Place Assimilation in OT

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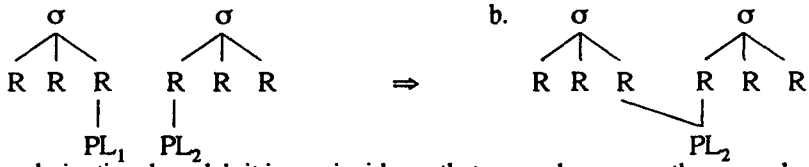
ABSTRACT

In this paper, I would like to explore the possibility that the nature of place assimilation can be captured in terms of the OCP within the Optimality Theory (McCarthy & Prince 1993, 1995; Prince & Smolensky 1993). In derivational models, each assimilatory process would be expressed through a different autosegmental rule. 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 nodes are adjacent across a syllable boundary, as illustrated in (1):

(1) a. 

(PL: place node)

In a derivational model, it is a coincidence that across languages there are changes that have the result of modifying a structure of the form (1a) into the other structure that does not have adjacent consonantal place nodes (1b). OT allows us to express this effect through a constraint given in (2) that forbids adjacent place nodes:

(2) OCP(PL): Adjacent place nodes are prohibited.

At this point, then, a question arises as to how consonantal and vocalic place nodes are formally distinguished in the output for the purpose of applying the OCP(PL). Besides, the OCP(PL) would affect equally complex onsets and codas as well as coda-onset clusters in languages that have them such as English. To remedy this problem, following McCarthy (1994), I assume that the canonical markedness constraint is a prohibition defined over no more than two segments, α and β: that is, *{α, β} with appropriate conditions imposed on α and β. I propose the OCP(PL) again in the following format:

(3) OCP(PL) -revised version of (2)-

*	Condition	Level
α	α = C-place	surface
β	β = C-place	surface
Linear Order	α > β	surface
Adjacency	strict	surface

α and β are the target and the trigger of place assimilation, respectively. The '*' is a reminder that, in this format, constraints specify negative targets or prohibited configurations. Any structure matching the specifications is in violation of this constraint. Now, in correspondence terms, the meaning of the OCP(PL) is this: the constraint is violated if a consonantal place α is immediately followed by a consonantal place β in surface. One advantage of this format is that the OCP(PL) would also be invoked in dealing with place assimilation within complex coda (e.g., *sink* [siŋk]): we can make the constraint scan the consonantal clusters only, excluding any intervening vowels. Finally, the onset clusters typically do not undergo place assimilation. I propose that the onsets be protected by certain constraint which ensures that the coda, not the onset loses the place feature.

§1. Introduction

The central issue of this paper is to investigate the nature of place assimilation in Korean within OT. I argue that the Correspondence Theory (McCarthy & Prince 1995) provides the proper means of representing the range of variability in place assimilation, which is explained through the interaction of a markedness constraint (i.e., OCP) and a set of faithfulness constraints.

§2. Paradigm

In Korean, a coronal stop, whether oral or nasal, optionally[1] assimilates in point of articulation to the following consonant (4a, b). Labials also optionally assimilate in point of articulation to a following velar consonant (4c). No change of articulation takes place if the following segment is a coroanl, as shown in (4d, e). Velars do not change its point of articulation at all, no matter what consonant follows (4e, f).

(4)

a. coronal	→	labial		
/nunmul/	→	[num.mul]		'tears'
/sinpal/	→	[ʃim.bal]		'shoes'
b. coronal	→	velar		
/kunki/	→	[kuŋ.gi]		'military discipline'
/pat + ko/	→	[pak=.k'o]		'to receive and ...'
c. labial	→	velar		
/kamki/	→	[kaŋ.ki]		'a cold'
/ɔp + ko/	→	[ɔk=.k'o]		'to take (a baby) on one's back and ...'
d. *labial	→	coronal		
/pap + to/	→	[pap=.t'o],	*[pat=.t'o]	'rice also'
/nop + ta/	→	[nop=.ta],	*[not=.ta]	'high'
e. *velar	→	coronal		
/ʧaktu/	→	[ʧak=.t'u],	*[ʧat=.t'u]	'a straw cutter'
/kaksɔ/	→	[kak=.s'ɔ],	*[kat=.s'ɔ]	'a memorandum'
f. *velar	→	labial		
/kukmul/	→	[kuŋ.mul],	*[kun.mul]	'soup'
/koŋpu/	→	[koŋ.pu],	*[kom.pu]	'study'

