

Alignment, Linking, and Faithfulness

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Lee, Ponghyung. 1997. Alignment, Linking, and Faithfulness, *Studies in Phonetics, Phonology and Morphology* 3, 183-202. The primary aim of this paper is to touch on the antagonistic phenomena associated with Korean sonorants in terms of Correspondence Theory. As a result of the analyses, I contend that the antagonistic phenomena mainly stem from the interactions among the constraints Alignment, Linking and Faithfulness (segmental or featural). First, the dominance of Align over Dep is responsible for *n*-Epenthesis; Second, the constraint against Linking of nasal-front glide or vowel *conjoins* with the OCP to result in *n*-Deletion. Here the edge Crisp of Prosodic Word is crucially called upon; Third, Delateralization is due to the combinatory effect of the constraint against *l* at the left edge of Prosodic Word and the constraint * [+lat, -cor]. (Taejon University)

1. The Issue of Phonological Antagonism

One of the fundamental questions in phonology is to account for the co-existence of phenomena whose ontology holds an opposite character in the analogous context. For instances, assimilation and dissimilation, insertion and deletion, feeding and bleeding, mutual bleeding of two phonological phenomena, etc. In the course of discussion, I will demonstrate that for the adequate explanation of the phenomena addressed in the above, it is proper to rely on the fundamental tenet of Correspondence Theory.

The organization of this paper is: Section 2 concerns the segmental faithfulness resulting from *n*-Epenthesis and its opponent, *n*-Deletion in Korean. Section 3 is concerned with the proper characterization of the featural faithfulness arising from two contradictory operations on *n* % *l* sequences. The final section concludes this study.

2. Segmental Faithfulness

2.1. *n*-Epenthesis

The *n*-Epenthesis in noun compounds is one of the unsolved problems in Korean phonology. Cook (1987), for instance, argues that the traditional view that Sai-sios (ㅅㅅ) is an epenthetic *t* or *n* is misleading and the phenomenon is motivated by gemination rather than epenthesis. Let us look at the following.

- 1) k^hoc^h-ip → [k^hon.nip] 'petal'
 pam-il → [pam.nil] 'night work'
 ramu-ip → [na.mun.nip] 'tree leaf'

Cook's argument against epenthetic *n* is based on the observation that the output [namun.nip] cannot be derived from epenthesis. This fact seems to show that the appearance of double *ns* does not depend upon insertion of a singleton, but upon gemination of *n* which is underlyingly present. However, this type of analysis is untenable. First, the epenthetic *n* appears only before front vocoid *i* or *y* which posits as an initial segment of the second element of compounds. It is obvious that its emergence is predictable. This phenomenon is separated from *t*-epenthesis, which occurs only when the second element of compounds begins with a consonant, i. g, *næt-ka* 'stream side' (cf. *sæ-al* 'bird's egg'). Second, the geminate account of Cook fails to account for why the epenthesis takes place in the presence of the preceding consonant as exemplified in (2).

- 2) a. kamki-yak → [kamgiyak] 'medicine for cold'
 b. mul-yak → [mullak](<mul-nyak) 'liquid medicine'

Another problem with the geminate analysis arises when we consider the more fundamental question why the epenthesis occurs only under the strict morphological condition of compounds. The stipulatory nature of gemination at the morpheme boundary has something to be desired.

Faced with these problems, some kind of patch-up device is not

likely to resolve them. In this regard, I will rely on the expertise of Optimality Theory, particularly Correspondence Theory, to touch on this question. First of all, I argue that *n* is supplied in the process of generating candidates to meet the condition that it is optimal when a prosodic category (syllable in this case) aligns with the morphological category (stem in this case). The condition of alignment is imposed at the *right* edge.

