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The Organization of the Place Node*

Young-mee Yu Cho

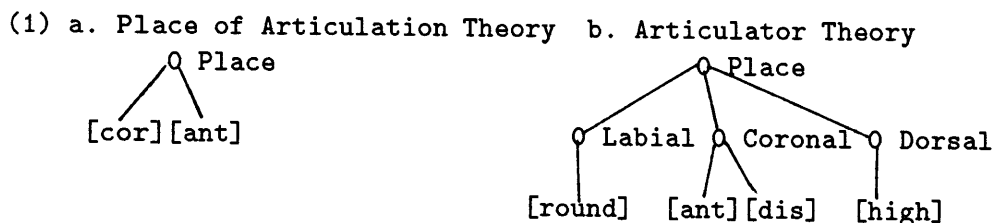
Stanford University

0. In this paper, I question the universality of the subplace nodes such as the Labial, the Coronal, and the Dorsal Nodes, which are assumed to be distinct class nodes under the Place Node in more recent versions of the Feature Geometry (Sagey (1986), McCarthy (1988), Levin (1987)). While there is ample evidence in some languages that each of these subplace articulator nodes functions as a real phonological entity, in other languages such evidence is not only lacking but postulating the articulator nodes makes incorrect predictions in defining certain natural classes of segments. Furthermore, in some languages simpler analyses of various phonological processes obtain if one assumes no class nodes under the Place Node, but binary features such as [+/- coronal].

The universalist position, however, does not seem warranted when we consider the organization of the Place Node for two languages, Sanskrit and Korean. When we are confronted with two cases that seem to argue for two different structures, a universal structure internal to the Place Node cannot be easily determined.

The paper is organized as follows. First, I will compare the two theories that deal with the internal organization of the Place Node. In the next section, I will discuss coronal assimilation and /n/-Retroflexion in Sanskrit with the conclusion that the Coronal articulator Node should be present. Then, Korean assimilation will be presented to show that a representation with no articulator nodes makes better sense in accounting for the data. In conclusion, it will be suggested that given the compelling arguments for both of the representations the choice of the relevant structure for the Place Node should be parameterized rather than universally determined.

1. As has been argued extensively, one of the most important motivations for a hierarchical structure for segment internal structure is the assumption that distinctive features are organized into sets constituting natural classes. In such a structure each feature or node of the feature tree constitutes a possible locus for phonological rules and various well-formedness conditions. McCarthy (1988) contains a brief comparison of the two theories concerning the internal organization of the Place Node, what he calls, Place of Articulation Theory (PT, henceforth) and Articulator Theory (AT, henceforth), which are represented in (1).



McCarthy compares two theories and concludes that AT is a better theory in several respects. First, it provides a coherent account for complex segments since complex segments are represented with two different articulators linked to a single Place Node (Sagey (1986)). The second evidence comes from phonological processes that independently manipulate labials, coronals, and dorsals. The third is the fact that OCP effects like root-morpheme cooccurrence restrictions are based on the articulator rather than on the place of articulation.

Given that there are formidable arguments for AT, it seems only natural to give up PT once and for all and adopt AT as part of the universal feature geometry. However, we will argue that such a move cannot be accomplished as easily as one might hope when we consider a set of different languages.

The two theories make different predictions regarding the natural grouping of segments. In a hierarchical representation every node of the tree represents a set of features designated by the theory as a natural class: every node, terminal and nonterminal, represents a distinct class. PT predicts that each terminal feature such as [cor] and [ant] represents a distinct class and both values of these features play a role in phonological representations and rules.¹

On the other hand, AT proposes that such class nodes as Labial, Coronal, and Dorsal function as monovalent "privative" features, so that the presence of a Coronal Node, for instance, indicates what would have been interpreted in a binary system as [+cor] and the negative value is not present in any part of the grammar.

PT expresses places of articulation primarily in terms of values of the features [cor] and [ant] (Chomsky and Halle (1968), Clements (1985), Archangeli and Pulleyblank (forthcoming)). Segments that are coronal are produced with the blade or the tip of the tongue; segments that are anterior are produced with a primary constriction in or forward of the palato-alveolar region.² Given these two features, one can characterize the four places of articulation as follows.

¹The particular choice of features like [ant] and [cor] is independent from the theory itself.

²Unlike Chomsky and Halle (1968), Halle and Stevens (1979) and Lahiri and Blumstein (1984) suggested that the feature "coronal" could be redefined both articulatorily and acoustically to

(2)	labials	dentals	palatals	velars
ant	+	+	-	-
cor	-	+	+	-

A primary argument against the feature make-up shown in (2) has been based on the fact that the feature [ant] does not refer to a single articulator and plays only a definitional role (McCarthy (1988)). However, as noted by Keating (1987) [ant] is not the only feature with this problem and it is not even clear whether every place feature should correspond to a single articulator; the features [lateral] and [distributed] are widely used to distinguish a place of articulation but it is disputable whether they in fact refer to a single articulator. Another objection against [ant] has been the putative fact that it never characterizes a natural class of segments referred to by phonological processes, as noted by Kenstowicz and Kisseberth (1979). Contrary to these objections, I argue that all the possible natural classes of segments are indeed attested as shown below, even though some groupings are more common than the others. (3) shows a logically possible classification of segments according to each value of the two distinctive features in question.

