Coda condition and licensing in place assimilation*

Sechang Lee
(Sookmyung Women's University)

Lee, Sechang. 2001. Coda condition and licensing in place assimilation. *Studies in Phonetics, Phonology and Morphology* 7.2. 353-373. This paper aims to propose a licensing constraint responsible for triggering assimilated or linked structure in phonology. It will be noted that while Lombardi (1999)'s proposal is adequate descriptively, but it has a problem in extending her analysis to place assimilation. The fact that the direction of place assimilation is typically regressive constitutes very strong evidence for the licensing approach to assimilation. As I will show in this paper, a translation of place assimilation analysis into the OT with licensing and alignment constraints allows a theoretically consistent explanation. I begin with the Korean paradigm and develop a theory of place assimilation in general. Then, I will show that the theory has the advantage of handling the variation among the place assimilation effects of other language, English. It will be shown that the interlinguistic variation among Korean and English lies in the re-ranking of a single constraint in the relevant constraint hierarchy. **(Sookmyung Women's University)**

Keywords: assimilation, licensing, alignment, markedness constraint, place feature

1. Introduction

The goal of this paper is to explore the nature of a universal markedness constraint responsible for triggering place assimilation. Several attempts have been made in the recent literature to provide a deeper understanding of assimilation within the framework of the Optimality Theory (OT, henceforth) in the sense of Prince & Smolensky (1993) and McCarthy & Prince (1995).

One explanation that has been offered by Lombardi (1999) for the assimilation property is based on the idea that the spreading imperative is the 'AGREE' which is stated very specifically to apply to certain features in a certain context. Based on her proposal, place assimilation would be analyzed all the following lines:

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(1)

Candidates	AGREE(place)	MAX-IO(place feature)
a. [+cons] [+cons] | | Place Place	*!	
☞ b. [+cons] [+cons] \ / Place		*

I argue that the AGREE(place) is not designed in such a way as to reflect the unmarked status of universal constraints. Adopting an analysis along these lines raises a question as to why consonant clusters in general do not reduce to a single place node across languages. That is, any such clusters that have more than two consonants (2a) do not result in an assimilated place node (2b), as shown below:

(2) a. [+cons] ….. [+cons] ⇒ b. [+cons] ….. [+cons]
| ….. | \ ….. /
Place ….. Place Place

In failing to capture the fact that the output structure in (2b) is not attested, the AGREE(place) is unlike ONS or NOCODA in the sense of Prince & Smolensky (1993). Hence the doubtful status of the constraint as a universal one.

In what follows, I propose that a licensing constraint be superior to Lombardi's constraint, in that (i) the former reflects the unmarked status of place features in coda position, and (ii) the former dispenses with a separate constraint to deal with the direction of assimilation while the latter entails it. It will be shown that place assimilation is a constraint interaction effect, and not a constraint by itself.

2. The paradigm

In Korean, a coronal obstruent, whether oral or nasal, optionally assimilates in point of articulation to the following consonant (3a, b). Labials also optionally assimilate in point of articulation to a following velar consonant (3c), but not to a coronal consonant (3d). Velars do not assimilate in any case (3e, f):

(3) Place assimilation in Korean

a. coronal ⇒ labial

/kitpal/	→	[ki**p**˺.p'al]	'flag'
/nunmu/	→	[nu**m**.mul]	'tears'

b. coronal ⇒ velar

/kunki/	→	[ku**ŋ**.gi]	'military discipline'
/pat + ko/	→	[pa**k**˺.k'o]	'to receive and …'

c. labial ⇒ velar

/kamki/	→	[ka**ŋ**.gi]	'a cold'
/nop + ko/	→	[no**k**˺.k'o]	'to be high and …'

d. *labial ⇒ coronal

/nop + ta/	→	[nop˺.t'a], *[not˺.p'a]	'to be high'
/pap + to/	→	[pap˺.t'o], *[pat˺.t'o]	'rice also'

e. *velar ⇒ coronal

/pokto/	→	[pok˺.t'o], *[pot˺.t'o]	'a corridor'
/kaŋnam/	→	[kaŋ.nam], *[kan.nam]	'the south of a river'

f. *velar ⇒ labial

/koŋ.pu/	→	[koŋ.pu], *[kom.pu]	'study'
/kukmul/	→	[kuŋ.mul], *[kum.mul]	'soup'