3) Align Right (stem, σ) (Align)

All the stems must be aligned with some syllables at the right edge

The alignment constraint answers the second question above why *n* emerges only when one consonant at coda occurs. Since Align concerns the coda consonant, the absence of coda automatically makes it possible to vacuously meet the requirement. The tableaux (4), (5) call on the dominance of the alignment constraint over the constraint Dep.¹⁾

4)

/k ^h oc ^h -ip/	Align	Dep
k ^h oc ^h .ip	*!	
☞ k ^h on.nip(<k ^h och. nip)		*

5)

/kamki-yak/	Align	Dep
☞ kamgi. yak		
kamgi. nyak		*!

In (4) the first candidate is eliminated by violating the fatal constraint Align, and in (5) the actual output [kamgiyak] fulfills both Align and Dep, so that it appears as output. In the above I mentioned that the

¹ There remains one problem why the epenthetic consonant is *n* rather than the default consonant *t*. In (2a) *n* never emerges unlike in (2b). I propose that *n* is supplied by Gen component within the framework of Optimality Theory, as noted by McCarthy and Prince (1994), Orgun (1994) in which one of the tenet of the standard Optimality Theory (Prince & Smolensky 1993), Consistency is abandoned; all the input structure must remain in the output. Accordingly, partial structural change is available by Gen which was formerly assumed to occur in the phonetic implementation.

alignment constraint concerns the grammatical category stem. This point is related to the question why *n*-Epenthesis occurs only in compounds. Let us look at tableau (6). Tentatively, I assume *Ons* and *Dep* is unordered in the constraint ranking.

6)

	/k'oc ^h -i/	Align	Ons	Dep
	k'o. c ^h i	*!		
3P	k'oc ^h . i		*	
3P	k'on. ni			*

The prediction of the above constraint ranking is incorrect. Even though the first double exclamation marked candidate is the actual form, one of the finger-marked candidates is predicted to be the winner. The problem lies in the kind of categories relevant to the alignment constraint. As seen in (7), *n*-Epenthesis is sensitive not to the stem, but to other categories.

7) a. Stem - Suffix

san-i → [sa.ni] *[sanni] 'mountain SUB'

pic^h-i → [pi.c^hi] *[pinni] (<pic^hni) 'light SUB'

b. Prefix-Stem

tət-yaŋmal → [təŋnyaŋmal] 'outer socks'

cit-ikita → [cinnigida] (<citnikita) 'press indiscriminately'

The output forms in (7a) are problematic in that they clearly violate *Align*. To resolve the problem, we need to revise the constraint *Align* as sensitive to the Prosodic Word rather than to the morphological stem. As mentioned in Han (1994), Kang (1994), the Prosodic Word in Korean is formulated in the following way:

8) Prosodic Word Formation in Korean

a lex⁰[] → w()

b The left element is the head of *w* and strayed elements are adjoined to the left side.

Under this definition of the Prosodic Word in Korean, we need to

redefine the constraint Align as follows:

9) Align Right (ω , σ) (Align)

All the prosodic words align with some syllables at the right edge

The tableau (10) predicts the right output. Specifically, note that the candidate *k'o. c^hi* does fulfill the constraint Align under the new definition of Align.

10)

<i>/k'oc^h-i/</i>	Align	Ons	Dep
<i>k'oc^h. i</i>		*!	
<i>k'o. c^hi</i>			
<i>k'on. ni</i>			*

All the candidates in (10) fulfill Align and other constraints are crucial in the evaluation of candidates. The Korean-specific dominance of Align suffices to predict the non-occurrence of epenthetic *n* between the two bound rooted words like *cip-yo* 'obstinacy' *pil-yo* 'necessity' *kul-yok* 'humiliation' etc.

11)

<i>/cip-yo/</i>	Align	Ons	Dep
<i>cib. yo</i>		*!	
<i>ci. byo</i>			
<i>cim. nyo</i>			*!

Since alignment of prosodic categories is not required *within* prosodic words, the crucial constraints relevant to evaluation are Ons and Dep.