(3) Classification of segments within the Place of Articulation Theory

[+ant]: labials, dentals (Philadelphia English, Klamath)

[-ant]: palatals, velars (palatalization (often as [+high]))

[+cor]: dentals, palatals, retroflex (Baule, Fe?fe?)

[-cor]([+grave]): labials and velars (Korean, Hungarian, Old English)

In SPE, the feature [ant] is defined to distinguish sounds produced with a constriction in front of the alveopalatal region from those produced with a constriction at the back of it. There is evidence that this feature in fact defines a natural class. In Philadelphia English (Ferguson (1975), Labov (1981), Kiparsky (1988)), /æ/ is tensed before tautosyllabic front nasals, /m/, /n/ and front voiceless fricatives /f/, /θ/, /s/ (e.g. in “jam, pan, staff, path, glass” but not in “bang, catch, cap, cash, rash, badge”). Thus, labials and alveolars but not alveo-palatals and velars trigger the rule, a class which can be specified as [+ant]. Labov also notes that this Philadelphia set is the minimal set that conditions the tensing of low vowels in English in general.

Another case for the feature [ant] involves Klamath syllabification, as reported in Levin (1985). According to Levin, sonority ranking is responsible for characterizing tautosyllabic clusters and in Klamath labial and dental consonants (/p/, /t/) should be regarded as more sonorous than palatal, velar, and uvular consonants (/c/, /k/, /q/), and therefore are found closer to a syllable nucleus as shown in (4).

(4) Klamath Sonority Scale (Levin 1985)

w, y	[-cons]
l, m, n	[+cons, +son]
h, s	[+cons, -son, +cont]
p, t	[+cons, -son, -cont, +ant]
c, k, q	[+cons, -son, -cont, -ant]

incorporate palatals and modified the feature “coronal” to include palatals, following Jakobson et al. (1963).

This fact has been incorporated into the grammar in terms of the so-called minimal sonority distance which assigns the [+ant] consonants to be more sonorous than the [-ant] consonants.

Now let us look at the use of the feature [cor] in the two theories. AT (McCarthy (1988), Sagey (1986), Mester (1986), Steriade (1987b)) distinguishes segments in terms of the active articulators making the constricting gesture rather than in terms of articulation. Gestures by the lips are characterized by [Labial]; gestures by the blade or tip of the tongue are characterized by [Coronal]; gestures by the tongue body are characterized by [Dorsal]. The Place Node is divided into these three articulator nodes that in turn dominate sets of terminal features. Proponents of this theory assume that the articulator nodes constitute monovalent features. The presence of a unary node automatically implies the absence of the other articulator nodes for non-complex segments. Postulation of the monovalent articulator nodes groups segments into natural classes quite different from PT. PT makes use of both values of the features involved, [+ant] in addition to [-ant], [+cor] as well as [-cor]; the use of the binary value for each feature results in four natural classes, as shown in (3). On the other hand, in AT the complement of a natural class is not a natural class; i.e. the classes of segments that are captured by such features as [-labial], [-cor], [-dorsal] in PT no longer constitute a natural class. In this account, labial, coronal and dorsal consonants each form a natural class by themselves but non-coronals such as labials and velars are not a natural class since there is no feature (such as [-cor]) that can be referred to group them together. They are a set just as arbitrary as a set of coronals and labials. We have cited in (3), however, cases where labials and velars are grouped together to the exclusion of coronals on the one hand, and cases where labials and alveolars are grouped together on the other. There is, in fact, quite an extensive literature that motivates the feature [-cor] (or [+grave] with the same attributes) (Jakobson et al. (1963), Hyman (1973), Lass (1976), Vago (1976), Odden (1978)).

Hyman (1973, 329) cites a common historical process of a fricative “at one end of the oral cavity turning into a fricative at the other end of the oral cavity” (/x/ > /f/ in Germanic and /f/ > /h/ in Hausa). This suggests a common feature shared by peripheral consonants. Also, the rule of vowel reduplication in Fe?fe? (Hyman (1973, 333)) can be characterized as coronals patterning with front vowels on the one hand, and labials and velars with back vowels on the other.

Another example is the Lenition of intervocalic voiced stops in Old English (Lass and Anderson (1975), Lass (1976)); here labials and velars are grouped as a leniting class, with dentals excluded. The Old English data are shown in (5), which can be best described by a rule that crucially refers to the [-cor] segments. The same grouping of consonants by the feature [-cor] is found in Hungarian and Tavgi initial lenition and intervocalic lenition in Mordvin and Cheremis (Collinder (1965)).

