

Consonant copy in Korean*

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Kang, Eungyeong. 2005. Consonant copy in Korean. *Studies in Phonetics, Phonology and Morphology* 11.2. 3-20. In this paper, I present an analysis of Consonant Copy in the Jeju dialect and *n*-Epenthesis in Korean in the framework of Optimality Theory. I argue that both processes are driven by two independent constraints: (1) Edge-Demarcation at the right edge of a word, which requires that the right edge of a morphological constituent coincide with that of a prosodic unit, and thus militates against syllabification across word boundaries (2) the sonority constraint SYLLCON, which prohibits rising sonority across syllable boundaries. With both constraints dominating DEP-IO, a consonant is inserted in the configuration of ...C]Word Word[V..., resulting in ...C][CV..., where C is an inserted consonant. Based on this, I propose that Consonant Copy in the Jeju dialect is a generalized process of *n*-Epenthesis. I also argue that a consonant root is inserted and copies the featural content of the preceding consonant in the Jeju dialect in Korean. In the other dialects, the insertion is more restricted, such that it is limited to the epenthesis of /n/ only before a high vocoid /i/ or /j/. Despite these differences, I show that the proposed analysis of Consonant Copy and *n*-Epenthesis in Korean supports the important role of the right edge demarcation in morphology-phonology interface in general. (Sogang University)

Keywords: Consonant Copy, *n*-Epenthesis, Edge-Demarcation, Jeju dialect, Korean, SyllCon, phonology-morphology interface

1. Introduction

Syllable structure is regulated by several different constraints. Some of them are purely prosodic conditions, such as ONSET and NOCODA. The asymmetry between onsets and codas in the syllable is well known in that syllables require onsets, while they tolerate codas at most (Itô 1986; McCarthy and Prince 1993a; Blevins 1995 and references therein). All else being equal, the best syllable structure for a given sequence /V₁CV₂/ is (1a) with the intervocalic consonant in the onset of σ₂.¹

* This work is supported by the Brain Korea 21 Project in 2005. The paper was presented at the 3rd International Seoul International Conference on Phonology. I thank the audience of the conference for their valuable comments. An earlier version of this paper was published in *Japanese/Korean Linguistics* 12. I am also grateful to the reviewers for their suggestions and comments.

¹ I am assuming that stress assignment does not exert any influence on the syllable structure in these cases.

- (1) Syllable structure of a morphologically complex form
 /V₁C+V₂/ (where + is a morphological boundary)
- a. $\sigma_1 \quad \sigma_2$
 $\quad | \quad / \quad \backslash$
 $\quad V_1 C. + V_2$
 [C as an onset]
- b. $\sigma_1 \quad \sigma_2$
 $\quad | \quad \backslash \quad |$
 $\quad V_1. C. + V_2$
 [C as a coda]
- c. $\sigma_1 \quad \sigma_2$
 $\quad | \quad \backslash \quad / \quad |$
 $\quad V_1. C. V_2$
 [C as an onset and coda]
- d. $\sigma_1 \quad \sigma_2$
 $\quad | \quad \backslash \quad / \quad |$
 $\quad V_1. C. \mathcal{C} V_2$
 [Insertion of \mathcal{C} as an onset]

When a given form is morphologically complex, however, we get the possibilities of structures as shown in (1). This suggests that another constraint comes in the picture. The relevant condition I propose is Edge-Demarcation that requires that the edges of a morphological unit or domain should be demarcated in phonology (Kang 2004). This is anti-force against the syllable or any prosodic structure disrupting a morphological boundary. If this is suitably high-ranked and is in conflict with syllable structure constraints, ONSET in particular, the range of possibilities as shown in (1) does appear at surface. When Edge-Demarcation dominates ONSET, for instance, the structure in (1b) is selected over the one in (1a), for the edge of the syllable, σ_1 , coincides with the morpheme boundary perfectly in (1b). German and Dutch are the prime examples of such languages, which do not allow a syllable boundary to straddle morphological junctures. The structure in (1c) is the so-called ambisyllabic structure, in which the consonant is linked both to the preceding and the following vowels across a certain morphological boundary. The structure in (1d) involves with the structure in which a consonant is inserted before the vowel initial morphological constituent.

