clayton's claim is based on two grounds: (1) that all MSC's which do not coincide with SPC's are not manifested on the surface and thus are not empirically testable for their psychological reality, and (2) that there are no diachronic changes which affect MPC's independently of SPC's. Both grounds are not quite justified for denying the existence of MSC's. Although the question of psychological reality is an im-

portant one, empirical evidence does not immediately require a "directly observable" phenomenon, as the state of art stands today. Linguists often have no other choice but to accept "indirect" evidence for various hypotheses. Note that if we deny the existence of MSC's for their lack of "empirical" evidence, we are also forced to question the existence of most P rules as well. P rules are postulated with the assumptions that there exist some abstract representations of linguistic units as inputs to such rules, and the speaker must know what the structure of such units should conform to. There are, however, cases of spurious MSC's, such as simultaneous feature conditions of the voice feature, e.g., all vowels are voiced in English, all obstruents are voiceless in Korean, etc. Clayton cites the one for Spanish continuant obstruents that are necessarily voiceless (Ibid. 302). Although the above generalizations are true, there is no basis to claim that they reflect the speaker's knowledge since the voice feature is not contrastive in these segments. If we consider MSC's to express the speaker's knowledge on the phonological structures of morphemes as inputs to P rules, MSC's are necessarily on the order of higher abstraction, i.e., in terms of phonemic contrasts, but not in phonetic terms. We will therefore revise the notion of MSC from that of Stanley (1967) to one that expresses the phonological constraints and systematic phonemic redundancy in the feature matrices of morphemes as inputs to P rules rather

than to perform a mechanical function of filling all unspecified feature values before the application of P rules. This interpretation of MSC's also entails exclusion of the use of non-phonemic contrasts in morphemes in the application of P rules, which Stanley's approach may not exclude.

Furthermore, many MSC's and SPC's will be written negatively reflecting their nature as constraints against certain simultaneous and co-extensive co-occurrences of features and segments. Many such constraints will have no function of filling blank values since such MSC's have no direct consequences upon inputs to P rules. For such negative statements, we will use a notational device of ~ prefixed to a given element as we find this way of notation to be more natural, if not resulting in feature saving. For example, ~X to be read as "non-X," ~{X} to be read as "X does not occur," and ~{~X}as "necessarily x." The question of overlaps between MSC's, P rules, and SPC's, however, remains to be re-evaluated. As Clayton (Ibid: 301) indicates, the slash notation of Shibatani does not amount to elimination of duplicated generalizations. However, we must question here the common assumption that all linguistically significant generalizations should be stated only once in all circumstances. If the same generalization applies to two different components of phonology, such as MSC's and SPC's, it should not matter whether it is stated twice in two different areas, or once with a notation that it applies to two different areas. We will

take the latter course of description, namely, all MSC's are included within the component regardless of their overlaps with SPC's, but MSC's which hold true for SPC's as well, will be eliminated from the SPC component. This means that all MSC's are at the same time SPC's unless there exist contrary SPC's which nullify the effect of such MSC's, in which case the nullification of MSC's is done by one or more P rules. The MSC's which are not countermanded by SPC's and pure SPC's, then, constitute the total of phonological patterns allowed for phonetic phrases as outputs of the phonological component, which are used by the speaker in the adjustment of loan elements. In this view, P rules are considered as a bridging function which removes violations of SPC's from the input sequences to P rules. Thus, SPC's do not only express phonetic constraints of the outputs of P rules, but also motivate, explain, and functionally correlate different sets of P rules. To cite a Korean example, there are two P rules that are functionally related to each other by the existence of an SPC, which disallows sequences of an obstruent and a nasal. The two rules that remove such a violation are epenthesis of a vowel and nasalization of the pre-nasal obstruent. The causal connective -ni 'since, because' employs the former as in tat-ɨni 'since one closes,' and the plain interrogative suffix -ni the latter means, as in tat-ni [tan-ni] "close-QUESTIONS."

The existence of the two sets of constraints raises an

interesting question of its significance in diachronic processes. Since phonological changes are essentially due to a reinterpretation of phonetic outputs of one generation by the subsequent generation, or those of one social group by another, it is reasonable to proceed with the assumptions that changes are typically introduced in SPC's rather than in MSC's, which are more abstract. However, we must note also that some changes may not involve SPC's in their initial stages. In other words, there should be many changes in the rule component without at first affecting MSC's and SPC's. The vowel fronting, consonant cluster reductions, etc., in late MK affected only a small sector of the lexicon and has gradually spread their domains of operation. In this regard, it is necessary to recognize that neither MSC's nor SPC's are always absolute, but they are of statistical significance, and both constraints permit exceptions, as we will see later. A crucial question, at this point, is whether a diachronic change affects MSC's independently of SPC's. This possibility is denied by Clayton (Ibid: 309), but her denial amounts to saying that the underlying representations may not change without accompanying a concomitant change in SPC's. This conclusion is simply derived from the view that MSC's play no independent role in phonology, but if we accept MSC's to express the constraints upon the underlying morphemic representations, we must allow the possibility that MSC's may be altered independently of SPC's. It is naturally expected that changes of this category

should be far less common than the other way around in any language, because "pure" MSC's, namely those that do not coincide with SPC's, are necessarily smaller in number than SPC's. Nevertheless, it should not be totally excluded. To draw one example from Korean, the diphthongal sequence /ɨi/ provides us with an interesting case. This sequence is disallowed in SPC's which permit only the rising diphthongs consisting of a glide (w, y) before a vowel. Consequently, /ɨi/ is reduced to either i after a consonant (as in mun-ɨi "question and consultation" [muni]) or to ɨ at the end of the syllable before a consonant (as in ɨi-non [ɨnon] "consultation and discussion"). This means that the underlying sequence of /ɨi/ should be recognized and an MSC allows three on-glides y, ɨ, and w, i.e., all high non-consonantals may form a glide. However, the only diphthongal sequence formed with the high central semi-vowel is /ɨi/ and its distribution is extremely limited. As it turns out, the sequence /ɨi/ is a residual unit surviving from the earlier off-glide series in MK, and it is fast disappearing in the informal style of all dialects today.[1] For such dialects, the sequence /ɨi/ has already been reduced to /i/ and /ɨ/ in the underlying lexical representations of mor-

[1]The unit /ɨi/ may not occur as a diphthongal sequence [ɨi] in most dialects or styles of speech in modern Korean except in a slow formal style of speech, perhaps influenced by orthography. In the present discussion, however, it does not matter whether or not such a unit exists for modern Korean. If we conclude that it does not, it would simply mean that a diachronic process of /ɨi/-reduction is complete. We will examine the status of /ɨi/ in greater detail in Chapter 5.

phemes, and the relevant MSC should be considered altered. The above sample demonstrates that pure MSC's are generally concerned with morphemic representations that are residual or transitional in the lexicon, or with some abstract representations such as morpheme-final consonant clusters in Korean, which are not productive, whereas SPC's pertain to the productive system which expresses constraints in admitting new forms including loan elements.

1.2. Syllable and phonological cycle. In the theory of Generative Phonology, the organization of a phonological phrase consists of a group of formatives entering into various constructs, progressively from smaller to larger, with brackets marking the hierarchical phrase structure as an output of the grammatical component. It is further assumed that phonological rules operate with reference to various grammatical information contained in the phrase structure. This character of organization suggests that the application of phonological rules may not necessarily progress from left to right following the temporal sequence of production. The principle of transformational cycle, as proposed by Chomsky and Halle (1968), reflects this aspect of the phonological organization, but subsequent applications of the cyclic principle largely stayed within the prosodic domain. Brame (1972), however, speculates that there might be two hypotheses that might be tacitly held among generative phonologists: "(I) any kind of phonological rules

may be cyclic, and (II) only stress assignment rules may be cyclic." He then proposes a third hypothesis (III) which states "only rules that specify the feature stress in the matrix of the affected segment may be cyclic." In Hypothesis (III), all cyclic rules are in some way dependent on stress, and consequently only the languages with phonemic stresses have cyclic rules. It appears that (III) is not much different from (II), and can be easily falsified, if we find some cases of segmental cyclic rules that do not depend on the stress or other prosodic features. In this section, we will examine the role of the syllable, and the syllabification rule in cyclic application in modern Korean.

There are in Korean many nouns and verb stems ending with an obstruent as shown in (1):

(1)	ip	'mouth'	ap^h	'front'
	mat	'eldest'	pat^h	'field'
	os	'clothes'		
	nač	'day'	$nač^h$	'face'
	so:k	'inside'	pak*	'outside'
			$puək^h$	'kitchen'

The forms shown in (1) are underlying representations, and they are in isolation phonetically realized as final obstruents undifferentiated with regard to features

"tense" (shown by * above), "aspiration," "stop" and "fricativity."[2] Thus, all the nouns in (1) phonetically end with either p, t, or k. On the other hand, when they are followed by a suffix beginning with a vowel, the final obstruents are fully differentiated. In (2), the above nouns are shown in two forms: one in isolation, the other with the Subject marker -i.

(2)	[ip]	[mat]	[ot]	[nat]	[so:k]
	[ibi]	[maji]	[oʃi]	[naji]	[so:gi]
	[ap]	[pat]		[nat]	[pak]
	[apʰi]	[pačʰi]		[nacʰi]	[pak*i]
					[puək]
					[puəkʰi]

The full realizations of the underlying final consonants, however, are not simply conditioned by the presence of a vowel immediately following. These consonants remain neutralized when they are followed by a non-enclitic vowel as shown in (3).

(3)	os-i	'clothes-SM'	[oʃi]
	os-an	'clothes-inside'	[odan]
	puəkʰ-e	'kitchen-in'	[puəkʰe]
	puəkʰ-an	'kitchen-inside'	[puəgan]

[2]We will use two features, Stop and Fricative, following Ladefoged's analysis (1971); i.e., stops as +Stop, -Fricative, affricates as +Stop, +Fricative, and fricatives as -Stop, +Fricative.

To explain the two different realizations of the word-final obstruents, one could set up two different kinds of boundary markers, the morpheme boundary and the word boundary. Then, the rule of obstruent realization would be that the final obstruent is reduced to one of the homorganic stops (p, t, k) unless a suffix vowel follows immediately.[3] This explanation is at least descriptively correct in so far as the phonetic data are concerned, but it does not really constitute an explanation as to why there is such a distinction between suffixes and non-suffixes in triggering the two different realizations for the final obstruents.

Another set of data where the two types of boundaries are involved is consonant cluster reductions in native nouns. There are a considerable number of native nouns ending with clusters of two consonants. Final consonant clusters are, however, phonetically realized only when a suffix which begins with a vowel follows. Otherwise, one of the two consonants must be deleted,[4] as illustrated in (4):

(4)	yətəlp	[yədəl]	'eight'
	yətəlp-i	[yədəlbi]	'eight +Subject marker'

[3]We will ignore the rules of palatalization and voicing here, since they are not relevant to the present question.

[4]Consonant reduction rules involved here are quite complex, but not relevant to the present topic. For the examples in (4), the last of the two consonants is deleted.

yətəlp iss-ə	[yədəris*ə]	'eight exist' (There are eight.)
kaps	[kap]	'price'
kaps-i	[kapʃi]	'price + Subject marker'
kaps əps-ə	[kabəpsə]	'price not-exist' (There is no price.)

Here again, we could easily account for the deletion and non-deletion by two different kinds of boundaries. For the two sets of problems, however, the most natural solution seems to be the one that explains the two different realizations in terms of the hierarchical principle of phonological organization, namely by cyclic rules. Phonological rules are first applied to the smallest units containing no formative boundaries (brackets), and after the first cycle, the innermost brackets are removed, and the relevant rules are applied again to the stretch of segments containing no brackets, and so on. Relevant to the present topic are two rules that affect the morpheme-final consonants: the syllabification and the obstruent neutralization.

The syllabification rule uniquely determines the number and the segmental structures of syllables in a given string of formatives. Enclitics such as case markers, verb suffixes, etc., are included in the first cycle as part of the major lexical categories to which they are assigned, and thus such enclitic boundaries are immediately removed with the operation of the syllabification rule in the first cycle. The syllabification rule takes the form of a syllabic boun-

dary marker insertion:

(5) $\emptyset \rightarrow +$ / ___(C) (G)V where + is a syllabic boundary, C a consonant, and G a glide.

Consider, for example, a phrase such as ##k^{h}i̱##n##ati̱l#i## "big son" where ## is a word boundary, and # an enclitic boundary. Two enclitics included here are -n (a prenominal participial suffix) and -i (a subject marker). In the first cycle of syllabification, the enclitic suffixes are removed and syllabic boundaries are inserted by (5) entailing ##k^{h}i̱n ##a+ti̱+li##, and in the second cycle, the word boundary between the two lexical units are removed resulting in a new syllabification: ##k^{h}i̱+na+ti̱+li##. The so-called "liaison" phenomenon is then a consequence of the syllabification cyclically applied.

Now, let us examine the cases cited (3) and (4) involving interactions between the syllabification and some phonological rules: what we will call the "obstruent neutralization" (ON) rule, and the consonant cluster reduction. ON has a function of readjusting the syllabic structures of morphemes (allowed by MSC's) such as those ending with a tense, aspirated, or fricative obstruent when they are not followed by an enclitic.

(6) Obstruent Neutralization

$$[-\text{Sonorant}] \rightarrow \begin{bmatrix} +\text{Stop} \\ -\text{Fricative} \\ -\text{Tense} \\ -\text{Aspirated} \end{bmatrix} \quad / \quad \underline{\quad} \begin{Bmatrix} \#\# \\ C \end{Bmatrix}$$

The obstruent neutralization rule reduces all syllable final obstruents before a word boundary or before a consonant to an unaspirated lax stop in the first cycle. The following illustrates an analysis of an example given in (3):

(7)	Underlying forms	##os#i##	##os##an##
	1st Cycle		
	Syllabification	##o+si##	
	Obst. Neutralization		##ot##an##
	2nd Cycle		
	Syllabification		##o+tan##
		[o+ʃi]	[o+dan]

The data in (4) involving consonant clusters are analyzed similarly:

(8)	Underlying forms	##yətəlp#i##	##yətəlp##iss#ta##
	1st Cycle		
	Syllabification	##yə+təl+pi##	##yə+təlp##iss+ta##
	Cluster reduc.		##yə+təl ##iss+ta##
	Obst. Neutralization		##yə+təl ## it+ta##
	2nd Cycle		
	Syllabification		##yə+tə+lit+ta##
		[yə+dəl+bi]	[Yə÷də+rit+ta]

The preceding analysis involving cyclic applications does not obviate the postulation of two types of formative boundaries, but it eliminates a need for extrinsic ordering to account for the data. If the cyclic interpretation was not available, the obstruent neutralization rules must

be extrinsically ordered before the syllabification. The need for the cyclic principle to dissolve ordering paradoxes has been already demonstrated by Kaye and Piggott (1973). In Ojibwa, the relationship between t-palatalization and the final lax vowel deletion is such that in one instance the t-palatalization precedes while in other cases the order must be reversed. However, a proper constituent analysis with the postulation of cyclicity would assign apparently paradoxical t-palatalizations to different cycles.

1.3. Some of the major MSC's and SPC's in modern Korean. One of the major differences between MSC's and SPC's on syllabic structures of the modern Seoul dialect may be stated in (9).

(9) MSC: C_0^1 G_0^1 V $C\acute{0}^2$

SPC: C_0^1 G_0^1 V C_0^1

Where C=consonant, G=glide, and V=vowel

As pointed out earlier, morpheme final consonant clusters are posited on the basis of such alternations as h±k~h±lk-i 'soil ~ soil-SUBJECT MARKER (SM)', kap ~ kaps-i 'price ~ price-SM', an-ko ~ anč-a 'sit down-and ~ sit down-PLAIN SENTENCE FINAL (PF),' etc. The resolution of the above differences by P rules is not a simple process since it requires various types of cluster reduction rules as we will closely examine later. A general principle of conso-

nant reduction seems to involve some language- or dialect-specific "relative phonological strength" which will be discussed in Chapter 3. The difference between MSC and SPC on syllabic structures, however, suggests that there may be a diachronic force operating against MSC (9), since the new generation of speakers must reconstruct their phonology mainly based on the surface manifestations. There is a set of evidence in the Seoul dialect which points to the fact that this process is indeed in its initial stage of operation. Most nouns ending in a consonant cluster have reduced their final clusters to single consonants before an enclitic vowel in the informal style, as shown in (10).

(10)

	Formal Style	Informal Style	
/hɨlk-i/	[hɨlgi]	[hɨgi]	'soil-SM'
/talk-i/	[talgi]	[tagi]	'chicken-SM'
/kaps-i/	[kapsi]	[kabi]	'price-SM'
/tols-i/	[tolsi]	[tori]	'anniversary-SM'
/saks-i/	[saksi]	[sagi]	'wage-SM'
/nəks-i/	[nəksi]	[nəgi]	'spirit-SM'

The doublets in (10) are by no means consistent from speaker to speaker, or morpheme to morpheme within the Seoul dialect, suggesting that this diachronic process is taking the process of 'lexical diffusion.' This process, however, has not affected the verb roots ending in a consonant cluster, mainly because the verb roots do not occur

independently of a suffix, and many suffixes begin with a vowel. Nouns, on the other hand, occur more frequently without a suffix, namely with the final clusters already reduced. This means that we must recognize both SMC and SPC (9) for all speakers in spite of the diachronic process of consonant cluster reductions to be in effect with a small sector of the lexicon.

There are three consonants that are restricted in the morpheme- and phrase-initial positions; ŋ, l, and n. The constraint against the velar nasal is an MSC/SPC.

(11) Initial velar nasal constraint

MSC/SPC: $\sim\{ŋ \;/\; \sim V\_\_\_\_\}$

To reflect the negative nature of these constraints, we will adopt a negative notation: ~. ~X is a non-X, and ~{X} is to be read as "X is not the case." MSC/SPC (11), then, will be read "A velar nasal is not preceded by a non-vowel" or "A velar nasal is necessarily preceded by a vowel." The other consonant, the sole liquid phoneme in Korean, presents more complex a picture. First of all, there is no constraint on the initial liquid in MSC's[5] due mainly to Sino-Korean morphemes. The native morphemes, however, conform to SPC.

[5]There are native morphemes with an initial liquid such as the 'anticipatory' suffix -l or -lyə. Such morphemes require an epenthetic vowel ɨ to satisfy the SPC when preceded by a consonant.

(12) Initial liquid constraint

$$\text{SPC: } \sim \left\{ \begin{bmatrix} +\text{Vocalic} \\ +\text{Consonantal} \end{bmatrix} \right\} \quad / \sim \left\{ \begin{matrix} V \\ 1 \end{matrix} \right\} \_\_\_\_$$

The above is to be read "A liquid is not preceded by a non-vowel or by a non-liquid." or "A liquid is necessarily preceded by a vowel or by another liquid." Thus, Sino-Korean morphemes with an initial liquid are subject to a nasalization rule: $l \rightarrow n \; / \sim \left\{ \begin{matrix} V \\ 1 \end{matrix} \right\} \_\_\_$ (A liquid becomes a nasal if it is not preceded by a vowel or by another liquid)as in lo: in [no:in] 'old man,' lakčʰak [nakčʰak] 'settlement,' pʰuŋlo [pʰuŋno] 'cooking stove,' etc. This nasalization is the general solution for the Sino-Korean morphemes violating (12), but recent loan words (from Japanese and European languages) are not always subject to the above rule for some educated speakers. In many cases, the initial liquid in such words are realized by a flap sound that is similar to an intervocalic flap.[6] An increasing presence of loan words that violate the constraint (12) may lead to an eventual abandonment of the initial liquid constraint as in Old Japanese where the same liquid constraint was removed due to the presence of Sino-Japanese morphemes violating the constraint.

The third consonant which is restricted in the initial position is the alveolar nasal before a high front vowel

[6] It is interesting to note that an earlier solution for (12) in the 19th century included a prothetic vowel as in arasa "Russia."

or glide. This is again an SPC but not an MSC. This constraint is placed only after a word boundary but not after a syllable boundary.

(13) Initial n constraint

$$\text{SPC: } \sim \left\{ n \;/\; \#\# \;\_\_\; \begin{bmatrix} -\text{Consonantal} \\ +\text{High} \\ -\text{Back} \end{bmatrix} \right\}$$

Unlike (11) and (12), the initial n-constraint excludes the Northwestern ($P^hyəŋan$ Province) dialects where the palatalization of acute consonants does not take place. Therefore, the initial n-deletion, a diachronic counterpart to (13) is assumed to have taken place after the palatalization (18th century), and it is the palatalized ñ rather than n, that is deleted. An interesting problem here is the existence of a phonetic form [ni] or [ñi] in a substandard dialect of Seoul, which is derived from ne, a contracted form of nə-e (nə-ɨi) 'your.' This form is obtained as an output of the e-raising: kečip → kičip 'woman,' čeka čika (1st person pronoun, humble), če:il → či:l 'number one,' pe:ta → pi:ta 'to slice,' etc. Here, we see a good example that might be used in support of the familiar argument for rule ordering; the n-deletion would be placed before the e-raising, and the output of the e-raising rule is not affected by the n-deletion.[7] This argument has

[7]Another explanation is to consider [ni] to contain a realization of /ɨi/. (Wan-jin Kim 1971), preventing the initial n from deletion, but we will have more to say on this subject later.

merit in a diachronic explanation, but synchronically such imposition of extrinsic rule ordering increases the phonological complexity. If some other explanation without extrinsic ordering is available, it would be preferable. We will examine this issue more closely later in Chapter 4. A question that may be raised with regard to the constraint (13) is why a language with a particular SPC should admit a form that violates the SPC. Obviously, SPC's are not absolute, and some of them are sometimes violated, as we see in the case of [ni] as well as in some recent loan words that violate (13). It is expected that as such violation increases, the particular SPC will be removed.

We will now examine syllable-final consonants where the difference between MSC's and SPC's is more pronounced. As shown in (9), there can be only one consonant in that position and the consonant is "restrained" from being released if it is an obstuent:

(14) Obstruent restraint

SPC: [-Sonorant] $\longrightarrow$ [-Released] / ___+

The syllable-final consonant may be a sonorant or an obstruent, but if it is an obstruent, it is not released, and as a consequence the contrasts of fricativeness, tenseness, and aspiration are neutralized. It means that there are only three obstruents (p, t, k) which can be syllable-final obstruents. Thus, <u>pit</u>, <u>pis</u>, <u>pič</u>, <u>pit^h</u>, etc. would

all be realized as [pit]. On the other hand, MSC's have no such constraints on the final obstruents, and furthermore MSC's allow syllable final consonant clusters with the following constraints:

(15) Morpheme-final consonant clusters (MSC)

a. $C \rightarrow \left\{ \begin{matrix} [-\text{Sonorant}] \\ [+\text{Nasal}] \end{matrix} \right\} \; / \; l\_\_\#$

b. $C \rightarrow [+\text{Nasal}] \; / \; \_\_ \left\{ \begin{matrix} č \\ h \end{matrix} \right\} \#$

c. $C \rightarrow \begin{bmatrix} +\text{Stop} \\ -\text{Fricative} \end{bmatrix} \; / \; \_\_s\#$

The constraints on morpheme-final consonant clusters provide a convenient framework for categorizing clusters into three types; the first is those that begin with a liquid, the second those that begin with a nasal, and the third type where the second consonant is s:

(16) a. Liquid + C

lp as in yətəlp 'eight,' nəlp 'to be wide'

lk as in talk 'chicken,' ilk- 'to read'

lp^h as in ilp^h 'to recite a poem'

lt^h as in $halt^h$ 'to lick'

lm as in kulm 'to skip a meal,'
talm 'to resemble'

ls as in tols 'anniversary'

b. Nasal + C

nč as in anč 'to sit', ənč 'to place...on...'

nh as in manh 'to be many/much,' anh 'Negative verb'

mh as in amh 'female (Prefix)'

c. Obstruent + s

ps as in kaps 'price,' əps 'not exist'

ks as in nəks 'spirit'

These morpheme-final consonant clusters are reduced by the first cycle syllabification or by cluster reduction rules to meet SPC's (9) and (14). If a suffix beginning with a vowel follows, the first syllabification moves the second consonant of the cluster to the next syllable. Otherwise, the first cyclic application of P rules deletes one of the two consonants. The consonant cluster reduction rules are, however, not altogether consistent in any dialect, and all dialects seem to present some variant patterns from one another. For all dialects, the following (17) holds true:

(17) C-cluster reduction (partial)

a. $\begin{bmatrix}-\text{Sonorant}\\-\text{Grave}\end{bmatrix} \rightarrow \emptyset \quad / \quad \begin{bmatrix}+\text{Consonantal}\\+\text{Vocalic}\end{bmatrix} \_\_ +$

b. $[-\text{Sonorant}] \rightarrow \emptyset \quad / \quad \left\{\begin{matrix}[+\text{Nasal}]\\[-\text{Sonorant}]\end{matrix}\right\} \quad \underline{\qquad} \quad +$

c. $\begin{bmatrix}+\text{Consonantal}\\+\text{Vocalic}\end{bmatrix} \rightarrow \emptyset \quad / \quad \underline{\qquad} \; [+\text{Nasal}] \; +$

Namely, (a) any acute obstruent after a liquid is deleted as in tols [tol], halt^{h}-ko [halk*o], etc., (b) any obstruent after a nasal or another obstruent is deleted as in anč-ko [ank*o], etc., and (c) any liquid before a nasal is deleted as in čəlm-ta [čəmt*a], etc. The above rules, however, leave the clusters lp, lp^{h}, and lk unresolved. The solutions for these clusters seem to be different from dialect to dialect.

With some exceptions, the Seoul dialect deletes the labial stop after a liquid, but retains the velar stop in the same position dropping the liquid. For example, the following morphemes drop p: yətəlp [yədəl] 'eight,' nəlp-ta [nəlt*a] 'to be wide,' etc., but morphemes ending with -lk drop l as in talk [tak] 'chicken,' malk-ta [makt*a] 'to be clear,' etc. A peculiar exception to be noted here is a verb pa:lp- 'to step on' which drops l rather than p: [pa:pt*a]. In any event, note the relative "durability" of the three obstruents after the liquid: the acute obstruents (s, t^{h}) are always deleted, the labials are more often deleted than retained, and the velars are almost always retained.[8] Later we will have more occasions to examine the

[8]Although this observation is based on the Seoul dialect, and there are various recombinations of deletion possibilities in other dialects, the above "relative durability" held between three obstruent types seems true for most dialects. It is also noteworthy that most doublets or dialectal variations are found in the resolution of lp, where the labial, the middle in the rank of durability, is involved.

differences between the consonants of three different places of articulation, in which the same or similar pattern of relations seems to recur in diverse phonological processes of Korean. We will for now leave this topic with the following modifications of the C-cluster reduction rules (17) to accomodate the preceding discussions based on the Seoul dialect:

(18) C-cluster reduction (revised)

a. $\begin{bmatrix}-\text{Sonorant}\\+\text{Anterior}\end{bmatrix} \rightarrow \emptyset \;/\; \begin{bmatrix}+\text{Consonantal}\\+\text{Vocalic}\end{bmatrix} \_\_^{+}$

b. $[-\text{Sonorant}] \rightarrow \emptyset \;/\; \left\{\begin{matrix}[+\text{Nasal}]\\[-\text{Sonorant}]\end{matrix}\right\} \_\_^{+}$

c. $\begin{bmatrix}+\text{Consonantal}\\+\text{Vocalic}\end{bmatrix} \rightarrow \emptyset \;/\; \_\_ \left\{\begin{matrix}[+\text{Nasal}]\\\begin{bmatrix}-\text{Sonorant}\\+\text{Grave}\\-\text{Anterior}\end{bmatrix}\end{matrix}\right\} +$

Although (18) accounts for those speakers who delete p consistently from the cluster lp, it does not reflect the competence of those speakers who delete l from such verbs as pa:lp-ta [pa:pt*a]. In such a case, we must regard the verb to be in some way marked in its lexical representation referring to (18c), which in turn must accomodate this irregularity by losing one feature [-Anterior] from its contextual segment. With reference to such an irregular lexical item, the two rules of C-cluster reduction (a) and (c) are formally in a competing relation, and perhaps

an additional marking for this variability by style should reflect this reality.

Intra-morphemic consonant clusters consist of two consonants, and in this respect, there are no differences between MSC's and SPC's. Medial clusters in a string of morphemes, however, may contain clusters consisting of three consonants as evident from the syllabic structure constraints. Inputs to the second cycle of syllabification and P rules, however, do not contain medial clusters of more than two consonants, since morepheme-final clusters are reduced to single consonants by (18) in the first cycle, and the syllable-final consonants that survive the first cycle are limited to sonorants and three stops. Of the four logically possible recombinations of obstruents and sonorants: O+O, S+S, S+O, O+S (where O=obstruent, S=sonorant), the last (O+S) is disallowed.

(19) SPC: $\sim \{[-\text{Sonorant}]\ [+\text{Sonorant}]\}$

The combination of an obstruent and a sonorant does not occur within a morpheme, but such a combination occurs freely between morphemes, and is resolved either by the epenthesis as in tat + ni →[tad̬ni] 'close-therefore,' or by the nasalization as in tat + ni → [tanni] 'close-Question Marker.' The choice between the two solutions is grammatically conditioned, and the suffixes are marked in their lexical representations as [+Epenthesis] and

[-Epenthesis] respectively. In the latter case, the obstruent must undergo the nasalization to satisfy (19).

We will now examine constraints on the three types of consonant clusters (O+O, S+S, S+O). In the obstruent-obstruent combinations, SPC's on the first obstruent are already expressed in the syllable-final obstruent restraints (14) and (15) where only three unreleased stops (p, t, k) are permitted to occur. The second obstruent, on the other hand, is not so constrained except:

(20) Obstruent cluster constraint

SPC: [-Sonorant] → [+Tense] / [-Sonorant] _____

Namely, all obstruents are tense after another obstruent, and thus the contrast of tenseness is neutralized in this position. For example, iss-ko 'exist-and,' i:s-ko 'connect-and,' ič-ko 'forget-and,' and mit-ko 'trust-and' equally have the same cluster t-k* as in [it-k*o], [i:t-k*o], [it-k*o], and [mit-k*o] respectively.

