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Front Vowels, Palatal Consonants and the Rule of Umlaut in Korean

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1. Introduction

The focus of this paper is on the interaction of front vowels and palatal consonants in the process of Umlaut in the Kyungsang dialect of Korean. The first part of the paper centers on the selective opacity of underlying palatal affricates in the assimilatory process of Umlaut. Following the widely accepted view of assimilation as spreading, I claim that front vowels and palatal consonants must be specified for the same place of articulation feature in underlying representation. The non-application of Umlaut across an intervening palatal is thus a direct consequence of the Line-Crossing Prohibition on phonological representations (Goldsmith 1976).

Yet the specification of palatal consonants as [-anterior] coronals and front vowels as [-back] as adopted in many current works in Korean phonology (see e.g. Cho 1989, Iverson & Kim 1987, Sohn 1987) is unable to account for the blocking effects of palatal consonants. Alternatively, by incorporating the independently motivated view that front vowels and coronal consonants form a natural class (see e.g. Clements 1976, 1989; Hyman 1973; Jakobson, Fant & Halle 1952) we are able to provide a clear account of this opacity. Following Clements (1976, 1989), this class is defined by the articulator feature [+coronal]. The interaction of palatals and front vowels in Korean emphasizes, however, that within this class of sounds a further breakdown is necessary. This is evidenced by the stronger affinity that front vowels have with non-anterior coronals than with anterior coronals. This affinity is represented underlyingly by the presence of the secondary articulation feature [+coronal] which characterizes both palatal consonants and front vowels.

The second part of the paper focusses on palatal consonants derived by a rule of Palatalization. Although on the surface front vowels are not realized before

these segments as a result of Umlaut, I show that unlike underlying palatals, they cannot be considered opaque to vowel fronting. Regardless of whether Umlaut applies before Palatalization or Palatalization applies before Umlaut, vowel fronting is predicted to apply. The non-occurrence of front vowels before derived palatals as predicted is claimed to be due to a later rule of Dissimilation.

The underlying consonant and vowel inventories of Korean assumed in this paper appear below in Tables 1 and 2 respectively.

Table 1: Consonantal phonemes of Korean (based on Sohn 1987)

	bilabial	alveolar	palatal	velar	glottal
plain stops/affricates	p	t	c	k	
aspirated stops	p^h	t^h	c^h	k^h	
tense stops	p'	t'	c'	k'	
plain continuants		s			h
tense continuants		s'			
nasals	m	n		ŋ	
approximants		l			

Table 2: Vowel phonemes of Korean (based on Sohn 1987, Cho 1988)

	Front	Central	Back
High	i	ɨ	u
	e	ə	o
Low	æ	a	

2. Umlaut

2.1 Description

The data in this paper are from my work with native speakers of the Kyungsang dialect of Korean, a dialect in which Umlaut is a highly productive rule. As stated in (1), a back vowel is fronted when followed by a high front vowel. Moreover, if the back vowel is round, i.e. /o,u/, it loses its labiality when fronted. The rule is conditioned by a number of suffixes including the causative, passive and nominalizer suffixes, all of which begin with -(C)i. Umlaut also applies in certain lexical items, some of which appear below. No examples were found in which Umlaut applies across word boundaries. This supports the earlier claim in Ahn (1987) in which the occurrence of Umlaut is restricted to the word level.

The present discussion focusses exclusively on cases in which there is an intervening consonant although Umlaut also occurs when a back vowel immediately precedes a high front vowel (see Ahn 1987). As can be seen in (2), for the speakers of this dialect Umlaut occurs across an intervening velar, labial or anterior coronal consonant. A back vowel is systematically not fronted, however, when the intervening consonant is palatal [1].

(1) Umlaut : [+back] → [-back, -round] / __ C_0 [+high, -back]
A back vowel becomes front and unround when followed by a high front vowel (cf. Ahn 1987, Kim 1973).