(C: plain consonant; C˺: unreleased consonant; C': tense consonant)

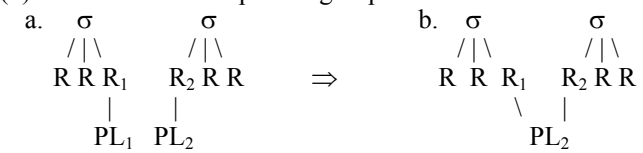
Now, a question arises as to why only certain types of place assimilation are found in the language. In this paper, I aim to answer this question by showing how the varied assimilatory effects are derived from the theory of constraint interaction incorporating a licensing constraint.

3. Earlier treatments

3.1 Derivational model

All the patterns of place assimilation to be discussed in this paper can be captured in derivational models. In such models, each assimilatory process can be expressed through a different autosegmental rule. The blocking of spread can be expressed either by adding conditions to the rule or the representation. However, what any such model misses is a clear generalization that all of those processes have the effect of avoiding a configuration in which two consonantal place features are adjacent across a syllable boundary, as illustrated below:

(4) Assimilation as a spreading of place node



(σ: syllable node; R: root node; PL: place node)

In an early derivational model since Chomsky & Halle (1968), it would be entirely a coincidence that across languages there are changes that have the effect of modifying the structure of the form (4a) into the structure that does not have adjacent consonantal place nodes across syllable boundary (4b). Thus, it fails to capture the fact that the structure in (4b) is widely attested across languages.

In a later development of derivational models, the same effect as in (4) can be attributed to a derivational output constraint in the sense of Kisseberth (1970). According to this model, the application of a phonological rule is blocked if it would create a violation of the (arguably universal) constraint. But such a model still fails to explain why there are abundant surface exceptions to the constraint: e.g., there are consonant clusters that do not undergo place assimilation, such consonant clusters of Korean as labial-coronal, velar-coronal, velar-labial, etc. One could come to a conclusion that the constraint is not universal. Then, it is difficult to capture the generalization that the configuration in (4b) is favored cross-linguistically.

3.2 Lombardi's proposal

Lombardi (1999) proposes an OT analysis of the laryngeal neutralization and voicing assimilation typology. The striking feature of the explanation developed in her work is that the markedness constraint AGREE enforces voicing assimilation in obstruent clusters. And the direction of voicing assimilation of consonant clusters is a result of the interaction of a constraint requiring voicing agreement (5) with constraints on positional faithfulness (6).

(5) AGREE: Obstuent clusters should agree in voicing

(6) Faithfulness constraints
- a. IDENONSET(Laryngeal)
  : Consonants in the onset position should be faithful to underlying laryngeal specification
- b. IDENT(Laryngeal)
  : Consonants should be faithful to underlying laryngeal specification

Thus, where the members of an input cluster disagree in voicing, the only way to satisfy AGREE will be for the coda to assimilate to the voicing of the onset. Consider a case of Yiddish (Lombardi 1999: 280):

(7) Direction of Voicing Assimilation (Yiddish)

/bakbeyn/	AGREE	IDENONSET(Laryngeal)	IDENT(Laryngeal)
a. bak.beyn	*!		
☞ b. bag.beyn			*
c. bak.peyn		*!	*

In the tableau above, (7a) crucially violates AGREE because it has an obstruent cluster that is not uniform in voicing. In contrast, the cluster in (7c) agrees in voicing and so satisfies AGREE at the expense of violating the two faithfulness constraints. Therefore, (7b) wins out.

Lombardi concludes that the phonology of place assimilation seems to call for a very similar account, as Padgett (1995) independently argues. That is, the important position for faithfulness to place features is the same as for laryngeal features, and Padgett justifies a similar cluster assimilation constraint for place. Therefore, this approach has some amount of appeal in that it suggests the extension of the voicing analysis to other cases of assimilation as a direction for future research, particularly for place assimilation. However, I argue in this paper that her analysis of voicing assimilation cannot be extended to analyzing place assimilation. I claim that there is a couple of important problems in extending her analysis.