The question then 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 (Prince & Smolensky 1993; McCarthy & Prince 1993, 1995).

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[1] Place assimilation typically occurs in a colloquial speech style.

§3. Proposal

The Obligatory Contour Principle (OCP) forbids representations in which identical elements are adjacent. I propose that a sequence of adjacent place nodes should be avoided so as to delete one of them, which triggers place assimilation. OT allows us to express this effect through a constraint given in (5) that forbids adjacent place nodes:

(5) OCP(PL)
: Adjacent place nodes are prohibited.

I assume that consonantal and vocalic place nodes are formally identical. At this point, then, a question arises as to how consonantal and vocalic place nodes are formally distinguished in the output for the purpose of applying the OCP(PL).

Following McCarthy (1994), I assume that the canonical markedness constraint is a prohibition defined over no more than two segments, α and β: that is, *{α, β} with appropriate conditions imposed on α and β. These conditions are as follows:

(6) (after McCarthy (1994: 5))

a. a specification of the featural properties of α and β as individual segments.

b. a specification of the linear order relation between α and β (α < β, β < α, or both in the case of mirror-image rules).

c. a specification of the adjacency relation between α and β (e.g., strict adjacency, vowel-to-vowel adjacency, etc.).

This decomposition of the conditions imposed by a phonological constraint will be crucial in accounting for the range of place assimilation. I propose to state the OCP(PL) in the following format:

(7) OCP(PL) -revised version of (5)-

*	Condition	Level
α	α = C-place	surface
β	β = C-place	surface
Linear Order	α > β	surface
Adjacency	strict	surface

α and β are the target and the trigger of place assimilation, respectively. The '*' is a reminder that, in this format, constraints specify negative targets or prohibited configurations. Therefore, any structure matching the specifications is in violation of this constraint. The column 'Condition' characterizes the prohibited configuration. I stipulate that the OCP(PL) has all of its level specifications set to 'surface': the conditions must be met at the surface. Now, in correspondence terms, the meaning of the OCP(PL) is this: the constraint is violated if a surface consonantal place α is immediately followed by a surface consonantal place β. In this way, we can make the constraint scan the consonantal clusters only, excluding any intervening vowels.

The OCP(PL) in (7) would also be invoked in dealing with place assimilation within complex coda in such a language as English (e.g., *sink* [siŋk]). In other words, the OCP(PL) affects

equally coda-onset clusters and complex codas, in languages that have them such as English. As to the onset clusters, they do not undergo place assimilation. I propose that the onsets be protected by a faithfulness constraint which ensures that the coda, not the onset loses the place feature:

(8) MAX-IO(onset (pl)): Every place feature of the onset has a correspondent in the output.

I propose that the adjacent consonantal places in the output violate the OCP(PL), so we can account for the deletion of a place node in the target by ranking the OCP(PL) over MAX-IO(place node) as shown in (9).

(9) OCP(PL) >> MAX-IO(place node)

Korean provides evidence that the OCP(PL) is violable, since there are abundant surface exceptions to it. One example is the velars that do not undergo place assimilation in coda (4e, f). This implies that the OCP(PL) is violable and can be ranked below the faithfulness constraints.