(2) a) Umlaut occurs:
Across a non-coronal consonant:

/koki/	[kegi][2]	'meat'	
/mək+hi+ta/	[mek^{h}ida]	'to be eaten'	
/cuk+i+ta/	[cigida]	'to kill'	
/api/	[æbi]	'father'	
/c^{h}aŋp^{h}i/	[c^{h}æŋp^{h}i]	'shame'	
/sum+ki+ta/	[šimgida]	'to hide'	

b) Across an anterior coronal:

/kɨli+ta/	[kirida][3]	'to draw, paint'	
/salp^h+i+ta/	[sælp^{h}ida]	'to inspect closely'	
/təti+ta/	[tedida]	'moving slowly'	
/puti/	[pidi]	'by all means'	
/canti/	[cændi]	'lawn'	

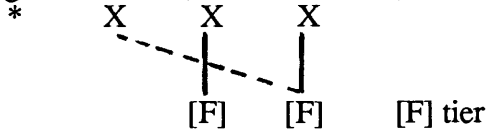
c) Umlaut blocked:
Across a palatal consonant:

/kac^{h}i/	[kac^{h}i]	*[kæc^{h}i]	'value'
/taci+ta/	[taǰida]	*[tæǰida]	'to mince'
/toci+ta/	[toǰida]	*[teǰida]	'worsening of an illness'
/huci+ta/	[huǰida]	*[hiǰida]	'to be old-fashioned'
/p^{h}əci+ta/	[p^{h}əǰida]	*[p^{h}eǰida]	'to spread out'

2.2 The opacity of underlying palatal consonants

Umlaut can clearly be viewed as an assimilatory process in which a back vowel is fronted before a high front vowel. Following the widely accepted view in Non-Linear phonology of assimilation as spreading, the principal means of accounting for the selective opacity of segments is to invoke the Line-crossing Prohibition on phonological representations (3). As stated in Goldsmith (1976), association lines between autosegments on the same tier may not cross. Consequently, since only palatal consonants systematically block the application of Umlaut, it must be assumed that palatal consonants are specified for the same feature that spreads from the high front vowel to the preceding vowel, and that this feature is on the same tier for both consonant and vowel.

(3) Line-Crossing Prohibition (Goldsmith 1976) ([F] represents any feature)

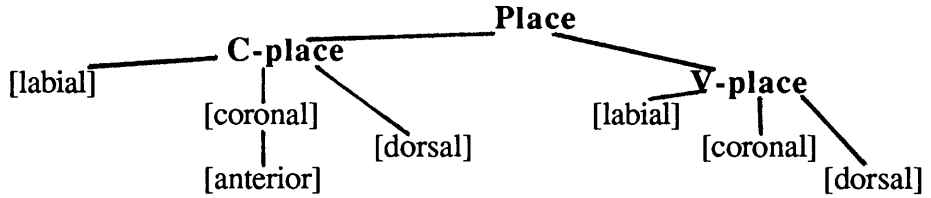


Specifying palatal consonants and front vowels underlyingly for the same feature is not a straightforward matter, however. It is generally assumed that segments are not specified for all features (or feature values) in underlying representation. Although the question concerning how much information is present underlyingly remains a debated issue, there is general consensus among most proponents of underspecification that redundant (predictable) information is absent (Archangeli 1984, Archangeli and Pulleyblank 1986, Clements 1988, Steriade 1987). Consequently, since palatal affricates are the only non-anterior coronal obstruents present underlyingly, the place specification [-anterior, +coronal] is sufficient to contrast them with anterior coronals (i.e. [+anterior, +coronal]). This is the feature specification adopted in many current works in Korean phonology (see e.g. Cho 1989, Iverson & Kim 1987, Sohn 1987). In fact, any other place specification, such as the secondary features [+high, -back] would be redundant and, as a result, predicted to be absent underlyingly. Front vowels, on the other hand, can be defined as a natural class solely by the feature [-back]. Consequently, given the view of assimilation as spreading, an intervening segment specified as [-anterior] would not, as is evident, block the spread of [-back] from a high front vowel. No line-crossing violation would be incurred. As a result, Umlaut would be expected to occur across palatals as it does across other consonants. Based on phonological evidence, however, blocking effects in Umlaut indicate that palatals and front vowels need to be specified for the same feature.