2.2. *n*-Deletion

In Korean, there are strict restrictions on syllable initial positions as follows:

12) Between Consonant and Glide

- a. *pw, *p^hw, *p'w
- b. *cy, *c^hy, *c'y

13) Between Glide and Vowel

- a *yi, *wu, *wo
- b *wi, *yi

Except for the last (13b), Cho (1988) analyses these restrictions in terms of the OCP. Furthermore, Cho notes that even though there is tight tension between glide and vowel and glide and consonant, there is no such kind of restriction between consonant and vowel. For instance, in words *ædi* 'where' and *cis-ta* 'to build INF,' the sequence consisting of coronal consonant and front vowel is freely allowed. However, the interaction between onset and the following vowels is not negligible in Korean.

- 14) a. loan words
 - p^huro 'professional'
 - p'æsi 'bus'
- b. phonological change
 - mɨl > mul 'water'
 - ɨl (unchanged) 'field'

The rounding licensed by the preceding labial consonants shows the interaction between an onset consonant and the following vowel. As noted by Itô, Mester & Padgett (1995), the interaction between *like segments* is not unusual, cross-linguistically. Here notice that the likeliness of interaction between segments is divided into two types according to the position in a syllable; *The likeliness increases in the case of vowel and coda in proportion to shared features, however, whereas between onset and vowel the inverse relation happens.* The universally unmarked syllable type CV is derived from the tendency. When we focus on the interaction between onset and vowel, the generalization can be captured in OT by the following constraint ranking:

- 15) No-Place-Link Constraint Rank
- No-GV-Link, No-CG-Link ≫ No-NG-Link, No-NV-Link ≫ No-CV-Link

Under the constraint hierarchy, the emergence of syllables like *di*, *ci* can be explained as follows: the linking between consonants *d*, *c* and the following vowel *i* are freely allowed since the No-CV-Link between

obstruents and vowels is lowerly ranked. On the other hand, the glide-vowel sequence shares more features and the No-Link constraint is highly ranked and this sequence is prohibited by the OCP.²⁾ If we hypothesize that the No-Link constraint regarding the nasal-vowel sequence is located in the comparatively higher position in the ranking, it would be reasonable to assume that even though the NV sequence is allowed in words like *mul* 'water', *mun* 'door', *mu* 'turnip', (*u* is Labial and Dorsal) in which they do not totally share place node, their link is not allowed between coronal nasal and the accompanying front vowel *i*, *e*, *æ*³⁾ in that two segments at stake totally share place node Coronal.

At this place, notice that the NV sequence is rejected because they violate both No-NV-Link and the OCP. When the sequence *di* violates only one of them, the OCP, it is viable in Korean. This type of cooperation among constraints is conceivable, as designated by the term *local conjunction* by Kirchner (1996). Two constraints may be conjoined to form a derived constraint, which is violated just in case *all the conjoined constraints are violated* within the relevant domain. Note the following tableau.

16)

/nyə-ca/	No-NG-Link & OCP	Max
n ^h yə-ja	*!	
☞ <n>yə-ja		*

² With the ranking relation to the linked structures between segments, I assume that No-NG-Link is ranked high to account for the prohibition of the sequence in (17). However, in the light of the ranking based on the shared features between segments, this ordering is problematic. In general, vowels and glides which are regarded as articulated at the identical places are not distinct regarding their feature constituency. Their differences are generally argued to originate from the position in a syllable. I leave this problem as an open question.

³ The argument for the coronal nature of front vowel has been presented in terms of the triggering behaviors of front vowels of palatalization of the preceding consonants. This account implies the redefinition of feature [coronal] and palatalization, as done by Clements (1976), Hume (1995). However, the relevance of tongue height to the OCP violation is rather intricate. For example, in Korean, the sequences *ni* is definitely prohibited, while the sequence *ne* is marginally allowed. In contrast, there is no restriction on the syllable type *næ* in Korean vocabulary.

Since the first candidate in (16) violates both No-NG-Link and the OCP, it is eliminated as an optimal output.