An interesting phenomenon to be noted here is a peculiar asymmetric relationship found between grave and acute consonants. Namely, acute obstruents are readily assimilated to grave obstruents, but the reverse is never true: iss-ko (by Obstruent restraint)→it-ko →ik-ko, but ik-ta, or ip-ta →* it-ta. This same asymmetric relationship exists in the place assimilation of nasals before obstruents or nasals, and thus the place assimilation rule is not as general as in most other languages:

$$[-\text{Grave}] \rightarrow \begin{bmatrix}+\text{Grave}\\ \alpha\text{Anterior}\end{bmatrix} \quad / \quad \underline{\quad} \quad \begin{bmatrix}+\text{Grave}\\ \alpha\text{Anterior}\end{bmatrix}$$

The above rule, however, is optional, or, to put it in more precise terms, determined by the (informal) style and the (faster-than-normal) speed of speech. In some sub-standard dialects, the above rule is obligatory, and in such cases, SPC's should include one that disallows the first obstruent to be acute unless the second is also acute. This dialect, then, acquires SPC (21) which motivates an obligatory place assimilation rule for obstruent clusters.[9]

(21) Acute obstruent cluster constraint

$$\text{SPC}: \sim \left\{ \begin{bmatrix}-\text{Sonorant}\\ -\text{Grave}\end{bmatrix} \quad \begin{bmatrix}-\text{Sonorant}\\ +\text{Grave}\end{bmatrix} \right\}$$

Clusters of acute consonants have further constraints with regard to the fricativeness and stop; i.e., a cluster of acute obstruents must agree in the two features:

(22) Stop/fricative agreement

$$\text{SPC}: \quad \begin{bmatrix}-\text{Sonorant}\\ -\text{Grave}\\ \alpha\text{Stop}\\ \beta\text{Fricative}\end{bmatrix} \quad \begin{bmatrix}-\text{Sonorant}\\ -\text{Grave}\\ \alpha\text{Stop}\\ \beta\text{Fricative}\end{bmatrix}$$

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[9] In an informal style of speech for many speakers, this SPC is further generalized by eliminating the -Sonorant condition; namely the constraint applies to nasals as well.

This necessitates a P rule of acute obstruent assimilation of the form:

$$[-\text{Grave}] \rightarrow \begin{bmatrix} \alpha\,\text{Stop} \\ \beta\,\text{Fricative} \end{bmatrix} \;/\; \left[\frac{\quad}{-\text{Sonorant}}\right] \begin{bmatrix} -\text{Sonorant} \\ -\text{Grave} \\ \alpha\,\text{Stop} \\ \beta\,\text{Fricative} \end{bmatrix}$$

as exemplified in pat-so ⟶ pas-so 'receive-(semipolite Suffix),' iss-ta ⟶ it-ta 'exist-(Blunt Suffix),' iss-ci ⟶ ič-či 'exist-(tag Suffix),' etc.[10]

Sonorant clusters are relatively uncomplicated except those involving the liquid. There are no clusters consisting of a liquid and an alveolar nasal; i.e., no clusters like ln or nl. Before stating this fact formally, we will examine the current notational convention for expressing ordered sequences of two elements, XY and YX. If both sequences are allowed, a brace notation may be used: $\left\{ \begin{matrix} XY \\ YX \end{matrix} \right\}$, which appears to involve a greater degree of complexity than XY or YX where the combination of the two elements is restricted to a unidirectional arrangement. To state the unrestricted sequences of two elements, we will adopt a notation X/Y, and let it signify "any sequence of X and Y." This notational convention is not entirely new, since the use of a slash (/) for contextual statements without a contextual bar (__) has been in existence for expressing a

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[10]Although there is no SPC against the combination of t and p, a peculiar gap (t+p) exists for verb and noun inflections, and for Sino-Korean due to the historical change: t → l/__#. There are, however, occasional occurrences of t+p in compounds such as os-po → ot-po (→ op-po) 'clothes wrapper.'

general context of X without regard to a particular order, as in A → B / X, where the inputs are AX and XA. Thus, the non-existence of clusters consisting l and n may be expressed:

$$(23)\quad \text{SPC:} \sim \left\{ \begin{bmatrix} -\text{Grave} \\ +\text{Nasal} \end{bmatrix} \quad / \quad \begin{bmatrix} +\text{Consonantal} \\ +\text{Vocalic} \end{bmatrix} \right\}$$

To meet (23), n is assimilated to l as a regular solution regardless of the sequence: n → l / l. This, however, is not the sole solution. The l-verbs (those verbs whose roots end with l) such as sa:l 'to live,' a:l 'to know,' etc., drop l to meet (23) as in sa:l + nɨn → sa: + nɨn a:l + nɨn → a: + nɨn, etc.

The sonorant-obstruent clusters have distributional peculiarities with respect to the tenseness feature. For Sino-Korean compounds, acute obstruents after a liquid are always tense, as in il-tan [ilt*an] 'once,' tal-səŋ [tals*əŋ] 'attainment,' mul-ča [mulč*a] 'material,' etc., but grave obstruents after a liquid are lax as in il-ka [ilga] 'relatives,' il-pu [ilbu] 'once part,' etc. Therefore, a P rule of the form: [-αGrave] → [αTense]/ l]$_{SK}$ $_{SK}$[__ is required.[11] In verb and noun inflections, however,

[11]There are also idiosycratic Sino-Korean morphemes which always require tensing when they follow another morpheme in compound such as ča 'letter,' kwa 'branch,' kwən 'right,' etc. Although these morphemes begin with a lax obstruent, their initial obstruent becomes tense when following another Sino-Korean morpheme; han-ča [hanč*a], čʰi-kwa [čʰik*wa], in-kwən [ink*wən]. Such information should be considered a property of the relevant morphemic feature matrices.

this tensing does not take effect for all obstruents after a liquid: a:l-ta [a:lda] 'know-SUFFIX,' ma:l-to [ma:ldo] 'word-also,' sa:l-ko [sa:lgo] 'live-and,' etc. The obstruent tensing operates, on the other hand, for verb roots after a nasal, as in an-ko [ank*o] 'embrace-and,' tam-so [tams*o] 'put in-SUFFIX,' etc.[12] These peculiarly complex operations of the obstruent tensing defy appropriate explanations. It should be noted, however, that the obstruent tensing is a diachronic process that has developed for a considerable span of time since the fifteenth century as we will examine closely in Chapter 2.[13]

Syllabic nuclei have a full vowel short or long with or without a glide preceding. Thus, (24) holds for both MSC and SPC:

(24) MSC/SPC: $\sim \begin{bmatrix} \text{-Consonantal} \\ \text{-Vocalic} \end{bmatrix} \; / \; \_\_ \; \sim \begin{bmatrix} \text{-Consonantal} \\ \text{+Vocalic} \end{bmatrix}$

Namely, a glide may not precede a non-vowel, or a glide is necessarily followed by a vowel. One problematic nucleus which may violate (24) is one that may be transliterated as /ɨi/ from its graphic counterpart in the orthography.

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[12]For those elements that do not render themselves to simple English translations, such as sentence-final verb suffixes of various levels and types, we will simply note as SUFFIX.

[13]This process appears to have gradually expanded its domain of operation, and is still in progress today, as observable in such examples as čom [č*om] 'a little,' čuŋkuk [č*uŋguk] 'China' in the speech of the post World War II generations.

This being such an extra-structural existence, some linguists such as S. Martin (1951) simply ignores the diphthong by choosing to describe a dialect within Seoul which has monphthongized /ɨi/; [e] as a "possessive" marker, [ɨ:] in the initial position as in ɨimu [ɨ:mu] 'duty,' and ɨisa [ɨ:sa] 'physician,' and [i] in the final position as in čə:ŋɨi [čə:ŋi] 'justice,' and hoe:ɨi [hwe:i] 'conference.' There are, however, other dialects or a formal style within some dialects where the diphthong is still pronounced either as [ɨi̯] or [ɨ̯i]. Huh (1964: 205), for example, regards the diphthong as containing an off-glide /ij/, which clearly violates (24). More precisely, the off-glide occurs only in the initial position before another syllable, but it is unstable and tends to be deleted with a compensatory lengthening of the syllabic vowel. The on-glide pronunciation [ɨ̯i], on the other hand, occurs in the final position preceded by another syllable, and in this case the first segment [ɨ] often gets deleted. There are various types of solutions among different dialects reflecting different stages of historical development.

All glides are high, and are either front unrounded or back rounded:

(25) MSC/SPC: $\begin{bmatrix}\text{-consonantal}\\ \text{-vocalic}\end{bmatrix} \rightarrow [\text{+high}]$

The unrounded front glide does not occur before i or ɨ, while the back rounded glide does not occur before u, o, or ɨ. Note that ɨ does not occur with either of the two

glides. This is due to a general constraint on the vowel ɨ, that it may not occur with any non-consonantal segment.

(26) SPC:~ ɨ / [-consonantal]

Thus, we remove the question of ɨ from the glide constraints, and we obtain:

(27) MSC/SPC:~ { [-consonantal, -vocalic, αback] [-consonantal, +vocalic, +high, -mid, αback] }

The problem which is not handled by (27) is the conspicuous absence of the possible diphthong *wo while the front counterpart ye is permitted. Diachronically, the absence of *wo is explained by the antecendent of the modern back glide (u or o) which could not combine with the vowel o due to the vowel harmonic constraints. In all dialects of Modern Korean, of course, vowel harmonic constraints have been removed, and therefore, the absence of *wo may simply be considered a lexical gap resulting from the earlier historical constraints.

Another question to be raised in connection with the glide constraints is the status of the so-called ninth vowel "œ" which corresponds to Middle Korean /oy/. Phonetic realizations of this vowel vary from [wɛ] (Northwest), [we] (Central), [œ] (Central), to [e] (Southeast). Since there is no case of [oy] in any dialect, /oy/ would not be an appropriate representation of the underlying vowel. In Seoul, both [œ] and [we] occur, and the former retains a prestige status while the latter is more prevalent. In

the dialect where [œ] exists, there is a phonemic contrast between /we/ and /œ/, but for most speakers in Seoul the contrast is lost. Thus, typical Seoul speakers have only eight simple vowels, and (27) is sufficient for glide constraints. For the dialect with the [œ] pronunciation, however, the constraint (27) is insufficient, since neither w nor y occur before /œ/. For this dialect, an additional glide constraint (28) is necessary.[14]

(28) MSC/SPC: $\sim\left\{\begin{bmatrix}-\text{consonantal}\\-\text{vocalic}\end{bmatrix}\quad\begin{bmatrix}+\text{high}\\+\text{mid}\\+\text{round}\end{bmatrix}\right\}$

For native Korean morphemes, there is a general tendency against vowel hiatus, which is resolved in various ways. First, a succession of the same vowel is not permitted:

(29) SPC [+Native]: $\sim\{V^n / V^m\}$, where $V^n = V^m$

Such forms as ka-ass-ta 'go-Past-Blunt' becomes [kat*a], but a Sino-Korean compound a-ak 'Graceful music (court music)' is not shortened.

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[14] There is another front rounded vowel [ü] that has often been counted as the tenth (simple) vowel in a Seoul (Standard) dialect, but even in this dialect, [ü] is contextually restricted to positions after sibilants. In most other dialects, [ü] does not occur. Thus, it is inappropriate to set this vowel as 'basic' for any dialect of Korean. [ü] will be considered as a realization of /wi/ in the context of sibilants.

The phonological rules of glide formation take the form: [+high] → [-vocalic] / [$\underline{\quad}_{V}$] V. Namely, short high vowels become glides as in tu-ə → twə 'leave-SUFFIX,' po-a → pwa 'see-SUFFIX,' či-ə → čyə 'be defeated-SUFFIX,' etc. Long vowels, however, are not reduced, but a homorganic glide is inserted: ki:-ə → kiyə 'crawl-SUFFIX.' It should be noted also that a long vowel obtained as a compensation to a consonant loss in some verbs is subject to the glide formation; kup-ə → kuu-ə → kuwə 'broil-Inf,' etc. Glide formations and glide insertion can be explained by another hiatus constraint (30):

(30) SPC +Native :~ [+high] / [$\underline{\quad}_{V}$] V

The constraints on vowels after a consonant are of two types: one that is due to labialization, and the other due to palatalization. The former involves the neutralization of the roundedness contrast, originated from MK. In Modern Korean, ɨ after a labial consonant in the word-initial position becomes rounded, but in other positions it remains unrounded. For example, [mu:] 'turnip,' [mul] 'water,' [pʰuda] 'to dip, scoop,' etc., have a rounded vowel, but the underlying vowel for the third example is unrounded as evident through the form [pʰə] which is obtained by deleting ɨ in /pʰɨ-ə/ 'dip, scoop-SUFFIX.' This roundness agreement between a consonant and a high back vowel is expressed in (31).

(31) Labiality agreement

$$\text{SPC: } [\ ] \rightarrow [\alpha\,\text{Round}] \quad / \begin{bmatrix} C \\ \alpha\,\text{Round} \end{bmatrix} \begin{bmatrix} \underline{\quad\quad} \\ V \\ +\text{High} \\ +\text{Back} \end{bmatrix}$$

The constraint on a high front glide due to dental palatalization applies to those after an affricate (č, čʰ, and č*). Again, it is an SPC which motivates a P rule which deletes the glide in this position. The deletion, however, applies after a glide formation as in <u>pačʰi-ə</u> 'dedicate+ SUFFIX' <u>pačʰyə</u> → <u>pačə</u> .

(32) SPC: ~{ y / č __ }

In many dialects, however, the front glide constraint is expanded to cover fricatives (non-grave) as reflecting a recent historical stage where morphemes containing the sequence syV, including Sino-Korean morphemes, are reduced to the form: sV as in syən > sən (仙, 先, 鮮, etc.), syo > so (小, 少, 照, etc.) and the like. The constraint (32) below expresses this state which is still maintained in some northwestern dialects, but in Seoul and in most southern dialects, (33) has been reduced to (32) in SPC.[15]

[15] For the speakers over sixty years of age in Seoul, (33) is well maintained, while for the younger generation, (33) is merely reduced to (32). This difference is demonstrated in such recent loan words as [ʃyas*ɨ] 'shirt' which is also pronounced [sas*ɨ], especially by the older generation.

(33) SPC: ~ y / $\begin{bmatrix} +\text{fricative} \\ -\text{grave} \end{bmatrix}$ ___

While the y-constraint seems to be weakened, it gained in this century another context in which y is constrained: [-sonorant]___e. Interestingly, however, the presence of a grave obstruent (/kye/, /pye/, etc.) simply requires y to be deleted, but after an acute obstruent it causes t to be palatalized before being deleted.

(34) SPC: ~ y / [-Sonorant]__e

The preceding analysis of MSC's and SPC's in modern Korean is not intended to be an exhaustive description, but a sketch for the purpose of setting a stage or a framework whereby several areas of historical interest, such as the evolution of syllabic structures, the development of features of aspiration and tensing in obstruents, the vowel systems and the pitch accent system in MK may be profitably examined.

Chapter 2. MK Consonant Clusters and Obstruent Tensing

2.1. The problems. One of the most striking differences in syllabic structure constraints between Middle Korean and modern Korean is in the word-initial consonant constraints. There have been varieties of views among Koreanists on the two-consonant graphic combinations of fifteenth and sixteenth century documents in Hangul, the Korean script which came into existence in 1446. Although there have been some skeptic views on the actual existence of such consonant clusters in the word-initial position, the majority view today appears to be leaning toward accepting the reality of the MK word-initial clusters. Yet the issue as to what the graphic clusters really mean is far from settled. We will therefore survey representative views, and try to form conclusions on the general conditions and types of constraints which exist for consonantal clusters in Middle Korean.

There are two types of putative word-initial clusters: one beginning with a labial stop followed by an obstruent, and the other beginning with a sibilant followed by an obstruent or n. We will call the former "p-clusters," and the latter "s-clusters."[1]

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[1]Since we are not, at this time, concerned with the MK vowels, we will tentatively represent them by what are commonly accepted as Late MK vowels: i, e, a, ʌ, o, u, ɨ. This does not mean that we necessarily accept their reality for MK. MK vowels will be extensively dealt with in Chapter 4.

(1)	ptay	'time'	pskul	'honey'
	ps∧l	'rice'	pstay	'time'
	pc∧	'salty'		
	pt^{h}∧	'pluck'		
(2)	sto	'again'	skoli	'tail'
	spul	'horn'	snah∧y	'boy'

There are three schools of MK cluster interpretations: (a) one which interprets the 15th century graphic consonant clusters to represent tense consonants and which denies any existence of word-initial consonant clusters in MK; (b) one which literally accepts all types of clusters as attested in the 15th century documents; and (c) one which considers only the p-clusters to be real, but which rejects an historical reality for the s-clusters. The majority of Koreanists today subscribe either to (b): H.P. Choi (1940), W. Huh (1958), H.K. Kim (1962), etc.,or to (c): K.M. Lee (1961), C.T. Yu (1964), S.N. Lee (1961), etc. The issue is alive with varieties of views, each backed up with strong arguments, and it is necessary to examine several viewpoints to establish the most probable hypothesis on MK initial clusters. There is a wealth of philological data available.

The view (a) may be represented by C.P. Seo (1975). There are several bases for Seo to deny the reality of the MK initial clusters. The first is the apparent instability and inconsistency in the MK representations of the clusters in the 15th century documents. Seo focuses his attention on the fact that scarcely one generation had passed since

the promulgation of Hangul script before the original cluster representations had become inconsistent, and they were almost totally eliminated in the next century except for the graphic use of the s-clusters for the tense obstruent representation. In fact, the earliest Hangul documents contain many variant spellings for the putative initial consonant clusters. For example, both pski- and ski- 'insert' appear in WS published in 1459. In some cases, a form with a more complex initial cluster appears later than a simpler form, as in pcoch- 'to chase' (WS 1459) and coch- 'to chase' (YP 1445).[2]

Seo's argument, however, is essentially based on the common suspicion that the word-initial consonant clusters are uncharacteristic of an Altaic language, and no modern dialects of Korean retain the clusters. He rejects the circumstantial evidence such as pʌsal for 'rice' appearing in KY (c. 1103) by explaining it as being made up of two morphemes: pap-sal 'meal+rice' rather than as a shape preceding MK psal. Another point in his argument concerns the swiftness with which the graphic uses of initial clusters degenerated and disappeared in the sixteenth century after the promulgation of the Korean script in mid-fifteenth century. He questions, for example, that if the form psal appearing in WC (1450) is to be taken literally, how is it possible

[2]The abbreviations for MK data are represented by two or more upper-case letters. See Reference for their full titles and publication dates.

that a Chinese source in CK (c. 1403) contains the same word as sar (色二) without the initial p. Weaknesses of Seo's interpretations on MK clusters ('graphic devices' for him) are that he does not have strong basis for his counter-proposal in explaining why the fifteenth century documents used the graphic combinations in words such as those listed in (1) and (2) and in many others. Seo interprets the preposed consonant (p or s in various clusters) to be a character radical similar to those used in Chinese characters as a morpheme indentification. As such, the preposed consonant would have no sound value. He further speculates that the authors of Hangul intended to unify spellings of such words as psal, which have dialectal variations: [sʌl], [ssal], etc. Then, Seo cites a long list of items in Hangul writing which can be considered as having been influenced by the structure of Chinese characters. This line of interpretation is a novel one, but is pure speculation, because there exists no description or explanation on the use of preposed silent consonants anywhere by the original inventors of the Korean script in the fifteenth century. A considerable number of detailed commentaries on the origin and proper uses of Hangul were published by some of the original court scholars who had helped devise the script, but there is a conspicuous absence of any explanation on how these initial consonantal clusters were to be pronounced, or to be used in writing, while there is a wealth of descriptive statements on the pronunciation of individual letters and

facts in modern Korean which may be interpreted as vestiges of the earlier clusters. There are in modern Korean a number of compound nouns or phrases where the last word or morpheme of a phrase begins with two consonants.

(3)	hɛ + s*al → hɛps*al	'new rice'
	$č^h$a + s*al → $č^h$aps*al	'glutinous rice'
	čo + s*al → čops*al	'millet seed'
(4)	i + t*ɛ̲ → ipt*ɛ	'yet, still (this time)'
	čə + t*ɛ → čəpt*ɛ	'that time'
(5)	pyə + s*i → peps*i	'rice seed'

The above examples may be treated as involving an epenthetic p̲ synchronically, but are regarded derived from the MK forms with initial clusters. These, however, may also be interpreted purely on a phonological basis, rather than a morphological, since there are epenthetic s̲ (or a glottal stop), k̲, ŋ̲ and h̲ in similar types of compounds, such as: səi + tal → səktal, 'three months,' nəi + ča → nəkča 'four feet,' kara + pi → karaŋbi 'light rain (drizzle),' pada + ka → pada?ka 'sea edge (coast)' [? is represented by the graph ʌ], məri + karak → mərik^{h}arak 'hair (head+hair),' etc. However, it is extremely difficult to state any phonological conditions that dictate the epenthetic consonants.

The third set of facts which tend to support the p-cluster analyses are:

(6) *han + pskɨi ⟶ *hampskɨi → hamkɨi → hamk*e 'together'
*son + psi ⟶ *sompsi ⟶ soms*i 'hand-skill'

The derivation of the labial nasal before a non-labial stop in the above two examples is explainable through positing a labial stop in the beginning of the second morpheme.

The fourth type of evidence is disyllabic representations of Chinese origin, such as KY quoted earlier.

(7) ye a wal po tal (女兒曰寶咀) 'female child is called Potal'
pʌyk mi wal han po sal (白米曰漢菩薩) 'white rice is called Han Posal'

The last two syllables, potal 'girl, daughter' and posal 'rice' in (7) are considered disyllabic forms preceding the MK monosyllables with initial consonant clusters (e.g., K.M. Lee 61:81); potal ⟶ *ptal, posal ⟶ psal. However, there is no compelling reason for regarding these disyllabic forms to be the historic precedences, because it is equally possible that the disyllabic forms may simply be Chinese transliterations of monosyllables with initial consonant clusters. The first example in (7) is also used as a counterexample for the reality of the p-clusters, as its MK form actually attested is not the expected *ptal but stal. The change of *ptal to stal would be phonologically implausible.

As we have seen, there are reasons why p-clusters have not gained universal acceptance among Koreanists, but the existence of the s-clusters has been on even shakier grounds.

The majority seems to be on the side of interpreting the s-clusters to represent tense obstruents, just as the grapheme ㅅ standing for s had been used as a diacritical mark for tenseness in the recent past before the modern spelling reform. S.N. Lee (1961), K.M. Lee (1961), and C.T. Yu (1964) represent this view, while H.P. Choi (1940), W. Huh (1958), and H.K. Kim (1962) believe that the s-clusters were real in MK.

We will now examine the bases on which the former group of linguists reject the existence of MK s-clusters. The first is the fact that writers of 15th century Hangul documents treated the grapheme ㅅ(standing for s) somewhat differently from all other consonant graphemes when it came medially between two syllables. Two consonants appearing in a medial cluster are automatically assigned to two different syllables (unless there is a morphemic boundary before or after the cluster). This rule, however, was often ignored only for ㅅ. For convenience, we will represent the grapheme ㅅ by the capital letter S. For example, the verb for 'polish' is represented as taS-ka or ta-Ska (with the hyphen marking syllable boundaries here). The same can be said of the epenthetic S between two nouns in a compound, as in sonS-ka-rak and son-Ska-rak for 'finger' (son 'hand' + S+karak 'stick'). As discussed earlier, the early MK (the 12th century) form *potal 'daughter' becomes Stal in the 15th century rather than *ptal as might be expected. This derivation would be natural and plausible only if Stal is

phonetically [t*al]. K.M. Lee, however, does not attempt to explain why the 12th century potal was reduced to [t*al] in the 15th century when p-clusters in other morphemes were maintained. (K.M. Lee 1961:100). Lee also considers doublets of the following types to be another set of evidence: so ~ Sso 'to shoot,' saho ~ Ssaho 'to fight,' sah ~ Ssah 'to pile,' etc., where S signifies semantic intensification. The most compelling evidence for the existence of the 15th century diacritic use of S is found in SS (1450) which records anSti (< anc 'sit' + ti 'Verb Suffix') where S can only be interpreted as a tense marker.

So, it appears that K.M. Lee and others are well justified in regarding S-clusters as representing tense obstruents but not phonetic consonantal clusters. Let us now turn to the arguments presented by those who view the s-clusters as real for MK as the p-clusters. Again, the total absence of explanatory notes or commentaries on the word-initial consonant clusters in all publications on the subject of Hangul is viewed as one important basis for their conclusion. Strong support for the fifteenth century s-clusters interpretation comes from data involving transliteration of foreign words beginning with such clusters. In OT (1485), some Sanscrit words beginning with sC (where C=consonant) are transcribed in Hangul with s-clusters: stha as Sta, stham as Stam, sporita as Spo-li-ta, sma as Sma, etc. Similar types of evidence are available in HT (1471) which contains records of Ryukyu words such as

tsutumiti where the first vowel u is devoiced in the same way as in Modern Japanese. The transcription of this word in Hangul appears as Stomɨiti. There are also older sources indicating possible existence of the initial sibilant in words which appear to have the 15th century cognates with s-clusters. SK (1145) records, for example, a proper noun səpalhan 'a horned man.' The first morpheme səpal is believed to be related to spul 'horn' appearing in the 15th century documents. The argument for the MK s-cluster hypothesis includes the presence of the combination Sn as in Snahʌy 'boy' in MK documents, which cannot be interpreted as a 'tense' n. W. Huh (1964) also quotes a northwestern dialect form, sitəku 'rice cake' for the Seoul standard t*ək.

There is one additional set of facts about MK which can render indirect support to the s-cluster hypothesis. It is the probable existence of a syllable-final sibilant in MK. Since the syllable-final environment and the preconsonantal environment are closely related in that they both inhibit a sibilant release in Modern Korean, the existence of a fully released sibilant in one environment would tend to suggest the same for the other.

There are several reasons to consider that the sibilants were permitted at the end of a syllable either before a pause or before another consonant. First, the sibilant s is listed along with three stops (p, t, and k) as a syllable-final consonant in HM (1446) itself. In fact, there

are many minimal pairs of monosyllables in early Hangul documents in which the minimal contrast is in the syllable-final consonant: t - s, such as kat ('hat') - kas ('wife'), kit ('column') - kis ('nest'), etc. One can argue that these representations indicate the underlying forms rather than acutal pronunciation, but the early Hangul spelling is almost entirely 'phonemic' in the classical sense and not 'morphophonemic'. The voiced counterpart of s, i.e., z, appears in the syllable-final position. However, the most important evidence for the syllable-final s appears in the disyllabic transliterations of MK monosyllabic words with the final s in the fourteenth century Chinese sources such as HY (1389). The data include kwas∧ for Kos 'flower,' was∧ for os 'clothes,' cwas∧ for cas 'castle,' etc. The second syllable represented by the character s∧ 'thought' obviously reflects a probable syllable-final sibilant s phonetically realized.[3] Taking these facts together, it is reasonable to assume that until at least the beginning of the fifteenth century, MK had a syllable-final sibilant. This also means that MK had not developed the syllable-final obstruent neutralization for fricatives before the 15th century. If the obstruent neutralization did not

[3]Some doublets and triplets also suggest that the sibilant before an obstruent might have been released. S.N. Lee (1976) reports that the verb isi- 'to exist' had two other variant forms in MK: si- and is-. The latter form subsequently became the immediate antecedent to the modern form iss.

exist for fricatives in the syllable-final position, the same was most probably true for the pre-consonantal position.

2.3. The reality of MK consonant clusters. We are now in a position to summarize the preceding discussions and arrive at a conclusion on the MK word-initial consonant clusters. We have seen that there are roughly three positions on this subject. The first is to totally deny the MK reality for the consonant clusters for several reasons, such as the inconsistency in spelling and short life of the cluster writing in the early Hangul documents. A phonetic implausibility, if not impossibility of such forms as t∧lkSptay < t∧lk 'chicken'+S (epenthesis)+ptay 'time' was also cited as a counter-evidence. The weakness of this position, however, is that it has no alternative interpretation on the graphic combinations except that the morpheme-initial P's and S's are some sort of semantic classifiers, and thus have no phonetic values. This interesting view has no credible evidence at present. The second position examined was a partial recognition of the MK clusters: recognition of the p-clusters but denial of the s-clusters. The denial of the s-clusters is mainly based on a unique combinatory treatment of S as compared to other consonant symbols in early Hangul documents. In disyllabic words and phrases, S occurs either at the end of the first syllable or at the beginning of the second. S occurs in the middle

of a three-consonant cluster such as pStay 'time' or pSkul 'honey' as cited earlier. Along with tʌlkSptay ('Chicken-time') and other similar examples, these occurrences of S point strongly towards the probability that the graph S was already in use as a diacritical mark for the tenseness in the mid-15th century. The 15th century forms without an initial cluster often gain the initial S in the sixteenth century: kuz± 'to pull' becomes Skuz±, tih 'to pound' becomes Stih, etc.

The third view on MK word-initial clusters holds both types of the clusters to be real in spite of various counter-examples presented above. The main thrust of the argument is the complete absence of comments or explanatory notes on consonant clusters in relatively rich commentaries on Hangul and its origin by fifteenth century scholars. But if the p-clusters are accepted on this basis, why reject the s-clusters? There are also transliterations of Sanscrit words of the 15th century which suggest that the S-cluster writing was meant for phonetic s-clusters. An important additional support for this view comes from a probable existence of the pre-pausal sibilant in the 14th and 15th century MK.

Not to be lightly dismissed are those suspected Altaic cognates first pointed out by G.J. Ramstedt (1939, 1949). They include entries supporting both the p-clusters and s-clusters such as:

(8) MK *ptal 'daughter' : Goldi patala 'girl'
Olča fatali id.

MK psi 'seed' : Manchu fisihe id.

MK pka- 'to shell' : Manchu faharambi id.

MK pStay 'time' : Tungus -pti (as in tari-pti 'that time')

MK Spul 'horn' : Olča soforie 'prickly, thorny'
Osmanli-Turkish sifri 'sharp edged'

MK Spalɨ 'fast' : Olča sapali 'quick, nimble'

Although Ramstedt's data predominantly support the p-clusters, they did not exclude the S-clusters entirely. An important fact to be noted in Ramstedt (1939, 1949) is that the clusters pSt- and pSk- do not have any Altaic counterparts. A part of our conclusion may be derived at this time from this fact. Indeed, we recall no data direct or indirect that suggest the existence of the word-initial clusters pSt- and pSk- among those items presented by the proponents of the MK consonantal cluster views. For both the p-clusters and the s-clusters, we have seen some suspected modern reflexes, foreign transcriptions, etc., but none for the above clusters pSt- and pSk-. Therefore, it is safe to conclude that MK did not have any word-initial clusters of three consonants.

An extra-systemic status of sn is evident not only in the fact that this is the only MK initial cluster that in-

volves a nasal, but also from the fact that there is only one lexical item snah∧y 'boy' appearing in one MK source:

(9) snah∧y sori kas-nah∧y sori (SS: 1450)
'boy' 'sound' 'girl' 'sound'

Many Koreanists simply dismiss sn from their discussions of MK clusters, and they are probably justified. If this was a true cluster, its later solution is quite different from the others since an epenthetic vowel appears in the 17th century: s∧nah∧y (PT: 1677). The modern reflexes have varieties of vowels in the first syllable: san-, sin-, sen-, son-, sɯn-, etc., according to Koono (1945). These suggest that the MK sn was probably not a true cluster, but was merely reflecting a devoiced vowel in the particular writer. We will therefore exclude sn from further discussion on MK clusters.