As noted above, in accounting for the interaction of palatal consonants and front vowels in Korean, I incorporate the view that front vowels and coronal consonants form a natural class. This is evidenced by their patterning together in phonological processes in a wide range of languages and was first formally defined in Jakobson, Fant & Halle (1952) by the acoustic feature [acute] (or [-grave]). Yet Chomsky & Halle (1968) fail to provide a means of referring to this natural class by a single non-disjunctive set of features; coronal consonants are defined as a class by the feature [+coronal] and front vowels are defined as [-back]. Clements (1976) shows that the treatment of front vowels and coronal consonants as belonging to the natural class [+coronal] elucidates why these segments pattern together in phonological processes such as First Velar Palatalization in Slavic, Reduplication in Bamileke, and Sound Shift in Tibetan. This view has recently been revived to account for processes affecting this natural class in a variety of languages in such works as Broselow & Niyondagara (1989), Cheng (1989), Clements (1989), Hume (1988) and E. Pulleyblank (1989).

The organization of place features assumed in this paper is illustrated in (4) as based on Clements (1989). Place features for consonants and vowels are arrayed on separate, non-interacting planes. This organization incorporates the general tendency that place features for consonants and vowels remain independent, while at the same time integrating the insight that the same articulator features characterize both consonants and vowels [4]. With respect to the articulator feature [coronal], (4) shows [coronal] linked to both a C-place and a V-place node. The former characterizes primary place of articulation for consonants, whereas the latter defines the class of front vowels, as well as the secondary articulation of palatalized consonants. These place nodes link to a superior node called Place. Following Sagey (1986), [anterior] is dominated by [coronal], yet is only distinctive for consonants; front vowels are redundantly [-anterior]. As a result, [-anterior] is the predicted value of [anterior] for V-place [coronal].

(4) Place feature organization (based on Clements (1989)):
(Predicted value of [anterior] for V-place [coronal] = [-anterior].
Features not relevant to the present discussion have been omitted)



As argued in Clements (1989) and E. Pulleyblank (1989), the specification of front vowels as [+coronal] renders the feature [-back] redundant and can thus be removed from the feature inventory. I follow Clements (1989) and specify front vowels as [+coronal] and back vowels as [+dorsal] (see (5)). The articulator feature [+coronal] defines sounds produced by raising the tongue tip or blade (tongue front) towards the hard palate. [+Dorsal], on the other hand, refers to sounds articulated with the back or dorsum of the tongue. Central vowels are [-coronal, -dorsal]. In the present analysis it is assumed that only positive values of the articulator features [coronal, labial, dorsal] are present underlyingly. Moreover, dorsality is considered redundant for non-coronal vowels and, as a result, is not present underlyingly. A vowel's specification for dorsality is predictable from its value for labiality, i.e. [+labial] -> [+dorsal], [-labial] –> [-dorsal] [5]. Given these assumptions, front vowels [i e æ] are specified underlyingly as [+coronal], back vowels [u o] bear the feature [+labial], and central vowels [ɨ ə a] are not specified for articulator features.

(5) Korean Vowels

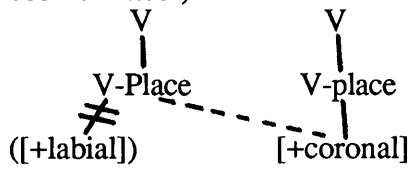
	i	e	æ	ɨ	ə	a	u	o
coronal	+	+	+	-	-	-	-	-
labial	-	-	-	-	-	-	+	+
dorsal	-	-	-	-	-	-	+	+
high	+	-	-	+	-	-	+	-
low	-	-	+	-	-	+	-	-