Next, let us consider the nasal-glide sequence in the word-internal position. Unfortunately however, the hypothesized ranking gives rise to incorrect output as shown by (17).

17)

/nam-nyə/	No-NG-Link & OCP	Max
!! nam.nyə	*!	
☞ nam.<n>yə		*

At this point, reconsider the local conjunction of No-NG-Link and the OCP. The function of the OCP in phonology is to prohibit the identical segment or features, although the precise definition is yet to be reconsidered (cf. Padgett 1992). Thus, the structure where a segment already shares a salient feature [nasal] with its neighbor in *nam.nyə*, we must interpret that the OCP is observed. The first candidate of the tableau (17) violates only No-NG-Link and it is saved.

18)

/nam-nyə/	No-NG-Link & OCP	Max
☞ nam.nyə	(only No-NG-Link)	
nam.<n>yə		*!

Here, notice the interaction between ambisyllabicity and linked structure. In general, the intervocalically posited consonants in Korean are considered as ambisyllabic (cf. Iverson & Kee-Ho Kim 1987). Note the *n*-Deletion in the following compounds.

- 19) nampu-nyətə → [nambuyədæ] 'carrying on one's back
and on his wife's head'
ihwa-nyətə → [ihwayədæ] 'Ihwa Woman's Univ'
kuksa-nyəntə → [kuksayəndæ] 'chronicle of national history'

Cross-linguistically, the problem of linked structure is discussed by Itô & Mester (1994) in terms of the constraint for the crisp edges of a category, which is defined as (25).

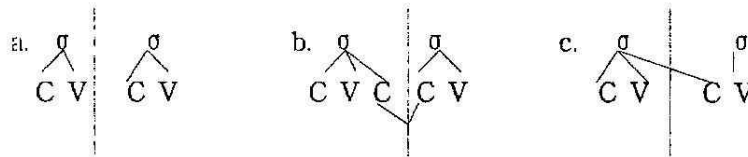
20)

Crispness Constraint (Crisp)

Let A be a terminal substring in a phonological representation,

C is a category of type PCat, and A be the content of C. Then C is crisp if and only if A is a PCat.

21)



When the configurations are concerned with Align Left (c, σ), unlike McCarthy & Prince (1994), Itô & Mester (1994:12-15) defines that only configuration (21c) violates the Align Left and (21b) as well as (21a) fulfills the alignment constraint. In other words, Itô & Mester regard the subsegmental linked structure as not violating the alignment constraint. The requirement on sharp edges which is called the crispness constraint is separated from the alignment constraint itself. If we accept this reinterpretation of the alignment constraint, ambisyllabicity can be licensed when the crispness constraint is not imposed between the syllable boundaries. However, the blocking of ambisyllabicity at the Prosodic Word boundary can be captured by the crispness constraint, that is the crispness constraint is operative at the Prosodic Word boundary. It follows that the exclusive belongingness of *n* to the second element in compounds in (19) leads to violation of the locally conjoined constraint No-Link-NG & OCP.

22)

/lihwa-nyəɾæ/	No-NG-Link & OCP	Crisp	Max
ihwa.ˆnyəɾæ		*!	
ihwa.<n>yəɾæ			*
ihwa. nyəɾæ	*!		

The crucial point in tableau (22) is that the crispness constraint on a category edge is imposed only on the right side of the Prosodic Word. It is important to differentiate compounds (19) from simple words like *namnyə* 'man & woman,' *pikuni* 'female monk'.

This analysis implies that the so called Melisoli Kyuchik (Word-Initial Avoidance) can be explained as the cooperative effect of constraints No-NG (NV)-Link & OCP and Crisp at the Prosodic Word boundary.

In the next section, I will discuss another phonological aspect of Word-Initial Avoidance in Korean, the avoidance of lateral sound at the word initial position.