2.4. MK syllabic structure MSC and the development of tensing. The preceding discussions lead us to conclude that word-initial consonant clusters are real only up to those consisting of two consonants, and those of three consonant graphemes represent also only two segments. Our first approximation of the MK syllabic structure constraint is then:

(10) MK Syllabic structure constraints
MSC/SPC: C_O^2 G_O^1 V G_O^1 C_O^2

The existence of graphemic combinations of three consonant

symbols, such as pSt- and pSk-, along with the evidence presented for the view (b) indicates, at the same time, that in spite of the absence of any commentaries to this effect, the grapheme S was used to represent the obstruent tenseness. We are, however, not in complete agreement with the view (b) which says that the phonetic s-cluster did not exist in the 15th century. The recognition of the diacritical use of S in MK does not immediately entail the denial of the MK reality of the s-clusters. In fact, the evidence presented by the proponents of the view (c) for the existence of MK s-clusters cannot be dismissed. The obvious dilemma for a monosystemic view of a language is choosing between the two apparently contradicting sets of data in the mid-15th century documents. This would be an insurmountable problem if we assume that two sets of apparently contradicting facts must not reflect the same MK of the 15th century. If, on the other hand, we abandon this assumption and adopt the theory of lexical diffusion (Wang 1969), there would be no difficulty accommodating the two sets of facts together. A phonological innovation does not necessarily affect all relevant morphemes at the same time, but it may rather affect a small sector of relevant morphemes only in the beginning and gradually increases its domain of operation. Various diachronic facts across different languages examined in such works as M.Y. Chen and W. S-Y. Wang (1975) demonstrate that the latter mode of phonological operation is more common than the former. A typical propa-

gation of lexical diffusion would also mean that at any given moment in a history of a phonological change, one should expect co-existence of doublets and triplets which may be viewed as representing the effects of overlaps in transition from one state to another.

Returning to the topic of MK consonant clusters, we will begin with the recognition of the two types:

(11) MK Word-initial Consonant Clusters

$$\text{MSC/SPC:} \quad C \rightarrow \begin{cases} p \;/\; \#\_\_ & \begin{bmatrix} C \\ -\text{Grave} \end{bmatrix} \\ s/\!/ \;\#\_\_ & \begin{bmatrix} C \\ -\text{Fricative} \end{bmatrix} \end{cases}$$

The questions to be raised at this point are through what stages the MK clusters were reduced, and in what stage of development with regard to the cluster reduction was the language recorded in the mid-15th century documents. Additionally, we are also interested in what might be revealed by the MK speaker's use of the grapheme S concerning the conceptual or underlying forms of those morphemes with the initial clusters. As for the first question, there are again divergent views among Koreanists, but once the reality of the MK clusters is accepted, the philological evidence for a gradual process of transition is fairly easy to interpret. By the time Hangul appeared in the mid-15th century, both the p-clusters and s-clusters were well in the process of reduction. Furthermore, the kinds of data presented earlier in support of the view (b) clearly demon-

strate that the reduction of s-clusters had started sufficiently earlier than that of p-clusters, and in the latter half of the 15th century this process was almost complete.

The first stage of this development was probably preceded by acquisition of tenseness in the second obstruent of the s-cluster. This we will assume to be a late phonetic rule:

(12) $[-\text{Sonorant}] \rightarrow \begin{bmatrix} +\text{Tense} \\ -\text{Aspirated} \end{bmatrix} \; / \; \#s\_\_\_$

The same, however, may not be assumed for the p-clusters, since there were a greater number of distinctions possible in the p-clusters as shown in (1).

(13) $s \rightarrow \emptyset \quad / \quad \#\_\_\_ \; [-\text{Sonorant}]$

As noted earlier, we regard (13) to have started sufficiently prior to the Hangul period, and in the mid-15th century this process had already affected a part of relevant morphemes. This means that in the latter half of the 15th century, the morphemes historically derived from those with initial s-clusters are to be found in one of the following three states: first, those that were not yet affected and therefore preserved the s-clusters; second, those that had two alternate realizations, one with the s-clusters preserved and the other without; and third, those that completely reduced their initial clusters for all occasions: the initial s no longer recoverable. These first two categories of morphemes would still have the s-clusters in their

conceptual (or underlying) forms, while the third category of morphemes would have no initial s-clusters even in their underlying forms. However, the obstruent after the s-deletion (13) would retain the feature tense, thus creating a new distinctive contrast as against their simple obstruent counterparts.

We will consider this to be the sole origin of the modern obstruent tension. Some scholars today, however, posit two separate origins for tense obstruents. H.K. Kim (1962) for example, cites those represented by double obstruent symbols (such as ㄲ, ㄸ, ㅃ, ㅆ,) along with the obstruent clusters. Double letters are used for representing two heterogeneous types of features in fifteenth century records: (i) to represent archaic voiced initials in Chinese loan words, and (ii) for unaspirated tense obstruents following the participial form, such as ROOT+(i/ʌ)l. The former was an unsuccessful attempt to revive the archaic distinction which naturally was doomed from the beginning. The latter was non-distinctive, and would not have been represented unless the tense obstruents were already phonemic elsewhere. The voiced obstruents in Sino-Korean morphemes must have had some phonetic images different from lax obstruents for MK authors, and yet they had no contemporary Chinese models since fifteenth century Mandarin had lost voice contrast (Toodoo 1957:96). It is therefore reasonable to interpret the double consonant symbols to have had phonetic values of the tense obstruents, which were already in

existence through the cluster reduction (13).

The tense obstruents produced through the s-cluster reduction must have retained a conceptual image of consonantal clusters for those MK speakers with alternative variant pronunciations, and the grapheme S began to acquire an additional value of symbolizing the obstruent tension through this association.

The reduction of p-clusters, on the other hand, was still in its early stage of transition in the mid-15th century, and was maintained as such at least up to the beginning of the 16th century. The graphic representations of the p-clusters persisted to the end of the next century. The peculiarities of p-clusters are that the obstruent types occurring in the second position are quite varied except for grave consonants. In fact, there is only one grave consonant (pk*), while there are five acute consonants. Additionally, the existence of pt^h immediately dispels the idea that the second obstruent of a cluster might be redundantly tense as is the case for k*:

(14) MK p-clusters:

-Grave		+Grave
pt	pc	pk*
pt^h	ps	
pt*		

The state of mid-15th century orthography indicates that there were many fluctuations in the representation of p-clusters. There is, however, no evidence for the redundant

tension in the initial obstruents resulting from the p-reduction (except for pSk - Sk, and pSt - St).

(15)	a.	pSk:	pSki	[pk*i]	'to insert'	WS 1459
		Sk:	Ski	[k*i]	'id.'	WS 1459
	b.	pSt:	pSt∧li	[pt*∧li]	'to smash'	WC 1450
		St:	St∧li	[t*∧li]	'id.'	SH 1450
	c.	pt:	ptwi		'behind'	NH 1475
		t:	twi		'behind'	MP 1463
	d.	ps:	psoy	'to have fresh air'		MP 1463
		Ss:	SSoy	[s*oy]	'id.'	KK 1499
		s:	soy		'id.'	KK 1499
	e.	pc:	$pcoc^{h}$		'to chase'	WS 1459
		c:	coc^{h}		'id.'	YP 1445
	f.	pt:	ptel		'to shake'	TS 1481
		pt^{h}:	$pt^{h}el$		'id.'	NK 1462

In spite of much evidence of transition attested in such doublets and triplets as (15), the p-clusters were generally well maintained up to the 17th century. There are of course signs of the continued disintegration of p-clusters in the 16th and 17th century documents such as pso- 'to shoot,' ps±- 'to use,' etc. in HC 1527, which did not have the p-cluster in the 15th century writing, as noted and considered as counter-evidence against the existence of real p-clusters by Seo (1975). A much greater number of p-clusters were preserved intact in HC and other 16th and 17th century documents, however.

The 18th century sources, on the other hand, document that the majority of the original p-clusters were replaced by S-clusters. In TM (1748), for example all but five instances lost their historical p-clusters (Huh 1964: 427). Unlike those p-cluster words that were reduced in the 15th

and 16th century, those that were reduced in subsequent centuries were accompanied by the obstruent tension, and thus graphically represented by S-clusters. This means that the obstruent tensing rule began earlier than the s-cluster reduction, producing tense obstruents in the word-initial position in the 15th century. The context of the obstruent tensing (12) was restricted to s-clusters and did not affect the products of the p-cluster reduction until the 17th century, where its domain of operation was expanded to cover all word-initial clusters:

(16) $[-\text{Sonorant}] \rightarrow \begin{bmatrix}+\text{Tense} \\ -\text{Aspirated}\end{bmatrix} \quad / \quad \# \quad [-\text{Sonorant}] \_\_\_$

This rule is part of the synchronic phonology of modern Korean, affecting medial obstruent clusters. The cluster reduction to affect all word-initial obstruent clusters may then be estimated in the latter part of the 17th century:

(17) $C \rightarrow \emptyset \quad / \quad \#\_\_\_ \quad C$

2.5. Obstruent tension in morpheme boundaries. Closely related to questions of the word-initial consonant clusters in MK is the epenthesis or obstruent tensing in morpheme boundaries, particularly in compound nouns. This is historically known by the term sai siot, the epenthetic S (where S again stands for the graph ' ㅅ ' in Hangul script), which still survives in South Korean Standard orthography. Some typical examples from the modern Seoul dialect are

shown in (18):

(18)	pata+ka	pataS+ka	[pada k*a]	'sea-edge'
	pom+palam	pomS+palam	[pom p*aram]	'spring-breeze'
	kaɨl+tal	kaɨlS+tal	[kail t*al]	'fall-moon'
	mun+soli	munS+soli	[mun s*ori]	'door-sound'
	u+čali	uS+čali	[u č*ari]	'upper-position'

It appears to be a simple obstruent tensing in a well-definable context, but the graph S appears before a nasal, and becomes nasalized.

(19)	nɛ+mul	nɛS+mul	[nɛn mul]	'stream-water'
	k^ho+nal	k^hoS+nal	[k^hon nal]	'nose-ridge'

Less common are those with the second member of a compound beginning with a vowel.

(20)	u+əlɨn	uS+əlɨn	[u dərɨn]	'upper-adult'
	k^ho+an	k^hoS+an	[k^ho dan]	'nose-inside'

The modern epenthetic S is thus never realized as [s], and is generally regarded as a tensing phenomenon in compounds to prevent the 'fusion' of the two nouns. The linguist who made the most extensive inquiry on this topic is C.T. Yu (1959, 1963). Yu regards the epenthetic S in compounds to be derived from MK forms shown in (21) below, but considers that it was phonetically [t].

We will now see the kind of conditions that existed in

MK insofar as the epenthetic consonants are concerned.

(21)	hyeŋ+pt*ɨ*ti	→	hyeŋ<u>K</u>+pt*ɨ*ti	'brother-intent'
	myeskan+cipi	→	myeskan<u>T</u>+cipi	'small space-house'
	c^{h}im+cʌ	→	c^{h}im<u>P</u>+cʌ	'invade-letter'
	hanal+pt*ɨ*sini	→	hanal<u>?</u>+pt*ɨ*sini	'heaven-intent'
	senko+pt*ɨ*t	→	senko<u>?</u>+pt*ɨ*t	'deceased father-idea'

All of the examples in (21) are taken from YP (1445), and the underlined letters indicate Hangul graphic symbols (? for a glottal stop). The earliest records of epenthetic symbols clearly show that the epenthetic consonants between compounds were phonetically determined.[4] The rule may be represented:

(22) MK stop epenthesis

$$\emptyset \rightarrow \begin{cases} \begin{bmatrix} \text{-Continuant} \\ \alpha\text{Anterior} \\ \beta\text{Coronal} \\ \text{-Nasal} \end{bmatrix} \Big/ \begin{bmatrix} \alpha\text{Anterior} \\ \beta\text{Coronal} \\ \text{+Nasal} \end{bmatrix} \Big]_N \text{——} {}_N\begin{bmatrix} \text{C...} \end{bmatrix}_N \Big]_{NP} \\ \begin{bmatrix} \text{-Continuant} \\ \text{+Back} \end{bmatrix} \Big/ \begin{Bmatrix} \text{[+Lateral]} \\ \text{[-Consonantal]} \end{Bmatrix} \Big]_N\text{—}{}_N\begin{bmatrix} \text{C...} \end{bmatrix}_N \Big]_{NP} \end{cases}$$

The phonetic motivation for a rule such as (22) is natural enough to take the transcriptions of (21) literally. The 15th century records, however, include the S-epenthesis in the same set of environments as those for (22). The exam-

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[4]HM (1446) contains curious uses of b-epenthesis in citing Chinese characters, as in tu-<u>b</u>-cʌ, p^{h}yo-<u>b</u>-cʌ, etc. We will exclude this from our analysis for now, since this practice is restricted to a few places in 15th century data.

ples in (23) are from YP and HM (1446).

(23)	nala+malss∧mi	⟶	nalaS+malss∧mi	'nation-speech'
	yain+seli	⟶	yainS+seli	'wild men-place'
	apanim+twihey	⟶	apanimS+twihey	'father-behind'
	han∧l+pyeli	⟶	han∧lS+pyeli	'heaven-star'

There are two representative views on the nature of the 15th century epenthesis. The first is to regard (22) to be basic, and the use of the symbol S to signify a stop at different articulatory points determined by its context, although S does not necessarily cause tension in the following consonant since the following consonant may not be an obstruent. This view is represented by W. Huh (1964: 394). The question unanswered is why the symbol S (which was not a symbol for a stop) was particularly chosen to stand for various stops. The second view would consider S to be phonetically [t] regardless of what symbol may have been used (C.T. Yu 1964: 128). It is difficult to follow why different consonant symbols used in (21) and (23) should represent only [t] unless one applies a deduction based on the S-value elsewhere. Yu's interpretation is obviously due to the S-cluster interpretation as we have examined earlier. Since we accept a multi-value interpretation of the word-initial consonant clusters, we should have no difficulty accepting literally various types of consonant epenthesis in (21) and (23). As for S in (23), we could regard it as having the same value as in the word-initial position,

a voiceless sibilant as well as a diacritic signifying tensing of the immediately following obstruent. There is, however, an important additional fact to the phenomena of Sai Siot. The epenthetic consonant was inserted before a vowel also, and it was apparently voiced as shown in (24).

(24)	hu+nal	⟶	huZ+nal	'later-day'
	nun+uh‡i	⟶	nunZ+uh‡i	'eye-above'
	pal∧l+m‡l	⟶	pal∧lZ+m‡l	'sea-water'
	nimk‡m+mal	⟶	nimk‡mZ+mal	'king-word' (YP 1445)

Z stands for the Hangul ㅿ which is here interpreted as a voiced sibilant. The epenthetic symbols S and Z in the examples (23) and (24) are interpreted literally since there is no reason to consider these to stand for anything other than what the symbols originally were meant to stand for. The S/Z epentheses are obviously determined by the voice feature of the adjacent segment, but how does it reconcile with the epenthetic stops of (22)? Again, we must abandon a view that 15th century MK consists of monosystemic phonology with one consistent style. The question we raise here is not one of choice between the two types of epentheses in comparable contexts, but one of recognizing natural and plausible relationships between the two. The stop-epenthesis did not persist beyond the 15th century, but its operation apparently overlapped with that of the S/Z epenthesis. The body of data represented in (21), (23), and (24), therefore reflect the intersection of the two rules.

For early MK, we recognize two epenthesis rules for noun compounds, which operate in two mutually complementary contexts. The stop epenthesis takes effect between a nasal and a stop, and the sibilant epenthesis elsewhere. The two rules may be approximated in (25).

(25) Early MK epenthesis

(a) Stop epenthesis

$$\emptyset \rightarrow \begin{bmatrix} -\text{Continuant} \\ -\text{Nasal} \\ \alpha\text{Anterior} \\ \beta\text{Coronal} \end{bmatrix} / \left[\begin{bmatrix} +\text{Nasal} \\ \alpha\text{Anterior} \\ \beta\text{Coronal} \end{bmatrix}_N \_\_ N\left[\begin{bmatrix} \text{C...} \end{bmatrix}_N \right]_{NP} \right.$$

(b) Sibilant epenthesis

$$\emptyset \rightarrow \begin{bmatrix} +\text{Continuant} \\ +\text{Strident} \\ \alpha\text{Voice} \end{bmatrix} / \left[\begin{bmatrix} +\text{Sonorant} \\ -\text{Nasal} \end{bmatrix}_N \_\_ N\left[\begin{bmatrix} \alpha\text{Voice} \end{bmatrix}_N \right]_{NP} \right.$$

The first disturbance of the mutual accomodation in (25) appears to be caused by an expansion of the domain of the sibilant epenthesis through simplification of its context in the fifteenth century. This means that (25a) and (25b) were in a competing relationship in the mid-fifteenth century during which various documents in Hangul were published. The stop epenthesis does not appear to have lasted beyond the 15th century, and, at the same time, the sibilant epenthesis were subject to the tensing (12) and then to the obstruent neutralization (13) which remains effective in modern Korean as an SPC, as seen in Chapter 1. In this regard, the MK epenthesis rule shares its history with the s-clusters in the development of the obstruent tension.

Chapter 3. Origin and Development of the Aspiration Contrast

3.1. Sino-Korean morphemes. A gap in a symmetric system, distributional peculiarities of some phonological units, minor rules for a small segment of morphological class, etc. may all be due to various factors such as phonetic or phonological universals, language-specific tendencies, or temporal and geographical overlaps of two or more diachronic forces. The lexicon of a language may contain several layers of morphological types, each exhibiting its own idiosyncratic behaviors and structures. This is especially true for a language which incorporates a large proportion of loan words, as does Korean. Because of Korea's history of political and cultural dominance by China, the lexicon of Korean contains a large number of Chinese loan words or Sino-Korean (SK) morphemes which constitute a major morphological class possessing its own morphological functions and phonological peculiarities. In this chapter, we will focus our attention on the distribution of the aspiration feature in the SK morphemes, and raise several issues relating to the historical acquisition and development of the aspiration contrast in Korean phonology.

The contrast of aspiration in modern Korean series is fully developed, and its existence is at least traceable to the MK period. The phonological states directly preceding the fifteenth century are relatively less known as far

as the contrast of aspiration is concerned, since direct philological evidence is generally lacking except for some scattered appearances of proper nouns and some small corpus of native morphemes transliterated by Chinese characters in Korean and Chinese sources. Most Koreanists today, however, seem to proceed with the assumption that the contrast of aspiration was there as it has always been within directly attested cases.[1]

As one examines Sino-Korean data with the above assumption, one encounters peculiar facts about the contrast of aspiration. First, aspirated initial stops in Sino-Korean are severely constrained in their distribution as compared to those in native morphemes. Second, there appears to exist wide discrepancies in the word-initial aspiration between cognate pairs of Sino-Korean and Chinese counterparts.[2] Based on the modern pronunciation of Sino-Korean morphemes, the following apparent deviances are notable from a cursory observation.

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[1] In recent years, there appeared at least two important studies on Sino-Korean which opened up more rigorous studies of Old Korean than hitherto possible. Koono (1968) and P. Pak (1971) doubt the existence of the aspiration contrast in Old Korean or Pre-Korean before the introduction of Chinese characters into Korea. We will examine their positions more in detail later.

[2] The initial comparison is made based on DOC data (Dictionary on Computer, compiled at University of California, Berkeley). As expected, there are no substantial differences among various modern Chinese dialects as far as aspiration is concerned, nor are those dialects from Middle Chinese.

Table 1. Degrees of deviances in Sino-Korean aspiration from that of Middle Chinese

		Middle Chinese		Sino-Korean
(1)	Labials	Unaspirated	41.5%	became aspirated
		Aspirated	40%	became unaspirated
		Voiced	45.5%	became aspirated
(2)	Dental stops	Unaspirated	12%	became aspirated
		Aspirated	15.5%	became unaspirated
		Voiced	16%	became aspirated
(3)	Dental affricates	Unaspirated	18.6%	became aspirated
		Aspirated	19.5%	became unaspirated
		Voiced	20%	became aspirated
(4)	Velars	Unaspirated }	almost	
		Aspirated }	100%	became unaspirated

The above computations are based on pertinent characters included in some 2,700 characters of DOC, which lists seventeen dialects[3] and Sino-Korean.

Significant among the facts revealed above are that the Sino-Korean reflexes vary according to the places of articulation, and the grave series are almost realigned with regard to the contrast of aspiration, while non-grave series exhibit acceptable degrees of deviance considering various extraneous non-linguistic factors that have been operative during the long history of cultural contact be-

[3]Chinese dialectal data are taken from Hànyǔ Fangyīn Zìnhuì (汉語方言字汇) published by Peking University in 1959.

tween Korea and China.[4] Furthermore, labials and velars are quite distinct in reflecting the Chinese aspiration. Labials exhibit 40-45% of deviance, and as we will see in detail later, the distribution of aspirated initials is considerably restricted by syllabic structures, which is not the case for native morphemes. In velars, however, the contrast of aspiration is simply neutralized with one notable exception: k^hoay (快) 'pleasant' in our data. Not included in our data are some more characters of low frequency occurrences that are mutually graphically related and pronounced the same such as 馱 噲(MC aspirated) and 夬 獪 澮 (MC unaspirated). Again, this is unique to Sino-Korean, and no such constraints are imposed on native morphemes.

The above phenomena must have been noticed by the scholars of the fifteenth century, who participated in the devising of the Hangul script. One of the authors of Tongkuk Chengun lamented the vernacular mispronunciation of many "legitimately' aspirated sounds.[5] Other writers who

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[4]Particularly significant in this regard is the role of graphic analogy. Both Koono (1968) and P. Pak (1971) rely heavily on this in explaining many deviances.

[5]Tongkuk Chengun (東國正韻 : The Correct Sounds of Sino-Korean) was published in 1447, and in it, one of the authors, Sin Sukcyu (申叔舟) remarked: "Korean uses many characters with aspirated initials, and yet k^hoay is the only word so pronounced; it is most laghable."

were well acquainted with contemporary or classical sources must have felt uneasy with such wide discrepancies, and actually tried to restore artificially the "original" aspiration and other "authentic" phonetic features of Ancient Chinese in Sino-Korean dictionaries. Nevertheless, it appears that as far as the contrast of aspiration is concerned, the Middle Korean state has remained essentially the same in Modern Korean, while some native morphemes acquired the aspiration during the same period of time.

3.2. Aspiration in SK labial stops. The preceding preliminary examination of SK and MC aspirated stops revealed that the three stop series (labial, dental, and velar) in SK have totally different types of reflexes from each other with regard to MC counterparts: (a) dentals closely reflect the MC models with minor deviances, (b) velars have practically no aspiration, and (c) labials reflect only approximately half of the MC aspiration contrast. It is therefore necessary to closely examine the nature of SK labial aspiration. Table 2 shows SK labial reflexes of 655 SK morphemes from DOC data with regard to the MC aspiration analyzed according to the MC rhyme categories. The rhyme categories are based on Karlgren's reconstructions slightly modified by Koono (1968).

Table 2. MC Syllabic Structures and SK Labial Aspiration

Middle Chinese Rhyme	Initial	Tone	Sino-Korean [-Asp]	[+Asp]
WG-II: -(w)ang	p	1	(1)	
		3		1
		4	(5)	
	p^h/b		(21)	
				0
YG-I: -(u)âng	p/p^h/b		(44)	
IIIB: -i(w)âng	p/p^h/b		(24)	0
OG-I: -(u)ang'	p/b		(12)	
IIIA: -i(w)ang	p/p^h		(13)	0
XG-II: -(w)ang'	p	1		4
		3/4	(9)	
	p^h	1		4
		4	(3)	
	b	1	(1)	
-(w)ăng'	p	1	(2)	1
		3	(1)	
		4	(3)	
	p^h	1		5
	b	1	(1)	2
		2/3	(3)	
IIIA: -i(w)äng'	p/p^h/b		(25)	
IIIB: -ï(w)ang'	p		(14)	
	p^h		(14)	0
	b	1		5
		3	(1)	1
IV: -i(w)eng'	p/p^h		(12)	
	b	1	(8)	2
		2/4	(2)	
NG-I: -ung	p/p^h		(12)	
	b	1/2	(8)	
		4	(1)	3

Middle Chinese			Sino-Korean	
Rhyme	Initial	Tone	[-Asp]	[+Asp]
NG-II: -ong	p	4		1
	b	4	(1)	
IIIB: -i̯ung	p	1		4
		3		2
		4	(11)	
	p^h	1		7
		3/4	(4)	
	b	1	(1)	2
		3/4	(19)	
-i̯ong	$p/p^h/b$		(26)	
NN-I: -(u)ən	$p/p^h/b$		(32)	
IIIA: -i̯(w)ĕn	p	1/3	(10)	
		4		16
	p^h	1	(1)	
		4		1
	b	1/2	(12)	
		4		10
IIIB: -ï̯(w)ĕn	p	1	(7)	
		4		4
	b	1	(1)	
		4		3
IIIB: -ï̯(w)en	$p/p^h/b$		(87)	
WN-I: -uân	p		(6)	
	p^h	1	(2)	
		3	(3)	2
		4	(2)	
	b		(12)	
II: -(w)an	p	1	(5)	
		2/4		3
	p^h	1	(1)	
		2		1
		4		1

Middle Chinese Rhyme	Initial	Tone	Sino-Korean [-Asp]	[+Asp]
WN-II: -(w)ăn	b		(1)	
	p/p^h		(4)	
	b			2
IIIA: -i̯(w)ăn	p	1		1
		2	(1)	
		3	(1)	
		4	(1)	
	p^h	1		3
		3		1
		4	(1)	
	b	1		1
		3	(1)	
IIIB: -ï(w)ăn	$p/p^h/b$		(8)	
	P	1	(2)	
-ï(w)ɔn		2	(2)	2
		3		2
		4	(3)	
	p^h	1	(6)	
		3		1
	b		(17)	
IV: -(i^w)en	p	1	(1)	4
		2/4	(6)	
	p^h	3		1
		4	(2)	
	b	1	(7)	
		2	(2)	1
		4	(2)	
NI-IIIA: -i̯(w)ie̯	p		(12)	
	p^h		(4)	
	b	1	(6)	
		2	(2)	
		3		2
-ï(w)ie	p	1	(2)	2
		2		3
		3	(1)	4

Middle Chinese Rhyme	Initial	Tone	Sino-Korean [-Asp]	[+Asp]
NI-IIIA: -ï(w)əi	p/p^h/b		(48)	
WI-I: -(u)ậi	p/p^h		(13)	
	b	1/2	(11)	
		3	(2)	11
-(u)ậi	p/p^h/b			10
II: -(w)ai	p/p^h/b			9
	p		(2)	
-(ɯ)ăi	p^h	3	(1)	1
	b	1	(2)	
		3	(3)	1
-(w)aiβ	p/p^h			3
IIIA: -i̯(w)äi	p/b			6
IIIB: -ï(w)ɒi	p/p^h/b			5
IV: -(i^w)ei	p	1	(8)	
		3		3
	p^h	1	(5)	1
		3	(4)	
	b	1	(4)	
		2		5
		3	(1)	
WM-IIIA: -i̯äm	p			6
IIIB: -ï(w)ɒm	p/p^h/b		(27)	
NM-IIIB: -i̯əm	p/p^h			2
NU-I: -əu	p/p^h/b		(16)	
IIIB: -i̯əu	p/p^h/b		(38)	
NO-I: -o	p	1	(1)	3
		2	(3)	
		3		4
	p^h	1		5
		2	(3)	
		3		4

Middle Chinese Rhyme	Initial	Tone	Sino-Korean [-Asp]	[+Asp]
NO-I: -o	b	1	(1)	4
		2	(3)	
		3	(7)	
IIIB: -i̯u	p	1	(9)	
		2	(11)	
		3	(4)	
	p^h		(21)	
	b		(20)	
WU-I: -âu	p	1		1
		2/3	(11)	
II: -au	$p/p^h/b$			29
IIIA: -i̯äu	$p/p^h/b$			40
IIIB: -iau	p/b			13
XO-I: -(u)â	$p/p^h/b$			24
WO-II: -(w)a	$p/p^h/b$			28

The numbers in parentheses indicates the number of occurrences within the subcategories.

As revealed in the preliminary observation, the aspirated labial stop in Sino-Koran appears to be unevenly distributed to various syllabic types. For instance, the aspirated syllable p^ha has no unaspirated counterpart pa, while pak lacks its aspirated counterpart p^hak. In other words, they look suspiciously non-contrastive although in some types of syllables a limited contrast does occur. Koono (1968) calls the above phenonenon "syllabic polarization"[6]

[6]Koono (1968: 106) describes it in terms of Onsetu Henkō.

and attempts to explain in the following words: "The syllabic polarization of labial aspiration could not be explained as local phenomena as in the case of graphic analogy elsewhere. Then, how did such a state come about? It is difficult to answer. One thing that comes to one's mind is that maintaining the aspiration contrast in all types of syllables would be impossible, and therefore certain syllables are associated with aspiration for ease of memory."

To go along with the above view, one encounters the contradiction that speakers of Old Korean already had possessed the contrast of labial aspiration in order to associate it with particular types of syllables, and yet the results would be to suspend the contrast in Sino-Korean since the aspiration would be a mere consequence of the syllabic types. Furthermore, it seems unlikely that speakers of a language possessing a phonological feature, say aspiration or voice, should find it convenient to reduce the same contrast found in a class of loan morphemes for ease of memory.

Both Koono (1968) and P. Pak (1971) attribute the syllabic polarization to the possibility that Old Korean aspiration was not fully developed at the time of the determination of SK sounds, suggesting further that the contrast of aspiration did not exist prior to this period, whatever the cause for the inception of the contrast might have been.

This hypothesis[7] is not unreasonable, although there is no direct evidence attesting to it. K.M. Lee (1961) also speculates on the absence of aspiration in a Pre-Korean stage from the Altaic viewpoint, since the aspiration is not a feature of Altaic languages. This hypothesis, however, requires some additional support along with more precise statements on the conditions for labial aspiration, which we will look at later.

As for the second part of Koono's conclusion, that the development of Sino-Korean aspiration is basically internal to Old Korean phonology, and as such the syllabic polarization has little to do with the phonological features of Old Chinese, a closer examination below reveals that it is not quite the case.

Table 2, which includes all relevant data from Koono, (1968) is summarized below in three groups: (I) those rhyme categories ending with a consonant, (II) those ending with the high front glide i, and (III) those ending with the high back glide u or those ending without any glide.

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[7] P. Pak (1971) speculates that the aspiration originally started in morpheme boundaries where a stop is followed by a velar fricative (e.g., t+h), and then the medial aspiration is extended to the word initial positions.