In this paper, I present an optimality theoretic analysis of Consonant Copy in the Jeju dialect and *n*-Epenthesis in Korean as a case study of the right edge demarcation. I will show that canonical (CV)_o (CV)_o syllabification is disrupted under the pressure of Edge-Demarcation at the right edge of a word. I will argue that this is evidence for the symmetries of the left and right edges in morphological edge-marking in phonology.

The next section is presented the data of Consonant Copy. The role of sonority in the analysis of Consonant Copy is examined in section 3. Section 4 argues the role of right edge demarcation in Consonant Copy. Section 5 analyzes another phonological process driven by right edge-demarcation in Korean: *n*-Epenthesis. Conclusion is in section 6.

2. Consonant copy in the Jeju dialect in Korean

The Jeju dialect is a regional variety of Korean spoken in the Jeju Island, located to Southwestern part of the Korea peninsula. It exhibits a peculiar phonological process, Consonant Copy, by which a word final consonant is copied and doubled when preceding a vowel initial word. Jeong (1997) describes it as more often observed from a younger generation, and thus is a kind of innovation. Consonant Copy is observed across words in compounds as in (2) and in phrases as in (3). All the examples are drawn from Jeong (1997).² Copied consonants are in boldface.

(2) Consonant Copy in Compounds

- | | | | |
|----|------------------|------------------------------------|----------------------|
| a. | /cicip ai/ | ci.cip. p 'a.i ³ | 'girl' |
| | female child | | |
| b. | /kacuk os/ | ka.cuk. k 'ot. | 'leather clothes' |
| | leather clothes | | |
| c. | /pitan os/ | pi.tan. not . | 'silk clothes' |
| | silk clothes | | |
| d. | /mul ankjəŋ/ | mul.lan.kjəŋ | 'goggles' |
| | water glasses | | |
| e. | /sul wesəŋ/ | sul.lwe.saŋ | 'drinking on credit' |
| | liquor on credit | | |

(3) Consonant Copy across words in Phrases

- | | | | |
|----|----------------------------|--------------------------------------|----------------------------|
| a. | /nun ətuk-ən/ | nun. nə .tu.kən | 'the eyesight is not good' |
| | eye dark-Inf | | |
| b. | /tap al-an/ | tap. p 'a.ran | 'knowing the answer' |
| | answer know-Inf | | |
| c. | /c ^h ɛksəŋ u-e/ | c ^h ɛk.s'əŋ. ŋ u.e | 'on top of the desk' |
| | desk top-Loc | | |
| d. | /mas ɪs-ən/ | mat. t 'ɪ.sən | '(sth) not tasting good' |
| | taste not-exist-Inf | | |

Consonant Copy is also observed across a prefix-stem boundary in (4), though it is optional and limited to some words. It does not apply across a stem-suffix boundary as in (5).

(4) Consonant Copy between Prefix-Stem

- | | | | |
|----|---------------|---------------------|-----------|
| a. | /hol- apaŋ/ | hol.lapaŋ~ho.ra.paŋ | 'widower' |
| | single father | | |

² My special gratitude goes to Professor Seong-Kyu Kim from Kyonggi University for bringing this phenomenon to my attention.

³ The fact that copied obstruents are realized as a tense consonant is due to an independent phonological process, Post Obstruent Tensing, by which an obstruent becomes a tense consonant following another obstruent.

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- | | | | |
|----|---------------------------|----------------|--------------------|
| b. | /mɛn- ip/
bare mouth | mɛn.nip~mɛ.nip | ‘with empty mouth’ |
| c. | /cʰəs- atəl/
first son | cʰət.t'a.təl | ‘the first son’ |

(5) No Consonant Copy between Stem-Suffix

- | | | | |
|----|----------------|-----------------------------------|------------------------|
| a. | /kacuk-i/ | ka.cu.gi, *ka.cuk.k'i | ‘leather-Nominative’ |
| b. | /mæk-ən/ | mə.gən, *mæk.k'ən | ‘eat-and’ |
| c. | /cʰɛk-i-uk'wa/ | cʰɛ.gi.u.k'wa
*cʰɛk.k'i.u.k'wa | ‘book-Copula-Question’ |

The contrast of the Jeju dialect and the other dialects with regard to syllable structure and Consonant Copy is clearly shown in (6). In the other dialects of Korean, the word final consonant appears as an onset of the initial syllable of the following word as in (6a). In the same environment, Consonant Copy is applied in the Jeju dialect as in (6b).