3. Featural Faithfulness

As shown in (23), the nature of mutual bleeding of two antagonistic processes of Lateralization and Delateralization gives rise to ordering paradox in the traditional derivational analyses.

- 23) a. sil-næ → [sillæ] 'inside'
mal-nyən → [mallyən] 'one's latter days'
- b. p^hul-næim → [p^hullæim] 'smell of grass'
pul-napaŋ → [pullabaŋ] 'garden tiger moth'
- c. pulill-nolæ → [purilloræ] 'song to sing'
ol-nyəca → [ollyəja] 'woman to come'

As demonstrated above, the adjacency of *n* and *l* suffices to result in the germinate output *ll*. It occurs between two bound roots (27a), free stems (27b), phrasal level (27c). However, the reverse direction of the assimilatory operation is not quite permissive.

- 24) a. wən-læ → [wəllæ] 'originally'
cin-li → [cilli] 'truth'
- t. p^hyocun-lilon → [p^hyojunn] *[p^hyojulliron] 'standard theory'
cikkwən-lamyon → [cikkwənnamyon] *[cikkwəllamyon]
'abuse of power'
sinpun-loc^hul → [sinbun-noc^hul] *[sinbullochul] 'exposure
of one's status'
- c. manan-loin → [manannoin] *[manalloin] 'the old man
I met'
copin-lopyən → [cobinnobyən] *[cobillobyən] 'a narrow
roadside'

Unlike the case of (23), the assimilatory process between nasal and

lateral consonant is confined to the case (24a). Before we analyze the data, let us examine the previous derivational analyses based on rule ordering. Han (1994) recognizes the ordering paradox which is indispensable in the serial application of phonological rules. She notes that Lateralization occurs between root compounds and it has priority over Delateralization, as displayed in (24a). On the other hand, on the compound or phrasal level, as in (24b) and (24c), Delateralization has priority over Lateralization. Her solution for the problem relies on application domain and cyclicity of rules: the domain of Lateralization is unlimited and it is cyclic, whereas Delateralization is noncyclic and its domain is Prosodic Word. Note the following derivation:

25)	(cin-li)ω	(sil-ræ)ω	(p ^h yocun)ω	(lilon)ω	(cyclic domain)
	l	l	---		Lateralization
<hr/>					
	---	---	n		(noncyclic domain)
					Delateralization
	[cilli]	[sillæ]	[p ^h yojunnron]		phonetic representation

Even though the cyclic analysis is successful in the resolution of the ordering of mutual bleeding processes, this type of analysis is subject to some criticism. First, if Delateralization is invoked as Domain Juncture Rule in the sense of Selkirk (1986), which applies at the Prosodic Word-initial position, it is difficult to account for the Delateralization at the word-internal position as in (26)

26)	koŋ-lo	→	[koŋno]	'merits'
	sim-li	→	[simni]	'psychology'
	liŋ-lyək	→	[niŋnyək]	'ability'

If Delateralization takes place to fulfill the condition imposed on the word-initial position, emergence of the nasal consonant at the word-medial position is strange. When a sequence does not satisfy the structural description of a rule, we expect that the sequence remains intact. Even though Delateralization can be regarded as responsible for the disappearance of *l* in the word-initial position, as assumed by

traditional Word-Initial Avoidance, the appearance of *l* (or flap sound *r*) in (27) is attributable to ambisyllabicity of lateral at the intervocalic position, as argued by Suh (1993), Iverson & Kim (1987).

- 27) *k^hwæ-lak* → [*k^hwarak*] 'pleasure'
 su-lo → [*suro*] 'a waterway'
 mi-lyən → [*milyən*] 'stupidity'

The ambisyllabicity of the lateral in the process of syllabification enables it to be posited in a special position and ultimately exempts it from Deateralization.