(5) Old English Lenition (Lass (1976), Lass and Anderson (1975))

būgan → [būyan] ‘bow’

plēgan → [plējan] ‘play’ (v → j by Palatalization)

gavol < gabala (Old High German)

hydan ‘hide’ *hyðan

glīdan 'glide' *gliðan

Also in Korean, there is another phenomenon that justifies the use of [-cor] as a feature that designates a natural class. Lee (1971) reports a fifteenth century rounding, in which /i/ (the back unrounded vowel) became [u] before all labials and velars but not before dentals and palatals.

(6) i Rounding (Lee (1971))

i → u / — m, p, ph, k, ph

ətip- > ətup	'dark'
təik > təuk	'more'
cizim > cuzum	'at the time' (the first [u] due to Vowel Harmony)

Of course, some arguments for the feature [grave] found in the literature are the arguments for the feature [-grave] (that is, [+cor]) and can be easily translated into AT. For instance, in Baule the glide /w/ is fronted when preceded by an alveolar or palatal consonant and followed by /i/ (Vago (1976)). Likewise, Sanskrit /n/-Retroflexion (which will be discussed later in detail) treats coronal consonants (dentals, retroflexes, and palatals) as a blocker of the rule. These cases can be equally well handled in AT where coronals are grouped as a natural class to the exclusion of non-coronals. The crucial difference between the two theories lies in the fact that one, but not the other, allows us to capture non-coronals as a natural class.

One possible way out for AT is to assume Radical Underspecification and to propose that what classifies labials and velars as a natural class as opposed to dentals is the presence or the absence of the Place Node (See Avery and Rice (forthcoming) for Ponapean). It is true that some cases reported in the literature can be accounted for by assuming that labials and velars pattern as if the place node had content whereas coronals are transparent as if they were totally unmarked for place.³

The transparency argument is well supported for languages in which there is only one coronal consonant or where only [+ant] consonants exhibit a transparency effect, but it cannot be maintained in languages with more than one coronal articulation and all coronal consonants pattern together. In PT non-dental consonants such as retroflexes and palatals are classified as [+cor] and thus they are expected to pattern with dentals/ alveolars, whereas AT combined with Underspecification would classify them together with the consonants with an underlyingly specified Place Node. Given the fact that there has to be a Place Node for every non-anterior consonant, the data argue for PT rather than AT. Whether or not palatals should have a Coronal Node might be controversial (Avery and Rice (forthcoming), Keating (1987)) but there are certainly languages with more than one coronal articulation which involves non-patalal articulation. If the transparency effect were really due to the lack of a Place Node, we would predict that palatals and retroflexes should not pattern with dentals/alveolars. However, palatal and retroflex consonants pattern

³See also cases of coronal transparency in Paradis and Prunet (forthcoming). They observe that in Fula and Guere the Place Nodes of vowels treat intervening [+ant] coronals as transparent and argue that the lack of a Place Node in coronals explains their transparency to vowels.

with dental consonants rather than with the peripheral consonants, thus justifying the use of both values of the feature [cor]. The intervocalic lenition in Tibetan discussed by Odden (1978) is one such case.

(7) Tibetan Lenition (Odden 1978)

p, k, q → B, v, q/ [-nas]—

<u>Affirmative</u>	<u>Negative</u>
paaBəree	maBaaBəree 'he lit'
kuuBəree	məvuubəree 'he waited'
qapəree	maqapəree 'he dried'
k ^y aaBəree	mak ^y aaBəree 'he lifted'
c'aaBəree	macaaBəree 'he went'
taapəree	mataapəree 'he sufficed'
ṭaaBəree	maṭaaBəree 'he roasted'

(B: bilabial fricative, k^y: palatal stop, c': palatal fricative, q: uvular fricative)

The fact that the nongrave consonants /t/, /t̪/, /c/ and /k^y/ remain unchanged not only argues against AT where [-cor] does not define a natural class but also against an attempt to attribute the transparency effect to underspecification of the Place Node. This is because we cannot assume that retroflex, alveo-palatal and palatal consonants lack a place node like dental consonants.

Such facts show that it is not easy to determine a universally valid feature geometry for the Place Node. In the remainder of the paper I will show in detail two cases that seem to support contradictory theories.

2. In this section I will propose an analysis for Coronal Assimilation and /n/-Retroflexion in Sanskrit, and argue that these phenomena are impossible to account for in PT without very ad hoc stipulations, but that they follow naturally from the representations assumed in AT.