Firstly, the constraint AGREE is not inherently directional: direction of assimilation will be a constraint interaction effect. My prime motivation for revising Lombardi's AGREE is the observation that the pattern of place assimilation is typically regressive[1], as is clearly shown in (3a, b, c) and repeated below in (8):

(8) Regressive direction of place assimilation in Korean

a. coronal ⇒ velar
   /kunki/ → [kuŋ.gi], *[kun.ti] 'military discipline'

b. coronal ⇒ labial
   /kitpal/ → [kip˥.p'al], *[kit˥.t'al] 'flag'

c. labial ⇒ velar
   /kamki/ → [kaŋ.gi], *[kam.pi] 'a cold'

[1] Syllable onsets are more likely triggers in place assimilation than codas while codas are more likely targets than onsets (Jun 1995: 85).

Secondly, a major point made by Prince & Smolensky (1993) is that the so-called 'Universal Constraint' in OT must be designed so as to reflect the unmarked status of the phonological patterns. In this regard, positing such a universal markedness constraint as AGREE raises a theoretical problem. It fails to explain why languages prefer an assimilated (or linked) structure (4b) to an unassimilated one (4a). This point becomes even more interesting when one considers it in conjunction with the generalization that a geminate (i.e., linked) structure is more marked than a plain one. Then, it becomes unclear why the AGREE, as a universal constraint, regards a marked (i.e., assimilated) structure as an unmarked one.

4. The proposal

4.1 Licensing place features

Since Itô (1986), a negative condition on syllable coda has been considered in the literature (Goldsmith 1990; Lombardi 1991, among others) for the purpose of ruling out particular configurations syllable-finally. One version is given below in (9); all consonantal place is ruled out syllable-finally (or remain unlicensed):

(9) Coda condition (Itô 1989: 224)

*C]$_\sigma$
|
Place

However, the Coda Condition does not apply to the languages which allow consonant clusters across syllables without place assimilation (English, Korean, etc). In order to account for the patterns of those languages, I propose to move away from the negative condition to a licensing constraint which is defined as exhaustive domination:

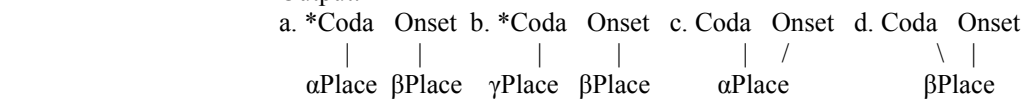
(10) LICENSE (consonantal place)
: Coda must not license consonantal place features, where licensing is defined as a single association

The LICENSE has the effect of prohibiting (11a) and (11b), but allowing (11c) and (11d):

(11) Input: R R (R = [+cons, -son])
| |
αPlace βPlace

⇓ LICENSE (consonantal place) Applied

Output:



(11a) is faithful to the input: it violates the LICENSE with the coda solely dominating the underlying αPlace. (11b) is also in violation of the LICENSE due to the default insertion of γPlace after a complete loss of the original αPlace. Both (11c) and (11d) satisfy the constraint because the place features are doubly-linked: onsets license place features.

My claim is that place assimilation is a strategy of avoiding those configurations in (11a) and (11b). I argue that the OT allows us to capture the various effects of place assimilation through the ranking of the LICENSE with a set of faithfulness constraints. In OT, the LICENSE is not inviolable, which is how the cases of failed assimilations will be accounted for: they violate the LICENSE due to higher-ranking constraints. From the OT perspective, deletion of a segment means that some constraint dominates MAX-IO(segment), a member of the MAX constraint family, as illustrated in (12):

(12) MAX-IO(segment): Every segment in the input has a correspondent in the output

Given this, we can account for the deletion of a place feature in the target of place assimilation by ranking the LICENSE over MAX-IO(place feature) as shown in (13):

(13) LICENSE » MAX-IO(place feature)

We can see the effect of this ranking in the following tableau, which illustrates how the candidate with one place feature deleted is chosen by the constraint hierarchy:

(14) Input: /[+cons] [+cons]/
| |
Place Place

Candidates	LICENSE	MAX-IO(place feature)
a. [+cons] [+cons] | | Place Place	*!	
☞ b. [+cons] [+cons] \ / Place		*

Korean provides evidence that the LICENSE is violable, since there are abundant exceptions to it. One example is the velars that do not undergo place assimilation in coda. This implies that the LICENSE is violable and can be ranked below a relevant faithfulness constraint:

(15) MAX-IO(velar) » LICENSE

Even if the LICENSE is ranked low, it can still have its effect. In Korean, coronal and labial consonants are typically the target of place assimilation (see (3)). The following constraint ranking forces the place assimilation:

(16) LICENSE » MAX-IO(lab) » MAX-IO(cor)

It is then highly significant that even the dominated constraint, LICENSE in (15), may be active as in (16) when MAX-IO(velar) is not relevant. In this regard, OT is sharply distinguished from the derivational approaches. Any model based on parameters or rules sees any linguistic principle in all-or-nothing terms. In OT, the LICENSE may be violated, but in a particular domain it is obeyed exactly. In that particular domain, the structure unmarked with respect to the LICENSE emerges, and the structure marked with respect to it is suppressed.

From (15) and (16), we obtain the following ranking by transitivity:

(17) MAX-IO(velar) » LICENSE » MAX-IO(lab) » MAX-IO(cor)

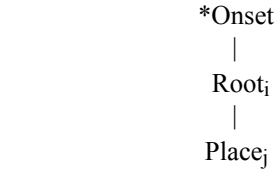
Each of the faithfulness constraints in (17) assesses a violation for each input element that does not have an output counterpart: the hierarchy of those constraints means that velars are less likely targets than labials, which in turn are less likely targets than coronals.

4.2 Onset as trigger

Within syllable onset clusters, consonants do not undergo place assimilation. I claim that the onsets be protected by certain constraint

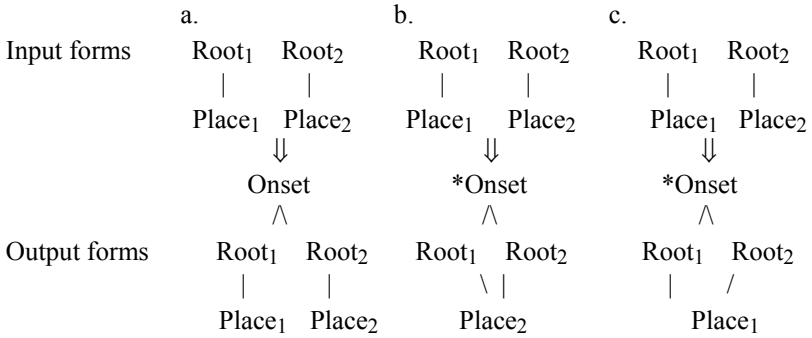
which ensures that the coda, not the onset loses place features. To express this insight in terms of a constraint, I propose a markedness constraint below, which will account for why syllable onsets are not subject to place assimilation:

(18) COINDEX(onset)



I assume that every underlying place node is coindexed with its mother node, i.e., root node. Then, the COINDEX(onset) assigns an '*' when an onset root node dominates a place node with a different index (i.e., the root has 'i', but the place node has 'j') as in (18). The following diagram explains how the constraint is to be interpreted. Crucial candidates are portrayed below with their input forms:

(19) Constraint (18) Applied

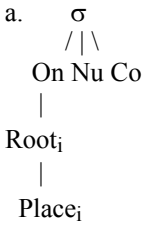


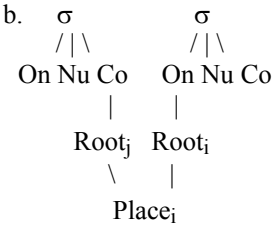
In case of (19a), each of the two roots is coindexed with its own place both at output and input forms. Therefore, the constraint COINDEX(onset) is not violated. Cases like (19b) and (19c) characterize a situation of place assimilation, and are exactly what the constraint looks for. Root$_1$ dominates Place$_2$ in (19b), and Root$_2$ dominates Place$_1$ in (19c). These two cases violate the constraint in question since they have different indices. Therefore, place assimilation cannot take place within onsets.

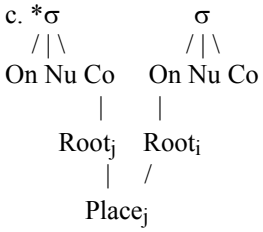
In addition, the COINDEX(onset) provides an explanation for why the syllable onset is typically the trigger of place assimilation rather than

syllable coda. Its effect is to allow structures like (20a, b) and forbid such surface structures as (20c):

(20) The effect of COINDEX(onset)

a.


b.


c.