Table 3. Conditions for SK Labial Aspiration

(I) those ending with a consonant

Rhyme	Class		SK [-Asp]	Relevant features for	SK [+Asp]
WG YG	II	-(w)ang	PANG PAK		
	I	-(u)âng			
	IIIB	-ï(w)âng			
OG	I	-(u)əng	PƎNG PƎK		
	IIIA	-i(w)əng	PING PYEK		
XG	II	-(w)ang'	PUNG PYENG PAYK	[1 Tone]	P^hAYNG
		-(w)ăng'	PYENG PYEK		
	IIIA	-i(w)äng'	PYENG PYEK		
	IV	-i(w)eng'			
	IIIB	-ï(w)ang'	----------	[1 Tone +Voice]	P^hYENG
NG	I	-ung -ong	PONG PƟK	[4 Tone + Voice]	P^hOK
	IIIB	-ïung -ïong		[1 Tone]	P^hUNG
NN	I	-(u)ən	PUN PUL PAL		
	IIIA	-i(w)en	PIN		
	IIB	-ï(w)en		[4 Tone]	P^hIL
		-ï(w)ĕn	PUN PUL		

Rhyme	Class		SK [-Asp]	Relevant features for	[+Asp]
WN	I	-(u)ân	PAN		
	II	-(w)ăn	PAL		
		-(w)an	----------	[2 Tone]	P^hAN
				[4 Tone]	P^hAL
	IIIA	-i(w)än	PYEN	[1 Tone]	P^hEN
	IIIB	-ï(w)an	PYEL		
		-ï(w)ɒn	PEN		
			PEL		
			PAN		
			PAL		P^hAN
	IV	-i(w)en	PYEN		
			PYEL		P^hYEN
WM	IIIA	-iäm	----------		P^hYEM
	IIIB	-ï(w)ɒm	PEM		
			PEP		
NM	IIIB	-ïəm			P^hɪM

(II) Those ending with a high front glide

NI	IIIA(i)	-i(w)ie	PI		
	(ii)	-i(w)i			
	IIIB(ii)	-ï(w)əi			
	(i)	-ï(w)ie	----------		P^hI
WI	I	-(u)ậi	PĂY	[3 Tone] [+Voice]	P^hAY
		-(u)âi	----------	[3 Tone]	
	II	-(w)ai			
		-(w)ăi	PĂY		

Rhyme	Class		SK [-Asp]	Relevant features for	[+Asp]
	IIIA	-i(w)ăi		[3 Tone, +Voice]	- P^hYEY
	IIIB	-ĭ(w)ɒi			
				[3 Tone, -Voice, -Asp]	
	IV	-i(w)ei	PI	[2 Tone, +Voice]	

(III) Those ending with the glide u or with a full vowel

Rhyme	Class		Relevant features for	SK -Asp	Relevant features for	+Asp
NU	I	-əu				
	IIIB	-ĭəu		PU		
NO	IIIB	-ĭu				
	I	-o	[2 Tone]	PO		
			[1 Tone]			
			[3 Tone]			
	I	-âu			[+Voice]	P^hO
			[-Voice]	PO		
	II	-au				
WU	IIIA	-iau				
	IIIB	-ĭău				P^hYO
XO	I	-(u)â				
WO	II	-(w)a				P^hA

From Table 3, it is clear that SK aspiration is determined by various features within Ancient or Middle Chinese.

Conditions for various rearrangements of aspiration in SK are extremely complex, and the discovery of phonetic causes for them seems extremely difficult to determine for the moment. Karlgren's reconstructions still contain many uncertainties for our purposes, but more significant is the fact that the various rhyme categories in the table are not synchronic facts, but represent several processes of different chronology. The processes of the development of SK aspiration must also be considered involving several stages. The first to be noted is the fact that there are only three contexts in which the SK reflexes with regard to aspiration split under identical conditions: WN Class IIIB, WN Class IV, and NO Class I, although the aspirated reflex is slightly smaller in proportion, and most of the relevant morphemes are graphically related.

The effect of the voiced stops with the 1st tone in Middle Chinese is evident in (I) where rhymes contain a velar final. Almost all cases of the aspirated reflexes in SK involve the voiced initials with the 1st tone. An interesting case, however, is the semantic split of the morpheme pyen 'excretion' (WN-IIIA) and p^hyen 'comfort' paralleling a similar (but not identical) split in Middle Chinese, and in both cases, the aspirated stop occurs with the first tone. It is therefore clear that the post-T'ang aspiration of the voiced stop had some impact on SK in re-

stricted contexts.

An area in which the SK aspiration appears to be of a secondary development is where the opposition of the syllables pǎy vs. pʰay occurs. Koono (1968) asserts that the opposition is a product of two different chronologies, and thus do not reflect Chinese rhyme differences. Koono's theory in this regard does not seem conclusive, however. Here the aspirated stop occurs predominantly in the 3rd tone. There must have been some perceptual feature in the 3rd tone which led Old Korean speakers to interpret it as tense, thereby increasing the aspiration. It is to be noted that the two vowels represented here by ǎ and a in Old and Middle Korean are related in such a way as to represent opposing values in tenseness (lax and tense respectively) which subsequently merged in a in the seventeenth century.

A similar role of tone is found in the 4th tone, which accompanies the change of the final consonant to an oral from a nasal. The so-called 'entering' tone is interpreted as producing syllables with an abrupt stop, and in the contexts of OG-I, NG-I, NN-IIIA/A, and WN-II, they induce aspiration in the initial labial. There are also other places where tones are suspected of being a factor for the initial aspiration, as in the 1st and 3rd tones in the context of NO. In all these cases, tonal features, in particular rhyme contexts, must have had perceptual effects of tenseness. The tenseness interpretation in SK have in turn the phonetic

consequence of the initial aspiration.

The overall patterns that emerge from these are that the SK labial aspiration is essentially the function of various rhyme features, and the rhyme finals provide three major classes of conditions under which the SK labial become aspirated: (I) the syllables closed with a nasal (1st, 2nd, and 3rd tones) or an oral stop (4th tone), (II) the syllables ending with a frontal glide, and (III) the open syllables. (I) is in turn subdivided by the places of closure: velar, dental, and labial.[8] The velar closure primarily induces no aspiration except in some tonal contexts as already noted. The dental closure entails somewhat more complex pictures. Here, a limited contrast (splits under identical rhyme conditions) seems to have developed, although tonal bias associated with the frontal on-glide exists. It must be noted, however, that the unaspirated reflex still predominates, and should still be considered primary. On the other hand, the labial closure preceded by a high vowel or a glide triggers the labial aspiration, but when the principal vowel is low, the initial stop is not aspirated:

WM-IIIA	_____iäm	-- SK always aspirated, e.g., <u>p^{h}yem</u>
WM-IIIB	_____ïʷɒm	-- SK always unaspirated, e.g., <u>pem</u>
WM-IIIB	_____ɨəm	-- SK always aspirated, e.g., <u>p^{h}ɨm</u>

[8]The MC palatal closure is interpreted in SK as velar, but it entails an intrusive high front glide immediately before the closing consonant.

It appears then that prior to the labial aspiration rule, an adjustment of the glide i must apply. The i-glide adjustment eliminates a high glide from the rhyme, which blocks the aspiration. An interesting case supporting the existence of the above aspiration rule, where the labial final induces the initial labial aspiration in the contexts of a high vowel, is a group of ten morphemes in the category of OG-IIIA with the 4th tone for all of which the Middle Korean sources give pyek.[9] The morphemes subsequently became aspirated in the eighteenth century, but only after switching the final velar to a labial: p^hip.

As for the syllables ending with a frontal glide (II), there are two kinds of conditions that induce aspiration. In NI, the rhyme class IIIB split into two sub-types, for which Karlgren gives the following reconstructions: $-\ddot{i}^{(\omega)}$ie and $-\ddot{i}^{(\omega)}$əi. In Middle Chinese, only the latter became spirantized, and in Sino-Korean, only the former induces the initial labial aspiration. It is not certain whether the SK reflex in this instance points to the original rhyme difference or the later split of the Middle Chinese voiced labial. The latter possibility is not to be excluded, since

[9] As early as in the late 16th century, p^hip is listed as a vernacular version of pyek (at least in one case: in Sinčing-lyuhap (1576 A.D.). After the mid-18th century, most Chinese Character dictionaries list three variant sounds for these characters, pyek or p^hik as 'correct' or 'standard' along with p^hip as 'popular,' probably reflecting the three historical stages. See Hashimoto (1977:110).

the majority of the characters with the aspirated labial in SK contain the same graph (皮: skin), and the 'skin' character itself had the voiced labial initial with the 1st tone, which could be the source of the graphic analogy. The second condition for the initial aspiration in this group is the 3rd tone aspiration in WI already discussed.

Aspiration is the primary reflex for the Ancient Chinese rhymes ending with a vowel or with a high back glide, but here again the vowel adjustment rules must precede the aspiration. Non-low vowels or glides are deleted before the high back glide producing the high back vowel u in SK, which blocks the aspiration. A limited contrast develops in NO-I. The situation here almost duplicates the lax-tense opposition of ăy and ay where the aspiration is associated with the tense vowel only. The vowel o in this instance represents the tenseness and u lax. The tense vowel again induces the initial labial aspiration. In the category of NO-I, however, the Middle Korean philological data fluctuate to a great extent between po, pu, p^hu, and p^ho for some characters, suggesting two or three historical stages, through which the aspiration accompanied the vowel shift. A slight tonal bias, where the 1st and 3rd tonal contexts predominate for the aspirated reflexes in NO-I, reflects the continuing influence of Middle Chinese. The rhyme category of WU entails aspiration with one exceptional situation (Class I). The context of WU-I is virtually the only place where the SK aspiration is determined by the

feature of the Chinese initials. The voiced labial initial in Old Chinese is interpreted as tense in Old Korean as in Modern Korean,[10] thus inducing aspiration. In view of the extremely limited domain of this process, the above analysis should not be considered conclusive.

Although the preceding complex patterns of the SK labial aspiration probably represent the effects of several historical stages, the basic conditions are not at all chaotic, and they probably reveal the phonetic state of Old Korean at the time when the SK morphemes were in large scale acclimatized in the southeastern part of the Korean peninsula.[11] To summarize the above discussions, we observe: (1) the SK labial aspiration in no way reflects the same in Old Chinese, which inevitably leads to a conclusion that Old Korean speakers were entirely unable to distinguish the contrast of labial aspiration in Old Chinese; (2) the SK labial aspiration is primarily conditioned by the rhyme types of Old and Middle Chinese, and it suggests that the

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[10]Modern Korean interprets voiced consonants in loan words as tense phonetically realizing them in glottalized obstruents. The glottal tension feature was probably developed in the late Middle Korean.

[11]Old Korean was the language of a small kingdon in the southeast of the Korean peninsula, called Silla, and its first major contact with Chinese culture must have been through a rival kingdom in the southwest, Paykcye, which had been in cultural contact with the Wu region at least from the late third century. Paycye is also responsible for Sino-Japanese Go-on. It is highly probable that Silla had two competing systems of Sino-Korean after the unification of Korea under strong influence of T'ang in the seventh century.

labial aspiration in Old Korean was sub-phonemic generally determined by the tenseness of the vowel and the final consonant. The relative height of the syllabic final vocalic element is a determinant factor. The syllables ending with a high glide (u or i) do not induce aspiration. The split in the case of the vowel o is probably due to the vocalic alternation prevalent between u and o in Korean phonology. Closed syllables ending with a non-labial consonant do not have the aspirated labial initial, but on the other hand, a syllable-final labial consonant along with a high vowel induces the initial labial aspiration.

3.3. Development of aspiration. There are three hypotheses concerning the origin of Sino-Korean. The first is to consider it representing basically the Wu dialect of the fifth century. This was advanced by Henri Maspero (1920) who asserts that the Wu sound was first introduced to Silla via Paykcye, and after the seventh century it coexisted with the newly introduced T'ang sound at the time of Silla's unification of the Korean peninsula. The two competing systems lasted until the fourteenth century when the Yi dynasty came to power, but the earlier Wu sound eventually emerged as the basis of the present Sino-Korean. This view, however, is not supported by internal evidence, and therefore is not generally accepted. The second hypothesis is to place the origin of Sino-Korean in the Sung sound of the tenth century, when Koryo replaced Silla in Korea. Unlike

the preceding view, it is supported by considerable internal evidence (Arisaka 1957).[12]

The third and most generally accepted view was first advanced by Karlgren (1926), and recent discussions by Koono (1968) and Pak (1971) seem to be in a basic agreement. Although Karlgren's view was stated in a rather simplistic manner, it is most probable that the T'ang sound was essentially the basis for Sino-Korean, but there are traces of the earlier Wu dialect introduced through Paykcye, as well as evidences of the post-T'ang influence. In this sense, the first two views are not entirely wrong either. An earlier layer of Sino-Korean is especially observable in Buddhist terms surviving today. Some of the examples are: tali, sapa, posi, palamun, talani, etc. These words would have aspirated stops according to the standard SK pronunciation. Traditionally, Buddhism is believed to have reached Silla in the fifth century,[13] and the above suggests that the contrast of aspiration was generally lacking at this stage.

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[12]It is beyond our scope to discuss specific points Arisaka discusses here, but it is to be noted that some of his arguments support the post-T'ang influence rather than a general characterization of Sino-Korean in terms of the Sung sound.

[13]Buddhism first came to Kokuryo in the north (372 A.D.), and to Paykcye in 384 A.D. It was brought to Silla by a Kokuryo monk in the fifth century. (Yi Pyeng-to, Cosensa Taykwan, 1948).

If we accept the view that Sino-Korean was primarily determined by the T'ang sound in the seventh century, then the broad patterns of Sino-Korean aspiration discussed may be regarded as representing the state of Old Korean in the seventh century with respect to aspiration. That is, aspiration at the labial point was merely sub-phonemic, not yet having acquired a distinctive function. At the velar region, the contrast of aspiration was also nonexistent, but the dental region was the only area where the aspiration was contrastive. In view of the difference between the labial and velar stops, it is possible that labial aspiration subsequently acquired a distinctive function, while the velar regions did not develop the contrast of aspiration until the Middle Korean stage. As for the cause of the initial acquisition of the aspiration contrast, one can only speculate, but one tentative consideration would be that vowel shifts and alternations might be ultimately responsible. In this regard, it is noteworthy that in Sino-Korean the tenseness of the vowels had crucial correlations with aspiration. The aspiration may first be closely associated with particular vowels in particular syllabic structures, but then the vowel shifts took place without altering the initial aspiration, thus creating contrastive minimal pairs in terms of aspiration.

The contrast of aspiration, however, had become fully contrastive at all points of articulation in the fourteenth and fifteenth centuries, and the acquisition and increase

of the aspirated stops seem to have continued to affect native morphemes throughout the Middle Korean period. Often cited examples include: ko > kʰo 'nose,' pal > pʰal 'arm,' and kal > kʰal 'knife' (where the first of each pair represents the MK form, and the second the modern Korean form). This expansion of the aspirated stops appears to have affected SK morphemes to a lesser extent, but such examples are not entirely absent. We have already noted some examples of the labial aspiration developed after the MK period in the category of OG-IIIA. To this, we might add a small number of cases where the aspiration was acquired relatively recently.[14] pan 'tray,disk' and pyeng 'screen' are today commonly pronounced with an aspirated stop as in načʰimpʰan 'compass' and pʰyəngpʰung. There are also two cases where SK morphemes have acquired aspiration medially when used as units of measurement; pun 'division' and kan 'space' become aspirated following a numeral as in han-pʰun 'one penny' and han-kʰan 'one unit of area.' Such cases probably led some writers (K.M. Lee 1961: 29, P. Pak 1971: 100) to speculate that the contrast of aspiration might have started word-medially, especially when a stop is immediately preceded by h. Many native morphemes end with h, which induces aspiration in the following stop in Middle and Modern Korean, and the above hypothesis is quite plausible, but there is no direct evidence to prove it.

[14]Modern standard dictionaries do not list the aspirated cases of the characters cited here.

3.4. Phonetic plausibility and the intrinsic nature of aspiration. The question of just how such an asymmetrical treatment of the contrast of aspiration in the host language dealing with loan lexicon will perhaps never be conclusively answered, since the direct evidence is not available. It is, however, a fascinating problem from the viewpoint of language contact and diachronic phonology. What is the intrinsic correlation, if any, between aspiration and places of articulation? Why should there be a particular sequence or directionality among different stops in acquiring the contrast of aspiration? To explore phonetic explanations, we will examine some acoustic data and some phonological systems across languages.

Aspiration is phonetically described as a brief voiceless duration immediately after the release of a stricture before the onset of the voice. M. Han and R. Weizman (1965) report such measurements for Korean stops as shown below:

Table 4: Durations of Aspiration in contiseconds in Korean stops[15]

	Labial		Dental		Velar	
Aspirated	p^h	9.8	t^h	10.4	k^h	11.8
Unaspirated	p	2.5	t	2.5	k	4.3
Tense (glottalized)	p*	0.5	t*	0.8	k*	2.1

[15]The data involved the averages of four informants. My own speech (the Seoul dialect) reflects essentially the same patterns in acoustic analyses conducted in Phonology Laboratory, UC, Berkeley in 1967.

Here two facts are notable: (1) the velar stops consistently have the longest duration of aspiration in all three series of stops, and (2) while the differences between labials and dentals are negligible, the differences between the aspirated and unaspirated stops at the three places of articulation show: Dental: 8.9 > Velar: 7.5 > Labial: 7.3. Namely, the dental stops show the greatest relative differences between the aspirated and unaspirated stops.

Lisker and Abramson (1964) have the following findings on the average lengths of aspiration in the initial voiceless stops in five languages:

Table 5: Duration of aspiration in stops for five languages

	Labial		Dental		Velar	
Cantonese	p^h	7.7	t^h	7.5	k^h	8.7
	p	0.9	t	1.4	k	3.4
Hindi	p^h	7.0	t^h	6.7	k^h	9.2
	p	1.3	t	1.5	k	1.8
Thai	p^h	6.4	t^h	6.5	k^h	10.0
	p	0.6	t	0.7	k	2.5
English	p	5.8	t	7.0	k	8.0
Spanish	p	0.4	t	0.9	k	2.9

Again, the velar stops have the longest duration of aspiration in all cases, but the differences between the labial and dental stops are neither consistent nor very great. There are also other investigators who have arrived at

similar conclusions on the velar stops as in Lehiste (1970) and Löfqvist (1973). The latter, however, finds the decreasing order of the duration of aspiration to be k > p > t in Swedish stops.

These data suggest that the velar point is the least profitable place for the contrast of aspiration to obtain for any language, since the velar stops are intrinsically associated with the longest duration of aspiration, and the perceptual distance between the aspirated and unaspirated stops should be easier to build upon ones with inherently shorter relative duration of aspiration. The intrinsic association of the velar place and the longer duration of aspiration is probably due to a relative lack of flexibility in the tongue dorsum as opposed to the apex and the lips.

To pursue further the question of the origin of the aspiration contrast, we will examine various types of aspiration systems across languages of the world reported in M. Ruhlen (1975). Of approximately 700 languages briefly described, 156 of them have the contrast of aspiration. Of the 156 languages, 137 have a perfect system with respect to the three major places of articulation (labial, dental or alveolar, and velar), and 19 imperfect. Since our analysis is in terms of three gross categories of places, we will obtain two types of imperfect systems: one that lacks aspiration in one of the three places, and the other that lacks it in two places.

Table 6. Imperfect aspiration systems

(a) Lacking one place

	Number	Languages	Pgs in Ruhlen(1975)
no labials	7	Arawas	161
		Chipewyan	180
		Dogrib	190
		Galice	197
		Kiowa Apache	222
		Ryukyuan	262
		Sarsi	264
no dentals	1	Chol	180
no velars	4	Circassian	183
		Hung	249
		Tuva	283
		Yucoa	296

(b) Lacking two places (having only one place for aspiration)

labial only	1	Mataco	238
dental only	6	Chasta Costa	178
		Hupa	207
		Cuahibo	201
		Tai	272
		Vietnamese	286
		Waica	288
velar only	0		

Table 6 (a) shows that if there is one place missing for the contrast of aspiration in any language, it is most likely to be either in the labial or the velar, but not the dental. Part (b) tells the other side of the same story, i.e., if there is only one place for the aspiration con-

čaŋ+nim —→* cannim 'blind person'
koŋ+čaŋ —→* konǰaŋ 'craft-place (factory)'

There seems to be, however, something more to the place assimilation than the gravity contrast. The following set of examples show further that there is a certain directionality among the kinds of stops in their relative strengths of assimilatory pull. The labials may be assimilated to the velars, but not vice versa;

(3) ip+ko —→ ik*o 'wear-and'
čamku- —→ čaŋgu- 'to lock'
kak+pu →* kap*u 'each section'
saŋ+pu →* sambu 'upper part'

In MK verb inflection, there is a class of verbs with obstruent altenations in terms of a tense-lax opposition: p - b [β], t - 1, and s - z, but not k - (X). These alternations are conditioned by what we call "pitch transposition.[16] Note the conspicuous absence of the velar stop in this series. This may be viewed as due to the resistance of the velar stop to the obstruent lenition. In the consonant cluster reduction, it was already noted that the velar stop is retained in lk (e.g., talk → tak 'chicken') but the labial stop is deleted in lp (e.g., yətəlp → yətəl 'eight').

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[16]See Chapter 5 on "pitch transposition," and for examples.

The relative strength of the velar consonant is also observed in the history of Chinese. M. Chen (1972) shows that the historical reduction process of the syllable-final stops and nasals in various dialects of Chinese proceeded in the sequence of labial-dental-velar. In this case, however, the dental is ranked in the middle of the strength scale. Korean examples so far, on the other hand, seem to suggest the order of t < p < k, where the velar is the strongest.

In a recent discussion of the relative phonological strength, J. Foley (1973) presents several kinds of evidence that demonstrates that in Germanic the relative phonological strength of occlusives runs in the opposite direction from that of Korean, specifically $\underset{1\ 2\ 3\ 4}{?\ k\ p\ t}$. Foley posits Germanic ? to be the weakest in scale, but when the 'strongest' t is to be strengthened, it is manifested in ? since t is the strongest and cannot be manifested in a stronger one. Examples given for this 'strengthening' are from English where t becomes ? after a stressed vowel and before a syllabic l or n as in bottle, kitten, etc. In this position, p and k do not shift to ?. Foley's concept of phonological strength does not necessarily coincide with ours, and the validity of such a concept in phonology itself is not fully tested across languages at this point. Therefore, these applications of the concept should be regarded as extremely tentative. We will consider the ten-

dencies observed in Korean to be language-specific, and explore further to see if there are more examples that demonstrate the scale t < p < k within Korean.

Returning to Korean cases, we will examine three more processes; vowel fronting, obstruent tensing, and cluster reduction, all of which appear to reveal relative phonological strength. There is a vowel fronting rule of an umlaut type, where a vowel is fronted when the next syllable contains a high vowel. This, however, takes place only when the intervening consonant is grave.

(4)	aki → ɛgi	'baby'	kasi → *kɛsi	'thorn'
	api → ɛbi	'father'	kači → *keǰi	'branch'
	əmi → emi	'mother'	əti → *edi	'where?'

The obstruent tensing after a nasal or lateral in Korean today is extremely complex, and it is beyond the scope of this paper to present the general scope of its operation. It may be basically considered as a device to prevent the voicing assimilation of obstruents. Oddly, however, the tensing after a lateral for Sino-Korean morphemes alone is quite regular. The tensing applies only to non-grave obstruents:

(5)	Sino-Korean		Tensing	Voicing
	il+pu	('a part')	*	ilbu
	il+toŋ	('all')	ilt*oŋ	*
	il+si	('temporarily')	ils*i	*
	il+ki	('weather')	*	ilgi

The consonant cluster reduction discussed earlier is another area where the question of relative strength may be raised. Native morphemes ending with two consonants have one of them deleted before a silence or another consonant, but the reduction does not depend on the order of the consonants at the end of the morpheme. According to C.W. Kim (1972: 92), grave consonants are retained while non-grave consonants are reduced as shown in the following examples:[17]

(6) kaps → kap 'price' əps → əp 'not exist'
saks → sak 'fee' nəks → nək 'spirit'
č*alp → č*ap, — ? c*al 'be short' yətəlp → yətəl 'eight' (EXCEPTION)
ilk → ik 'read'
čəlm → čəm 'be young'
±lp^h → ±p, — ? ±l 'recite a poem'

A closer examination, however, reveals the cluster reduction is not so straightforward as to be determined by the gravity feature alone. The troublesome cases for the above analysis are the three morphemes <u>č*alp</u> 'to be short,' <u>±lp^h</u> 'to recite a poem,' and <u>yətəlp</u> 'eight,' all of which end with a combination of a lateral and a labial. As Kim recognizes, dialectal variations have either <u>l</u> or <u>p</u> deleted, and it seems that the p-deletion is more predominant. Especially in the case of <u>yətəlp</u>, the p-deletion is almost

[17] Examples are taken from Kim's own (1972: 92).

uniform for different speakers, and for many speakers it is not exceptional at all. After l, the labial is weaker than the velar. The labial nasal, however, is not deleted when combined with the lateral, but the nasal is the strongest in this position:

(7) anč ⟶ an 'to sit'
talm ⟶ tam 'to resemble'

If we represent nasals with N, the lateral by L, and the non-nasal dentals by T, the relative phonological strength may be represented as N > k > L > P > T.

From the preceding discussions, it is possible to recognize as a language-particular trend in Korean phonology that the gravity feature frequently brings the labials and the velars together in opposition to the dento-alveolar consonants in various phonological operations. Furthermore there seems to be a certain directionality in the phonological strength among different obstruents in the sense that one consonant is more resistent to assimilation or deletion than others in a given context. Among the three types of obstruents in Korean, the relative scale of strength seems to run in the order of k > p > t, and the velars are shown to be consistently the strongest in resisting phonological changes and in inducing changes in others, while the dento-alveolars are shown to be the weakest. These facts suggest that the acquisition of distinctive contrast of aspiration in the sequence of t-p-k is

directly related to the relative phonological strength. The dental being the weakest, it is naturally prone to have a greater number of variations, and this fact is manifested in the large number of distinctive contrasts for the dento-alveolar region as compared to other articulatory regions.[18] It is, therefore, the most natural place to develop the first contrast of aspiration. Among the grave consonants, the labial is shown to be the weaker of the two, and thus the aspiration contrast developed here next. The velar aspiration was retarded until perhaps the late Old Korean period where the Sino-Korean sounds had already been well established, and the process of the acquisition of the velar aspiration did not affect the Sino-Korean morphemes.

The absence of the velar aspiration in Sino-Korean morphemes leads us to question why loan morphemes appear to be less affected by some phonological processes than native morphemes in the Middle Korean period. We have also noted the case of the obstruent tensing after a lateral which is regular only for Sino-Korean morphemes. The root vowel harmony in the early Middle Korean, vowel contraction rules and the vowel fronting rule of Modern Korean, etc., are generally inapplicable to SK morphemes. The morpheme structure conditions for SK are more restrictive, and dis-

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[18]The dento-alveolar region has ten consonants (t, t^h, t*, č, $č^h$, č*, s, s*, n, l) while the labial and velar regions have only four each (p, p^h, p*, m and k, k^h, k*, ŋ respectively).

tinct from those for native morphemes. To these, we might add the word-initial liquid adjustment which is applicable only for SK morphemes, for the obvious reason that native morphemes (roots) simply do not have a word-initial liquid.[19]

There are several possible reasons for such special phonological properties manifested in the SK loan morphemes. First, SK lexicon has always constituted a literary, intellectual and technical vocabulary distinct from the general vocabulary of native morphemes. As such, SK lexicon has been maintained by a small segment of population within their social sub-dialect throughout the centuries. The wide-spread use of SK morphemes has probably a shorter history than is generally imagined, with the exception of those that are completely naturalized in the sense that they are no more subject to the SK morpheme structure conditions. Second, SK morphemes have always fulfilled a productive function of neologism, and thus they are relatively resistant to complete fusion when compounded. Each SK lexeme (typically bi-morphemic) is analyzable in its constituent morphemes (quite readily associated with graphic images) in the awareness of educated speakers. In this regard, the graphic associations with characters should not be minimized. Until the fifteenth century, writing was done exclusively in Chinese characters, and even after the advent of the

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[19] In spite of the MS conditions generally disallowing the word-initial liquid, it is necessary to set up SK morphemes with an initial liquid and then subject to liquid-adjustment rules.

native phonetic script, the use of Chinese characters continued to be the standard medium of written communication. These probably have contributed to the conservative character of SK morphemes in Korean phonology.

Chapter 4. Vowel Systems of Modern Dialects and MK

4.1. Issues in modern Korean vowels. The vowel system of Korean through the ages and in modern dialects presents complex but fascinating problems providing various testing grounds for competing phonological theories, both synchronic and diachronic, and has been extensively studied by linquists of both Korean and American/European traditions of the 50's and 60's. In recent years, a fair number of insightful works in the generative framework has also appeared. In this chapter, we will make a quick survey of major issues in the analysis of modern Korean vowels, and then proceed to a close examination of the MK vowel system and vowel harmony.

The early studies on Korean vowels of the modern Seoul dialect were mainly concerned with the question of determining how many vowel phonemes (in their classical sense) should be recognized. The most influential in this area are those of H.P. Choi (1929) and H.S. Lee (1955). Choi lists nine simple vowels for Standard Korean, defined as the Seoul dialect of the educated middle class: i, e, æ, ɛ, a, ə, o, u, ɨ. Lee, on the other hand, lists ten vowels, adding y (a high front rounded) to the preceding, and the majority of subsequent works on Korean vowels by major linguists seem to follow Lee (W. Huh 1958, W. Huh 1964, K.M. Lee 1961, H.K. Kim 1962, W.C. Kim 1971, B.G. Lee 1976, etc.). It appears, on the face of it, simply a matter of different sub-dialects within Seoul, but it is more due to two different theoretical

orientations, though not overtly enunciated. W. Huh (1958: 153) states that the realization of the unit /wi/ is most commonly [wi] or [ɥi] rather than [y] except in limited contexts such as š__, č__, and č^{h}__, and quotes Lee (1955) in accepting /y/ as an independent phoneme. There is, however, in most dialects of Korean today a phonetic tendency to weaken the labial glide after a consonant, especially after a continuant, e.g., twe [tɛ], pwa [pa], etc. If we observe such cases more closely, the labiality is either superimposed on the syllabic vowel as in swi [ʃy] or completely suppressed as in [ʃi]. This weakening of labiality is not restricted to the sequence wi but is applied to all cases of C+G+V, and its operation is determined by several spacial and temporal variables, such as the dialect, sub-dialect, style, and speed of delivery, etc. The high front rounded vowel y, then is a special phonetic realization of the diphthongal sequence /wi/ under particular variable conditions in Seoul.

The mid-high front rounded vowel œ, on the other hand, has a different status from that of y both from diachronic and synchronic points of view. We will return to its diachronic developments later, but for now we will briefly touch upon its synchronic status. Phonetically, it has remained a monophthong in all positions in some southwestern dialects and a part of Seoul (particularly among older generations). However, for most speakers in the north, southeast, and central areas including the greater part of Seoul,

it has become diphthongized as we or wɛ , and after a consonant, w is weakened or deleted. This means that for most modern dialects of Korean, there is an SPC against rounded high or mid-high front vowels, especially after a consonant while MSC's allow at least one rounded front vowel /œ/. There are then two types of vowel systems in Seoul: one with nine monophthongs, and another with eight (without œ). Southern dialects are generally much more innovative in vowel systems. Both the southeast (Kyəŋsang Province) and southwest (Čənla Province) have neutralized the contrasts of e-ɛ and ɨ-ə, creating seven- and eight-vowel systems, while the dialect of Cheju island, in the extreme south, remains the most conservative preserving the MK ʌ which has been lost in all mainland dialects by the 17th century (S.N. Lee 1957).