First, I will look at one of the so-called internal and external sandhi processes. In these sandhi processes, one can observe an asymmetry in the direction of change. For instance, a segment assimilates to such marked features as [+voice], [+nasal], as well as to the features that characterize retroflex and palatal segments. The unmarked value of each relevant feature, however, never plays a role in assimilation, a fact which supports the Radical Underspecification hypothesis. I will limit my attention to place assimilation and show why it is necessary to have a coronal node as a distinct entity in the representations. Couched within the Radical Underspecification Theory (Kiparsky (1982, 54-56), Archangeli (1984), Pulleyblank (1986), Archangeli and Pulleyblank (forthcoming)), various sandhi processes can be characterized as instances of spreading specified features to an unspecified slot (Cho (forthcoming)). I will show that the asymmetries found in place assimilation can be directly accounted for as autosegmental spreading in underspecified hierarchical feature representation once one assumes the Coronal Node.

Sanskrit has five places of articulation among stops: labial, dental, retroflex, palatal and velar.

First, by assuming AT as the correct theory for Sanskrit, we adopt the structure

given in (1b). Also, on the basis of the evidence from feature spreading and delinking, I will assume that in underlying representations only one value of a given feature is present. Dental, retroflex and palatal consonants are all characterized by a Coronal Node and they are differentiated from one another by the features [ant] and [dis].

(8) a. Fully specified Matrix for coronals

	dental	retroflex	palatal
ant	+	-	-
dis	+	-	+

b. Underspecified Matrix

	dental	retroflex	palatal
ant		-	-
dis		-	

We assume that dentals are maximally underspecified and the result is the (8b) above.

Now let us see what kinds of coronal assimilations are found in Sanskrit and how they are accounted for in AT. First, the dental consonants (/t/, /n/ and /s/) assimilate to the following coronal consonant such as retroflex, palatal consonants and in all the other cases remain a dental sound. /t/ and /n/ also assimilate to /l/. The relevant examples are illustrated in (9) (Whitney (1889, 66-68), Allen (1962, 83-84, 92)).

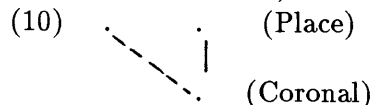
(9) Sanskrit Coronal Assimilation⁴

mahān + kaviḥ →	mahānkaviḥ	‘great poet’
mahān + bhāgaḥ →	mahānbhāgaḥ	‘illustrious’
tān + janān →	tāñjanān	‘those people’
tān + ḍimbhān →	tāṇḍimbhān	‘those infants’
trīn + lokān →	trīllokān	‘three worlds’
tat + ḍhaukate →	taḍḍhaukate	‘it approaches’
ut + carati →	uccarati	‘rise’
etat + chattram →	etacchattram	‘this umbrella’
vidyut + jāyate →	vidyujjāyate	‘the dawn is born’
tat + labhate →	tallabhate	‘it takes’
tatas + ca →	tataśca	‘and then’
pātas + ṭalati →	pātaṣṭalati	‘the foot is disturbed’

One should formulate the rule as spreading specified features from the neighboring Coronal Node, as formalized in (10). Dentals, which are unspecified for such coronal features as [ant], [dis] and [lat] will acquire those features by a spreading mechanism. Dentals do not assimilate to noncoronals since the site of assimilation

⁴Postvocalic word-final fricatives become ‘visarga’ (represented as ḥ), an aspirated continuant homorganic to the preceding vowel.

is the Coronal Node, not the Place Node.⁵



In order for the rule to have the effect of referring only to the terminal features that define the Coronal Node, the formalization of the rule crucially relies on the presence of the Coronal Node for the triggering consonants. Contrary to the claim made by Avery and Rice (forthcoming), the fact that the assimilation is limited to the Coronal Node does not in itself constitute evidence for the presence of a Coronal Node for dentals, since the target of assimilation could be totally unspecified and still undergo the rule. Also there is no principle that guarantees their claim that when an articulator node is specified, only assimilation within the articulator will be found. If we formulate the rule as **Spread the Coronal Node**, dentals will assimilate within its articulator node even if they are not specified for an empty Coronal Node. Since the rule is spreading the Coronal Node, it is crucial to refer to all the features under the Coronal Node as a set but it is not necessary to posit the Coronal Node or the Place Node for the target, i.e. dentals.

In sum, it is necessary to refer to the coronal node as a functional unit which is not possible to do within PT when it is combined with Radical Underspecification.

Now let us try formulating the same assimilation rule within PT. The consonants are now distinguished not by the active articulator nodes like Labial, Coronal and Dorsal, but by such binary features as [ant], [cor] and [dist]. (11) represents one possible underspecified matrix within PT.