In (20a), the root and the onset place are coindexed, so it satisfies the COINDEX(onset). The same explanation can be given for (20b); one thing to note here is that $Root_j$ and $Place_i$ have different indices, but COINDEX (onset) is not violated since $Root_j$ is in coda. (20c) is the very configuration the constraint prohibits: the onset $Root_i$ dominates $Place_j$.

After all, if the COINDEX(onset) is undominated in the constraint hierarchy, place assimilation will never occur within syllable onset. Besides, the generalization is captured that syllable coda is typically assimilated in place to the following onset.

4.3 Alignment constraints

The result of place assimilation is a linked structure, as shown in (4) above. I assume that there is a constraint in Universal Grammar that militates against the linked structure. The constraint is in conflict with the LICENSE which forces a linked structure, and the resolution of the conflict is determined by the hierarchical ranking of the constraints. For example, in case the constraint against the linked structure is ranked above the LICENSE as in (21a), the underlying phonological material would be preserved in the output. If the ranking is reversed as in (21b), a linked structure obtains.

(21)

a.

	No Linked Structure	LICENSE
☞ Candidate$_1$		*
Candidate$_2$	*!	

b.

	LICENSE	No Linked Structure
Candidate$_1$	*!	
☞ Candidate$_2$		*

I propose that the constraint against linked structure be represented as in (22), revising the BASIC ALIGNMENT (BA, henceforth) in the sense of Cole & Kisseberth (1993):

(22) BA (PL$_i$; Root$_i$)
: Every place node must be aligned with its underlying mother node (i.e., root node)

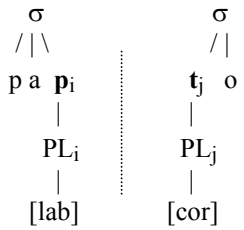
In fact, the COINDEX(onset) in (18) is deduced from this alignment constraint. Therefore, (22) is independently motivated and positing (22) as a universal constraint does not complicate the grammar in question. And I claim that the BA family explodes into two separate components: BA (Coronal place$_i$; Root$_i$) and BA(Noncoronal place$_i$; Root$_i$). They are ranked in such a way as to express the generalization that noncoronals are the more likely trigger of place assimilation than coronals:

(23) BA(Coronal place$_i$; Root$_i$) » BA(Noncoronal place$_i$; Root$_i$)

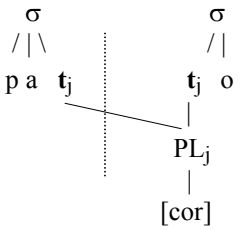
A violation of BA(Coronal place$_i$; Root$_i$) is assessed for each coronal place linking in the output. Examples illustrating its effect are given in (24):

(24)

a. /pap + to/ → [pap ˺.t'o] 'rice also' *satisfies BA(Coronal place$_i$; Root$_i$)*



b. /pap + to/ → *[pat˥.t'o] 'rice also' *violates BA(Coronal place$_i$; Root$_i$)*



(24a) fulfills the BA(Coronal place$_i$; Root$_i$): the coronal place in the onset is coindexed with its underlying mother node (i.e., **t**$_j$ – PL$_j$ – [cor]). But the place assimilated form (24b) violates the BA because of the additional link to the coda of the preceding syllable: the onset place node with an index 'j' is linked to t$_i$ and t$_j$ at the same time.

Taking all the constraints introduced so far, the overall constraint hierarchy will be as shown below in (25):

(25) Constraint hierarchy for place assimilation in Korean
: COINDEX(onset) » BA(Coronal place$_i$; Root$_i$) » MAX-IO(velar) » LICENSE » MAX-IO(lab) » MAX-IO(cor), BA(Noncoronal place$_i$; Root$_i$)

The sub-ranking 'MAX-IO(velar) » LICENSE' implies that the input-output identity of velars (in coda) forces the violation of LICENSE, which accounts for the cross-linguistic pattern that velars are typically not targeted in place assimilation. Labials and coronals are targeted in Korean through the sub-ranking, 'LICENSE » MAX-IO(lab) » MAX-IO(cor)'. In addition, the same ranking forces the coronals to assimilate to labials.