2.3 The Representation of Umlaut

With the high front vowel specified as [+coronal], the rule of Umlaut can now be formulated as in (6). This involves spreading the feature [+coronal] from a high front vowel to the V-place node of a preceding vowel. The targets of Umlaut are non-coronal vowels; in other words, vowels which are unspecified for the articulator feature [+coronal]. This includes back and central vowels which, as stated above, I assume to contrast minimally only for labiality. The fact that back rounded vowels lose their labiality when fronted is the expected outcome given that front rounded vowels do not form part of the underlying vowel inventory of this dialect. This follows from the principle of Structure Preservation as stated in Kiparsky (1985): "if a certain feature is non-distinctive in a language we shall say that it may not be specified in the lexicon. This means that it may not figure in

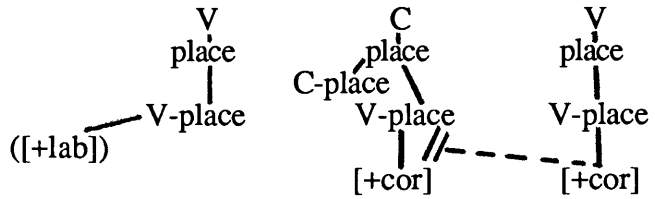
non-derived lexical items, nor be introduced by any lexical rule, and therefore may not play any role at all in the lexical phonology....By Structure Preservation I mean that marking conditions...must be applicable not only to underived lexical representations but also to derived lexical representations, including the output of word-level rules" (pp.87, 92). Given this view of Structure Preservation, it would seem reasonable to assume a marking condition of the form *[+coronal, +labial] for this dialect of Korean. The loss of labiality when a back vowel is fronted is then the expected outcome.

(6) Umlaut (Internal structure not directly relevant to the present discussion has been omitted.)



With front vowels and all coronal consonants potentially specified as [+coronal], we are still left with the problem of explaining why only palatal consonants block Umlaut. Since Umlaut involves spreading the feature [+coronal] from a high front vowel, the only intervening feature that can block this is another intervening V-place [+coronal]. This same vocalic feature must then be available underlyingly on a palatal consonant. As illustrated in (7), spreading [+coronal] across an intervening palatal consonant results in a line-crossing violation.

(7) Underlying / Vc i / sequence
Umlaut blocked by the Line-Crossing Prohibition.



The interaction of front vowels and palatal consonants in Umlaut is explicitly captured by positing that palatals are underlyingly specified for the secondary (vocalic) feature [+coronal]. As M. Halle (1989) points out, however, all consonants have a primary place of articulation. At some point in the derivation then, the secondary articulation of palatal consonants must assume primary status. This shift can be considered a direct consequence of the principle of Tier Promotion as stated below in (8). Tier Promotion is independently motivated in Clements (1989) to elucidate cases of Palatalization involving a consonant's shift from velar to coronal articulation before high front vowels or glides (i.e. [k] > [k^{j}] > [k͡] (palatalized velar) > [c] or [tʃ]). In a first stage, the secondary articulation feature [+coronal] is copied to C-place. In a second stage, [+coronal] is delinked from V-place. The promotion of the secondary feature [+coronal] to primary status must be considered obligatory in Korean since palatal consonants lack primary articulation underlyingly.

(8) Tier Promotion (adapted from Clements 1989):

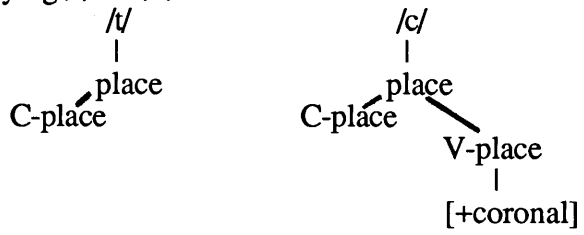
C
|
Fa: V-place → C-place (where Fa = any articulator feature, and V-place is linked to C on the skeletal tier)

1. link a copy of F to the C-place node. 2. delink F from the V-place node.