(11) labial dental retroflex palatal velar

ant		-	-	-
dis		-		
cor	-			-

Within PT one could formulate the place assimilation in such a way that only the features [ant] and [dist] spread. Even though such a rule insures that dentals will assimilate to retroflexes and palatals, it also predicts that labials will assimilate to velars by acquiring the feature [-ant] from velars. A technical solution to the problem of preventing labials from participating could be suggested, but the question remains as to why the features [ant] and [dist] pair up as a set to the exclusion of [cor]. One such solution is to stipulate that only dentals assimilate due to their status as a maximally underspecified structure. I believe this move is undesirable because a rule has to refer to the absence of a structure, rather than to the presence of a structure. All these problems arise mainly because one cannot refer to the set of [+cor] segments in underspecified representations within PT. PT, when combined with no Underspecification or Contrastive Underspecification (Clements (1988), Steriade (1987b)), can refer to the set of consonants designated by the feature [+cor], but the prime virtue of Radical Underspecification disappears; i.e. there is no way to

⁵I will assume that the locus of the feature [lat] is under the Coronal Node, as has been argued by Levin (1987). In view of the fact that the processes in Sanskrit treat /l/ as a coronal consonant, both as a trigger and a blocker, /l/ is best characterized as [+lat], which is dominated by the Coronal Node.

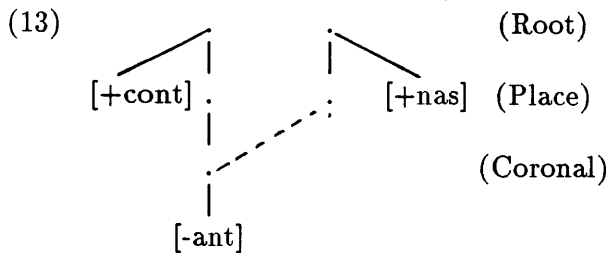
explain the asymmetrical nature of assimilation. In Radical Underspecification the markedness relationships between consonants are expressed by means of underlying feature specifications, but in the other frameworks a totally different mechanism is called for to account for the special behavior of the dental consonant in many languages. For the Sanskrit data, AT proves to be superior in that it explains why only certain features function as a unit and why the assimilation affects only the maximally unspecified dentals.

Within PT it is also problematic to account for /n/-Retroflexion without violating the Locality Condition which is well motivated in Autosegmental Phonology. The Locality Condition proposed by Poser (1985) and Steriade (1987a) dictates that rules cannot stipulate which segment class may or may not intervene between the target and the trigger. In general, rules can refer only to the target and the trigger and they are subject only to positive, prosodically expressed locality conditions.

/n/ gets retroflexed when it follows a retroflex continuant. When the trigger is separated from the target by a coronal consonant, retroflexion is blocked. Within AT, /n/-Retroflexion can be characterized as a rule which spreads the Coronal Node of a continuant (/s/ and /r/) to an adjacent coronal nasal on the right projection (Whitney (1889, 65), Schein and Steriade (1986, 717-18)).

(12) a. /n/-Retroflexion⁶

<u>Application</u>	<u>No Application</u>
iṣ-ṇā 'seek'	bhug-na 'bend'
pr-ṇā 'fill'	mṛd-nā 'be gracious'
vṛk-ṇa 'cut up'	marj-āna 'wiping'
kṣubh-āṇa 'quake'	kṣved-āna 'hum'
kṛp-a-māṇa 'lament'	kṛt-a-māna 'cut'



If a Coronal Node intervenes between the trigger and the target, the rule cannot apply since the trigger cannot spread the node across an intervening Coronal Node. In this sense, this rule requires the presence of a Coronal Node to account for the blocking effect. It is necessary to assume that all the relevant default rules have applied before /n/-Retroflexion because not only palatals, laterals, and retroflexes but also dentals block the rule.

Let us now analyze this process within PT. There is no concept of Coronal as a class node in the theory and it is impossible to explain why only coronals such as dentals, retroflexes, palatals and laterals block the rule. In PT, they are all marked for [+cor], and we can formulate the rule as applying across the [-cor] specification. This formulation is problematic in two respects. First, it violates the Locality Condition in that there is an element ([-cor]) that could optionally intervene

⁶ṛ represents a syllabic /r/.

between the target and the trigger. Second, even if the rule were formulatable without being constrained by the Locality Condition, the fact that non-coronals are transparent to the application of the rule would remain arbitrary because it is stipulated without any motivation as part of the structural description of the rule. In this account, a hypothetical rule of /n/-Retroflexion where coronals are transparent would be equally natural. On the other hand, in AT the fact that coronals function as blockers is directly derivable from the fact that the rule is spreading the coronal node onto the adjacent Place Node.

3. In this section we will look at Korean Place Assimilation both within PT and AT. In Korean which has four places of articulation among stops, we encounter the following optional place assimilation rules in addition to several obligatory manner assimilation: (1) dentals assimilate to labials, palatals, and velars and (2) labials and palatals assimilate to velars (Kim-Renaud (1974), Cho (1988)).

In Cho (1988), I have attempted to explain why only certain types of assimilation are found in the language, and under what conditions such assimilatory processes take place. Given the assumptions set down by Underspecified hierarchical segmental structure, the various seemingly unrelated rules can be collapsed into one single rule which spread specified—and consequently marked—features to an adjacent relatively unspecified segment.