In fact, 'MAX-IO(velar) » MAX-IO(lab) » MAX-IO(cor)' is a universal ranking for the target place. If labials are the target of place assimilation, so are coronals. There are no languages where labials undergo place assimilation but coronals do not. On the other hand, 'BA(Coronal place$_i$; Root$_i$) » BA(Noncoronal place$_i$; Root$_i$)' is a universally fixed ranking to obtain the generalization that if coronals trigger place assimilation, so do noncoronals. In other words, there are no languages in which coronals trigger place assimilation but noncoronals do not. The directionality of place assimilation from onset to coda is encoded in the undominated status of the COINDEX(onset) which protects onsets from losing their underlying place features. In those languages that have progressive assimilation, the COINDEX(onset) can be violated.

5. The analysis

5.1 Korean

In this section, I aim to provide a complete formal analysis of place assimilation patterns in Korean, as illustrated in (3). We observe in Korean that coronals assimilate in place to the following labials or velars. The tableau in (21) illustrates how the proposed constraint hierarchy delivers this effect[2]:

(26) Input: /kit pal/ → [ki**p**˥.p'al] 'flag'

PL	PL
|	|
cor	lab

Candidates	COINDEX	BA(cor)	MAX(vel)	LICENSE	MAX(lab)	MAX(cor)
a. t]$_\sigma$ $_\sigma$[p | | PL PL | | cor lab				*!		
b. t]$_\sigma$ $_\sigma$[t | / PL PL | | cor lab	*!				*	
☞c. p]$_\sigma$ $_\sigma$[p \ | PL PL | | cor lab						*

Note that (26b) crucially violates the undominated COINDEX since the onset loses the original labial place node. That leaves two candidates: the faithful (26a) and the assimilated (26c). This is the case where the LICENSE comes into play in choosing the optimal output. The constraint assigns an '*' for each instance of two consonantal places on adjacent

[2] Due to the limitation of space, I omit the lowest-ranking BA(Noncoronal place$_i$; Root$_i$) from the constraint hierarchies from now on. But it will not affect the result of the evaluation.

syllables, as in (26a). The effect of this constraint depends on its interaction with other constraints in the same hierarchy. We can see that the LICENSE, while low-ranking, is still active. The faithful candidate (26a) loses out by crucially violating the LICENSE. Therefore, (26c) is more harmonic than (26a) or any other competitor. Another possible candidate would be the one in which one of the two segments is completely deleted. I assume that this will be handled by a high-ranking MAX-IO(root), which is not reflected on the tableau.

Almost the same analysis as that in (26) holds for coronals assimilated to velars, as shown in (27):

(27) Input: /kun ki/ → [kuŋ.gi] 'military discipline'

PL	PL
cor	vel

Candidates	COINDEX	BA(cor)	MAX(vel)	LICENSE	MAX(lab)	MAX(cor)
a. n]$_\sigma$ $_\sigma$[k (PL–cor, PL–vel)				*!		
b. n]$_\sigma$ $_\sigma$[t (PL–cor, PL–vel)	*!		*			
☞c. ŋ]$_\sigma$ $_\sigma$[k (PL–cor, PL–vel)						*

As shown earlier, labials assimilate to velars. Again, the same hierarchy in (28) delivers this effect:

(28) Input: /kam ki/ → [kaŋ.gi] 'a cold'

PL	PL

lab vel

Candidates	COINDEX	BA(cor)	MAX(vel)	LICENSE	MAX(lab)	MAX(cor)
a. m]$_\sigma$ $_\sigma$[k | | PL PL | | lab vel				*!		
b. m]$_\sigma$ $_\sigma$[p | / PL PL | | lab vel	*!	*			*	
☞c. ŋ]$_\sigma$ $_\sigma$[k \ | PL PL | | lab vel					*	

Now, let us consider why labials do not assimilate to coronals. The constraint hierarchy in (29) correctly predicts the facts:

(29) Input: /nop + ta/ → [nop˥.t'a] 'to be high'

PL PL
\| \|
lab cor

Candidates	COINDEX	BA(cor)	MAX(vel)	LICENSE	MAX(lab)	MAX(cor)
☞a. p]$_\sigma$ $_\sigma$[t | | PL PL | | lab cor				*		
b. p]$_\sigma$ $_\sigma$[p | / PL PL | | lab cor	*!					*

c. t]$_{\sigma}$ $_{\sigma}$[t \ | PL PL | | lab cor		*!			*	

One thing to note about (29) is that the LICENSE is not active. (29b) and (29c) crucially violate two high-ranking constraints forbidding a linked structure: COINDEX(onset) and BA(Coronal place$_i$; Root$_i$), respectively.