2.4 The Representation of Coronal Consonants

Earlier works in Korean phonology have convincingly argued that anterior coronals in Korean lack specification for place of articulation underlyingly (see e.g. Cho 1988, Iverson & Kim 1987, Sohn 1987). They are the least marked consonants in the language and receive the specification [+coronal, +anterior] by default. Motivation for this underspecification comes from a variety of phenomena which include, among others, consonant place assimilation, neutralization and epenthesis. It is not my intention in this brief paper to review all the arguments in favour of such underspecification but, rather, to propose an extended view of coronal underspecification. In terms of the representation of palatal consonants proposed above, we can consider all coronal consonants, both anterior and non-anterior, to be unspecified for primary place of articulation. In underlying representation, palatal consonants (i.e. /c, c^h, c'/) contrast for place of articulation with anterior coronal stops (i.e. /t, t^h, t'/) solely by the presence of the secondary articulation feature [+coronal]. As shown in (9), an underlying /t/ completely lacks place specification whereas /c/ is specified for V-place [+coronal]. This clearly accounts for the observation that an anterior consonant is transparent to Umlaut whereas a palatal is opaque.

(9) Underlying /t/ vs. /c/



2.5 Summary

It has been proposed that due to the blocking effects of palatal consonants in Umlaut, front vowels and palatal consonants are specified underlyingly for the same feature. Specifying palatal consonants for the primary place features [+coronal, -anterior] and front vowels as [-back] is not able to account for this opacity. The account presented above posits that front vowels and palatal consonants are underlyingly specified for the secondary articulation feature [+coronal]. Redefining the feature [coronal] in this way is motivated on independent grounds which reflect the observation that front vowels and coronal consonants form a natural class and should then share a common place feature. Within this natural class, however, there is need to recognize the greater affinity that front vowels have with non-anterior coronals than with anterior coronals. This is explicity captured by the presence of the secondary feature [+coronal] on both front vowels and palatal consonants. At the same time, however, palatal consonants

maintain their unmarked status along with other coronal consonants in that they lack primary place specification underlyingly.

3. The Interaction of Palatalization and Umlaut

The discussion until this point has focussed solely on the behaviour of underlying palatal consonants. Not all palatals in Korean are present underlyingly, however; some are derived by a process of Palatalization. Following Ahn (1985), Palatalization in Korean is most insightfully accounted for by two rules[6]. In the first, the segments /t, tʰ/ are realized as [c, cʰ] before a high front vowel or glide at morpheme boundaries. In the second rule /s, n, l/ are realized as [š, ɲ, ʎ] before a high front vowel or glide. The latter is a post-lexical rule since it applies within and across morpheme boundaries as well as across word boundaries. This section will focus only on the post-lexical rule although the conclusions drawn apply to both rules.

(10) provides examples of words containing underlying back vowels in Umlaut environment preceding palatal consonants derived by the rule of Palatalization. As can be seen, front vowels are not realized as a result of Umlaut. Given this, it would appear that these consonants behave identically to underlying palatals in that they block the application of Umlaut. Yet derived palatals are not opaque to Umlaut; vowel fronting is predicted to occur across a derived palatal regardless of whether Umlaut applies before Palatalization or Palatalization before Umlaut.

(10)

/kasi/	[kaši]	*[kæši]	'thorn'
/əps+i/	[əpši]	*[epši]	'without'
/əməni/	[əməɲi]	*[əmeɲi]	'mother'
/tani+ta/	[taɲida]	*[tæɲida]	'to travel/commute'
/p'al+li/	[p'aʎʎi]	*[p'æʎʎi]	'fast'

To make this point let me begin by showing that Umlaut is predicted to apply before Palatalization. Strong evidence for this rule ordering comes from examples such as [šimgida] 'to hide', derived from underlying /sum+ki+ta/ (see (2) above). In order for Palatalization to apply to the word-initial /s/, we must assume that /u/, the target of Umlaut, has first been fronted to [i]. It is then in a position to trigger the palatalization of /s/. This ordering is crucial since Palatalization is not triggered by /u/. In (11) I present a derivation showing this to be the correct rule ordering.