It has been observed many times that /t/ is the least marked segment among Korean consonants. Coronals, especially /t/ behave differently from the other consonants in several processes including assimilation (Kim (1973, 275-78), Kim-Renaud (1974, 231-240)). First, all coronal obstruents, regardless of their place and manner features are neutralized to /t/ in the coda position. Second, in cluster simplification, coronal obstruents are deleted regardless of their position. Third, in one type of Compound Tensification, coronals, but not labials and velars undergo tensification (e.g. “il-pun” vs. “il-t’o”), for which no immediate explanation seems possible.

Within PT, the following underspecified matrix distinguishes the four places of articulation (Cho 1988).

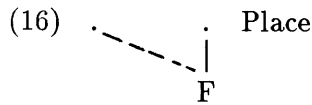
(14) Underspecified Matrix

	labial	dental	palatal	velar
ant			–	–
cor	–			–

On these assumptions, the peculiar array of data can be represented as follows. First, the dentals /t/ and /n/ assimilate to the following consonant in place.

(15) Korean Dental Assimilation

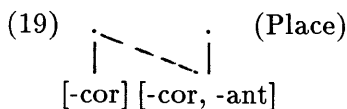
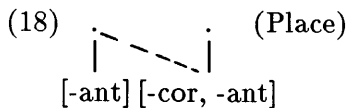
pat+ko → pakko	‘to receive and’
kotpalo → kopparo	‘straight’
kət+ ci → kəcci	‘let us uncover’
hankan → haŋkan	‘the Han river’
han+bən → hambən	‘once’



Thus any features under the Place node spread as stated in (16). For labials the specified feature is [-cor], for palatals it is [-ant], and velars are marked for both [-cor, -ant]. The reason why dentals cannot function as a trigger is obvious; they are unmarked for any feature and thus cannot spread. This phenomenon of coronal assimilation is well-attested cross-linguistically (Sanskrit, English, Catalan, Japanese, etc.), but Korean allows also non-coronals to assimilate, which provides a crucial test case for the two theories of the Place Node.

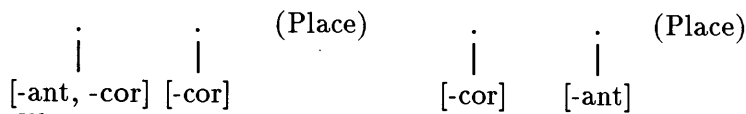
Palatals and labials assimilate to velars but velars never undergo assimilation and there is no interaction between labials and palatals. (17) shows some examples and the formalization of the rules.

- (17) a. nac+ko → nakko ‘to be low and..’
 kam+ki → kaŋ+ki ‘a cold’
 əp+ko → əkko ‘to bear on the back and..’



Now let us consider two questions: one being why velars never function as targets and the other being why labials do not assimilate to palatals and vice versa. (20) represents the configurations shown by the velar-labial and labial-palatal sequences.

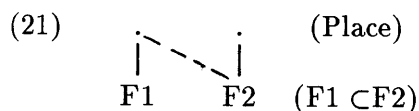
- (20) a. k p b. p c



The reason why velars do not undergo the rule is obvious; they are more marked than any other segments and thus always trigger assimilation, but never undergo the rule. I have to assume that labials and palatals do not interact in assimilation because they are marked for different unrelated features; labials are marked for [-cor] and palatals are marked for [-ant], and thus there is no interaction between the two consonants.

The formulations introduced so far tell us two things. First, the choice of /t/ as the maximally underspecified segments requires that velars should be more than labials or palatals, which is confirmed by the assimilation processes in question. Secondly, there is something quite similar about the three rule formulations in (16), (18) and (19): that is, assimilation is best characterized as the spreading of marked features to the less-specified (rather than unspecified) coda consonant. This intuitive

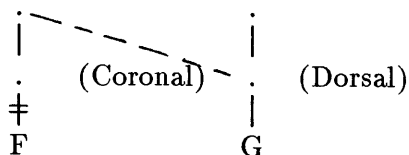
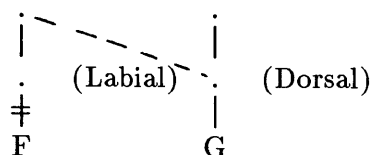
notion of more marked and less marked is formally defined as a subset relation, as shown below.



(Spread when a set of features F1 in the place node is a subset of F2 (Cho 1988).)