Modern Korean vowels are given a componential analysis by S.E. Martin (1951), and a similar approach in the phonological feature analysis, such as given in C.W. Kim (1968), entailed more abstract representations of modern Korean vowels. Before discussing the issues involved in such abstract vowel representations, we will now examine the problems of high front vowels and diphthongs, in relation to palatalization.

4.2. The synchronic status of i and palatalization. There are, in some sub-dialects of Seoul, two 'subphonemic' variants of the high front vowel. They are non-distinct in the sense that the difference between the two is not perceptually clear except in the coloring of the preceding consonant.

(1) ni+ka [niga] 'you+Subject Marker'

(2) ka+ni [kañi] 'go+Question Marker'

The first instance of i does not result in palatalization of the preceding n, while the second induces a palatalized n (marked here by ñ). The standard form (orthographical and therefore the prestige dialect) of (1) is neka [nega], historically derived from nəyka<nə-i-ka. This fact may lead one to propose a particular extrinsic rule ordering where the palatalization precedes the raising of e to i to protect (1) from undergoing palatalization. If the hypothesis of extrinsic rule ordering is not acceptable, one may invoke the concept of "global rules" which require scanning of the derivational history in rule application. Before resorting to any of such hypothetical apparatuses we must note that the speakers making the above distinctions do not palatalize any word-initial n before the high front vowel. In all modern dialects of Korean with the conspicuous exception of the northwest, there are few surface manifestations of the word-initial sequence of ni or ny, as a result of the n-deletion in that context which took place in the 18th cen-

tury. The exceptions to this are of two kinds: a handful of native morphemes such as neka [niga] in (1), nim 'master,' and nyəsək (a pejorative of 'son'), and recent loan words of the Western origins such as nyusɨ 'news,' nikʰel 'nickel,' etc. These tend to reintroduce a word-initial n without palatalization. In other words, the word-initial n reintroduced in this century would violate the SPC against occurrences of such n's in the context of ##__i/y, and the reintroduction of it required circumvention of the SPC by not palatalizing n. As already noted, the deletion of n was preceded by palatalization, and the original SPC may be more precisely stated as:

(3) SPC: $\sim\tilde{n}$ / ##__ $\begin{bmatrix} -\text{Consonantal} \\ +\text{High} \\ -\text{Back} \end{bmatrix}$

The issue of the high front vowel and palatalization is further complicated due to idiolectal variations. Consider, for example, those speakers reported in W.C. Kim (1971), where both palatalized and unpalatalized n's occur in the identical phonological contexts as below:

(4) əti kani [ədi kani] 'Where are you going?'

(5) čipe kani [tʃibe kañi] 'As I went home,...'

Kim offers a historical explanation for the difference in this dialect; the interrogative marker suffix -ni in (4) was derived from MK form -nɨy/-nʌy, which was exempted from palatalization, and for this reason proposes to postulate an underlying vowel ɨy for (4). This interpretation has

certain advantages in providing explanations to a broader range of palatalization phenomena; those affecting dental and velar stops. Let us briefly examine how this hypothesis deals with the two types of palatalization observable in most central and southern dialects.

The palatalization of dentals is a wide-spread phenomenon that started in the 17th century and was completed in the 18th century in all dialects except in the northwest, as noted, and it resulted in a large-scale relexicalization.

(6) tinata → činata 'to pass'
tʰyən → čʰyən 'heaven'
tyohta → čohta 'to be good'
ptita → č*ita 'to steam'

There are, however, a small number of high frequency native morphemes that retain an unpalatalized dental and i or y. These morphemes had i̱, i̱y or ʌy in their late MK antecendents.

(7) əti̱y → əti [ədi] 'where'
ti̱ti̱yta → titita [tidida] 'to step on'
təti̱yta → tətita [tədida] 'to be delayed'
sti̱y → t*i [t*i] 'belt'
pʌtʌy → pati [padi] 'reed'

In southwestern dialects, some velar stops are palatalized before a high front vowel, while others are not in the identical environment. This is due to the difference in the historical antecedents of the high front vowels: one is derived from i̱y, the other from a simple high front vowel.

(8)	a.	kil±m	→	čil±m	[tʃir±m]	'oil'
		kil	→	čil	[tʃil]	'road'
		kyul	→	čul	[tʃul]	'tangerine orange'
	b.	k±y	→	ki	[ki]	'air'
		k±ypyəl	→	kipyəl	[kibyəl]	'news'
		k^h±y	→	k^hi	[k^hi]	'height'

To explain synchronically the palatalized and unpalatalized dentals before i/y, W.C. Kim (1971) sets up two different underlying high front vowels: i and ±i, and presumably establishes a rule order in the sequence of the palatalization followed by the monophthongization of ±i to i. Similar solutions have been proposed in S.B. Cho (1967), C.W. Kim (1968), B.G. Lee (1973), and S.K. Kim (1976). The following table shows the underlying pairs of high front vowels set up by those analysis.

(9)	S.B. Cho 67		C.W. Kim 68	W.C. Kim 71	B.G. Lee 73
	ɪ	[ɪ]	±y	±i	±i
	i	[i]	y±y	i	i

S.K. Kim 76
±
i

Of the five analyses, S.B. Cho (1967) is unique in that the two high front vowels are claimed to have distinct phonetic realities independent of their contexts for what

he calls the PM ("Standard") dialect (S.B. Cho 1967:261).[1]

In the other four analyses, the recognition of the two high front vowels is strictly on the morphophonomic level, and their phonetic realizations are neutralized in the identical high front vowel [i] in most, if not all, contexts. C.W. Kim (1968) involves a large scale of abstract vowel representations accompanied by reduction of "basic" monophthongs to four. We will later return to further discussions on these abstract vowel representations along with a similar approach by S. Martin (1954), since these two works on Korean vowels exerted more influence on subsequent works on this topic than any others.

W. C. Kim (1971) and B.G. Lee (1973) have essentially the same approach setting up a diphthongal sequence ±i which corresponds to the graphemic unit "ᅴ" in the orthography. This is far more acceptable than the preceding two analyses since it has a phonetic reflex [±y] at least in the deliberate style of educated speakers: ±ise [±ysa] 'physician,' ±imun [±ymun] 'question,' čəŋ±i [tʃəŋ ±̂i] 'definition,' etc. Even in these cases, the psychological reality of such a unit is not without some doubt. There

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[1]This claim is not supported by any phonetic/phonemic data. Since no major phonological studies that this writer is aware of, nor his experience of actual encounters with any dialects or idiolects point to the existence of such contrasts, this putative phonetic fact will be eliminated from further consideration. It should be noted that if such phonetic/phonemic contrasts exist in any dialect, the present issue would not have risen.

exist two kinds of influence on educated speakers of both the new and old generations; first, the knowledge of Chinese characters with (their) associated conservative pronunciations, and the present orthography of Hangul which preserves the graphic unit ɨi. The main stream of colloquial pronunciation today, however, reduces it to a monophthong everywhere. Historically, the monophthongization of ɨi (or ɨy in its MK representation), a part of the MK falling diphthong series, has preceeded from the context of #C___ to that of #___, and the completion of its process took place toward the end of the last century. This process may be regarded still incomplete for some speakers of the old generation in Seoul. The consequences of setting up the underlying unit /ɨi/ in this dialect are to recognize two optional monophthongization rules:

(10) a. ɨi → ɨ: / ##___

b. ɨi → i / #C__

These are post-cyclic rules placed well below the palatalization of dentals, and create forms such as; ɨisa → ɨ:sa 'physician,' ɨica → ɨ:ja 'chair,' kə:ɨi → kə:i 'almost,' hœ:ɨi → hwe:i 'conference,' etc.

The ɨ hypothesis proposed in S.K. Kim (1976) is similar to the preceding, but less desirable due to the following reasons. First, the realization of ɨ as i would be under complex and restricted circumstances, and the majority of morphemes containing the vowel ɨ would not be affected by

this frontalization rule. It would change ẗiẗiẗa to [tidida] 'to step on' obligatorily, ẗiẗlita 'to give' optionally to [tirida], but not ẗiẗl 'field,' ẗiẗmiẗlta 'to be rare,' ka:ẗiẗ 'card,' and many others. It also involves an absolute neutralization, since, for example, there are no instances of ẗiẗiẗa to be realized as [ẗid̈ida], in its inflectional paradigm. Furthermore, under this hypothesis, it is impossible to handle occurrences if ẗiẗi discussed earlier. It appears then the /ẗiẗi/ hypothesis is the most promising of the five approaches we have so far examined.

However, before conclusively accepting the two underlying high front vowels in modern Korean, we need to raise a few more questions on the status of /ẗiẗi/. Which of the two vocalic segments in /ẗiẗi/ is the peak of the diphthong? What is the relationship of /ẗiẗi/ to MSC's or SPC's? Is this unit fully on a par with other vocalic units forming the Korean vowel system, when its distributions are severely restricted? As for the question of the diphthongal peak, there are of course two possible solutions, but neither of them seems non-arbitrary. In the word-initial position, the second segment is weakened or deleted, and it appears to be a falling diphthong. In other positions, however, it is the first segment that becomes weakened or deleted, and thus the diphthong appears to be a rising type. The only non-arbitrary decision is to appeal to SPC's which include one that prohibits falling diphthongs. In this case, we are forced to admit a non-labial non-front semivowel into

the system. More crucial is the fact that ɨi is found only as an independent syllable without any consonant preceding or following as in ɨi#sa 'physician,' hœ#ɨi 'conference,' etc. but not in such surface forms as *[tɨidɨida] 'to step on' or *[kanɨi] 'go-therefore.' How is it possible for a child to construct an underlying ɨi after a consonant in lexical representations if such a sequence never occurs on the surface? If a child is to derive an underlying vowel other than the surface forms on the basis of non-palatalization, is it not equally possible for him to posit ɨ or e? Phonetic proximity of ɨi to i is not sufficient since ɨ and e may be regarded just as adjacent to i as ɨi. Thus, we seem to have made a full circle back to the original dilemma. The positing of any underlying vowel other than /i/ for the phonetic [i] after an unpalatalized dental appears to be arbitrary and unrealistic. How do we then account for unpalatalized dentals before a high front vowel? We have no choice but to reexamine the basic assumptions that dental palatalization is part of the synchronic phonology of the modern Seoul dialect. If palatalized dentals before i/y are regarded as such in the lexicon, there is no need for the palatalization rule. Unpalatalized dentals before i/y would be also straightforwardly represented without palatalization; e.g., [tidida] as /titita/, [ədi] as /əti/, etc. This means that the SPC against the occurrence(s) of unpalatalized dentals before a high front vocalic is removed from the modern Seoul dialect. In fact,

this interpretation is quite reasonable in view of the fact that there are an increasing number of recent loan morphemes containing an unpalatilized dental before a high front vowel, as noted earlier. If this is the case, how should the palatalization in some noun and verb inflectional paradigms be explained?

4.3. Dental Palatalization and Vowel Fronting. We have concluded that SPC's for the modern Seoul dialect do not include one that restricts occurrences of unpalatalized dentals before a high front vocalic (i/y), and the historical palatalization of dentals has altered lexical representations. How do we then reconcile this with the data in (11)? (Taken from the Unified Spelling Methods of Hangul published in 1930 by the Hangul society.)

(11) NOUN + SUBJECT MARKER (-i)

*nat	as in nat-al	[nadal]	'grain'
mat-i		[madʒi]	'the eldest'
kət^h-i		[kət$\int^h$i]	'surface'
kyət^h-i		[kyət$\int^h$i]	'side'
k*ɨt^h-i		[k*ɨt$\int^h$i]	'end'
*nat^h	as in nat^h-mal	[nanmal]	'vocabulary word'
mat^h	as in məli-mat^h-i	[mərimat$\int^h$i]	'pillow area'
*mut^h-i		[mut$\int^h$i]	'land'
mit^h-i		[mit$\int^h$i]	'lower area'
pakkat^h-i		[pak*at$\int^h$i]	'outside'
pat^h-i		[pat$\int^h$i]	'field'
pyət^h-i		[pyət$\int^h$i]	'sunray'
*sat^h-i		[sat$\int^h$i]	'groin'

soth-i	[sotʃhi]	'iron pot'
*suth-i as in <u>məli-sutʃh-i</u>	[mərisutʃhi]	'thickness (of hair)'
phath-i	[phatʃhi]	'red bean'

The list of nouns in (11) is probably exhaustive of those ending in <u>t</u> or <u>th</u>, and they all retain the unpalatalized dental unless followed by a suffix -<u>i</u> or by the enclitic copula suffix -<u>i</u>-. This class of nouns is a 'closed' system, and furthermore the ones marked with an asterisk are in one sense or another archaic or surviving only in idiomatic compound phrases. There are also a number of verbals which may take a derivational suffix -<u>i</u>- or -<u>hi</u>- entailing palatalization.

(12) VERBAL + i/hi (derivational suffix)

kət-hi-	[kətʃhi]	'roll up+PASSIVE'
kut-i	[kudʒi]	'be firm+ADVERBIAL'
tot-i as in hɛ-tot-i	[hɛdodʒi]	'sunrise'
mut-hi-	[mutʃhi]	'bury+PASSIVE'
mut-hi-	[mutʃhi]	'soil+PASSIVE'
tat-hi-	[tatʃhi]	'shut+PASSIVE'
p*ət-hi-	[p*ətʃhi]	'extend+PASSIVE'
kath-i	[katʃhi]	'like-wise'
puth-i	[putʃhi]	'stick+CAUSATIVE'
yath-i	[yatʃhi]	'shallow+ADVERBIAL'
halth-i-	[haltʃhi]	'lick+PASSIVE'

It is obvious then that dental palatalization, though limited in application, is a part of the synchronic rules in spite of the SPC's that do not motivate such rules. This, however, is no defect of the theory since the SPC's

are never regarded absolute in determining what the phonological rules should be. Instead, it simply means that the particular rules are not supported by the SPC's, which in turn suggests that the rules in question are either historical vestiges surviving as minor rules within 'closed' systems or those that are newly introduced into the system. It is well-known that high frequency inflectional sets often contain "irregular" or "exceptional" forms in languages. Dental palatalization in Korean is clearly a minor rule in this sense. A child learning the language may or may not generalize a palatalization rule based on the data such as (11) and (12).

One more set of data that W.C. Kim (1971) presents in support of his ±i hypothesis is the regressive assimilation of a vowel followed by a high front vowel, often compared to the Umlaut in Germanic. This is one of the major historical vowel changes that has transformed the MK characteristics to modern Korean. We will discuss this topic more extensively later. For now, we will be concerned with a synchronic interpretation of the phenomena, which we will simply call vowel fronting. It generally occurs within a morpheme or between morphemes forming a lexical stem, but not before an inflectional suffix: koki > kœki 'meat,' api > ɛpi 'father,' əmi > emi 'mother,' etc, but the vowels in pap-i ('rice+SUBJECT MARKER'), po-ki ('see-ing')[2] are

[2] poki 'seeing' as a true nominal is not fronted, but when it is relexicalized as poki-silh-ə [pœgiʃirə] 'don't like' it is fronted.

not fronted. Furthermore, the intervening consonant has to be [+Grave] as in above examples, and if it is [-Grave] as in tasi 'again,' həli 'waist,' əti 'where,' etc., the fronting does not take place. However, even when all these conditions are satisfied, there are cases where the fronting does not take effect.

(13) a. to:mi - tœ:mi 'red bream'
koki - kœgi 'meat'
aki - ɛgi 'baby'

b. čoki - tʃogi 'yellow corvina'
yəki - yəgi 'here'
kəmi - kəmi 'spider'

Historically, this is due to the fact that the assimilator vowel i in (13b) was derived from a falling diphthong ɨy, oy, or ʌy. In order to explain this synchronically, Kim proposes to set up the underlying vowel ɨi for those in (13b). As in the case of dental assimilation, an absolute neutralization is required to derive the phonetic [i] for (13b) in this interpretation. When a set of data presents such complex restrictions, either the rules are "minor" affecting a limited subclass of morphemes and not supported by SPC's, or no such rules need be synchronically recognized. The vowel fronting is largely historical and it has altered the lexical representations of some morphemes such as (13a). Some speakers may maintain doublets for a small number of lexical items due to dialect mixing or stylistic variations particularly influenced by orthography, but most speakers of modern Korean have only one form with the first vowel either fronted or unfronted for those of the type (13), but

not both. This means that the vowel fronting is not relevant to the kind of morphemes examined, and the high front vowel in (13b) need not be represented by ±i or any other abstract form. Our conclusions on high front vowels in modern Korean are, then, that it is simpler and more straight-forward to represent most cases of the phonetic [i] as /i/ for the great majority of morphemes containing such a vowel (with the exceptions noted below), and the postulation of two abstract underlying forms is neither necessary nor appropriate for modern Korean, and that the two rules examined are minor rules relating some freely varying doublets, where they exist, or for some derivational relations between some lexemes of closed paradigms. These, however, do not entail a total rejection of a diphthongal unit ±i. Some educated speakers and a minority of the old generation still maintain such a unit in formal style, and for those speakers, the dental n is not palatalized as in [kani] 'go+QUESTION MARKER' contrasting to [kañi] 'go+therefore,' as noted earlier. It must be noted, however, that in such instances, the diphthongal unit ±i is phonetically realized as [±i] at least in some contexts under certain conditions. Such facts point to the necessity of recognizing all components of a synchronic structure to be a multiplex system subsuming several subsystems reflecting on-going diachronic processes.

4.4. Diphthongs and abstract vowels. The modern Korean vowel systems allow only rising diphthongs with two glides, y and w. This may be stated in an SPC of the form (14).

(14) Glide Constraint

SPC: If $\begin{bmatrix}+\text{High}\\-\text{Consonantal}\end{bmatrix}$ $[-\text{consonantal}]$

Then $[-\text{Syllabic}]$ $[+\text{Syllabic}]$

The SPC (14) motivates most vowel clusters to be diphthongized as in nɛli + ə ⟶ nɛlyə 'get off+SUFFIX,' teu + ə ⟶ tewə 'warm + SUFFIX,' etc. The glide has to be [+High], but there are a few gaps in the diphthongal combinations: *yi, *yɨ, *wɨ, *wu, and *wo. In other words, two successive segments of high front non-consonantals or high back non-consonantals are not permitted.

(15) Glide Constraint

SPC: (a) $\sim \left\{ \begin{bmatrix}+\text{High}\\+\text{Back}\\-\text{Syllabic}\end{bmatrix} \quad \begin{bmatrix}+\text{High}\\+\text{Back}\\(+\text{Mid})\end{bmatrix} \right\}$

(b) $\sim \left\{ \begin{bmatrix}+\text{High}\\-\text{Back}\\-\text{Syllabic}\end{bmatrix} \quad \begin{bmatrix}+\text{High}\\-\text{Round}\\-\text{Mid}\end{bmatrix} \right\}$

There is an asymmetry in the two subparts of (15). After a high front glide, only two high nonback vowels (i, ɨ) are restricted, while after a high back glide a mid-high back (o) is also restricted along with high non-front vowels. This peculiarity is due to a historical shift of MK u to o. The MK counterpart to (15) was simply: $\sim \left\{ \begin{bmatrix}+\text{High}\\\alpha\text{Back}\\-\text{Syll}\end{bmatrix} \quad \begin{bmatrix}+\text{High}\\\alpha\text{Back}\end{bmatrix} \right\}$.

In some styles of modern Korean the [Mid] specifications may be absent, which allows a glide formation of mid-high front vowels, as in tewə ⟶ tyə: . It must be noted here that the glide formation SPC's of the type such as (14) and (15) is distinguished from their counterparts in the rule component by the fact that while SPC's are stated in general phonetic terms, phonological rules are specified in terms of phonological and morphological contexts within which the particular rules operate. For example, the glide formation rules of the rule component must include such information as the type of morpheme boundaries, the vowel length, and the derivational source of the first segment. For example, the glide formation rules generally apply to a [-Long] segment before an enclitic element, but not before a lexemic item.

The five diphthongal gaps (*yi, *y$\dot{\pm}$, *w$\dot{\pm}$, *wu, and *wo) led C.W. Kim to regard the glides to be something less than full segments or features that may be realized either simultaneously with other feature bundles within a segment or successively in two different segments as a diphthong (C.W. Kim 1968: 516-517). This view may be seen as an extension of an approach taken earlier in S.E. Martin (1951 and 1954), where Korean vowels are analyzed in terms of five vowel components: I [High], E [Mid], A [Low], Y [Front], and W [Round]. In his pioneering works on a componential analysis applied to Korean phonology, the five vowel components may occur coextensively (simultaneously), overlap-

ping, or successively to form various vowel phonemes. However, S.E. Martin did not explicitly treat W [Lip rounding component] and Y [Fronting component] to be freely realized as glides, except two; for example, /œ/ is implemented either coextensively WEY [œ] or successively [we].

(16) a.

IY [i]	I [ɨ]	IW [u]
EY [e]	E	EW [o]
AY	A [a]	

b.

W-IY [wi]	X	X	X	X	Y-IW [yu]
WIY [y]					
W-EY [we]	W-E [w]	X	Y-EY [ye]	Y-E [y]	Y-EW [yo]
WEY [œ]					
W-AY [w]	W-A [wa]		Y-AY [y]	Y-A [ya]	

Subsequently, when the Yale University romanization was devised based on Martin's analysis, five vowels (i, u, e, a, o) are considered basic and the other five monophthongs are derived from diphthongs:

(17)

uy	[y]	i	[i]	u	[ɨ] or [ɯ]	wu	[u]
oy	[ö]	ey	[e]	e	[ə]	o	[o]
		ay	[ɛ]	a	[a]		

C.W. Kim (1968) extended Martin's approach and literally set up four underlying monophthongs (ɨ, ə, a, o) and derived other vowels similarly. Kim, however, included two underlying units (ɨy, yɨy) for one phonetic vowel [i] as discussed earlier.

(18)

wɨy	[y]	{ɨy, yɨy}	[i]	ɨ	[ɨ]	wɨ	[u]
wəy	[œ]	y	[e]	ə	[ə]	o	[o]
		ay	[ɛ]	a	[a]		

C.W. Kim further elaborates on his analysis and defends the proposed system in another article (C.W. Kim 1972), particularly in view of subsequent criticisms against such abstract representations in phonology (e.g., Kiparsky 1968). Kiparsky's objections are mainly concerned with the trend in the late 1960's set by Chomsky and Halle (1968) where the underlying units of a phonological system are postulated sometimes in terms of shapes quite removed from their phonetic forms actually realized on the surface in any contexts. The justification for such abstract representations is typically given where an operation of a phonological rule is blocked in an apparently identical phonetic context for the rule to take effect. The particular opaque context, then, is considered having a phonological form distinct from its phonetic manifestation, and in some instances such a representation may take a form that is altogether different from any of the surface forms manifested in that language. This in turn necessitates the postulation of a rule that converts all instances of the abstract form back to the actual phonetic shape, which Kiparsky called "absolute neutralization." It is difficult to argue against the general constraint against absolute neutralization that Kiparsky proposes to impose on the phonological theory,

since an abstract representation may easily become arbitrary, and more seriously, it may become divorced from the psychological reality in the speaker's linguistic competence. A child must construct his grammar largely based on adult's performance data as inputs, whatever is his innate capacity to learn a language (Chomsky 1965: 48). It is hard to believe that a child could construct an underlying representation unless it is at least once manifested on the surface.

Setting aside, for the moment, the general objections raised against abstract representations, we will now examine closely the justifications presented for such systems as (17) and (18) to see if the data and the analyses constitute sufficient grounds for absolute neutralization to be included in the theory of Korean vowels. Furthermore, if there are gains in significant generalization and elegance, as often claimed, these will be comparatively examined against possible costs in the total phonological structure.

4.5. Lexcial representations and phonological rules. The postulation of abstract representations in lexicon is often motivated by a concern for a maximum generality in phonological description. For example, a set of data traditionally regarded as exceptions or irregular may be shown to be regular and general manifestations by such a reanalysis. It can result in a fewer number of rules within the local area of concern, but the real test of such a hypothesis is

what it does to the whole phonological system as a reflection of the speaker's competence. We have already discussed at length the inadequacy of postulating two underlying high front vowels associated with palatalization and vowel fronting. In this section, therefore, we will take a close look at the justifications presented in support of the abstract vowel wɨ for [u], and two front vowels əy and ay for [e] and [ɛ].

One set of data cited for such an analysis in C.W. Kim (1968) is the so-called p-irregular verbs. There are a little more than a dozen such verbs in modern Korean, which have three different surface forms, one ending in p before a suffix beginning with an obstruent (to:p-ko 'help-and'), another ending in w before a suffix beginning with a vowel ə or a (tow-a 'help-BLUNT ENDING'), another ending in u before a prenominal suffix (tou-n < top-ɨn 'help-ed'). The traditional account of the p-irregular verbs is to regard to:p as the basic stem, and derive the other two forms by three rules.

(19) a. p ⟶ u / __V

b. ɨ ⟶ Ø / V

c. u ⟶ w / __V

C.W. Kim's analysis takes to:w to be the underlying form of the verb root, in which case the number of rules required

is reduced to two:[3]

(20) a. w ⟶ p / __ [-Sonorant]

b. w + ɨ ⟶ u

The analysis (20) has a definite advantage over the traditional account in certain ways: the so-called p-irregular verbs need not be considered "irregular," because the underlying lexical representations of this class of verbs are given a different form (CVw) from those ending with p (CVp) which do not undergo the rules (20). However, the counting of rules affecting the overall system will show no advantage over the other. The analysis (20) requires two new rules, and the traditional account (19) requires also two, since the rule (19b) is independently required elsewhere. For example, the ɨ-deletion (19b) is a general rule applied to many situations such as s*ɨ-ə ⟶ s*ə 'write,' čo:h-ɨn ⟶ čo:-ɨn ⟶ čo:n 'good+ATTRIBUTIVE,' etc.[4]

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[3] In C.W. Kim (1968: 518), the rule (20b) is not counted, and therefore it is claimed that two extra rules are required for the traditional account. Since we are interested here in the comparative consequences affecting the total system that converts a string of formatives into articulatory/perceptual components, we must assume that there exists a rule of the type (20a) somewhere.

[4] Two extra rules cited as needed for the traditional account in C.W. Kim (68: 518) are (a) ɨ ⟶ u /w__, and w ⟶ ø /__u. These rules would be required only if the verb root is represented as kiw. Since the so-called p-irregular verbs are simply represented in the form CVp in the traditional view, there will be no instances of w occurring as an off-glide (unsupported by SPC's), and therefore the above two rules are not considered part of Korean phonology.

There are, on the other hand, a number of weaknesses in this approach. First of all, the rule (20a), w → p, is less natural than (19a), p → w. A change of a stop to a homorganic fricative or glide is universally prevalent, but not the reverse. Secondly, the postulation of the rule (20) affects only a small number of verbs (perhaps about fifteen), and yet it requires a wholesale representation of all morphemes containing [u] to be /wɨ/, only to be realized as [u] later. Thirdly, the ɨ-deletion rule becomes suspiciously complex. Consider the verbs having a monosyllabic root with wɨ [u], such as twɨ 'to put,' čwi 'to give,' and pwɨ(s) 'to pour,'[5] According to the wɨ hypothesis, if they are followed by the suffix -ə, we should obtain [twə], [čwə], and [pwə] respectively. However, these forms are less common stylistic variants of the more basic [tuə], [čuə], and [puə]. This would mean that the ɨ-deletion rule is applied optionally determined by the speed and/or style. To account for these variations, it is more natural to have the diphthongization rule (u → w/__V) rather than the ɨ-deletion, since the diphthongization of such sequences as uV (or wɨV) and iV (or ɨyV) is obligatory in some cases, but optional

[5]The verb pwɨ(s) is tentatively represented here following the orthographic representation with a final s. In reality, the orthographic final s is never realized as [s] unless the suffix starts with s. According to B.G. Lee (1976), such verbs are represented with a final z to distinguish this class of verbs from the regular verbs with a final s.

in others. Thirdly, along with the preceding examples, note the following variations.

(21) Ci + ə			Normal Speed		Faster-than-normal	
ki: + ə	'to crawl'	kiə	2			
k*i: + ə	'to insert'	k*iə	2			
mi: + ə	'to carry'	miə	2			
pi: + ə	'to become empty'	piə	2			
si: + ə	'to be sour'	siə	2	syə	1	
i: + ə	'to carry on one's head'	iə	2			
t^hi + ə	'to splash'	t^hiə	2	t^hyə	1	
p^hi + ə	'to bloom'	p^hiə	2	p^hyə	1	
či + ə	'to lose'	tʃə	1			
$č^h$i + ə	'to strike'	$tʃ^h$ə	1			
-i + ə	'to be'	iyə	2	yə	1	

Phonetic details aside, the list of verbs with a monosyllabic root in (21) shows a complex operation of the diphthongization. The numbers (1 and 2) after the phonetic transcriptions indicate the number of syllables as they are pronounced by five Seoul dialect speakers at two different speeds. If a verb has a polysyllabic root, the high vowel in the last syllable of the root obligatorily forms a diphthong. In monosyllabic roots, short vowels are obligatorily diphthongized, while long vowels are not, except for the copula i-. The two high vowels i and u are both subject to more or less the same set of rules, but under the (y)i̯y and wi̯ hypothesis, these cannot be adequately generalized. Instead, the i̯-deletion rule must apply in an ad hoc manner. For example, let us consider further the verbs in (21). If they are represented with the vowels of the form (y)i̯y,

we would not have the diphthongization rule, but would have the ɨ-deletion rule in a context of y, or we must assume the diphthongization to occur only after the monophthongization of (y)ɨy: (y)ɨy ⟶ i ⟶ y.

Fourth, the representation of CVw for the traditional p-irregular verbs would have no structural parallel within the language, since the significance of w in CVw as a labial diphthong formant or as a high back vowel formant is entirely different from the off-glide y in ɨy, ay, and əy. The off-glide y in this system must be viewed as the frontalizer of the preceding vowels, but not as a diphthong formant. Thus, CVw appears to be an ad hoc device without general structural affinity with other elements in the system. Fifth, a verb like [kip/kiw] 'to mend' would be represented as kɨyw, and MSC's would become extremely complex to allow this kind of syllabic structure.

It appears then that the incorporation of an abstract unit such as wɨ creates more problems and disharmony to the total phonological system than otherwise. Finally, however, we must examine one possible gain in this hypothesis that we have noted earlier, i.e., the elimination of the irregular category by viewing the so-called p-irregular verbs as w-final verbs. Do we gain a real generalization by setting up CVw rather than CVp for the underlying roots of this class of verbs? To answer this question, we must examine the consequences of such an approach in terms of how lexical information of this type might be entered in the lexicon.