Another problem with the cycle-driven analysis is that cyclic phonology is thought to require serial derivations, but serial derivations doom to be unacceptable in Optimality Theory. Recent work in Optimality Theory claims that cyclic effects are an epiphenomena resulting from constraints on alignment between edges and metrical constituents. As McCarthy & Prince (1994:37) points out, the cyclic analysis is fraught with difficulties. For example, Inkelas (1989) argues that bound roots are not cyclic domains, but some language like Axininca Campa shows that they must be cyclic domains.

Let us view the scenery from a different angle. In the first place, let us concern Lateralization from left-to-right direction across any type of boundaries. Under OT framework, I propose that Liquid/Nasal sequence is disallowed by the constraint (28).

- 28) Constraint on Nasal-Liquid Link (N/L Link)
 Adjacent nasal/liquid are linked.

As discussed by Rice & Avery (1991), this type of constraint is attested universally, as exemplified in English (level 1), Klamath, Ponapean, Toba Batak, which gives rise to geminate nasals or liquids *nn*, *rr*, *ll* etc. from the nasal-liquid sequences *nr*, *rl*, *nl* etc. As far as Korean is concerned, this constraint is assumed to be ranked high in the constraint dominance relation. Since geminate laterals guarantee the optimal output, N/L Link is to dominate the IO Identity.

29) a. Link from Left-to-Right

/sil-næ/	N/L Link	IO Ident
sil. næ	*!	
sil. læ		*

b. Link from Right-to-Left

/cin-li/	N/L Link	IO Ident
cin. li	*!	
cil. li		*

For the completeness of explanation, we must account for the interaction between N/L Link with another constraint which addresses the avoidance of liquid at the left edge of Prosodic Word. For this purpose, the following constraint is introduced.

30) *[lat]

[+lateral] is prohibited at the left edge of prosodic word

By this conceptualization, the seemingly (non)cyclic effect of Delateralization is obtainable from constraint (30) which serves the function of being an anti-alignment constraint, as phonologists usually assume that cyclic effects are an epiphenomenon of alignment. In this regard, we are on the right track up to now.

Next, let us examine the interaction of the constraints Align Right (ω , σ) and N/L Link. One significant problem arises here. Even though the constraint Align demands all the segments within Prosodic Word must exclusively belong to the domain, the constraint N/L Link requires the linking across the boundary of Prosodic Word. It is serious when we regard all the linked structure at the relevant juncture as violating the alignment constraint. Before we solve the problem, let us examine the following configurations.

In section 2.2, we noted that the crispness constraint functions to license *n*-Deletion in compounds and contended that crispness of the Prosodic Word boundary is required in Korean. However, the allowance of N/L linking across the Prosodic Word boundaries in compounds is problematic in this regard. But it is not problematic in the Optimality

framework. The dominance relation of the constraints N/L Link and Crisp resolves the problem.

31)

/pul-napan/	N/L Link	Crisp	IO Ident
pul. laban		*	*
pul. naban	*!		

Since the N/L Link constraint dominates Crisp, the violation of the latter is less fatal than the violation of the former. Then, why is the nasal-lateral sequence in compounds, as in (24b), not altered by the nasal-lateral linking? The effect of blocking Lateralization by applying Delateralization before Lateralization within the domain of Prosodic Word (Han 1993, 1994) is invisible in the process of parallel evaluation of available candidates in OT. As pointed out by Orgun (1994), it is still an unsettled matter whether the mechanism of OT is good enough to accommodate all the contributions made by the cyclic analyses. In this paper, I claim that constraint (30) suffices to replace the cyclic analysis in explaining the avoidance of lateral sound at the left edge of Prosodic Word. The constraint is so undominated that it never permits lateral sounds at the left edge of Prosodic Word. Note the following tableau.

32)

/cikkwən-lamyon/	*[lat]	N/L Link	Crisp	IO Ident
cikkwən. lamyon	*!	*		
cikkwəl. lamyon	*!		*	*
cikkwən. namyon		*		*

Since the constraint *[lat] is so undominated that other constraints have no chance to exert influence in evaluating candidates as output. Thus the constraint is successful in effecting the notion of cyclicity.⁴⁾

Another issue associated with the avoidance of lateral sound at left edge of Prosodic Word is its feeding relation to *n*-Deletion.