(10) MAX-IO(vel) >> OCP(PL)

Even if the OCP(PL) is ranked low, it can still have effects. In Korean, coronal and labial consonants are typically the target of place assimilation. The following constraint ranking means that the OCP(PL) triggers place assimilation:

(11) OCP(PL) >> MAX-IO(lab) >> MAX-IO(cor)

It is then highly significant that even the dominated constraint, OCP(PL) in (10), may be visibly active as in (11) when MAX-IO(vel) is not relevant. In this regard, OT is sharply distinguished from the derivational approaches. Any models based on parameters, rules or other devices see such linguistic principle as OCP in globally all-or-nothing terms. From (10) and (11), we obtain the following ranking by transitivity:

(12) MAX-IO(vel) >> OCP(PL) >> MAX-IO(lab) >> MAX-IO(cor)[2]

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[2] Jun (1995:150) proposes the following ranking for preservation constraints which preserves the perceptual cues for place of unreleased coronals, labials, and velars.

(i) Universal ranking for target places
Pres(pl(dor$^-$)) >> Pres(pl(lab$^-$)) >> Pres(pl(cor$^-$))

His proposal is based on the observation that velars are acoustically stronger than labials, which are in turn stronger than coronals: e.g., the duration of **dg** is more overlapped than that of **gd** because the cues for the unreleased **d** are so weak that there is little motivation for the speaker to preserve them. This ranking indicates that place cues of unreleased velars must be preserved in preference to those of unreleased labials, which are in turn preserved in preference to those of unreleased coronals. It indirectly captures the generalization that (i) if velars are target of place assimilation, so are the labials and (ii) if labials are a target of place assimilation, so are the coronals. This observation is captured by the hierarchy of faithfulness constraints I propose: MAX-IO(vel) >> MAX(lab) >> MAX-IO(cor).

Making use of the concept of *Optimal Domains Theory* developed in Cole & Kisseberth (1994), I propose that the constraint against linked structure be represented as in (13):

(13) BASIC ALIGNMENT(Anchor-s; Root)
: Every sponsoring anchor[3] of $PLACE_i$ is aligned with $Root_i$ in the output.

This alignment constraint explodes into three separate components. I claim that they are ranked in such a way as to express the generalization that coronals are the most unlikely trigger of place assimilation. In addition, labials are less likely to trigger place assimilation than velars:

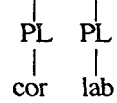
(14) BA(cor; Root) >> BA(lab; Root) >> BA(vel; Root)

In other words, the hierarchy in (14) means that coronals are more likely to preserve the underlying association than labials, which in turn are more likely to preserve the underlying association than velars.

§4. Analysis

In this section I will present a unified analysis of a range of place assimilaiton patterns in Korean. The surface forms in (4) will be accounted for by the established constraint ranking in the previous section. We observe in Korean that coronals assimilate in place to the following labials or velars. (15) illustrates the proposed solution to coronals assimilating to labials:

(15) Input: /sin pal/ 'shoes'



[3] "... An anchor *sponsors* [F] if it is affiliated with [F] in underlying representation. Non-sponsoring anchors are those anchors that come to be affiliated with [F] in the mapping from underlying to surface form, by the operation of GEN..." (Cole & Kisseberth 1994: 3).

Candidates[4]	MA(pl)[5]	BA(cor)	MA(vel)	OCP	MA(lab)	MA(cor)	BA(lab)	BA(vel)
a. n]$_\sigma$ $_\sigma$[p PL PL cor lab				*!				
b. n]$_\sigma$ $_\sigma$[t PL PL cor lab	*!	*			*			
☞ c.m]$_\sigma$ $_\sigma$[p PL PL cor lab						*	*	

Notice that (15b) crucially violates the undominated MAX-IO(onset(pl)) since the onset does not dominate the original labial place node. This leaves two candidates: the faithful (15a) and the assimilated (15c). This is the case where the OCP(PL) comes into play in choosing the optimal output. The OCP(PL) assigns a "*" for each instance of the two consonantal places on adjacent syllables, as in (15a). The effect of this constraint depends on its interaction with other constraints in the same hierarchy. We can see that the OCP(PL), while low-ranking, is still active. The faithful candidate (15a) loses out owing to the OCP(PL) which prevents adjacent place nodes. (15c) violates MAX-IO(cor) and BA(lab; Root), but both of them are low-ranked. Therefore, (15c) is more harmonic than (15a) or any other competitor.