Now Korean Place assimilation is collapsed as one feature-filling rule shown in (21), which spreads F2 onto the preceding Place Node when a set of features F1 in the Place Node is a subset of F2. (21) subsumes all the cases of Place assimilation. First, dentals which are totally unspecified assimilate to whatever consonants that follow it because zero-specification is the subset of any specification. Second, each feature specification of labials and palatals is a subset of the specification of velars and is subsumed under (21) We have seen in this section that (21) owes its simplicity and generality to PT, where all places of articulation are defined with a binary opposition so that the notion of markedness is derivable from the underspecified matrix. We will see in the next section that AT with its monovalent features finds it difficult to classify the same segments along the markedness hierarchy.

Iverson and Kim (1987, 186-87) is an attempt to account for the assimilatory phenomenon within AT. First, within this account, the unspecified dentals acquire the place node by spreading. The assimilation of labials and palatals to velars should be accomplished by delinking followed by spreading. This is in direct contrast to the formulation in (21) in which no Node or feature needs to be delinked.



However, the reason why a velar triggers delinking as in (22) and (23) remains a mystery. I assume that the 'feature-changing' operations always result from delinking followed by spreading (Poser (1982), Kiparsky (1985), Mascaro (1987)). Therefore, the delinking operation should be independently motivated and is not part of the assimilation proper. In many languages coda neutralization or delinking applies independently of spreading (Saltarelli (1970)).⁷

⁷Cho (forthcoming) argues that consonant alternations in Hausa and Japanese need be analyzed

In Korean, however, there is no independently motivated deletion and delinking of a Class Node is a context-sensitive rule that applies only before a Dorsal Node. Also there is no explanation as to why there is no interaction between labials and palatals. In the feature make-up in of PT velars are more marked than labials and palatals, and thus trigger spreading. In AT, there is no reason why labials and palatals should be less marked than velars. Assimilation of labials and palatals would be as natural as assimilation of velars to labials or palatals. The prediction of AT is limited to dentals, which are empty and thus will assimilate to any place. In summary, the articulator nodes assumed under AT make it impossible to explain why only certain assimilations are possible.

4. We have seen in the above discussion that the two theories are independently motivated to account for two different languages. In Sanskrit positing a Coronal Node as a distinctive entity is crucial for two otherwise unrelated phenomena: Coronal Assimilation and /n/-Retroflexion. In a similar fashion, Korean phonology crucially relies on the cross-classifying function of terminal features which are not directly dependent on the articulator nodes as evidenced in two different rules (Place Assimilation, /i/-Rounding). Adopting a universalist position seems too hasty at this point since a cluster of facts argue for one type of representation over the other in each language. At least what is comforting is the fact that we do not need to posit two different representations for one language. If we take this parametrization seriously, we predict that every one of the phonological rules in a language should be consistent with a given structure for the Place Node. For instance, we predict that no phonological processes in Sanskrit refer to such features as [+ant] or [-cor] since natural groupings of segments defined by the articulator nodes are not compatible with those defined by these features.

The question, however, remains as to how cross-linguistic variations should be accounted for in a principled manner. At this point we can offer only speculations. When we consider the multi-dimensional nature of speech sounds, it might be only natural to assume that some languages highlight one dimension over the other in organizing the sounds in the grammar. The facts of physics and physiology requires us to define sounds in many different ways; for instance, articulatorily defined classes should be distinct from the ones acoustically defined. We will have to assume that place features are “more articulatorily organized”(in the sense that each articulator is assigned a more active role in organizing the sound system) in Sanskrit and other languages for which we have clear evidence for the articulator nodes, thus resulting in a hierarchical structure within the Place Node. On the other hand, a flat structure should be assumed for the Place Node for Korean as well as for other languages where [+ant] and [-cor] each define a natural class of segments. If we continue on this speculation, a possible parameter would be the presence vs. absence of some active articulators in the underlying representations.

* A longer version of this paper will appear in C. Paradis and J. F. Prunet eds. *The Special Status of Coronal: Internal and External Evidence*. My sincere thanks

 not as place assimilation but as syllable-controlled delinking, followed by an automatic spreading.