- | | | | |
|-----|-------------------|----------------------------------|--------------------|
| (6) | | /mul ankjəŋ/ | ‘swimming goggles’ |
| | | water glasses | |
| a. | no Consonant Copy | [mu. <u>ran</u> .kjəŋ] | Korean in general |
| b. | Consonant Copy | [mu <u>l</u> . <u>lan</u> .kjəŋ] | Jeju dialect |

Several interesting properties of Consonant Copy emerge readily. First, there is no restriction on the quality of the copied consonant or the following vowel. Any type of consonant allowed in the coda can be copied preceding any vowel. Thus word final velar nasal [ŋ] is doubled in (3c) [cʰɛk.s'aŋ.ŋu.e] ‘on top of the desk’, in spite of the fact that [ŋ] is not allowed word-initially in Korean.

Second, all and only legitimate coda consonants may be copied. Thus word final consonants exhibit the effect of the so-called Coda Neutralization. This strongly suggests that the word final consonant *is* in coda position. In (3d), the word final /s/ in /mas/ is realized as [t] such that /mas ɪs-ən/ ‘not tasting good’ is surfaced as [mat.t'ɪ.sən], instead of *[mas.s'ɪ.sən]. This shows that the /s/ is associated with the coda position and neutralized into the [t].⁴ In a derivational analysis, this will be accounted for by rule-ordering, such that Coda Neutralization applies within a word first, and then the neutralized consonant is doubled across word boundaries. In a parallel analysis in Optimality Theory, it means that the word final consonant is regulated by CODACOND in the coda position in Korean.

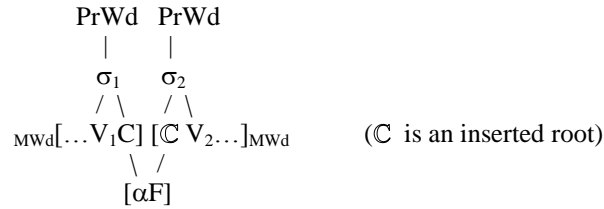
Third, Consonant Copy applies at a morphological word juncture, i.e., across words in compounds and phrases. This is further supported by the

⁴ In Korean, obstruents lose the contrast of laryngeal features, such as aspiration and tenseness as well as continuancy. Thus the fricatives /s, h/ and the affricates /c, cʰ/ are realized as [t] in the coda position (Sohn 1995 and references therein).

fact that it does not apply at a stem-suffix boundary, considering that a sequence of stem-suffix forms a morphological word in Korean.⁵

Given this, I propose that Consonant Copy involves the insertion of a root node to the initial position of a vowel initial word following a word ending with a consonant, and that the inserted root takes the featural content of the preceding consonant by sharing its phonological features, as is represented in (7).

(7) Consonant Copy as Insertion and Copy



In the next section, I will discuss what motivates this insertion between words in this particular environment in the Jeju dialect.

3. Consonant copy and sonority

It is not rare that onsetless syllables trigger insertion of a consonant. However, the examination of the environment in which Consonant Copy applies reveals that the insertion is not due to the avoidance of onsetless syllables. This is clear from the schematic summary in (8); Not every onsetless syllable triggers insertion. Moreover, it is not only onsetless syllables that trigger Consonant Copy. Note that Consonant Copy applies when the second word begins with a glide and thus has an onset already as in (8b), while insertion does not apply between two vowels in (8c). This tells us that the constraint driving the insertion of a consonantal root cannot be the familiar ONSET (Prince and Smolensky 1993).

(8)		Consonant Copy
a.	$\text{MWd}[\dots \text{VC}][\text{V}\dots]_{\text{MWd}}$	✓
b.	$\text{MWd}[\dots \text{VC}][\text{GV}\dots]_{\text{MWd}}$	✓
c.	$\text{MWd}[\dots \text{V}][\text{V}\dots]_{\text{MWd}}$	*

Then what is driving this insertion? I propose that the sonority consideration across syllable boundaries is playing a role. It has been

⁵ Prefixes are excluded in the discussion, because only some prefixed words undergo Consonant Copy only optionally. Jeong (1997) speculates that some prefixed forms might be reanalyzed as compounds, and undergo Consonant Copy. The nature of Consonant Copy in prefixed forms needs more research.