The lexical information must include, among others, phonological formants of feature matrices specifying the root segments, e.g., t o w, but the speaker must also possess the information that this verb is associated with the minor rule, w → p / __C, since this rule is exclusively set up for this class of verbs. In contrast with the above, the traditional approach would have the root segments, t o p with the associated rule, p → u/ __V to distinguish it from regular verbs. Formally, the two systems appear to be equivalent to each other: a segmental information X plus one associated minor rule Y. It seems then that no particular advantage is gained, and only the contents of the segmental information, and the subsequent effects on the phonology in general should demonstrate the difference in the explanatory adequacy of the two hypotheses as examined.

4.6. Front vowel series and vowel fronting. In the present Korean orthography, the front vowels except i are all represented by two vowel symbols: e as /əy/, ɛ as /ay/, œ as /oy/ and wi or y as /uy/. These are due to the fact that the modern front vowels are derived from the MK falling diphthong series. Both S.E. Martin (1951 and 1954) and C.W. Kim (1968) consider the historical fact to be synchronically significant in representing modern front vowels. The underlying representations of these vowels to be falling diphthongs are, of course, supported by internal (synchronic) facts in C.W. Kim (1968). We will now examine if there

are sufficient synchronic facts to justify such representations. The Seoul dialect has the following sets of doublets for some morphemes:

(22) a.

a:i	= ɛ	'child'	
o:i	= œ	'cucumber'	
poi-ta	= pœ:-ta	'to be seen'	
moi-ta	= mœ:-ta	'to be gathered'	
noi-ta	= nœ:-ta	'to be laid'	
k*oi-ta	= k*œ:-ta	'to lure'	

b.

na-e	= nɛ	'my'	(<na-ɨi)
nə-e	= ne	'your'	(<nə-ɨi)
čə-e	= ce	'my'	(<čə-ɨi)
			Humble form

These data alone, however, do not constitute sufficient grounds for considering all instances of [e], [ɛ], and [o] to be derived from the falling diphthongs (or two-vowel sequences), since there are numerous morphemes containing monophthongs (e, ɛ, œ) with no variants: kɛ 'dog,' ke 'crab,' nɛ 'stream,' ne 'yes,' tɛ 'bamboo,' pɛ 'pear; boat; stomach,' sœ 'iron,' etc. There are also many morphemes containing two-vowel sequences which have no shortened variants such as na:i 'age,' nu:i 'sister,' kə:i 'almost,' etc. Sino-Korean morphemes and other polysyllabic morphemes containing [e], [ɛ], and [œ] do not have such variants either.

There are, however, two additional types of data that appear to support the falling diphthong hypothesis: vowel fronting and some derivational sets of verbs. As discussed earlier, both types of phenomena are historical in their origins, which we will examine in detail later. For the

moment, we will be concerned with their synchronic significance.

(23) a.

aki	-	ɛki	'baby'
čami	-	čɛmi	'fun'
hakkyo	-	hɛkkyo	'school'
a:nkyəŋ	-	ɛ:nkyəŋ	'eye-glasses'
pəlita	-	pelita	'spoil'
čukita	-	čwikita	'kill'
məkita	-	mekita	'feed'
u	-	wi	'upper part'

b.

pyə	-	pe (<pəy)	'rice plant'
kyə:u	-	keu (<kə:yu)	'barely'
p*yə	-	p*e (<p*əy)	'bone'
pyəlak	-	pelak (<pəylak)	'thunder'
hasyəyo	-	haseyo (<hasəyyo)	'do+HONORIFIC(si)+SUFFIX(ə)+SUFFIX(yo)'

c.

hayə	-	hɛ (<hay < haay < haya)	'do+SUFFIX(ə)'
tœyə	-	twɛ (<tway < toay < toya)	'become+SUFFIX(ə)'

An important fact to note here is that each set of doublets in (23) is not a true pair of free variants occurring in one subdialect or in one style of speech. They are mostly results of dialect mixing or style variation. A child acquiring his native language competency would not be exposed to such variants until his world of experience expands sufficiently at his school ages, and even then his encounters with variant forms would simply be registered as an addition to his passive comprehension repertory in most cases. Let us suppose, contrary to the above observations, that the child constructs some sort of a general relation in the form of a minor rule. He will have to formulate at least three rules which are sensitive to complex sets of contexts: first, a vowel metathesis rule to convert ya and yə to ay and əy re-

spectively for a small number of morphemes as in (23b) and (23c); second, a vowel fronting rule of a highly restricted type; and third, a deletion rule for i/y after a fronted vowel. The three rules may be represented in (24).

(24) Vowel fronting and associated rules

a. Vowel metathesis

$$\begin{bmatrix}-\text{Consonantal}\\+\text{High}\\-\text{Back}\end{bmatrix}_1 + \begin{bmatrix}-\text{High}\\+\text{Back}\\-\text{Round}\end{bmatrix}_2 \longrightarrow 2 + 1 \,/\, \underline{\quad}\,\Big] X$$

b. Vowel fronting

$$\begin{bmatrix}V\\+\text{Back}\end{bmatrix} \longrightarrow [-\text{Back}] \,/\, \underline{\quad}\ (C) \quad \begin{bmatrix}-\text{Consonantal}\\+\text{High}\\-\text{Mid}\\-\text{Back}\end{bmatrix} Y$$

c. i/y deletion

$$\begin{bmatrix}-\text{Consonantal}\\+\text{High}\\-\text{Mid}\\-\text{Back}\end{bmatrix} \longrightarrow \emptyset \,/\, \begin{bmatrix}V\\-\text{Back}\end{bmatrix} \underline{\quad}$$

There are many implausible aspects to the analysis (24). The metathesis rule (24a) is too highly abstract for a child to construct, since its outputs are not consistent with SPC's and they have to be fed into two other rules. The domain of operation is too restrictive, and especially the derivational pass shown for (23c) is clearly historical and does not belong to synchronic accounts; e.g., ha-a → ha-ya → hay → hɛ. The context cover symbols X and Y would include extremely narrow phonological and morphological restrictions and outputs of (24a) violate the SPC against falling diphthongs.

Y appears to be morphologically broader, since (24b) applies to some nouns internally and to some verbs with a derivational suffix i/hi/u, but phonologically restricted to the cases where only a grave consonant or no consonant intervenes. While it is extremely doubtful if the vowel metathesis (24a) is a synchronic rule, there is reason to regard vowel fronting to be a minor rule in modern Korean. The pairs of verbs derivationally related shown in (25) below exhibit synchronic sources of fronted vowels:

(25)	a.	na-	'to happen'	nɛ-	'to cause'
		ča-	'to sleep'	čɛu-	'to put to sleep'
		tah-	'to reach'	tɛ-	'to bring'
		čʰa-	'to become full'	čʰɛu-	'to fill'
		tʰa-	'to ride'	tʰɛu-	'to give ride'
		sə-	'to stand'	seu-	'to set up'
		kʰɨ-	'to be big'	kʰiu-	'to raise'
	b.	noh-	'to put'	noi-/nœ-	'to be placed'
		mo:-	'to gather'	moi/mœ-	'to be gathered'
		po-	'to see'	poi/pœ-	'to be seen'
		nu:p-	'to lie'	nui/nü-	'to lay'
	c.	nam-	'to remain'	namki-/nɛmki	'to leave'
		nəm-	'to exceed'	nəmki-/nemki	'to let exceed'
		an-	'to embrace'	anki-/ɛnki-	'to be embraced'
		mək-	'to eat'	meki-	'to feed'
		čuk-	'to die'	čwiki-/čüki-	'to kill'
		pəs-	'to take off'	pekki-	'to peel'
		čap-	'to catch'	čɛphi-	'to be caught'

d.	tat-	'to close'	tac^{h}i-	'to be closed'
	p*ət-	'to stretch'	p*əc^{h}i-	'to be stretched'
	anč-	'to sit'	anč^{h}i-	'to seat'
	al-	'to know'	alli-	'to inform'
	čop-	'to be narrow'	čop^{h}i-	'to make narrow'
	təp -	'to cover'	təp^{h}i-	'to be covered'

As mentioned earlier, the intervening consonant between the interacting vowels must be grave as seen in (25a, b, and c). When there are two intervening consonants, at least one must be grave (25c).

The existence of vowel fronting, however, does not justify a wholesale representation of all front vowels to have been fronted, since numerous other morphemes including almost all Sino-Korean morphemes have no back vowel alternants. More important is the fact that the relevant data examined so far (22, 23, and 25) can be easily accounted for by two minor rules (24b, 24c). Note also that in this approach, the vowel fronting is explained by one single feature change, [+Back] to [-Back], without affecting the rest of the lexicon that is not concerned with vowel fronting. On the other hand, if we choose to adopt the falling diphthong hypothesis, we must insert an off-glide y after the affected vowel only to be incorporated into the vowel as [-Back].

The foregoing discussions lead us to conclude that the diphthong hypothesis does not represent the synchronic reality of modern Korean, and it does not entail significant simplification in description, nor does it seem to reflect

the speaker's competence. On the contrary, this approach would unnecessarily increase the complexity of the system The results of our investigations also suggest that, as far as the present Korean data is concerned, Kiparsky's alternation condition which requires any underlying form of a phonological unit to appear on the phonetic surface at least in some contexts(s) is correct, and the adoption of this condition seems to result in simple and natural phonological descriptions.

4.7. Middle Korean vowels. The seven monophthongs: The early studies on MK vowels were centered around speculating on the phonetic value of the disappeared vowel symbol ᄋᆞ in HM (1446), and the other six vowels were more or less assumed to have the same phonetic values as those in modern Korean (H.P. Choi 1940, 1959, S.N. Lee 1949, 1954, W. Huh 1958, T. Lee 1961, S.B. Cho 1967, etc.). It has been only relatively recently that the overall MK vowel system has been more closely examined without modern bias and based on a broader field of comparative data (K.M. Lee 1961, W.C. Kim 1963). We will now look at the major sources and analytical works on the subject to determine the state of MK vowels in the 15th century.

To set a point of reference, we will first examine the most primary source in one of the earliest MK documents HMHL (1446) written by the original authors of the script.

(26) Three basic graphemes in HMHL

- • the tongue contracted, and the voice deep
- — the tongue slightly contracted, and the voice not deep, not shallow
- | the tongue not contracted, and the voice shallow

Four additional vowel symbols are derived by recombining the three forms in (27).

(27) The contracted tongue series vs the slightly contracted

a. same as • and the mouth puckered

 same as • and the mouth open

b. same as — and the mouth puckered

 same as — and the mouth open

The seven vowels are characterized in terms of three features: (a) the tongue contraction feature: not contracted -slightly contracted - contracted, (b) the mouth feature: puckered - open, and (c) the voice feature: shallow - deep. Although the above characterizations are too gross to determine clear phonetic interpretations, it is not difficult to see the overall structural relationships held between them. The tongue contraction feature may be interpreted straight-forwardly as such: front-central-back, but the other two features are not immediately obvious. The mouth feature seems to involve two different parameters, since "puckered" is obviously the roundedness but "open" seems to refer to the lowness. Thus, we have two rounded vowels, but they are one central and one back, rather than

both back. The hardest to interpret is the shallowness and deepness of the voice which seems to refer to acoustic impressions. We will tentatively give "shallow" the high-front, "not deep, not shallow" the mid-central, and "deep" the mid-back. This may be summarized in (28):

(28) MK vowels based on HMHL

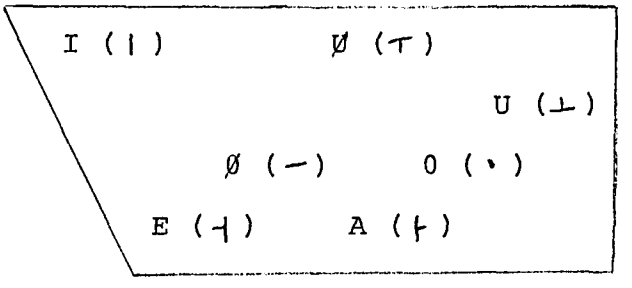
TONGUE FEATURE: / VOICE & MOUTH FEATURES	Not contracted	Slightly contracted	contracted
Voice shallow	| (I)		
Mouth puckered		‾• (Ø)	_• (Ü)
Voice not shallow not deep		— (Ø)	Voice deep • (O)
Mouth open		•| (E)	|• (A)

The vowel system as characterized in (28) evidently reflects the MK vowel harmony where the high front vowel (I) is neutral and other vowels form two groups: the dark (Ø, Ø, and E) and the bright (U, O, and A). A similar speculation on the MK vowels with the vertical (front-back) vowel harmony was suggested early in G.J. Ramstedt (1939: 25-26), deduced from a comparative study of other Altaic vowel systems. The vertical relations of harmonic vowels has been generally rejected in most subsequent works, however. Typical is H.P. Choi (1959), where Choi writes in reference to the tongue feature descriptions in HMHL:

> "If the above descriptions are to be taken literally, A (ㅏ) becomes a back vowel along with U (ㅗ), and, leaving E (ㅓ) aside, Ø (ㅜ) and Ø (ㅡ) belong together as central vowels; is it possible to accept these in view of present knowledge?"
> (H.P. Choi 1959: 4)

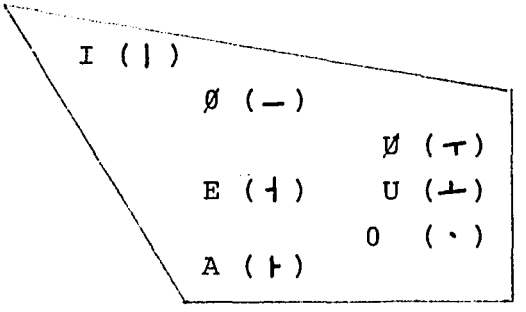
The HMHL hypothesis (28) was not given serious attention until W.C. Kim (1963). Kim, however, considers the vertical alignment of front (or central) vowels and back vowels "phonemic" and not necessarily "phonetic." Based on comparative data of Chinese and Japanese sources, a clockwise rotation of the central and back vowels had taken place to give phonetic relations shown in (29). (W.C. Kim 1971: 12)

(29) A phonetic interpretation of MK vowels in Kim (1971: 12)



K.M. Lee, on the other hand, considers the rotation to be more complete, and the vowels of the Late MK (the 15th century in Lee's terms) are seen to resemble more closely those of Modern Korean except that <u>0</u> has been lowered further and lost its labiality: [ʌ] . (K.M. Lee 1972: 111)

(30) Late MK in K.M. Lee (1972)



Both K.M. Lee and W.C. Kim seem to agree that at some point in the MK period, there existed a vowel system of the type (29) with one harmonically neutral vowel i and two vertical series of front and back vowels, and furthermore there subsequently was a major vowel shift which brought about a realignment (30). The issue between them is then the matter of locating the time of the vowel shift. W.C. Kim (1963) places it after the 15th century, and K.M. Lee (1972) prior to this period. This difference between the two interpretations, however, is not very significant since a narrow phonetic interpretation is not quite possible within the available data. Again, the MK state of vowels, like that of modern Korean, probably was not one that would be subject to one single stable phonetic interpretation, and in all likelihood, the MK vowel shift took a longer span of time than is generally assumed.

It is often observed that a period of great social turmoil and displacement coincides with the time of major linguistic changes. The 14th and 15th centuries fall precisely in such a time of great social changes; the weaken-

ing of the early feudal structure of the Koryo society aggravated by various external pressures in the last half of the 14th century, which culminated in a dynastic change in 1392 in the establishment of the Yi regime. Subsequently, the early founders of the Yi dynasty found it necessary to execute many new policies to suppress the old social institutions in order to solidify the new order (K.P. Lee 1963: 195). It is not difficult to imagine all these to have entailed many social and geographical dislocations which, in turn, greatly increased various dialect contact. In our view, therefore the MK vowel shift along with other major changes as reflected in 15th century documents coincides with this period of time in the 14th and 15th centuries.

4.8. MK vowel harmony. The most significant aspect of the late MK vowels as revealed in HMHL is the fact that the 15th century MK speakers, or at least the authors of the early Hangul documents, were clearly aware of the phonetic basis of the vowel harmony (VH henceforth); three front (phonetically central) and three back vowels. The high front unrounded vowel was regarded as a unique category. The existence of a high front unrounded vowel as a neutral one in vowel harmony parallels other systems of VH, where there is a neutral category, especially among Altaic and Ugric languages (H. Aoki 1968). It is most probably due to the neutralization of an earlier harmonic pair of high vowels. These facts are perfectly consistent with ample MK data.

The majority of polysyllabic native root morphemes exhibit harmonic forms, as in namu 'tree,' sarom 'person,' amu 'any,' kepʉ́p 'turtle,' kʉ́mʉ́ 'hole,' nyeløm 'farming,' etc. There are, however, a fair number of counterharmonic roots intermingled; munce 'first of all' (YP), pyelu 'ink-slab' (HMHL), kyesku- 'to compete' (SS), nemu 'excessively' (NH), tyekuli 'woodpecker' (HM), etc. A great number of compound stems, consisting of two or more roots, naturally including Sino-Korean morphemes, do not conform to VH. Some of the native lexemic examples include nʉ́n-ssal 'eyelash' (WS), kus-kyecip 'flower-woman (=concubine)' (SH), pʉ́p-mac^{h}i 'drum-stick' (HC), etc.[6]

The morpheme-internal VH may be stated in an MSC, which applies only to root morphemes of native origin. Furthermore, it should be stated directionally from left to right to reflect the fact that the first vowel in a morpheme is more stable and counterharmonic forms develop later typically by shifting the backness specification in the following syllable(s), as in selʉ́ > selu 'each other,' sahu- > sahʉ́- 'to fight,' etc.

(31) MSC: $V \rightarrow [\alpha\,\text{Back}] \;/ [\alpha\,\text{Back}]\; C_0^2(i) \underline{\quad\quad} \Big]_{\text{Native}}$

where $V \neq i$

[6] Here, we will use /ʉ́, ø, e/ as front vowels corresponding to {ㅜ ㅡ ㅓ}, /u, o, a/ as back vowels corresponding to {ㅗ ㅏ ㅏ}, and /i/ as the neutral vowel corresponding to ㅣ.

By the 15th century, however, the MSC (31) was already on its way out of existence due to an ever-increasing number of counterharmonic lexemes including Sino-Korean elements, and also to a gradual vowel rotation resulting in various phonemic overlaps. This means that there was in this period no SPC counterpart to (31). Yet, HMHL clearly points to the fact that this process of vowel rotation had not been complete, as the so-called 'bright' vowel series are described as back vowels and the 'dark' as central. Such apparent contradictions should pose no theoretical difficulties, but on the contrary, should be viewed as a natural synchronic state of a phonological system, if we accept a language to be a multiplex of stylistic and subdialectal variables (W. Labov 1966, 1973). It is highly probable that in the 15th century a conservative style or prestige subdialect preserved the two series of vowels phonetically apart in the front-back contrast while a prevalent colloquialism had slanted the vertical contrast to a diagonal, which Kiparsky (1968) proposes as a third type of VH.

The phonological rule of suffix VH is isomorphic to the MSC counterpart (31) except the contextual specifications and the status of the high front vowel. The so-called "neutral" vowel, i, generally requires front vowel suffixes with a few exceptions. It is, however, noteworthy that there are more cases of back vowels in the thematic case suffix (S.N. Lee's term) -on/non and the object case suffix -ol/lol; pi-non 'rain,' pi-lol 'rain+OBJECT,' cip-on 'house,'

cip-ol 'house+OBJECT,' etc. (S.N. Lee 1961: 103-105) while, in all other suffixes especially for verbs, front vowels predominate after the high front vowel i: cekins seli-yey 'northern barbarian's midst-to' (YP), kilh-ey 'on the street' (YP), pit-ølu 'debt-by' (WC), ti-ye 'fall-and' (YP), isi-etu 'exist-but' (HM), etc. One consistent exception is the honorific suffix -si which always takes a back vowel suffix: -si-a [sya], suggesting that this high frequency morpheme -si preserved the original back vowel characteristics. This, however, is nothing more than one conspicuous exception, and as far as the general VH rule of suffixes is concerned, the so-called neutral vowel i functions merely as a front vowel in VH.

(32) Suffix VH rule: $V \rightarrow [\alpha\text{Back}] / [\alpha\text{Back}]\, C_0^1]_{\text{STEM}}$ __

Like its MSC counterpart, the suffix VH rule in the 15th century reflects a weakened state of VH in several ways. First, there are a considerable number of suffix vowels not conforming to the stem vowels, even in the earliest Hangul publications such as psø-non 'using' phye-a 'open-and' (HM), eps-a 'there isn't-and,' waŋ-øl 'king-OBJECT' (YP), yel-osi-mye 'open-HONORIFIC-and' (WC), etc. The non-application of (32) appears to be sporadic, but not systematic, and in the second half of the 15th century, the violation of (32) progressively increases (C.P. Seo 1975).

Second, the VH determinant vowel in a polysyllabic stem is the last one, since there are many polysyllabic lexemes contrary to the MSC (31). This is true even when a bright (back) vowel is followed by i, the neutral one. For example, it is the last vowel i that determines the suffix vowel in ipati-yey 'feast-to' (YP). Third, the suffix VH rule applies only to those beginning with a vowel with one conspicuous exception; the vocative suffix -a whose back vowel counterpart occurs but a few occasions such as sʌ́puli-ye 'name of Buddha's disciple' (KK). Once the suffix vowel is chosen by (32), the subsequent vowels in the suffix or suffixes are not sensitive to the VH rule. In fact, MK suffixes may be classified into two types from the point of view of VH, one which is subject to VH, and the other which isn't. The former includes those beginning with a vowel, such as the thematic marker suffix -On (where the vowel O stands for an archiphoneme, with the backness specification to be determined by VH), the object marker suffix -Ol, the locative -Ey, the possessive -Oy, the instrumental -Olu, the intentive verb suffix -U, the connective -E, and many other verb suffixes beginning with -O, which is often called an "epenthetic" vowel between two consonants in morpheme boundaries. The latter type includes a far greater number of suffixes than the former, such as the plural marker -tol, the parallel marker "also" -tu, the humble marker -sop, the present tense marker -no, the past tense marker -te, etc. This means that the presence of a consonant blocks the suffix VH. There are,

however, two suffixes that are sensitive to the suffix VH rule, and yet do not appear to satisfy the context of (32); the thematic marker -On, and the object case marker -Ol. These two suffixes include variant forms beginning with a consonant if preceded by a vowel: syu-non 'cow-THEME,' keʎlʎ-non 'mirrow-THEME,' cyeŋsya-lol 'temple-OBJECT,' namnye-løl 'men-women-OBJECT,' etc. For these suffixes, the forms beginning with a mid vowel, -On and -Ol should be considered the underlying forms in the lexicon. In YP and other early Hangul documents, they also occur in a single consonant (without the vowel O) after a vowel: etin-i-n 'wise-person-THEME' (TS), ney hanapi-n 'your grandfather-THEME' (TS), kiloma-l 'saddle-OBJECT' (YP), sozi-l 'middle-OBJECT,' etc. There are then two optional disjunctive rules associated with -On and -Ol: one that deletes O in the context of another vowel paralleling the ɨ-deletion rule for modern Korean, and the other that reduplicates the final consonant. Finally, another peculiarity of these two suffixes is that the high front vowel i counts almost completely as a bright ("back") vowel in triggering VH rule in -On and -Ol, while the same vowel i counts as a dark ("front") in other suffixes. For example, in HM and WC, there is no single exception to the above; min-non 'people-THEME,' i-non 'difference-THEME,' zi-non 'and/thus-THEME,' sin-non 'extend-THEME,' etc. (HM); hyeŋ-nim-ol 'elder brother-HONORIFIC-OBJECT,' mali-lol 'hair-OBJECT,' syenzin-on 'hermit-THEME,' etc. (WC). These facts create an additional complexity in

the character of the MK suffix vowel harmony. It must be noted that an abstract solution of positing an underlying back vowel for i does not solve this problem since, then, all instances of i as a VH conditioning factor would be represented the same way, and at the same time this same vowel would have to be regarded as a front vowel for other suffixes. Neither the rule-feature solution nor the morphological solution would adquately apply in this situation (cf. R.M. Vago 1973: 581). It appears necessary to look over the MK data once again for additional clues.

A closer examination of the mid-15th century documents reveals other significant trends with regard to vowel harmony. The non-harmonic suffixes not only generally begin with a consonant, but also predominantly contain back vowels; -a, -ha (vocatives), -tol (plural), -kwa/wa (connective), -ku (connective), -ta (declarative), -sop (humble), -non (present attributive), etc. While front vowel varieties do occur, as in -te (imperfect), -key/ey (adverbial), etc., they are decidedly a minority as compared to the former type. Among counter-harmonic suffixes, the front-back combinations such as pʰye-a 'open-and' (HM), eps-a 'there isn't-and' (YP), etc. are far greater in number than the back-front combinations, such as waŋ-ø1 'king-OBJECT' (YP). One other important set of facts to be noted here is that root morphemes containing an off-glide y, such as uy, ʉy, oy, øy, ay and ey almost exclusively call for a back vowel in the thematic and object marker suffixes; cyey-non 'making-THEME'

(HM), soyŋ-on 'living-THEME,' ɯ́y-non 'becoming-THEME,' køy-non 'recording-THEME' (WC), key-lol 'Buddhistic phrase-OBJECT' (YP). All these seem to indicate that the MK suffix vowel harmony had a certain bias toward back vowels, and the rule (32) alone does not appear to adequately reflect this character of the 15th century VH. If we take a full harmonic system to be "symmetric" in the sense that the conditioning vowel to be either of the two vowel classes for VH rule to operate, then the late MK system has lost its symmetry. To reflect this reality, the suffix VH must include the following two disjunctive rules for the two high frequency suffixes, -On and -Ol.

(33) VH for Thematic and Object marker suffixes

$$V \rightarrow \left\{ \begin{array}{ll} \text{a.} & [-\text{Back}] \;/\; \overset{V}{[-\text{Back}]} \\ \text{b.} & [+\text{Back}] \;/\; \text{elsewhere} \end{array} \right\} \left. C_0^2 \right]_{\text{STEM}} \text{—} \left\{ \begin{array}{c} n \\ 1 \end{array} \right\}$$

where $V \neq i$

In other words, (33a) specifies when front vowels occur in suffixes; i.e., the last syllable of the stem contains a true dark vowel (e, ø, ɯ́), and (33b) converts all other instances of suffix vowels to bright vowels, including the situations where the stem contains a high front vowel i or a falling diphthong.

4.9. NK syllabic structures and diphthongs. One of the major changes that occurred in MK to shape the character of modern Korean is the monophthongization of the MK falling diphthongs in the 18th century (K.M. Lee 1961). MK exhibits much wider varieties of diphthongs and triphthongs than those of modern Korean. There are two glides: y and w, and the former occurs both as an on-glide and as an off-glide while the latter is restricted to the on-glide position. The MK syllabic structures may be represented in: $((\{^{p}_{s}\})\ C)\ (\{^{y}_{w}\})\ V(y)\ (C\ (C))$, and diphthongs and triphthongs are shown in (34), where the asterisks indicate gaps:

(34)

a.	(wi)	*	*		b.	*	yʊ	yu
		*	*				*	*
		we	wa				ye	ya
c.	(iy)	ʊy	uy		d.	*	*	*
		øy	oy				*	*
		ey	ay				wey	way
							yey	yay

There are some other triphthongs occurring in the early graphic representations such as yʊy and yuy, but they are generally not considered reflecting the true pronunciations of 15th century MK, but rather idealized sounds of Sino-Korean characters (R. Koono 1968: 24).

Of the eighteen units, wi and iy are not universally recognized due to the lack of clear graphic representations in MK documents (K.M. Lee 1972). Lee points out that, in

some instances of graphemic combinations such as {ㅱi}, {ui}, and {ㅱei}, the phonetic sequence wi is represented (Lee 1972: 45). Its occurrences were, however, restricted to the nominalization and adverbial derivations of the p-w verbs; e.g., cʰibi (< cʰip-i) 'coldness,' tebi (< tep-i) 'hotness' etc., are also spelled cʰibㅱi, tebㅱi, etc. in SS. In other cases, both b and ㅱ are completely deleted as in sㅱi (< sㅱp-i) 'easily,' kaskai (< kaskap-i) 'near-by,' etc. Thus, Lee concludes that ㅱi in these instances must represent [wi] rather than [ㅱy].

The falling diphthong iy does not have a graphic representation in the Hangul script, but its existence is attested in such an example as tǐ- 'to let fall' where the rising pitch accent (ˇ) is a composite of a low pitch and a high pitch derived from ti- 'to fall' with a low pitch (unmarked here) plus a causative formant -í- with a high pitch. When the connective -kú 'and' is suffixed to the two verb stems, k is deleted after tǐ- but not after ti-: tǐ-ú (W. Huh 1964: 472).[7] The k-deletion in this suffix occurs after l or y as in al-u < al-ku 'know-and,' poy-ay

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[7]Pitch marks are abbreviated in other examples, unless relevant to the particular discussion. As far as the MK pitch analysis is concerned, we will follow Y.C. Jeong 1976 where two pitch accents (one high and one low) are considered basic, and the rising pitch is analyzed as a composite of a low and a high in one syllable. Actually, the basic pitch of ti- 'to fall' is regarded as a high, but when it is followed by a monosyllabic high pitch suffix such as -kú, the pitch of ti- changes to a low: ti-kú.

< poy-kay 'pear-bay (a place name),' etc. It is therefore clear that the causative verb tȳ- should be represented as tiy- for which the 15th century script lacked a graphic device.

All diphthongs and triphthongs in MK, like their modern counterparts, have a composite character, resulting from combinations of a high vowel and another vowel in various inflectional and derivational forms. It is also noteworthy that the majority of falling diphthongs, particularly those in verb stems, have a rising pitch (Y.C. Jeong 1976: 191-194). A typical diphthong formation is found in the suffixation of the subject marker i, which becomes an off-glide y after a vowel without exceptions, or is deleted if the root morpheme ends in i or y. If, however, we accept the diphthong iy, the above deletion rule applies only after a falling diphthong.

The rising diphthong series has a few gaps as seen in (34a) and (34b). The two mid vowels do not form diphthongs, probably due to an unstable character. Both ø and o serve as reduced vowels between two successive consonants disallowed by SPC's in epenthesis, and both are often deleted in morpheme boundaries; talo-a > tal-a 'be different-and,' psø-e > pse 'use-and,' etc. There are indications, however, that Early MK may have had sequences such as yø and yo (K.M. Lee 1972: 126), but at least for the 15th century Seoul dialect did not include rising diphthongs with a mid-high vowel.

(35) MSC/SPC: $\sim\left\{ \begin{bmatrix} -\text{Syllabic} \\ -\text{Consonantal} \end{bmatrix} \begin{bmatrix} \text{V} \\ +\text{Mid} \end{bmatrix} \right\}$

The two rounded high vowels ɸ and u were combined with their respective low vowels to form we and wa. There are, however, two different interpretations of these diphthongs since they are graphemically composed of two vowel symbols each: ØE and UA. W. Huh (1964) interprets each of the diphthongs to consist of all constituent phonetic symbols, namely ɸe and ua.[8] W.C. Kim (1971: 55) considers the initial segment of the two diphthongs to be phonetically identical: w. Since their initial segments are not interchangeable and carry no phonemic load, we will simply follow the latter interpretation.