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References

- Allen, W. (1962) *Sandhi*, Mouton, The Hague.
- Archangeli, D. (1984) *Underspecification in Yawelmani Phonology and Morphology*, Doctoral Dissertation, MIT, Cambridge, Massachusetts.
- Archangeli, D. and D. Pulleyblank (forthcoming) *The Content and the Structure of Phonological Representations*, MIT press, Cambridge, Massachusetts.
- Avery, P. and K. Rice (forthcoming) "Segment structure and coronal Underspecification," *Phonology* 6.2.
- Cho, Y. Y. (1988) "Korean Assimilation," in *Proceedings of the Seventh West Coast Conference on Formal Linguistics*, vol. 7, 41-52.
- Cho, Y. Y. (forthcoming) *The Parameters of Consonantal Assimilation*, Doctoral dissertation, Stanford University, Stanford, California.
- Chomsky, N. and M. Halle (1968) *Sound Pattern of English*, Harper, New York.
- Clements, G. N. (1985) "The geometry of phonological features," *Phonology Yearbook* 2, 223-250.
- Clements, G. N. (1988) "Towards a substantive theory of feature specification," *NELS* 18, vol. 1, 79-93.
- Collinder, B. (1965) *An Introduction to the Uralic Languages*, University of California Press, Berkeley and Los Angeles, California.
- Ferguson, C. (1975) "'short a' in Philadelphia English," in *Studies in Linguistics: in honor of George L. Trager*, Mouton, The Hague.
- Halle, M. and K. Stevens (1979) "Some reflections on the theoretical bases of phonetics," in B. Lindblom and S. Ohman eds., *Frontiers of Speech Communication Research*, Academic Press, London.
- Hyman, L. (1973) "The feature [grave] in phonological theory," *Journal of Phonetics* 1, 329-37.
- Iverson, G. and K-H. Kim (1987) "Underspecification and hierarchical feature representation in Korean consonantal phonology," in *Proceedings of CLS*, vol. 23, 182-198.
- Jakobson, R., G. Fant and M. Halle (1963) *Preliminaries to Speech Analysis*, MIT Press, Cambridge, Massachusetts.
- Keating, P. (1987) "Palatals as complex coronals: X-ray evidence," paper presented at 62nd annual LSA meeting.
- Keating, P. (1988) *A Survey of Phonological Features*, Indiana University Linguistics Club.
- Kenstowicz, M. and C. Kisseberth (1979) *Generative Phonology*, Academic Press, New York.
- Kim, C.-W. (1973) "Gravity in Korean phonology," *Language Research* 9, 274-81, Seoul, Korea.
- Kim-Renaud, Y.-K. (1974) *Korean Consonantal Phonology*, Doctoral Dissertation, University of Hawaii.

- Kiparsky, P. (1982) "Lexical morphology and phonology," in Yang, I. ed. *Linguistics in the Morning Calm*, Hanshin, Seoul, Korea.
- Kiparsky, P. (1985) "Some Consequences of Lexical Phonology," *Phonology Yearbook* 2, 85-138.
- Kiparsky, P. (1988) "Phonological change," *Linguistics: the Cambridge Survey*, vol. 1, Cambridge University Press, Cambridge.
- Labov, W. (1981) "Resolving the neogrammarian controversy," *Language* 57, 267-308.
- Lahiri, A. and S. Blumstein (1984) "A re-evaluation of the feature coronal," *Journal of Phonetics* 12, 133-45.
- Lass, R. (1976) *English Phonology and Phonological Theory*, Cambridge University Press, Cambridge.
- Lass, R. and J. Anderson (1975) *Old English Phonology*, Cambridge University Press, Cambridge.
- Lee, B.-G. (1971) "A reconsideration of NC/MH's feature system," ms. Indiana University.
- Levin, J. (1985) *A Metrical Theory of Syllabicity*, Doctoral Dissertation, MIT, Cambridge, Massachusetts.
- Levin, J. (1987) "A place for lateral in the feature geometry," paper presented at 62nd LSA meeting.
- Mascaro, J. (1987) "A reduction and spreading theory of voicing and other sound effects," ms., Universitat Autònoma de Barcelona.
- McCarthy, J. (1988) "Feature geometry and dependency," in O. Fujimura ed., *Phonetica* 43. 84-108.
- Odden, D. (1978) "Further evidence for the feature [grave]," *Linguistic Inquiry* 9, 141-44.
- Paradis, C. and J. F. Prunet (1989) "Markedness and coronal structure," in the *Proceedings of NELS* 19.
- Paradis, C. and J. F. Prunet (forthcoming) "On coronal transparency," *Phonology* 6.2.
- Poser, W. (1982) "Phonological Representations and action-at-a-distance," H. van der Hulst and N. Smith eds., *The Structure of Phonological Representations*, Part 2, 121-58, Foris, Dordrecht.
- Poser, W. (1985) "There is no domain size parameter," *GLOW Newsletter* 14, 66-67.
- Pulleyblank, D. (1986) *Tone in Lexical Phonology*, NLLT Collection, Reidel.
- Sagey, E. (1986) *The Representation of Features and Relations in Non-linear Phonology*, Doctoral Dissertation, MIT, Cambridge, Massachusetts.
- Saltarelli, M. (1970) *A Phonology of Italian in Generative Grammar*, Mouton, The Hague.
- Schein, B. and D. Steriade (1986) "On Geminate," *Linguistic Inquiry* 17, 691-744.
- Steriade, D. (1987a) "Locality conditions and feature geometry," in *Proceedings of NELS*, vol. 17, 595-617.
- Steriade, D. (1987b) "Redundant Values," *CLS*, Vol. 23:2, 339-62.
- Vago, R. (1976) "More evidence for the feature [grave]," *Linguistic Inquiry* 7, 671-74.
- Whitney, W. D. (1889) *Sanskrit Grammar*, Harvard University Press, Cambridge, Massachusetts.