⁴ I assume the model of feature geometry in which lateral and nasal consonant share a higher node and the feature [lateral] is marked, whereas the feature [nasal] is unmarked and underspecified.

- 33) lica → [nija] → [ija] 'interest'
 limyən → [nimyən] → [imyən] 'inside'

As discussed in section 2.2, *n* is disallowed in front of front vowel *i* and glide *y*. We analyzed the deletion of *n* in terms of the working of a conjoined constraint, No-NG(V) Linking & OCP. The chain changes are a great challenge to OT in that in this framework the one level evaluation of candidates does not permit any intermediate level. As we already mentioned in the discussion of cyclicity of *n/l* alternations, the monotonicity of evaluation procedure in OT requires us to reshuffle the former analyses which relied on the intermediate levels in the derivational process. In this case, the Prosodic Word-initial sequence *li* violates *[lat] and the candidate *nija* does not fulfill the No-NV-Link & OCP constraint. Note the following.

34)

/lica/	*[lat]	No-NV-Link & OCP	Max	IO Ident
lija	*!			
nija		*!		*
☞ <l>ija			*	

Next, consider the interaction between the constraints *[lat], No-NG(V)-Link & OCP, and N/L Link. Note the *l*-Deletion in the following:

- 35) rucən-lyənlak → [mujənyəllak] 'radio contact'
 p^hyocun-lilon → [p^hyøjuniron] 'standard theory'

The dominance of *[lat] over N/L Link and other faithfulness constraints accounts for the blocking of linking between nasal and lateral sounds in favor of deletion of *l*, as shown in (36).

36)

/p ^h yocun-lilon/	*[lat]	N/L Link	Crisp	IO Ident
p ^h yøjunliron	*!	*		
p ^h yøjulliron	*!		*	
☞ p ^h yøjun<l>iron				*

Still, one unsolved problem remains here. Aside from the forms of (35), the better pronunciation of (35) is the forms with double *ns*, as *mujønny əllak*, *phyojunniron*. In the light of the constraint on the right edge of the Korean Prosodic Word, the predicted output in (36) violates the alignment constraint by syllabifying the final consonant *n* into the onset of the following syllable, i.e. *p^hyoju niron*. Exemption from the effect of Align by ambisyllabicity is not allowed. As pointed out earlier, the crispness constraint blocks ambisyllabicity at the Prosodic Word boundary. As a result, it is safe to conclude that the output in (35) arises when the compounds are interpreted as simple words. When we see the words as compounds, this type of pronunciation is never likely to occur. The output can be predicted by assuming the following hierarchy: *[lat] » Align » No-NV-Link & OCP » N/L Link » Crisp.

37)

/p ^h yojun-liron/	*[lat]	Align	No-NV-Link & OCP	N/L Link	Crisp
p ^h yojun.liron	*!			*	
p ^h yojul.liron	*!				*
p ^h yojun.niron			*		
p ^h yoju. n<l>iron		*!			

Tableau (37) shows that the violation of Align with the fourth candidate eliminates its status as winner. The same thing happens in the following:

38)

Single PW

Double PWs

- a. ac^him-isil → (ac^hi. misil)ω (ac^him)ω (nisil)ω 'morning dew'
 b. sac^hon-imo → (sac^ho. nimo)ω (sac^hon)ω (nimo)ω 'mother-in-law'
 c. simcaŋ-isk → (simjaŋ. isik)ω (simjaŋ)ω (isik)ω 'heart transplant'
 d. imun-lon → (imullon)ω (imun)ω (non)ω 'phonology'
 e. sinmun-lo → --- (sinmun) (no) 'Shinmun Avenue'