4.10. Vowel Rotation and Vowel Harmony. The preceding discussions on MK vowels is based on an assumption that the MK vowel harmony is essentially a vertical (palatal) type, and MK speakers were aware of this harmonic contrast. However, it was also assumed that there was a great vowel shift at some mid-point of MK history. We will call this shift a "rotation" since the vowels of a later system roughly correspond to those of MK rotated clockwise one space each to

[8]His representations are uə and oa (W. Huh 1964: 360), which we have reinterpreted as ɸe and ua respectively. Although the phonetic contents in his view are different, the differences do not affect the point of our discussion here.

the next, leaving <u>i</u> in its place. If we label the MK vowels of the two series as A B C ("bright") and A' B' C' ("dark"), the rotation may be schematically shown:

(36)

System A			System B		
i	A'	A	i	B'	A'
	B'	B		C'	A
	C'	C		C	(B)

With regard to the time of the vowel rotation, we have seen two major hypotheses; one placing it prior to the 15th century (K.M. Lee 1972), and the other after (W.C. Kim 1971). The vowel rotation, as represented in (36), is naturally a grossly simplified version, and in reality it must have taken long gradual processes in achieving the change. In our view, the 15th century, where various detailed phonological data became available, falls in the midst of the vowel rotation, and to many speakers of the time both systems were coexistent as subdialectal or stylistic variants. This view allows us to reconcile with two conflicting types of data which appear to support the two contradicting hypotheses. To put it more precisely, the process of change is not System A $\rightarrow$ System B, but rather System A $\rightarrow$ $\left\{\begin{array}{l}\text{System A}\\ \text{System B}\end{array}\right\}$ $\longrightarrow$ System B. Clearly related to this process are those various aspects of the 15th century VH, that we have observed; such as the back vowel bias, the character of the neutral vowel <u>i</u> and falling diphthongs, the peculiarity of the mid-high vowels, and the kinds of counter-harmonic forms. There are other indications that the vowel rotation had started

prior to the 15th century. Although mergers to other vowels and eventual disappearance of the mid back vowel o (the grapheme { ㆍ } , and B in (36)) is generally considered to be between the 16th and 17th centuries (K.M. Lee 1961; 20-24), this process seems to have started even earlier. Let us look again at the distributional peculiarities of o.

(37) $$\text{MSC/SPC:} \sim \left\{ \begin{bmatrix} \#\# \\ -\text{Consonantal} \\ -\text{Syllabic} \end{bmatrix} \quad \begin{bmatrix} \text{V} \\ +\text{Back} \\ +\text{Mid} \end{bmatrix} \right\}$$

The mid-high back vowel in MK data rarely occurs in the word-initial position and never after an on-glide (w or y). In the Dictionary of Old Words (K.U. Nam 1971), there are two entries which begin with o cited from the 15th and 16th century data; oy 'oh (interjection)' (WC), oyŋmɤ́ 'parrot' (HC), but there are a few more entries of this type from publications dated much later such as HK (1883). Although it is not certain what dialect the author of HK had in his background, the following two examples are suggestive of a broader distribution of o in Early MK: oloy 'below' corresponding to alay in HM (1446), and olph-oy 'front-at' corresponding to aph-ølo 'front-to' (SE 1585). In HM, there are two occurrences of the morpheme talo- 'to be different,' one with the first vowel a and the other with o; tal-a 'different-and' and hol stolom-inila 'do-difference-COPULA' ('it is none other ...'). The latter form (s)tolo-m appears to be a reduced form of talo- used as a syntactic device. Some counter-harmonic morphemes provide us further

examples which suggest earlier changes of the word-initial o. YP and TS give eno 'which/some,' which is enø in WC. The form appearing for "eight" in HM, yetølp, has counter-harmonic variants in WC as yetolay 'eight days,' and yeton 'eighty' in KL. K.M. Lee cites HMWH (1750) which actually contain yotolp (K.M. Lee 1972: 126-127). From these, it is possible to reconstruct *ono 'any,' *yotolp 'eight,' etc. to be early MK forms. Countrary to the commonly accepted view, then, the reduction and phasing out of the mid-high back vowel o has an earlier beginning in two contexts: a merger with the low back vowel a in the word-initial position, and a fronting to e after the palatal on-glide in the word-initial position.

(38) Pre-15th century o-reduction: $o \rightarrow \left\{ \begin{matrix} a \ /\#\#\_\_\_\_ \\ e \ /\#\#y\_\_\_\_ \end{matrix} \right\}$

What happened to o after the 15th century has been well-documented and analyzed in many modern studies such as S.N. Lee (1949), H.P. Choi (1959), etc. At this point of discussion, it is important to note the phonetic characteristics of this vowel in the 15th century. According to the above cited works and other major studies, it is estimated to be unrounded, slightly lowered, and centralized; i.e., [ʌ] . In the late 15th and 16th centuries, o in the non-initial syllable of polysyllabic morphemes merges with ø, as in kaloma (YP)> kaløma (TS) 'saddle.' Suffixes and enclitics containing o follow suit; kaun-toy > kaun-tøy 'mid section' (TS), c^{h}ɣm-tøl-ey 'dance-PLURAL-in' (SS), etc.

In the 17th and early 18th centuries, o in the initial syllables merges mostly with a; nol- > nal- 'to fly,' kolak > kalak 'finger,' etc.[9] (H.P. Choi 1959: 83-91).

The development of the MK mid back vowel is clearly not an isolated series of events, but is closely related to phonetic changes in other vowels. Although it is not, at this time, possible to determine which vowel started the chain of reactions, there are indications that the phonetic relations among the MK vowels had begun prior to the mid-15th century. Notably, the relation between ø and u was not one of the front-back contrast, but one of the relative height contrast; [u] and [o] as reflected in the transcription of Mongolian vowels contrained in SSTH (1517) which was based on the original version SSTK (1450) (K.M. Lee 1972: 104). K.M. Lee concludes that the centralization of e also occurred at this time the grapheme E alone was not used in transcribing the Mongolian e, but the combination YE was used for it (Ibid.). The elevation of ø to ɨ appears to have been achieved by the 17th century, as reflected in CHSE (1618) (published in 1676) and the revised

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[9]Although we will not get into details of this development which has been amply studied and published, we must at least note two aspects; (1) the use of the grapheme ㆍ persisted until the early 20th century, and thus it is not easy to precisely determine the time of the total disappearance, but a statistical study of ㆍ changes of some 17th and 18th century texts (Ibid.: 91) shows 58% for ㆍ to others, and 48% for other vowels to ㆍ, which is interpreted as an indication of the disappearance of o; (2) these and other conditioned changes (such as labialization and fronting) of o are overlapping in chronology rather then in linear succession.

CHSE (1781) (W.C. Kim 1971: 24-26).[10]

We must assume that sometime between the 16th and 17th centuries, the vowel rotation was complete, and most MK speakers lost access to System A on which the MK vowel harmony was based. How then can vowel harmony be maintained within a vowel system such as System B? Is it possible for a VH system to shift its basis from one (such as a vertical or palatal type) to another (a horizontal or a relative-height type)? As far as MK is concerned, VH seems to be all but lost when it has lost its phonetic basis of the original type, and the MSC for morpheme-internal VH is considered removed at this point.

With respect to the suffix VH, the loss of System A means the suspension of two harmonically alternating pairs: ㅚ-u and ø-o, and the only remaining pair, e-a is limited to verb inflections. The first pair, ㅚ-u, probably as a result of an earlier shift noted above, became harmonically non-functional prior to the 15th century. The evidence of this is seen in the types of suffixes exhibited in the early Hangul publications. Among the harmonic suffixes, there is only one which has the high vowel alternants, a prefinal

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[10] W.C. Kim reports that the original CHSE does not contain a single example of the grapheme ø to represent the Japanese high back unrounded ɨ or iu after s and ts, but in the revised CHSE the grapheme ø appears in transcribing sɨ and tsɨ. Thus, Kim claims ø was raised to ɨ sometime during this period: 1676-1781.

suffix -ɯ/-u, which is called the "volitive" marker by S.N. Lee (1961: 173), as in niløkucye hul (< .. ho-u-l 'do-INTENT-PARTICIPLE') 'to want to say' (HM), ciz-ɯ-l 'build-INTENT-PARTICIPLE' (SS), etc. The great majority of harmonic suffixes begin with the mid-high vowel pair, ø-o, and a few verb suffixes begin with the low vowel pair, e-a. Furthermore, the non-harmonic suffixes, which begin with a consonant and a high vowel, invariably contain u, but not ɯ, exhibiting again the back vowel bias: -ku 'and,' -tu 'also,' -nula 'INTENTIVE-FINAL,' -tuta 'EXCLAMATORY' -Olu 'INSTRUMENTAL,' etc. It must be noted also that the "volitive" suffix, as long as it lasted in the 15th and 16th centuries, favored the back vowel alternant -o rather than strictly observing VH rule.

With the suspension of the two harmonic pairs, and the phasing out of o, the back vowel bias also reversed its trend in the 17th century. The last harmonic pair, e-a which is to remain in verb inflection until the modern time, has what might be called a "dark" vowel bias. Since the original front-back contrast of VH is lost, what remains now is a minor rule of the two vowel alternation, ə and a, where ə appears everywhere unless immediately preceded by a syllable containing a or o (< u).

Chapter 5. MK Pitch Accent System

5.1. Preliminaries. So far in our examination of MK data, pitch marks have been ignored, as in most modern studies in MK. This has not been because pitch marks are irrelevant to particular issues, but because the MK pitch system has not been well-understood until recent years. The history of investigation in MK pitches has been short, and the authors of early diachronic works on MK have even doubted the existence of a pitch system because one does not exist in the central dialects including the Seoul dialect. The situation has, however, greatly changed in recent years with a number of significant works on the subject appearing successively. Some of the major contributions are made in: R. Koono (1951), W. Huh (1955), Y.C. Jeong (1960), __ (1976) S.R. Ramsey (1974), __ (1975), etc. As understanding of MK pitches increases, new light is expected to be shed on many areas of diachronic studies on MK. One area of immediate concern, for example, involves possible conditions for the tensing, lenition and deletion of various segments we have observed. Before investigating the role of MK pitches in such areas, we will briefly summarize the salient issues in MK pitch studies.[1]

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[1]An excellent account of the history of the MK pitch studies in English is available in S.R. Ramsey 1974, and 1975.

In publications in MK Hangul since the mid-15th century, "side dots" (傍點) have been used to mark tones on syllables. It is explained in HM 1446, HMHL 1446, and HMEH 1459 that one dot to the left of a syllable means the "departing" tone (去聲), two dots the "rising" tone (上聲), and no dots the "level" tone (平聲). Hangul scholars until the 1950's generally dismissed the side dots as an imitation of Chinese tones reflecting no MK reality. The first proper interpretation of the side dot convention was rendered in R. Koono (1951), and since its publication the side dots have been generally accepted according to the original explanations given in the above cited 15th century books, one dot marking a high pitch, two dots a rising pitch from low to high, and unmarked indicating a low pitch. The rising pitch, however, is interpreted as a composite of a low and a high, and this means that there are only two basic pitches: high and low. There have been a number of major taxonomic studies such as W. Huh (1955), Y.C. Jeong (1976), etc. Particularly Y.C. Jeong compiled an excellent taxonomy of various pitch patterns from which MK studies will surely benefit. However, the majority of MK pitch studies so far lack appropriate theoretical frameworks, as they have approached the problems as those of lexical tones and tonal patterns, with associated sets of tonal sandhis. It was S.R. Ramsey who has proposed to treat the MK pitches as realizations of an underlying accentual system. Ramsey's study begins with analyses of two modern dialects which retain distinctive pitches, the

South Hamkyəŋ and Kyəŋsaŋ dialects. (S.R. Ramsey 1974). This is a natural procedural step that should lead to a proper understanding of the MK pitches, as philological sources are by nature limited and records of them are not completely dependable although MK pitch data have proven to be surprisingly accurate. Ramsey finds both dialects to have the same type of pitch accent system with some variant pitch placement rules. Both have lexically accented and unaccented syllables, and each morpheme may have either one accent or no accent (atonic form). The realization of pitches in a phonological phrase is determined by Pitch Assignment Rule (PAR)1, which says:

(1) Pitch Assignment Rule 1

> "Within a phonological phrase, the initial mora is low pitched, unless it is accented, and the moras following an accented mora are also low pitched. All the remaining moras are high pitched." (S.R. Ramsey 1974: 85)

For South Hamkyəŋ Dialect (SHK), phonological phrases such as poli-ka 'barley-SUBJECT,' məlí-ka 'hair-SUBJECT,' and móki-ka 'mosquito-SUBJECT' are realized in po⌈li ka⌋, mə⌈li⌋ka, and mo⌈ki ka⌋, respectively. For Kyəŋsaŋ dialect (KS), however, the second pitch pattern does not exist, since an accent does not fall in the final syllable of a polysyllabic noun, according to Ramsey's analysis.[2]

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[2]For the pitch pattern, High-High(-Low) Ramsey sets up a preaccented category. Hashimoto 1973 considered this to be atonic. Both S.R. Ramsey 1974 and Hashimoto 1973 are based on kimhɛ dialect of South Kyəŋsaŋ Province.

Instead, KS dialect has a preaccented syllable, which has the peculiarity of transferring its accent to the preceding syllable. For example, kasil +'moku → kasíl-moku 'autumn mosquito' which is realized as ka⌈sil⌋mo ku. If a phrase beginning with a preaccented mora is not preceded by another morpheme, it sustains two high pitched syllables before the pitch falls. Thus, KS dialect has another pitch assignment rule, as in (2) below:

(2) Pitch Assignment Rule 2

> "Within a phonological phrase, if there is an accent in front of the first mora, the first two moras are high pitched, and all succeeding moras are low pitched." (Ibid.: 94)

KS dialect, therefore, has the following three forms, corresponding to the SHK phrases cited above: poli-ka 'Barley-SUBJECT,' mə́li-ka 'hair-SUBJECT,' and 'moku-ka 'mosquito-SUBJECT,' which are realized respectively po⌈li ka, mə⌈li ka, and mo ku⌋ka.

The most notable fact to emerge from Ramsey's analyses of modern Korean dialects is a high degree of accent correspondences between MK, SHK, and KS, particularly for morphemes of one to three syllables. Of the two modern dialects with pitch accentual systems, SHK exhibits more direct correlations with MK than KS. Accented syllables in MK morphemes, as analyzed by Ramsey, generally match those in SHK: yetǿlp - yatɨ́lp 'eight,' áki - ɛ́ki 'baby,'

pewéli - pəpə́li 'deaf-mute,' etc.[3] On the other hand, the KS reflexes of MK accents are not direct, but are still systematic, if we accept Ramsey's analysis of preaccented syllables in KS. The accent of a MK morpheme is generally found to have shifted to the immediately preceding syllable in the KS counterpart: yə́təl 'eight,' ʼɛ́ki 'baby,' pə́puli 'deaf-mute,' etc. A reversal of high and low pitches in cognates betwen MK and KS has previously been noted and puzzled some analysts (W. Huh 1963: 309, Y.C. Jeong 1976: 274, etc.), but the theory of an accent shift in KS entails, ceteris paribus, a natural and plausible explanation for the MK-KS relationship.[4]

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[3] These examples are taken from Lists of accent correspondences in Ramsey 1974: 116-138, but the Yale romanization is converted to our transcription reflecting the analyses given in previous chapters.

[4] We have so far omitted reference to the MK rising pitch, and its reflexes in modern dialects, since our primary concern in this section is to establish a basic relationship between MK and the modern dialects, and thereby to provide an appropriate thoretical framework in analyzing MK pitch data. For the reflexes of the MK rising pitch in modern dialects, see Ramsey 1974: 139-158. We will, however, return to the topic of the MK rising pitch later.

5.2. MK data and problems in MK pitches. The very nature of the philological data makes it extremely difficult to analyze its prosodic features. Research in this fieled is insufficient to provide solutions to many problems that MK pitch phenomena present. It is, however, necessary to recognize a notable advance made in recent years, as cited earlier, and venture toward a coherent analysis of the underlying MK pitch system based on recent gains. Some of the tentative assumptions that are suggested in our preliminary discussions are:

(3) a. The MK pitches reflect an accentual system rather than lexical tones.

b. The basic unit of pitch patterns is the phonological phrase, possibly determined in part by syntactic structures.

c. There is more than one occurrence of high pitch prominence in one phonological phrase, and probably the first such prominence is accentually significant.

d. The pitch assignment is determined by the place(s) of lexical accent, the number of moras, and possibly by the syntactic stress.

e. The MK rising tone is a complex unit consisting of one low pitch mora and one high pitch mora within a syllable.

f. The MK pitch patterns reveal considerable variations and fluctuations and probably carry a relatively small amount of information content.

g. Consistent pitch marking in MK data lasted not much more than one hundred years after the first Hangul publications appeared in the mid-15th century. Therefore, the early MK data reflect a weakened state of its pitch system.

The most perplexing problem that an analyst faces in dealing with MK data is apparent inconsistency and variations of various types found in texts. It is important to understand the sources of textual variations from the onset of investigation. For example, within the same text (WI, in this case), the following doublets occur: nál-áy - nal-áy 'day-on (on the day),' stáh-áy - stah-áy 'ground-on,' tól-í - tól-i 'moon-SUBJECT,' etc. In apparently the same or similar phonological contexts, one stem morpheme may carry different pitches: syĕ-myé 'stand-and,' sye-myén 'stand-if,' syé-kená 'stand-or,' etc. Most analysts have attempted to explain these and many other textual variations by choosing one form to be "basic" and setting up various tonal rules to derive the others. Undoubtedly, there must be some obligatory and optional derivational rules to account for such variations, but there should also be two other criteria to consider: first, the phonological phrasing and, second, the syntactic stress. Since we have assumed the phonological phrase to be one of the basic units in pitch assignment, how phrasing is conceived by an author in each instance of pitch marking should be of utmost importance. Of course, MK texts are not punctuated by any phrase marks, and there are no certain ways of determining phonological phrases. Nevertheless, it is theoretically unsound to proceed without this recognition. So far, most analysts have either ignored this in analyzing MK texts, or taken a conventional "lexical unit" (probably a root plus

enclitics) as the bais for a pitch pattern (e.g., Y.C. Jeong 1976: 36). Since the pitch marks on MK texts obviously reflect surface pitches, and the written texts are not in a conversational style, it is reasonable to assume that phonological phrases are relatively short constructs, but neither uniform nor consistent in length and type. Let us consider, for example, a well-known pitch contrast between the nominative form and the possessive form of monosyllabic nouns and pronouns ending with a vowel.

(4) Nominative

nǎy (< na+i)	'I+SUBJECT'
nǎy (< ne+i)	'you+SUBJECT'
cǎy (< ce+i)	'self+SUBJECT'

Possessive

nay (< na+oy)	'I+POSSESSIVE'
ney (< ne+øy)	'you+POSSESSIVE'
cey (< ce+øy)	'self+POSSESSIVE'

The nominative forms in (4) carry a rising pitch, while their possessive counterparts carry a low pitch, and each pair is homonymous except for different pitches. Y.C. Jeong considers such contrasts to be due to a homonym differentiation (Ibid. 36), but this explanation fails to account for many other similar cases where such pitch differentiation does not materialize between the two homonymous constructs, such as:

(5) Nominative

nʌ́y	(< nʌ+i)	'who+SUBJECT'
syú́y	(< syu+i)	'cow+SUBJECT'

Possessive

nʌ́y	(< nʌ+øy)	'who+POSSESSIVE'
syŭ́y	(< syu+oy)	'cow+POSSESSIVE'

A more natural explanation is to take into consideration the phonological phrasing and the syntactic character of the pronominal forms. While the nominative forms in (4) may stand by themselves as independent phonological phrases, their possessive counterparts are of a proclitic nature, and as such, they are included within larger phonological phrases together with nominals following. The tonic forms in (5), on the other hand, do not have a proclitic nature, and exhibit their full pitch forms regardless of their homonymic coincidence with the nominative counterparts.

Although the great majority of phonological phrases in MK texts end with a high pitch, there are a few putative exceptions scattered through the texts, with phrases ending with a low pitch. Because this tendency seems to expand in the late 15th century (TS 1481, PC 1485, KK 1482, etc.), W.C. Kim postulates a diachronic rule which lowers the phrase-final pitch (W.C. Kim 1971: 163). However, in the mid-15th century data, with which we are primarily concerned at present, such examples are generally restricted to a small group of short verbals, such as prenominal participles,

adverbials, and other connective constructs, that tend to be included in larger phrases: sŏ-non 'liv-ing,' ŏp(s)-te-n 'not exist+PAST+PARTICIPLE,' kóth-i 'similar+ADV,' etc. It is not certain in these instances whether such examples constitute genuine cases of the final pitch lowering of phonological phrases, since MK authors could have easily included these into larger constructs. Although there are indications that the authors of MK texts have taken relatively short phrases (perhaps minimal independent units) in imposing pitch patterns, there is no reason to believe that has been consistently done. Some of the examples included in W.C. Kim 1971: 166 are more clearly demonstrative of this aspect. Short phrases such as hó-lye 'do+INTEND,' and poly-ú-lye 'discard+VOLITIVE+INTENT' (WC 1450) have the final pitch low, but these are immediately followed by another verbal construction which forms the second part of a larger verb phrase as shown below:

(6) hó-lye hó-si-ní 'do+INTENT so+HONORIFIC+as' (as intended to do)

poly-ú-lye hó-si-ní 'discard+INTENT do+HONORIFIC+as' (as intended to discard)

As we will see later, the pitch patterns in (6) are perfectly normal and predictable by prosodic rules for MK.

5.3. MK accents and accent neutralization. In many ways, the MK accentual system appears more complex than any of its modern cognate systems. First of all, in addition to the two basic pitches, high and low, it has a complex unit in the "rising tone," which consists of two moras, a low pitch followed by a high within a syllable. It is, however, important to note that the basic prosodic unit on the phonemic level is the syllable rather than the mora. Although a rising tone syllable is phonetically realized in two moras, it counts as one mora when its accent is neutralized, and thus all unaccented syllables consist of one mora each. For example, the Humble marker suffix -sŏp- is generally marked by two dots, but when it follows an accented mora, it is reduced to one mora, and carries either a high or low pitch as in hó-zop-kú 'do+HUMBLE+and,' pú-zóp-no+ní 'see+HUMBLE+INDICATIVE+as,' etc. As observed earlier, a "rising tone" may result from a contraction of two morphemes into one syllable; na + í ⟶ nǎy 'I+SUBJECT,' ne + í ⟶ nĕy 'thou+SUBJECT,' etc., and furthermore it may break into two successive syllables when a monosyllabic morpheme with a "rising tone" gains an epenthetic vowel as in nǐs +myé ⟶ nizó-myé 'connect+and,' mɤ̆t + lá ⟶ mɤ̆lǿ-lá 'ask+IMP,' etc. For the moment, we will retain the "rising tone" notation x̌ without doubling the vowel letter as though it is a third pitch on the surface. The "rising tone" marks on MK data are an important heuristic factor in locating accented syllables, because any syllable marked as such

within a single morpheme is necessarily accented. If not, such a syllable may not retain its "rising tone," but is reduced to a single mora. Syllables marked as high pitched (a single dot) are not necessarily accented, since atonic syllables may carry either of the two pitches, high or low.

(7)	sălom-măta	'person+every (every person)'	(HM)
	mŭt-kĕt-kú	'unable+walk+and'	(WC)

Examples such as (7) demonstrate the fact that accented syllables occur more than once within one phonological phrase. It must be noted, however, that each accented mora in (7) is separated by a low pitch. The two succession of the rising tone in the second example are not common, but even in this instance the accented mora which is the second half of a rising tone is separated by a low pitched mora. It is, of course, possible that the authors of MK texts could have recorded the underlying accent for each morpheme without considering actual realizations of it in various contexts. This possibility is slight because, in a great majority of cases, the pitch forms of single morphemes vary extensively, and in all probability, the authors recorded actual pitch rises and falls without regard to the underlying accent locations. We will therefore assume that in MK, a phonological phrase may actualize more than one accent if it is separated by a low pitch mora.

This aspect of the MK prosodic system, in which there is more than one overt accent (two or more pitch prominences)

is significantly different from modern pitch systems. Modern dialects have only one stretch of pitch prominence within a phonological phrase, but MK has more than one. Note the following typical pitch patterns.

(8)	kúc-i	'flower+SUBJECT'	(WC)
	sáy-lú	'new+ly'	(HM)
	isyétú (isi+étú)	'exist+though'	(HM)
	ká-si-ní	'go+HONORIFIC+as'	(WC)
	psǿ-nó-nilá	'use+PRESENT+DECLARATIVE'	(HM)

The final mora is almost always high pitched, and therefore it does not seem distinctive. It is interesting to note that this fact alone coincides with one typical pitch pattern for phonological phrases of modern Seoul dialect, though it has no phonemic significance. We will therefore consider the phrase-final pitch rise to have a phrase marking function, but no accentual significance. Instead, along with S.R. Ramsey (1974: 113), we will for the moment regard the location of the first "departing tone" (pitch rise) to be distinctive. Ramsey, however, does not consider pitch rises after the first to be distinctive, but such rises (and falls) of the pitches after the accent are determined by "rules of rhythm" such as proposed by W.C. Kim (1963). We will return to the topic of such rules later, but let us observe a few more examples to determine the accentual structure of MK phonological phrase.

One item that reveals the behavior of accented syllables

is the Humble marker suffix -sŏp- with a "rising tone." It is particularly convenient for this purpose since the suffix follows various types of verb stems, and it is one of high-frequency items that occur in MK texts. Fortunately also, there are two important recent studies on the pitch changes of -sŏp- (W.C. Kim 1971: 150-153, and Y.C. Jeong 1976: 80-105)

(9)	tøt-sŏp-kú	'listen+HUMBLE+and'	(WS)[5]
	mek-sŏp-kenǿl	'eat+HUMBLE+though'	(WC)
	kǿli-zŏp-te-ní	'yearn+HUMBLE+PAST+as'	(WC)
	kitǿli-zŏp-te-ní	'wait+HUMBLE+PAST+as'	(WC)

The verb phrases in (9) demonstrate that when -sŏp- is not immediately preceded by an accented syllable, it retains its basic pitch form. However, when the suffix -sŏp- is immediately preceded by an accented mora, the rising pitch is reduced to a single mora with a high or low pitch, as shown in (10).

(10)	mŭ́t-sop-kú	'ask+HUMBLE+and'	(WC)
	hó-zop-kú	'do+HUMBLE+and'	(WC)
	pú-zóp-kucyé	'see+HUMBLE+in order to'	(WC)

[5]This particular form is spelled in the MK texts: tøt-cŏp-kú. For this reason, the initial consonant of -sŏp- is generally considered having three variants: s, c, and z. Since the MK c is an apico-dental fricative without palatalization, we will interpret -cŏp- to be simply -sŏp- following a dental.

Although the rising pitched syllable is somewhat unique in that the accent is not always neutralized following an accented mora, it is nevertheless a general rule that it loses its pitch characteristics following a high pitched mora. We will interpret this to be a loss of the accent, and tentatively set up an accent neutralization rule (11).

(11) Progressive accent Neutralization

[+Accented] ⟶ [-Accented] / [+Accented] ____

The difference between (11) for MK and its counterpart in modern dialects is that in MK, the accent neutralization applies only to one mora that immediately follows another accented mora while it applies to all accented moras after the first occurrence of an accented syllable within a phonological phrase in modern Hamkyəng and Kyəngsang dialects.

With reference to (11), however, there is need for clarification of the status of the rising-pitched syllables. There are two hypotheses to account for the accentual character of the rising pitch. The first is to take the rising-pitched syllable to be simply a succession of two moras, low and high, and the accentual rules will count the moras. In this case, the accent will be considered a property of the second mora in a syllable. The accent neutralization rule (11), then, will not apply to a rising pitched syllable. This is, at least, consistent with certain cases such as the second example in (7), mŭt-kĕt-kú, and a few other cases scattered in MK texts. Such cases are, however,

exceptional, and the great majority of cases involve the neutralization of the rising pitched syllable. To account for the neutralization of the rising-pitched syllable and the subsequent reduction of two moras, the rule (11) must be modified to include another context specifying the syllabic structure for the rising pitch. This will considerably increase the complexity of the accent neutralization rule. An alternative is to consider the accent feature to be a property of a syllable rather than of a mora. The rising-pitched syllable, then, will have one additional feature specification such as [+Long] to be distinguished from a simple high-pitched syllable. This will eliminate any need for modification of the rule (11). The neutralization of a rising-pitched syllable simply entails a shortening of the vowel quantity.

(12) $[+\text{Long}] \longrightarrow [-\text{Long}] \; / \; \left[\frac{\quad}{-\text{Accented}}\right]$

This second alternative is preferred not only for its simplicity, but also for its correlation with the vowel quantity in modern dialects. It is well-known that the modern Seoul reflex of the MK "rising tone" is a long vowel as in tǎ ⟶ ta: 'all,' mǎl ⟶ ma:l 'word,' etc. This fact can be naturally explained as a loss of the accentual feature, but without a concomitant loss of the vowel length feature. It is, furthermore, interesting to note that a rule of the form (12) is also retained in modern Seoul dialect. Long vowels are shortened typically in the non-

initial syllables of compounds where no syntactic stress is placed.

Under this hypothesis, there are two types of accented syllables: $\begin{bmatrix}+\text{Accented}\\-\text{Long}\end{bmatrix}$ and $\begin{bmatrix}+\text{Accented}\\+\text{Long}\end{bmatrix}$ in MK. The former will be realized as a single high-pitched mora, and the latter as two moras, a low followed by a high. All unaccented moras will consist of single moras, and their pitch forms are mechanically determined by a set of general pitch assignment rules.

5.4. Progressive and regressive accent neutralizations. Monosyllabic root morphemes are of three basic forms; X, X́, and X̌. When monosyllabic suffixes are attached to these, three phrasal patterns are obtained: X-X́, X́-X́, and X̌-X́. When a suffix loses syllabicity and is incorporated into the preceding syllable, the final high pitch also is incorporated into the composite syllable; in the case of X-X́, the merger produces a rising pitch, as in ce + í ⟶ cěy 'he+SUBJECT' (WS). Two high pitched moras produce a single high pitched mora in contraction, as in nɯ́ + í ⟶ nɯ́y 'who+SUBJECT' (YP).