(11)

	/sumkita/
Umlaut	simkita
Palatalization	šimkita
Output[7]	[šimgida]

	/sumkita/
Palatalization	n/a
Umlaut	simkita
Output	*[simgida]

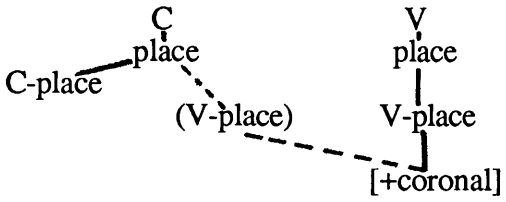
Although applying Palatalization to the output of Umlaut derives the correct result for forms such as that in (11), it is particularly interesting that this ordering incorrectly predicts that a front vowel is realized before a derived palatal in other forms. This is illustrated in (12) for the word [əməɲi] 'mother'.

(12) Umlaut ordered before Palatalization

e.g.	/əməni/	[əməɲi] 'mother'
Umlaut	əmeni	
Palatalization	əmeɲi	
Output	*[əmeɲi]	

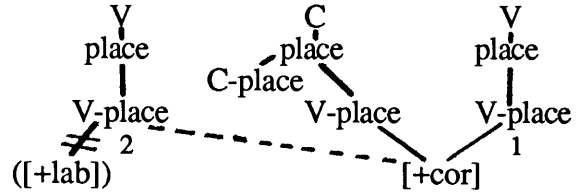
A possible means of generating the correct outputs in both (11) and (12) would be to assume that Palatalization applies twice, first in the lexical component before Umlaut and then again post-lexically after Umlaut. In this way, the feature that the intervening consonant acquires as a result of Palatalization would block the application of Umlaut, similar then to the predictions made concerning underlying palatals. Yet these predictions do not hold in the present case. In order to show why applying Umlaut to the output of Palatalization is not a feasible solution, it is first necessary to present the representation of Palatalization which I assume in this paper. This appears below in (13). Palatalization involves spreading the feature [+coronal] from a high front vowel or glide to a preceding anterior coronal consonant. Since the target is unspecified for place of articulation, [+coronal] docks onto an interpolated V-place node which in turn links to the superior place node.

(13) Palatalization: (following Clements (1989); cf. Broselow & Niyondagara 1989; Hume 1988; E. Pulleyblank 1989)



With this as a basis it is now possible to see why applying Umlaut to the output of Palatalization is not a viable means of prohibiting the application of Umlaut. The output of Palatalization, as illustrated in (14), results in a configuration in which the feature [+coronal] is multiply-linked to both consonant and vowel. Since there is no intervening feature which would block the path of the Umlaut trigger [+coronal] when it spreads to the V-place node of the preceding vowel, the rule of Umlaut would freely apply. In other words, no line-crossing violation would occur. Thus under this view, Umlaut is also predicted to occur.

(14) Palatalization ordered before Umlaut



1. Output of Palatalization. 2. Application of Umlaut

It might be argued that the Linking Condition as proposed by Hayes (1986) would prohibit the application of Umlaut in a case such as (14). Following Hayes, association lines in structural descriptions are interpreted as exhaustive. Applied to the representation in (14), this would then prohibit the application of Umlaut since the rule's trigger, i.e. [+coronal], is multiply linked to more than one segment and the rule itself does not refer to a multiply linked structure. Notice, however, that in forms in which both Umlaut and Palatalization apply, the Linking Condition would make the wrong prediction [8]. This is illustrated below in (15) where once again I use the word [šimgida] as an example.

(15) Incorrect predictions of the Linking Condition
e.g.

/ s u m k i t a/ [šimgida] 'to hide'

Umlaut

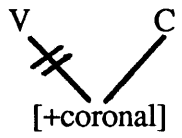
Palatalization Blocked by Linking Condition
Output *[simgida]

Consequently, whether Umlaut applies before Palatalization or Palatalization applies to the output of Umlaut, it is predicted that a front vowel is realized. This, however, is not what the surface forms show. As seen in (10), front vowels are not realized before a derived palatal consonant as a result of Umlaut. Let me point out, however, that the non-occurrence of front vowels before palatals is not a general constraint of the language. Numerous cases can be cited in which an underlying front vowel is followed by a palatal consonant, e.g. /k'ini/ [k'iɲi] 'meal', /c^{h}ici/ [c^{h}iǰi] 'support, backing', /ses+i/ [sešiǰi] 'three (subject)'. The non-occurrence of a front vowel before a derived palatal is then directly related to the interaction of the rules of Umlaut and Palatalization.