By the same token, velars followed by coronals do not undergo place assimilation. In light of (29), we can expect to find the BA(Coronal place$_i$; Root$_i$) active again, which is shown in (30):

(30) Input: /pok to/ → [pok˥.t'o] 'a corridor'

	PL PL
	| |
	vel cor

Candidates	COINDEX	BA(cor)	MAX(vel)	LICENSE	MAX(lab)	MAX(cor)
☞a. k]$_\sigma$ $_\sigma$[t | | PL PL | | vel cor				*		
b. k]$_\sigma$ $_\sigma$[k | / PL PL | | vel cor	*!					*
c. t]$_\sigma$ $_\sigma$[t \ | PL PL | | vel cor		*!	*			

That velars do not assimilate to the following labials is expected given the ranking of MAX-IO(velar) in the constraint hierarchy in question. This is shown in (31):

(31) Input: /koŋ pu/ → [koŋ.pu] 'study'

	PL PL
	| |
	vel lab

Candidates	COINDEX	BA(cor)	MAX(vel)	LICENSE	MAX(lab)	MAX(cor)
☞a. ŋ]σ σ[p | | PL PL | | vel lab				*		
b. ŋ]σ σ[k | / PL PL | | vel lab	*!				*	
c. m]σ σ[p \ | PL PL | | vel lab			*!			

As can be seen in (31), MAX-IO(velar) plays a crucial role in deciding between (31a) and (31c). Under present constraint hierarchy, other things being equal, it is more harmonic to leave the cluster faithful to the input (31a) than to have it assimilated (31c). As is shown in (31c), *[kom.pu] would induce the deletion of velar place, violating MAX-IO(velar). Therefore, (31a) is determined to be the optimal output.

5.2 English

The system developed so far has the advantage of handling the variation among the place assimilation effects of other languages. In English, only coronals can be the target of place assimilation while in Korean, coronals as well as labials can be targeted. In this section, I will show that the English pattern relies on re-ranking of a single constraint in the present hierarchy for Korean given in (25). The English examples of interest are the following:

(32) Place assimilation in English (expanded on Jun 1995: 166)

a. coronal ⇒ velar
/hɑt kejk/ → [hɑ**k**.kejk] 'hot cake'

b. coronal ⇒ labial
/ten pawndz/ → [te**m**.pawndz] 'ten pounds'

c. *labial ⇒ velar
/lip kwɪkli/ → [lip.kwɪ.kli] 'leap quickly'

d. *labial ⇒ coronal
/ʃɑb tikit/ → [ʃɑb.ti.kit] 'job ticket'
e. *velar ⇒ labial
/ʃæk pɑt/ → [ʃæk.pɑt] 'jack pot'
f. *velar ⇒ coronal
/buk dilər/ → [buk.di.lər] 'book dealer'

The crucial difference in the patterns of place assimilation between English and Korean lies in the re-ranking of MAX-IO(lab) in the hierarchy. While the LICENSE dominates MAX-IO(lab) in Korean (i.e., LICENSE » MAX-IO(lab)), the ranking is reversed in English (i.e., MAX-IO(lab) » LICENSE). The meaning of this ranking is rendered clearer when the rankings of Korean and English are considered together:

(33) Ranking for Korean place assimilation
: COINDEX(onset) » BA(Coronal place$_i$; Root$_i$) » MAX-IO(velar) » LICENSE » MAX-IO(lab) » MAX-IO(cor), BA(Noncoronal place$_i$; Root$_i$)

(34) Ranking for English place assimilation
: COINDEX(onset) » BA(Coronal place$_i$; Root$_i$) » MAX-IO(velar) » MAX-IO(lab) » LICENSE » MAX-IO(cor), BA(Noncoronal place$_i$; Root$_i$)

This will capture the fact that labials are not targeted in English. An illustrative tableau is shown below, where the surface candidates for a schematic underlying sequence of /…pk…/ are evaluated:

(35) Input: /lip kwɪkli/ → [lip.kwɪ.kli] 'leap quickly'

PL	PL
|	|
lab	vel

Candidates	COINDEX	BA(cor)	MAX(vel)	MAX(lab)	LICENSE	MAX(cor)
☞a. p]σ σ[k | | PL PL | | lab vel					*	
b. p]σ σ[p | / PL PL | | lab vel	*!		*			
c. k]σ σ[k \ | PL PL | | lab vel				*!		