In (38ab) the interpretation of the input as simple words (that is a single Prosodic Word) results in no *n*-Epenthesis in violation of the alignment constraint, whereas the compound interpretation (double Prosodic Words) of the righthand column produces *n*-Epenthetic outputs

and abides by the alignment constraint. In contrast, in (38c), we get no difference in both columns. It is due to the syllable structure in Korean, that the velar nasal is impermissible as a legitimate onset. In the case of (38d), the linking of the feature [+lateral] into the preceding nasal is permitted only within the domain of Prosodic Word, which is out of the influence of the constraint, *[lat]. For the last case of *summun-lo*, I speculate the productiveness of the suffix-like morpheme in the formation of street name, promotes it to the status of an independent lexical item and for this reason, it shows its invariance.

The same explanation can be employed to the following.

- 39) a. səul-nyək (səul)ə (lyək)ə 'Seoul Station'
 t̪, t̪əku-nyək (t̪əgu)ə (yək)ə 'Təgu Station'

The crucial point here is the constraint dominance relation proposed so far: N/L Link » Crisp » Max. While in (39a) the dominance of N/L Link permits linking, in (39b), deletion of *n* is allowed by ranking Crisp at the Prosodic Word boundary higher than Max.

For the sake of completeness in explanation, I adduce the following variations.

- 40) p^hiryo ~ p^hillyo 'necessity'
 toŋyæŋ ~ toŋnyæŋ 'a person's name'
 yuk-io ~ yuŋ-io 'Korean War'

The variations arise due to the difference in input structure. The (quasi)-geminated outputs are owing to the presence of the *n* at the input level. Note the following tableau.

41)

/p ^h il-nyo/	No-NG-Link & OCP	Max	IO Ident
p ^h il nyo	*!		
p ^h il ^h yo			*
p ^h il <n>yo		*	

The interpretation that the linked structure enables the second candidate to fulfill the constraint No-NG-Link & OCP leads us to correctly predict the output *p^hillyo*.

So far, I have delayed the discussion of the problem that among the *n/l* sequences the linked structure is allowed only when the nasal at stake is coronal to the exclusion of other nasal consonants *m, ŋ*. Cho (1988) argues that it is due to the Structure Preservation.

42) **[lateral, -coronal]*

Since in Korean lateral articulation is confined to coronal place, the potential lateralization of the adjacent nasals of labial or velar place is blocked by the Structure Preservation. Shinsook Lee (1993) tries to analyze this phenomenon in the same direction. When we translate the analysis into OT, it is arguable that 42) dominates the N/L Link.

43)

/koŋ-lo/	* <i>[lat, -cor]</i>	N/L Link	IO Ident
koŋ-lo		*!	
koŋ-no			*
koL-lo	*!		*

The optimal output violates only the trivial constraint of feature faithfulness. By the same token, the linking of feature [lateral] from left-to-right is prohibited in the words like *hal. mani*.

4. Conclusion

The alternations associated with Korean sonorant show intricacies and a constraints-based approach in OT is successful in providing an adequate explanation. The crucial point in our argument is the dominance relation among relevant constraints. The overall ranking can be schematized as follows:

- 45) **[lat]* » Align » NO NG-Link & OCP, **[lat, -cor]* » N/L Link,
Crisp » Dep, Max » IO Ident

One crucial idea in this ranking relation among constraints is that the requirement of a crisp edge at the Prosodic Word boundary is imposed to the exclusion of ambisyllabicity at this position. The combined effect

of the alignment at the right edge and *[lat] at the left edge of Prosodic Word suffices to take place of the notion 'cyclicity' in Korean phonology. Another is the idea that the cooperation between two constraints can be captured by local conjunction of relevant constraints. I relied on this concept to explain the *n*-Deletion before coronal vocoids by conjoining No-NG(V) Link and OCP. The dominance of *[+lat, -cor] over N/L Link explains the blocking of linking of a velar or labial nasal consonant to adjacent laterals.

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