Since the phrase-final pitch is basically high, the accentual function at this position should be neutralized. However, there are some examples, which show that it is not quite the case. Let us examine such examples:

(13) a. kálh + í → kálhí 'sword + SUBJECT' (YP)
kálh + áy → kalháy 'sword + LOCATIVE' (YP)

b. nóm + kwa → nómkwá 'other + with' (WS)
nóm + óykøéy → nomóykøéy 'other + to' (WS)

c. múm + í → múmí 'body + SUBJECT' (WS)
múm + áy → mumáy 'body + LOCATIVE' (WS)

An accented noun and a phrase-final monosyllabic suffix are expected to generate two high pitches, as in the first phrase of each pair (13), but in certain cases (the second phrase of each pair in (13)), the first mora is low-pitched. To account for this first pitch depression, Y.C. Jeong sets up a rule of the form, X́ + X́ → X + X́ (Y.C. Jeong 1976: 39), but he does not elaborate the conditions under which the rule applies. Since it takes place only after particular suffixes, and not before others, the pitch depression should be regarded as a consequence of a property of the suffix in question. We will therefore postulate a phrase-final accent for such cases, and consider the pitch depression of the first mora to be caused by an accented suffix. In other words, an accented suffix at the phrase-final position achieves its pitch prominence by depressing the pitch of the preceding mora. This rule must be regarded optional, for the moment, since there are exceptions such as mu̍l-éy (WS) 'water-in,' pu̍l-éy 'fire-in' (SS), etc. The first pitch depression is also responsible in producing a rising pitch for such forms as nu̍y (WS) 'whose,' syu̍y (WS) 'cow's,' etc.

which contrast with their subject forms, nýy (YP) 'who+SUBJECT,' syýy (WS) 'cow+SUBJECT.' The possessive suffix is accented and depresses the pitch of the first mora producing a rising pitch, while the subject marking suffix is not accented and therefore does not depress the preceding mora. The rule of pitch depression may be stated in (14).

(14) Regressive Accent neutralization

$$[+\text{Accented}] \longrightarrow [-\text{Accented}] \; / \; \_\_ \; [+\text{Accented}] \; \#$$

The rule (14), however, is in conflict with the accent neutralization rule of the preceding section. There may be two possible interpretations for this apparent contradiction. The first is to modify the first accent neutralization rule in such a way as to apply to all cases except when the final syllable is accented. The two accentual rules are, then, in a complementary relation. In this case, the problem is that the first rule is obligatory and the second optional as data suggest.

The second interpretation is to take the two rules as they are, i.e., in a competing relation. In MK, then, there simply are two different directional rules, one progressive and the other regressive. The progressive neutralization rule applies forward from the initial syllable, and any accent immediately next to another accent is removed. The regressive rule applies backward from the last syllable of a phonological phrase depressing the pitch of the immediately preceding syllable, thus neutralizing the accentual real-

ization of that syllable. The two rules are not always in conflict, since the penultimate syllable of a long phrase is typically depressed as we will see later. However, disyllabic phrases consisting of two accented morphemes must resolve the accentual conflict by choosing one or the other of the accent neutralization rules. The choice of the progressive rule results in the pitch pattern, X́-X́, as in múmáy 'body-in,' but a favor on the regressive rule entails the pitch pattern, X-X́ such as kalháy 'sword-at.' The determinant factors for such decisions, however, are not clear in MK data.

Of the two possible interpretations, the second seems preferable for a number of reasons. Although the two neutralization rules are in conflict, each would be in a natural and plausible form. The MK data do not support a well-defined complementary relation between the two rules. The most important reason, however, is the fact that the MK data themselves contain many doublets and variant shapes in their prosodic structures, which suggest that there are various competing factors, e.g., kut-áy (SS) - kút-áy (YP) 'place-at,' nal-áy (WC) - nál-áy (WC) 'day-on,' stah-áy (WS) - stáh-áy (WS) 'ground-on,' sal-áy (YP) - sál-áy (YP) 'arrow-at,' etc. It is therefore natural to expect that the MK prosodic system was burdened with rules of such relation as the two accentual neutralizations exhibit.

Another area where the regressive neutralization applies is the verb phrases with roots ending in a vowel. Unlike

verb roots ending in a consonant or a glide, the verb roots of the form CV- carry varying pitch forms, high, low or rising, depending on verb suffixes that follow. For example, kásyá (ka-si-a) 'go-HONORIFIC-and,' kásiní 'go-HONORIFIC-then,' kákésinǿl 'go-EMPHATIC-HONORIFIC-as,' etc. have the root high pitched, but the following forms have the root low or rising-pitched; kanílá 'go-DECLARATIVE,' kamyé 'go-and,' kǎmí (ka-am-i) 'go-NOMINAL-SUBJECT,' etc. There are two possible solutions to this problem; to take either the high pitched root or the low-pitched root to be basic and derive the other. Y.C. Jeong (1976: 173) considers the high pitch to be basic, while W. Huh (1973: 330) begins with the low pitch and derive the high pitch. We will regard all verb roots ending with a vowel to be accented, and the instances of the low pitched root to be a result of pitch depression or regressive accent neutralization due to the presence of an accented suffix. There are two compelling reasons for this analysis. The first is the fact that the occurrences of the low pitched root are consistently followed by a high-pitched suffix or a suffix which begins with a high pitch, whereas the occurrences of the high pitched root may or may not be followed by a low pitched suffix. In other words, if we take the low pitch to be basic, there would be no conditioning factor for the occurrences of the high pitched root, unless one resorts to a morphological solution, namely to classify the suffixes into two groups, in which case the choice of the "basic" pitch form for this

class of verbs is arbitrary. The second reason is the fact that the pitch depression as a result of the regressive accent neutralization is consistent with those similar cases involving nominal phrases already observed. The rule (14), however, requires further refinement.

(15) Regressive Accent Neutralization

$$[+\text{Accented}] \rightarrow [-\text{Accented}] \; / \left\{ \begin{array}{l} \text{(a)} \; [\underline{\quad}]_{N} \; [+\text{Accented}]\,\#\# \\ \text{(b)} \; [\overline{\text{V}}\underline{\quad}]_{\text{Vb}} \; [+\text{Accented}] \end{array} \right\}$$

There is, in fact, another set of data that suggest the existence of an impediment to the progressive neutralization. The plural suffix -tólh carries an accent and refuses to be neutralized after an accented syllable. Note the following examples (16) taken from Y.C. Jeong (1976: 60-61).

(16)	pĕt-tólh-ól	'friend+PLURAL+OBJECT'	(WS)
	nalá-tólh-áy	'nation+PLURAL+to'	(SS)
	sulí-tólh-ól	'sound+PLURAL+OBJECT'	(SS)
	ú́li-tálh-i	'we+PLURAL+SUBJECT'	(SS)
	úli-tálh-ól	'we+PLURAL+OBJECT'	(SS)

The persistent maintenance of the high pitch in -tólh is interpreted here as the non-application of the progressive neutralization, since the penultimate suffix is otherwise expected to be lowered. Although the causes for such non-application are not clear, we may regard such morphemes not

only to be accented but also to carry a prosodic feature dominancy, the presence of which entails an exemption to the progressive neutralization.

5.5. Phrasal pitch assignment. MK phonological phrases of several moras often have high and low pitch alternations rather than a sustained series of high pitches. This tendency led W.C. Kim (1963) to propose a broad prosodic principle which he terms Avoidance of Three Successive High Pitches (ATSH). Although loosely defined, ATSH seems to capture basic surface phonetic constraints on MK phrases of three or more moras. In this section, we will explore surface pitch assignment rules related to ATSH, and other relevant rules that produce phrases of various lengths.

Pitches are the intersect of two sub-systems within MK phonology, one of the lexical accents, and the other of syntactic phrase markings. The interactions of the two competing functions produce complex pitch patterns weakening the distinctive function of the lexical accentual system. The MK data seem to reflect such low functional operations headed toward an eventual suspension of the former function in the 16th century.

There have been a number of important works in the area of pitch changes in MK, notably (W. Huh 1963, W.C. Kim 1971, Y.C. Jeong 1960, etc.) where some basic principles or generalizations on MK pitch patterns and pitch changes,

are stated, such as:

(17) a. Phrase-final pitch rise (Y.C. Jeong 1976)

b. Avoidance of three successive high pitches (W.C. Kim 1963)

c. Avoidance of two successive high pitches (Y.C. Jeong 1976)

d. Phrase-final High-Low interchange (Y.C. Jeong 1976)

These generalizations are, however, not well-defined, and they are often invoked for individual cases in an ad hoc manner. Although many insightful observations are contained in these studies, a coherent organization of the MK pitch rules is yet to be constructed.

The first significant generalization to be made on MK phonological phrases is the fact that they typically end with a high-pitched mora. There are, as noted earlier, a considerable number of counterexamples, especially when uninflected morphemes are taken in isolation. Short adverbials often provide such examples; selø 'mutually' (HM), chezem 'for the first time' (HM), etc., but it is not at all certain whether these consitute independent phonological phrases by themseleves. The phrase-terminal high pitch is still an overwhelming majority, and we will therefore hold (17a) to be true. On the phonetic level, SPC's and rules count the moras rather than the syllables, and we will use angular brackets for the mora notation.

(18) SPC: $\sim$ $\langle$-High$\rangle$ #

There are some differences between root prosody and suffix prosody. Atonic roots may sustain a series of low-pitched syllables up to the suffix where the pitch typically rises, as in azo-wá 'younger brother-with' (SS), teø-ní 'add-as' (WS), etc. If accented, the pitch rises in the accented syllable, and the pitches of the subsequent syllables are determined by the phrasal prosody. For example, the following disyllabic roots have the first syllable accented, and the pitch of the second syllable varies due to the phrasal structure.

(19)	a.	kømøl	'net'	(WC)
		kømøl-í	'net-SUBJECT'	(WC)
	b.	chézem	'first time'	(YP)
		chézém-i-lá	'first time-COPULA-DECLARATIVE'	(WS)
	c.	télep-kú	'dirty-and'	(WC)
		télébø-myé	'dirty-and'	(WC)

Therefore, within a root morpheme, only the first high pitch is accentually significant. The phrasal pitch assignment, on the other hand, depends on the number and kinds of syllables that follow the first high pitch in the root. In this regard, we must remember that some suffixes are also accented within a phonological phrase.

The phrasal pitch assignment may be explored with reference to the accented syllable in the root, and to the last low pitched syllable in an unaccented root. This

means that we need only to examine pitch forms of various phrases with a monosyllabic root, accented and unaccented. The morphological type of a given phonological phrase (e.g., nominal or verbal) seems to play no role in determining the pitch pattern, and therefore we will make no distinction in citing examples. The following illustrates the most high frequency pitch patterns of progressively longer phrases.

(20) a. Unaccented root

Root	Suffixes	Examples		
X -	X́	cip-ǿy	'house-of'	(YP)
	X́-X́	cip-ólú	'house-by'	(YP)
	X́-X-X́	mith-í-lutá	'bottom-COP-DEC'	(TS)
	X́-X́-X-X́	anc-áys-té-si-ní	'sit-be-PAST-HON-as'	(WC)

b. Accented root

Root	Suffixes	Examples		
X́ -	X́	mǿl-é	'water-in'	(WC)
	X-X́	ká-si-ní	'go-HON-as'	(WC)
	X́-X-X́	yélh-í-ená	'ten-COP-but'	(SS)
	X-X́-X-X́	ptǿt-i-lí-ŋis-ká	'wish-COP-CONJ-HUM-Q'	(YP)

Abbreviations: COP=copula, DEC=declarative marker, HON=honorific marker, CONJ=conjectural marker, HUM=humble marker, Q=question marker

Note the alternating low pitches surrounded by high pitches in the suffixes. This pitch lowering may be stated in two contexts: first, the penultimate following a high pitch, and second, the middle of three moras preceding a low-pitched mora. Before stating these pitch lowerings, all moras following an accented syllable must be considered high-pitched. Also, note that the syllables in the suffix after an atonic root are high-pitched unless they are surrounded by high pitches. In other words, we recognize two components in a phonological phrase: the prelude which precedes the accented syllable in the root, and consists of a series of low-pitched syllables, and the corpus which is headed by the accented syllable. If the root is atonic, the root alone makes up the prelude. The following diagram illustrates the prelude (P) and the corpus (C) of phonological phrases. The lines show the place of a pitch rise.

(21)

	Root	Suffixes
Atonic ..	P-P⌈	-C-C-C...
Tonic ..	P⌈C	-C-C...

It is, then, clear that both (20a) and (20b) exhibit the identical pitch contours in the corpus.

To summarize the preceding analysis, we will formalize the MK accent and pitch assignment rules in three sets. First, the accent realizations:

(22) Accent realization

a. $\begin{bmatrix}+\text{Accented}\\-\text{Long}\end{bmatrix} \longrightarrow \langle +\text{High} \rangle$

b. $\begin{bmatrix}+\text{Accented}\\+\text{Long}\end{bmatrix} \longrightarrow \langle -\text{High} \rangle \langle +\text{High} \rangle$

Next, phrasal pitch assignments may be stated in three different contexts: if the root is atonic, the suffix immediately following it is high, and all preceding the three primary high pitch (defined so far) are low pitched, and following it are high pitched.

(23) Phrasal pitch assignment

$$\langle\rangle \longrightarrow \begin{cases} \text{a. } \langle +\text{High} \rangle \ / \ ]_{\text{Root}} \text{———} \\ \text{b. } \langle +\text{High} \rangle \ / \ \langle +\text{High} \rangle \ \text{———} \\ \text{c. } \langle -\text{High} \rangle \ / \ \text{———} \ \langle +\text{High} \rangle \end{cases}$$

The pitch lowering, motivated by the constraint ATSH, may be stated in two contexts: first, the penultimate position preceded by a high pitch, and second, any other mora surrounded by high pitched moras.

(24) Phrasal pitch lowering

$$\langle\rangle \longrightarrow \langle -\text{High} \rangle \ / \ \langle +\text{High} \rangle \ \text{\_\_} \ \langle +\text{High} \rangle \begin{cases} \text{a. } \# \\ \text{b. } \langle -\text{High} \rangle \end{cases}$$

The following sample derivations demonstrate the effects of the rules, (22), (23), and (24).

		cipøy	mithiluta	yélhiena	ptøtili iska
(22)	Acc Realiz:	X X	X X X X	X́ X X X	X́ X X X X
(23)	Phr Pitch:	X X́	X X́ X́ X́	X́ X́ X́ X́	X́ X́ X́ X́ X́
(24a)	Lowering:		X X́ X X́	X́ X́ X X́	X́ X́ X́ X X́
(24b)	Lowering:				X́ X X́ X X́

The preceding analysis is slightly oversimplified, because we did not take accented suffixes into account. As noted earlier, an MK phonological phrase may contain more than one accented syllable, and an accent is not neutralized unless it is immediately preceded by another accent. Pitch variations that are not accounted for by the rules (22), (23), and (24) are due to such accented suffixes which are not neutralized. We will not at this time get into great details of MK suffix classifications in terms of accent, but note some examples.

Verb phrase terminal suffixes containing -ní, such as -níla (Declarative marker suffix), -níwa (Concessive suffix), -sŏp (Humble marker suffix), -ssí (Bound Nominal 'word'), etc. comprise the examples.

(25)	a.	ká-sí-no-nílá	(SS)	'go-HON-PRESENT-DEC'
		stolom-í-eníwá	(WC)	'difference-COP-CONCESSIVE'
		puthyĕ-si-nílá	(WC)	'Buddha-(COP)-HON-DEC'
		póla-l-ssí-lá	(WC)	'desire-PART-word-DEC'
	b.	ná-si-lí-lúsoní	(WC)	'emerge-HON-FUT-CONCESSIVE'
		hó-zobú-lí-lotá	(WC)	'do-HUMBLE-FUT-DEC'

c. niǿ-l-ssí-lá (HMEH) 'connect-PART-word-DEC'
tubó-l-ssí-lá (WC) 'help-PART-word-DEC'

The phrases in (25a) have the penultimate syllable accented (underlined), and therefore have the antepenultimate low-pitched instead. In (25b), the third syllable (underlined) is accented, and the anticipated pitch lowering does not materialize. In (25c) three successive high pitches are not circumvented due to the accented penultimate syllable.

5.6. Epenthetic vowels. Trisyllabic phrases present an interesting problem for analyzing pitch-behaviors of the so-called "epenthetic" vowel, o/ø, which is inserted between two consonants (typically an obstruent and a sonorant) at a morpheme boundary of an inflected word. To determine whether or not it carries its own accent, it is necessary to examine its pitch characteristics after an unaccented root. In this context, the pitch of the epenthetic vowel rises after one group of unaccented verb roots, and is lowered after another group. We will call the first group of verbs Class A, and the second Class B, after S.R. Ramsey (1975):

(26) Class A

kut-ó-myé	'straight-and'
cap-ó-myé	'catch-and'
nic-ó-myén	'forget-if'
nuph-ó-myé	'high-and'
cʊ́k-ǿ-nî	'die-as'

pes-ǿ-ná	'take off-but'
pʊ́z-ǿlyé	'pour-INTENT'

Class B

tøl-ø-myén	'listen-if'
nʊ́b-ø-myé	'lie down-and'
anc-o-lá	'sit-IMPERATIVE'
anc-o-nî	'sit-as'
nac-o-myé	'bear-and'
yenc-o-nî	'place-as'
nuh-o-myén	'let go-if'

W.C. Kim (1971: 157) was the first to note the above peculiar distinction in the pitch character of the epenthetic vowel, but did not advance any explanation. S.R. Ramsey, however, proposes to explain the pitch difference of the two groups by positing two different segmentations of the phrases. According to his hypothesis, Class A phrases contain a true epenthetic vowel, but the vowel o/ø of Class B phrases is part of the verb roots (S.R. Ramsey 1975). The verb phrases in Class B, then, contain disyllabic roots such as tølø- rather than tøt- or tøl- 'listen,' and such a verb loses the second vowel o/ø when followed by a suffix of another type. Based upon this analysis, Ramsey sets up disyllabic roots for the so-called 'irregular' verbs to explain the obstruent lenition in such verbs. We will examine this analysis in more detail later, and focus our attention on the status of the epenthetic vowel for the moment. Ramsey's analysis explains the low pitch in Class B phrases, but there remains still the question of the high pitch in Class A. Since Ramsey considers the first high pitch in a phonological phrase to be accentually significant

(Ibid. 109), the epenthetic vowel must be accented but is neutralized after an accented root. Since the epenthetic vowel has no morphological status and an accent is a property of a morpheme, this consequence is not acceptable unless the MK data allows no alternative solution. There is an alternative solution to the problem. Suppose we consider the epenthetic vowel to be a phonological extension of a morpheme, but the pitch of such elements is mechanically determined by a phrasal pitch rule based on some feature within the morpheme. Although segmental structures of Class A verbs and Class B verbs exhibit some contrast, especially in the types of the root-final consonants, they do not as a rule correlate to the prosodic forms.

One feature which we have noted but whose possible ramifications we did not explore fully is the vowel quantity. According to this analysis, an accented syllable may be either long or short, and an accented long syllable results in the rising pitch with two moras. A natural question may arise as to whether an unaccented syllable has the vowel quantity distinction, but MK texts do not contain direct evidence for such distinction. However, this may simply be due to the lack of graphic device in the MK script to represent the vowel quantity. This possibility was suggested by Y.C. Jeong (1976: 45-55), though his proposal does not necessarily include the postulation of two moras for some low-pitched roots. Jeong's analysis calls for what he terms "complex" low-pitched units, and such a root has

an epenthetic vowel low-pitched. If we interpret the "complex" low-pitched unit to be an unaccented long vowel, the low pitch of the epenthetic vowel may be regarded as a corollary effect of the long vowel in the root. In other words, an unaccented long vowel of a morpheme such as nӣp- 'to lie down' retains its prosodic characteristics even when the morpheme gains an extra syllable by imposing a low pitch on the epenthetic vowel, thus producing the pitch patterns X-X-X́. Such an approach, however, requires further supporting evidence, and a closer examination of its consequences on the overall pitch assignment system. We will return to this topic later, but for the moment, we will pursue problems of the epenthetic vowel further.

If the low pitch of Class B phrases is due to extension of the root prosody, what is responsible for the high pitch of the epenthetic vowel in Class A phrases? Since the epenthesis has no independent morphological status, the high pitch of the vowel must be a property of the particular phonological phrase in question. The same pitch pattern is exhibited in noun phrases with an unaccented root, such as cip-ó-lú 'house-toward' (YP), mol-wá-nón 'horse-with-THEME' (WC), etc. The same high pitch is also noted after atonic disyllabic roots, such as mozom-ólú 'mind-by' (WC). We must therefore conclude that the pitch rise after an unaccented root is a property of the particular phrasal construction with disyllabic suffixes. This means that Ramsey's generalization that "the first accented mora is

high-pitched, and all moras up to that point are low-pitched" must be modified to apply only to the root morphemes, rather than to a phonological phrase.[6]

5.7. Pitch transposition and obstruent lenition. It was suggested in the previous section that a long syllable may transpose its pitch characteristics onto the next syllable under certain conditions. We will now explore the consequences of such a hypothesis with the Humble marker suffix -s̆op-. The suffix has a few segmental variant realizations; both s and p become voiced fricatives intervocalically (transcribed here by z and b respectively), but what we are, for the moment, concerned with is only the pitch realizations of the suffix.

(27)	a.	tøt-s̆op-kú	'listen-HUM-and'	(WS)
	b.	pat-sobó-si-kú	'receive-HUM-HON-and'	(WS)
	c.	nip-sob-á	'wear-HUM-and'	(WS)
(28)	a.	p̆i-zóbo-myén	'pray-HUM-if'	(WS)
	b.	ă-zop-kú	'know-HUM-and'	(WS)

HUM = Humble marker
HON = Honorific marker

[6] Ramsey (1974: 109) states this principle in reference to a phonological phrase, but his main concern in the discussion where the quoted statement appears, is to establish morpheme correspondences between MK and modern dialects.

The underlying form of the suffix -sŏp- has a long accented vowel, and its full realization is expected to have a rising pitch, but the suffix exhibits various pitch forms as in (27-28). Since the suffix -sŏp- follows unaccented roots in (27), it is expected to exhibit a rising pitch. However, only (27a) shows a rising pitch, and (27b and c) a low pitch. The suffix -sŏp- in (28), on the other hand, carries either a high pitch or a low pitch which is determined by the phrasal pitch assignment since the accent on the suffix is neutralized following an accented root. The pitch change of the suffix in (27b-c), from a rising pitch to a low pitch, is inexplicable since there is no cause for accent neutralization, unless this change is considered due to something other than accent neutralization. We will therefore regard this pitch change in the suffix -sŏp- to be pitch transposition rather than accent neutralization.

In pitch transposition, two moras (a low pitch followed by a high pitch) of a single syllable break up into two successive syllables, transposing its accent onto the second syllable. It takes effect under two conditions: (a) the accented long syllable ends with one of the three obstruents, p, t, and s, (b) it is immediately followed by an enclitic which begins with a vowel. The pitch transposition then is the reverse process of the rising pitch formation where a low pitched syllable and a high pitched syllable become incorporated into a single rising-pitched syllable.

The pitch transposition also applies to verb roots

with an accented long syllable.

(29)	a.	mʉ̌t-sobó-ní	'ask-HUM-as'	(WS)
	b.	mʉ́l-é	'ask-and'	(WS)
(30)	a.	tɛ̌p-kú	'is hot-and'	(WS)
	b.	tebʉ́-myén	'is hot-if'	(WS)
(31)	a.	nǎs-tí	'get better-NOMINAL'	(PH)
	b.	naz-á	'get better-and'	(YP)
(32)	a.	cyɛ̌k-kú	'is few-and'	(WS)
	b.	cyɛ̌k-ǿn	'is few-PARTICIPLE'	(WS)

In (29), (30), and (31), but not in (32) the rising pitch is manifested before a consonant, and when a vowel follows, the accent (high pitch) is transposed to the second syllable. A significant fact to be noted here is that the verb cyɛ̌k- 'to be few' does not transfer the accent to the next syllable so far as the data reveals. This fact coincides with the asymmetry of the velar stop which lacks its lax counterpart while anterior obstruents, p, t, and s have their lax counterparts in b [β] , l, and z.

There is, however, another hypothesis on the MK verbs of the type (29) through (31), recently proposed by Ramsey 1974. Ramsey posits disyllabic roots for this class of verbs, e.g., tebǿ- rather than tɛ̌p- 'be hot,' mʉ́lʉ́- rather than mʉ̌t- 'ask,' etc. This analysis seems to be primarily concerned with providing a solution to the high pitch of the second syllable in such a phrase as tebʉ́myén as discus-

sed in (26). This solution, however, necessitates a few improbable rules, such as deletion of root-final vowels before an obstruent, e.g., tebʌ́-kú → tĕb-kú, and tensing of the lax obstruents, e.g., tĕb-kú → tĕp-kú. Furthermore, it raises another question, as to why an accented syllable should be deleted, and leaves the correlation between the pitch changes and the obstruent lenition unexplained.

The high correlation between the pitch transposition and the obstruent lenition suggests that the alternations between three pairs of MK obstruents, p - b, t - l, and s - z, were originally developed as biproducts of the pitch transposition of the accented long vowels. It is highly probable that MK /b/ and /z/ were originally subphonemic in early MK, conditioned by the pitch transposition, and subsequently obtained a phonemic status for a brief period (the 15th and 16th century) due to the weakening of the lexical pitch system. The two phonemes are, however, contrary to the basic character of MK, which does not use the voice feature contrastively elsewhere, and for this reason, they were unable to sustain the structural pressure to maintain their phonemic status in the 17th century. Although a great majority of p/b, t/l, and s/z verbs have a long accented vowel, there are a few that do not. Among 28 such verbs listed in Y.C. Jeong (1976: 143-171), 22 have a rising pitch and 6 do not. This means that the pitch conditions for the obstruent lenition are already weakened and b and z were phonemicized in the mid-15th century.

5.8. A summary of MK prosodic systems. We are now in a position to summarize the preceding analyses of the MK prosodic phenomena as reflected in the side dots marked in the 15th century MK data. MK pitches are consequences of the interactions between two subparts of the MK prosody, the accent system and the phonological phrase marking. The former has a distinctive function, and its domain is the morpheme. Morphemes, both roots and suffixes of all types, may be either tonic or atonic. If tonic, a morpheme may carry exactly one accented syllable which attains its prominance by a high pitch. The pitch characteristics of an unaccented syllable, on the other hand, is determined by the phonological phrase structure. The syllable, however, has another prosodic feature, the vowel length. A long accented syllable is realized in a 'rising tone,' which begins with a low-pitched mora and ends with a high-pitched mora. A long accented syllable may also result from a combination of a low-pitched syllable and a high-pitched syllable to form a single syllable. When the accent is removed through neutralization from a long syllable, the vowel length is also lost from the syllable. A long accented syllable has another peculiarity in that it transfers its high pitch to the following syllable when an enclitic vowel follows. This pitch transposition triggers obstruent lenition which converts the syllable-final obstruent to its lax counterpart (i.e., p $\rightarrow$ b, t $\rightarrow$ l, and s $\rightarrow$ z).

In a phonological phrase, there may be two or more

occurrences of accented syllables, but those two juxtaposed accented syllables normally result in a neutralization of one. The accent neutralizations operate in two directions, progressive and regressive. The former is general and the latter restricted. The regressive accent neutralization occurs under two conditions. First, a small group of monosyllabic nouns followed by an accented suffix, such as nál-áy ⟶ nal-áy 'day-in,' where the suffix is accented. Another for the regressive accent neutralization is the verb roots ending in a vowel. When they are immediately followed by an accented suffix, the root accent is neutralized, e.g., ká + níla ⟶ kanílá 'go-DECLARATIVE.' The former case of regressive neutralization, however, is not obligatory, and at times the progressive neutralization may apply, producing frequent occurrences of pitch-form doublets.

The phrasal pitch realization on the phonetic level operates with the mora as the basic unit, after the accent neutralization is resolved. The accented syllables unaffected by the neutralization within a phonological phrase will be assigned high-pitched moras, and if the accented syllable is long, it is realized in two moras,a low-pitched mora followed by a high-pitched mora (22). The pitches of the unaccented syllables are mechanically determined by the phrasal pitch assignment rules (23): any unaccented syllables preceding the high pitch of the accented syllable are low, and those following it are high. A series of three or more high-pitched moras are, however, subject to the

phrasal pitch lowering (24), typically producing an alternating series of high and low pitched moras.

There is much evidence suggesting that the 15th century pitch system has extremely low functional yields.

Table 1 below shows the correlation between the syllabic structures and the accent in the verbs listed in Y.C. Jeong (1976).

Table 1. Distribution of accents in verbs

Roots ending in	Atonic	+Accented -Long	+Accented +Long
Obstruents with no lenition	63	1	3
Obstruents with lenition	5	2	32
Nasals	0	0	12
Lateral	6	3	13
Consonant Clusters (except lp)	16	2	3
-lp	1	0	6
Vowels			
-V	0	24	0
-Vy	0	8	15

The distributions of the accent and the vowel quantity appears to be largely determined by the syllabic structures of the roots. Some generalizations that can be extracted from Table 1 are: a. verb roots ending in an obstruent or a consonant cluster are generally atonic, unless they contain

a long vowel associated with the obstruent lenition.

b. all verb roots ending in a vowel or a nasal are accented, and c. verb roots ending in a lateral or -lp are generally accented and long.

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Abbreviations and title in Korean		Year of Publication	Title in Yale Romanization
CHSE	捷解新語	1618	Chephay Sine
		1781 (Revised)	
CK	朝鮮館譯語	c. 1403	Cosenkwan Yeke
HC	訓蒙字會	1527	Hwunmong Cahoy
HM	訓民正音	1446	Hwunmin Cengum
HMEH	訓民正音諺解	1459	Hwunmin Cengum Enhay
HMHL	訓民正音解例	1446	Hwunmin Cengum Haylyey
HMWH	訓民正音韻解	1750	Hwunmin Cengum Wunhay
HK	華音答蒙諺解	1883	Hwaum Kyengmong Enhay
HT	海東諸國記	1471	Haytong Ceykwukki
HY	華夷譯語	1389	Hwayi Yeke
KK	救急易解方	1499	Kwukupihaypang
KL	家禮諺解	1632	Kalyey Enhay
KY	雞林類事	c. 1103	Kyeylim Yusa
MP	妙法蓮華經諺解	1463	Myopep Lyenhwakyeng Enhay
NH	內訓	1475	Nayhwun
NK	楞嚴經諺解	1462	Nungemkyeng Enhay
OT	五大眞言	1485	Otaycinen
PC	佛頂心陀羅尼經諺解	1485	Pwulcengsim Talanikyeng Enhay
PH	般若波羅密多心經諺解	1464	Panya Palamiltasimkyeng Enhay
PT	朴通事諺解	1677	Pakthongsa Enhay
SC	新增類合	1576	Sincung Lywuhap
SK	三國史記	1145	Samkwuksaki
SE	小學諺解	c. 1585	Sohak Enhay
SH	三綱行實圖諺解	1450	Samkang Hayngsilto Enhay
SS	釋譜詳節	1450	Sekposangcel
SSTK	四聲通攷	1450	Saseng Thongko
SSTH	四聲通解	1517	Saseng Thonghay
TC	東國正韻	1447	Tongkwuk Cengwun

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Abbreviations and title in Korean	Year of Publication	Title in Yale Romanization
TM 同文類解	1748	Tongmwun Yuhay
TS 杜詩諺解	1481	Tusi Enhay
WC 月印千江之曲	1450	Welin Chenkangcikok
WS 月印釋譜	1459	Welin Sekpo
YP 龍飛御天歌	1445	Yongpi Echenka

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