It is clear that (35b) loses out because it crucially violates the highest-ranking constraint COINDEX(onset). The decision has to be made between (35a) and (35c). (35c) crucially violates MAX-IO(lab). Therefore, (35a) is evidently more harmonic than (35c).

6. Conclusion

Recapitulating the main proposal in this paper, I claimed that the essential properties of place assimilation be determined by a conflict between faithfulness constraints and the LICENSE on the one hand, and alignment constraints on the other hand. The pattern of place assimilation in Koran showed that the LICENSE is violable but not completely inert when the conditions leading to violation are not present. In the OT analysis of place assimilation, the LICENSE plays a role in favoring a place-linked structure but is subject to many violations in surface forms in cases where the linked structure results in a violation of higher ranking constraints.

Compared with earlier work (Kim-Renaud 1974; Kim 1987; Cho 1990, among others), the analysis presented here has some positive results. OT allows for language-specific variation in constraint rankings. The seven constraints in (25) are all independently motivated and arguably universal. It has been shown that the language-specific patterns follow from the permutation of the constraint ranking established for Korean. For example, the interlinguistic variation among Korean and other language such as

English consists in the re-ranking of the LICENSE in the hierarchy. OT has further advantage: it allows us to capture a cross-linguistic tendency that universal constraints such as LICENSE are not always surface true, but are violable under appropriate conditions. This interpretation of constraints is not possible in derivational models.

REFERENCES

CHO, Y. –M. Y. 1990. *Parameters of Consonantal Assimilation*, PhD Dissertation, Stanford University.

CHOMSKY, N. & M. HALLE. 1968. *The Sound Pattern of English*. New York: Harper and Row.

COLE, J. S. & C. W. KISSEBERTH. 1993. "An optimal domains theory of harmony," Rutgers Optimality Theory Archive 22.

GOLDSMITH, J. 1990. *Autosegmental and Metrical Phonology*. Oxford and Cambridge, Mass.: Basil Blackwell.

ITÔ, J. 1986. *Syllable Theory in Prosodic Phonology*. PhD Dissertation, University of Massachusetts, Amherst.

_____ 1989. "A prosodic theory of epenthesis," Natural Language and Linguistic Theory 7, 217-259.

JUN, J. 1995. *Perceptual and Articulatory Factors in Place Assimilation: An Optimality Theoretic Approach*. PhD Dissertation, UCLA.

KIM-RENAUD, Y. K. 1974. *Korean Consonantal Phonology*. PhD Dissertation, University of Hawaii.

KIM, K. –H. 1987. *The Phonological Representation of Distinctive Features: Korean Consonantal Phonology*. PhD Dissertation, University of Iowa.

KISSEBERTH, C. 1970. "On the functional unity of phonological rules," *Linguistic Inquiry* 1, 291-306.

LOMBARDI, L. 1991. *Laryngeal Features and Laryngeal Neutralization*. PhD Dissertation, University of Massachusetts at Amherst.

_____ 1999. "Positional faithfulness and voicing assimilation in Optimality Theory," *Natural Language and Linguistic Theory* 17, 267-302.

MARTIN, SAMUEL E. 1992. *A Reference Grammar of Korean*. Tokyo: Charles E. Turtle Co.

MCCARTHY, J. & A. PRINCE. 1995. "Faithfulness and reduplicative identity," Rutgers Optimality Archive 60.

PADGETT, J. 1995. "Partial class behavior and nasal place assimilation," *Proceedings of Southwestern Optimality Theory Workshop*, Coyote Working papers in Linguistics, Department of Linguistics, University of Arizona, 145-183.

PRINCE, A. & P. SMOLENSKY. 1993. "Optimality Theory: Constraint Interaction in Generative Grammar," Ms. (linguistics department) Rutgers University & University of Colorado at Boulder.

Division of English Language and Literature
Sookmyung Women's University
53-12 Chungpa-Dong 2-Ka Yongsan-Ku
Seoul 140-742, Korea
e-mail: sechangl@sookmyung.ac.kr