argued in the literature that sonority plays a role in syllabification across syllables (Murray and Venneman 1983, Venneman 1988, Clements 1990, Hong 1997, Davis and Shin 1999, 2003, 2004). More specifically, rising sonority across syllables is prohibited. I propose that the same sonority constraint is at work in Consonant Copy; Consonant Copy applies when sonority rises across the syllable boundary. Thus, as in (8b), Consonant Copy applies preceding a word-initial glide anyway, because glides are more sonorous than the other consonants. However, Consonant Copy does not apply between two vowels in (8c), since vowels are equally sonorous with each other. When this sonority driven constraint is ranked higher than DEP-IO, insertion of a consonant is tolerated. The definition of the constraint SYLLCON and the sonority scale in Korean are given below.

(9) Syllable Contact Condition (SYLLCON) (Kang 2004)

The sequence $\alpha]_{\sigma}\sigma[\beta$ at the syllable juncture is not allowed where β is more sonorous than α .

(Rising sonority across a syllable boundary is not allowed.)

(10) Sonority Scale in Korean

stops, fricatives < nasals, liquid < glides, vowels
less sonorous more sonorous

The insertion of a consonantal root in Consonant Copy is evaluated as shown in tableau (11). The domination of DEP-IO by SYLLCON forces insertion as shown by candidates (11b) and (11d). Note that ONSET does not play a role in this evaluation.

(11) SYLLCON >> DEP-IO

/mul ankjəŋ /	SYLLCON	DEP-IO	ONSET
a. mul.an.kjəŋ	*!		*
☞ b. mul.lan.kjəŋ		*	
/sul wesəŋ/			
c. sul.we.səŋ	*!		
☞ d. sul.lwe.səŋ		*	

It is worth pointing out that SYLLCON does not subsume ONSET: they are two separate constraints. SYLLCON regulates the relative sonority relations between segments across syllable boundaries only. It does not care about onsetless syllables nor vowel hiatus. With SYLLCON dominating ONSET, onsetless syllables are freely allowed in the language, while offensive syllable contact is penalized.

In addition, Consonant Copy provides evidence that glides are as sonorous as vowels in Korean, though they differ from each other by the feature [+/-consonantal]. This is why the presence of a glide does not block Consonant Copy as shown in the evaluation of the candidates (11c) and

(11d). When the preceding word final consonant is less sonorous than the glide, as in /sul wesɑŋ/ ‘liquor credit’ → [sul.lwe.sɑŋ], this sequence violates SYLLCON and Consonant Copy still applies.

4. Consonant copy and the right edge demarcation

Korean allows syllabification across morpheme boundaries as well as word boundaries. This is evidenced by the allophonic realization of the liquid /l/ as in (12). It is realized as the [l] word-finally or preceding a consonant as in (12a-b), and surfaces as the [r] in an intervocalic position as in (12c-d). Note that this is true of a compound and a phrase across word boundaries as in (12e-f).

(12) Syllabification across words in Korean

- | | | | |
|----|--------------|-------------|---------------------------|
| a. | /mul/ | mul | ‘water’ |
| b. | /mul can/ | mul.can | ‘cup (water cup)’ |
| c. | /muli/ | mu.ri | ‘group, herd’ |
| d. | /mul-i/ | mu.ri | ‘water-Nom’ |
| e. | /mul ankjəŋ/ | mu.raŋ.kjəŋ | ‘goggles (water glasses)’ |
| f. | /mul əps-ə/ | mu.rəp.sə | ‘there’s no water’ |
- water not.exist

As was illustrated in (6a) above, Korean can satisfy SYLLCON without violating DEP-IO: word final consonants may be syllabified as the onset of the initial syllable of the following word. This is shown in tableau (13). Candidate (13a)(=6a) satisfies both SYLLCON and ONSET, by parsing the intervocalic consonant in the onset. It also incurs less violation of NOCODA than the candidate (13b)(=6b). Overall, (13a) fares better than (13b) in terms of the syllable structure constraints, such as ONSET and NOCODA. In addition, (13a) does not violate DEP-IO. Given these constraints and the ranking, (13b) is harmonically bounded, in that the violation marks incurred by (13a) constitute a proper subset of those by (13b), and no ranking permutation will yield (13b) as optimal with the given constraints.