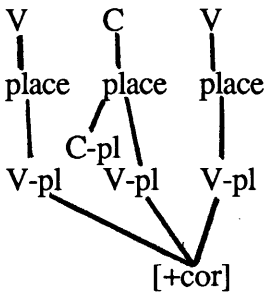
As noted in the introduction, I propose that the non-occurrence of front vowels before derived palatals as expected is due to Dissimilation. This applies after the rules of Umlaut and Palatalization. The formulation of this rule appears below in (16). The association line linking the secondary feature [+coronal] to the vowel delinks just in case it is multiply-linked to a following consonant. Why the multiple linking of [+coronal] to both consonant and vowel is crucial can be seen by comparing forms in which both Palatalization and Umlaut have applied to forms such as [k'iɲi] 'meal' in which the first vowel is underlyingly specified as

[+coronal]. (17) gives the representation of the former situation in which both Palatalization and Umlaut have applied. The output of these rules results in a configuration in which the secondary feature [+coronal] is linked to the first vowel, the following derived palatal, as well as to the following vowel (the trigger of Umlaut and Palatalization). This configuration differs crucially from that in (18) in which the feature [+coronal] is multiply-linked only to the derived palatal and the following vowel. Why Umlaut does not apply in (18) falls out directly from the view of Umlaut as a feature-filling rule which applies only to vowels not specified for the feature [+coronal], i.e. back and central vowels. Since the first vowel in (18) is pre-specified for the feature [+coronal] it does not constitute a target for the rule.

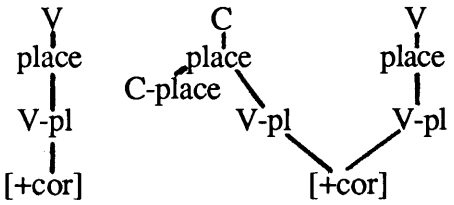
(16)
Dissimilation



(17)
Output of Palatalization and Umlaut



(18) [k' i ɲ i]



The crucial difference between the configurations in (17) and (18) is that in (18), the feature which triggers Umlaut has spread via association line to the preceding vowel. This then results in a structure in which the feature [+coronal] is linked to the first vowel as well as to the following consonant. Assimilation as spreading is therefore central in distinguishing the two structures. Note that if assimilation were done by feature copying we would have no way of accounting for the difference between these two forms. Both would be predicted to have the same surface realization; either both with a front vowel or both with a back vowel. For similar reasons we cannot assume the automatic reduction of features as a result of the Obligatory Contour Principle (McCarthy 1986). If this were the case we would, once again, have no way of differentiating between sequences of VC in which the vowel is underlyingly [+coronal] and sequences of VC in which the vowel acquires the specification [+coronal] as a result of assimilation. By invoking the OCP, both sequences would be represented with the feature [+coronal] multiply-linked to both the vowel and the following consonant. Assimilation as spreading in conjunction with the rule of Dissimilation, on the other hand, provides a principled account of this phenomena.

The occurrence of dissimilation involving adjacent [+coronal] features may be more widespread in Korean than the case discussed here. C.W. Kim (1980), for example, discusses a case involving the formation of the causative in Korean. As he states, "a causative verb stem is formed in general by adding a causative affix i to the stem...If the stem ends in a front vowel, the causative affix is u instead of i, probably due to dissimilation" (p.152). Moreover, cross-linguistically the dissimilation of a front vowel when adjacent to a palatal consonant is not uncommon. Sound change in Old Irish provides an example similar to Korean. As discussed in Thurneyson (1980), a front vowel is dissimilated just in case the following segment is a derived palatal consonant. It is then realized as a back vowel. The mirror image of this has been attested in the Turkic languages of Gagauz and Karaim, as discussed in Comrie (1981).