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

[4] GEN does not produce the following structures because they are uninterpretable:

(i) n]$_\sigma$ $_\sigma$[p (ii) n]$_\sigma$ $_\sigma$[p

PL PL PL PL

cor lab cor lab

[5] Due to the limitation of space, I abbreviate the names of the constraints: MA(pl) = MAX-IO(onset(place)), BA(cor) = BASIC-ALIGNMENT(cor, Root), MA(vel) = MAX-IO(vel), OCP = OCP(place node), MA(lab) = MAX-IO(lab), MA(cor) = MAX-IO(cor), BA(lab) = BASIC-ALIGNMENT(lab, Root), BA(vel) = BASIC-ALIGNMENT(vel, Root).

(16) Input: /pap + to/ 'rice also'

PL PL
| |
lab cor

Candidates	MA(pl)	BA(cor)	MA(vel)	OCP	MA(lab)	MA(cor)	BA(lab)	BA(vel)
☞ 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 in (16) is that the OCP(PL) is not active. Compared with the result in (15), (16) forbids the candidate (16c) which has a linked structure. The relevant constraint is BA(cor; Root), which requires that the underlying coronal place be aligned with its original root node in the output.

The question why velars do not assimilate to the following labials can be answered if one resorts to the constraint MAX-IO(vel) which prohibits phonological deletion of velars. This is exactly what is expected given the ranking of MAX-IO(vel) in the constraint hierarchy in question. The theory works as follows:

(17) Input: /koŋ pu/ 'study'

PL PL
| |
vel lab

Candidates	MA(pl)	BA(cor)	MA(vel)	OCP	MA(lab)	MA(cor)	BA(lab)	BA(vel)
☞ a. ŋ]$_\sigma$ $_\sigma$[p PL PL vel lab				*				
b. ŋ]$_\sigma$ $_\sigma$[k PL PL vel lab	*!				*			*
c. m]$_\sigma$ $_\sigma$[p PL PL vel lab			*!				*	

As can be seen in (17), MAX-IO(vel) plays a crucial role in deciding between [koŋ.pu](17a) and *[kom.pu](17c). Under present constraint hierarchy, other things being equal, it would be more harmonic to leave the cluster faithful to the input (17a) than to have it assimilated (17c). As observed in (17c), *[kom.pu] would induce the deletion of velar place, violating MAX-IO(vel). Therefore, (17a) is determined to be the optimal output.

§5. Conclusion

We have seen that various patterns of place assimilation can be derived from the different responses to the OCP of consonantal places. The pattern of place assimilation in Korean shows that the OCP(PL) is not necessarily completely inert when the conditions leading to violation are not present. The OT analysis can account for the pattern of place assimilation, in which the OCP(PL) plays a role in favoring a linked structure, but is subject to numerous violations in surface forms.

REFERENCES

Cole, J. S. & C. W. Kisseberth. (1994) "An optimal domains theory of harmony", ROA-22.

Jun, Jonho (1995) *Perceptual and Articulatory Factors in Place Assimilation: An Optimality Theoretic Approach.* PhD Dissertation, UCLA.

McCarthy, J. (1994) "Remarks on phonological opacity in optimality theory", ROA-79.

McCarthy, J. and A. Prince (1993) *Prosodic Morphology I: Constraint Interaction and Satisfaction.* Ms. U Mass, Amherst and Rutgers University.

_____ (1995) "Faithfulness and reduplicative identity", ROA-60.

Prince, A. & P. Smolensky (1993) *Optimality Theory: Constraint Interaction in Generative Grammar.* Ms. Rutgers University & University of Colorado.