4. Conclusion

This paper has examined the interaction of front vowels and palatal consonants in the rule of Umlaut in the Kyungsang dialect of Korean. Although both underlying and derived palatal consonants appear to block the application of this rule, the non-occurrence of front vowels before these segments cannot be treated in a uniform way.

Only underlying palatals are considered opaque to the rule of Umlaut and this blocking effect indicates that the feature they share with front vowels must be present underlyingly. I have proposed an account based on the view that front vowels and coronal consonants form a natural class. Although this natural class is well-motivated in the literature, the data from Korean indicate that a further breakdown is necessary as a means of recognizing the greater affinity that front vowels have with palatal consonants. This is expressed underlyingly by the presence of the secondary (vocalic) feature [+coronal] for both front vowels and palatal consonants.

Unlike underlying palatals, I have argued that derived palatals are not opaque to Umlaut. Instead, they freely allow the application of this rule regardless of whether Umlaut applies to the output of Palatalization or vice versa. The view of assimilation as spreading has been shown to play a crucial role in accounting for the non-occurrence of front vowels in this context. This, in conjunction with a late rule of Dissimilation, then provides a principled account of this phenomena.

Notes

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1. This blocking effect differs from earlier accounts of Korean Umlaut in the literature (see e.g. Ahn 1987, C.W. Kim 1973). In these accounts, Umlaut was blocked not only by an intervening palatal but also by anterior coronals. However, exceptions in which Umlaut did occur across an intervening [r, l] and occasionally [d] were noted. The data collected for this study revealed Umlaut to be blocked only by an intervening palatal. This difference in blocking effects can be interpreted

in two ways. First, it may be a dialectal phenomenon. The second possible explanation is more in line with the observations made by Ahn (1987). She states that in many dialects, Umlaut is becoming more productive and at the same time, some of the constraints, such as the nature of the intervening consonant, are weakening. This may in fact be a move from a more marked to a less marked phonological process. As the model proposed here predicts, in the unmarked case, consonants with secondary articulations would be the only consonantal segments expected to block vowel harmony processes.

2. Voiceless unaspirated stops become voiced between voiced segments.

3. Note that /l/ becomes [r] intervocalically.

4. The independence of place features for consonants and vowels reflects the general tendency in languages for consonants to be transparent in vowel harmony processes and or vowels in consonant-to-consonant assimilation. Although cases of consonant-to-consonant assimilatory processes occurring over intervening vowels are relatively rare, at least two cases have been cited in the literature. The first involves the process of n-retroflexion in Sanskrit in which /n/ becomes retroflex following a retroflex consonant. This process can occur across any number of intervening vowels. Schein & Steriade (1986) claim that this involves spreading the [coronal] node of a consonant to a following /n/. It is only blocked by an intervening consonant already specified with a [coronal] node. The second case is that of Chumash Sibilant Harmony as discussed, for example, by Yip (1988). She proposes that it is the [coronal] node that spreads from one sibilant to another across any number of intervening vowels. As is evident from these two cases, within the view proposed here that front vowels are [+coronal], if the feature [+coronal] were on the same tier for both consonants and vowels, front vowels would be expected to block the spread of [coronal] in both Sanskrit n-retroflexion and Chumash Sibilant Harmony.

5. It is assumed for independent reasons (see e.g. Clements 1989, Odden 1989) that height and backness features do not form a single constituent. In other words, height features are not dominated by V-place but rather link up to a higher node in the tree.

6. Iverson (1987) argues that these two rules can be collapsed into a single Palatalization rule. Although we follow Ahn (1985) in this analysis, it should be noted that viewing Palatalization as one or two rules would not alter the conclusions drawn in this section.

7. Although not explicitly stated in the derivation, I am also assuming the Voicing Rule as stated in Note 2 above.

8. Note that the Uniform Applicability Condition (Schein & Steriade 1986) would allow Umlaut to apply in this case since this condition makes crucial reference to a multiply-linked target.

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