(13) /mul ankjəŋ/ ‘goggles (water glasses)’

/mul ankjəŋ /	SYLLCON	DEP-IO	ONSET	NOCODA
☞ a. mu.raŋ.kjəŋ				**
b. mul.laŋ.kjəŋ		*!		***

Then the question is what drives Consonant Copy. Comparing (13a) with (13b), we see that the left edge of /ankjəŋ/ is disrupted in both forms, by having either the preceding consonant or by the inserted consonant in the onset. However, their difference emerges at the right edge of the first word: the rightmost segment of the first word, i.e., /l/ in /mul/ is linked to the final position in (13b), while it is displaced in (13a).

Apparently morphological structure comes in picture. I propose that an additional requirement of Edge-Demarcation is responsible for Consonant Copy in the Jeju dialect. That is, morphological demarcation weighs more and forces the insertion of a consonant despite the additional violation of DEP-IO.

The constraint at work to achieve Edge-Demarcation in this case is an alignment constraint, STEMR. This is an independently needed constraint matching up morphological structure with prosodic structure along with STEML in Korean. The definition of STEMR and STEML is given in (14).⁶ Assuming that the constraint NONREC-PRWD in (14c) is undominated in Korean, we get the prosodic structures as in (15). Note that the structure (15a) satisfies STEMR while that of (15b) violates it.

- (14) a. STEMR: Align(Stem, Right; PrWd, Right)
 b. STEML: Align(Stem, Left; PrWd, Left)
 (Stem=a lexical category, Noun, Verb, Adjective, Adverb)
 c. NONREC-PRWD: No PrWd dominates a PrWd.
 (*Rationale: a recursive PrWd structure is not allowed.*)

- (15) a. Consonant Copy b. Resyllabification
- | | |
|--|--|
| $\begin{array}{cc} \text{PrWd}_1 & \text{PrWd}_2 \\ & \\ \sigma & \sigma \\ \quad \backslash & / \quad \\ \text{MWord}[\text{V}_1 \text{C}][\underline{\text{C}} \text{V}_2] \text{MWord} \end{array}$ | $\begin{array}{cc} \text{PrWd}_1 & \text{PrWd}_2 \\ & \\ \sigma & \sigma \\ & / \quad \\ \text{MWord}[\text{V}_1 \text{C}][\text{V}_2] \text{MWord} \end{array}$ |
|--|--|

In the structure (15a), the right edge of the morphological constituent which hosts the final consonant is perfectly aligned with the prosodic word, compared with the structure in (15b). The crisp alignment between an MCat and a corresponding prosodic unit is achieved at the right edge in (15a). It should be pointed out that the left edge of the morphological category is disrupted in both structure, either by the inserted consonant or by the word final consonant parsed in the onset of the syllable with following vowel.

The interaction of the prosodic constraints and syllable structure constraints is illustrated in tableau (16). In tableau (16), candidates (16a) and (16b) are tied with regard to SYLLCON. Both (16a) and (16b) violate STEML due to the disruption of the left edge of /ot/ ‘clothes’ to satisfy a higher-ranked constraint SYLLCON. The decision goes down the constraint hierarchy to STEMR. The representation in (16a) violates it fatally and loses. Candidate (16b) is chosen as the optimal output. Candidate (16c) loses trivially due to the fatal violation of SYLLCON.

⁶ I assume that the edges of the syllable are forced to coincide with those of a morphological unit indirectly, through the prosodic hierarchy in which PrWd dominating Syllable, following Selkirk (1995) and McCarthy and Prince (1993a,b).

(16) Consonant Copy in the Jeju dialect

/kacuk os/ → [ka.cuk.k'ot.], *[ka.cu.kot]

'leather clothes'

	SYLLCON	STEML	STEMR	DEP-IO
a. PrWd PrWd $\begin{array}{c} \sigma \quad \sigma \quad \sigma \\ / \quad \backslash \quad / \quad \backslash \\ [k \ a \ c \ u \ k][o \ t] \end{array}$		*	*!	
b. PrWd PrWd $\begin{array}{c} \sigma \quad \sigma \quad \sigma \\ / \quad \backslash \quad / \quad \backslash \\ [k \ a \ c \ u \ k] \ k' [o \ t] \end{array}$		*		*
c. PrWd PrWd $\begin{array}{c} \sigma \quad \sigma \quad \sigma \\ / \quad \backslash \quad / \quad \backslash \\ [k \ a \ c \ u \ k][o \ t] \end{array}$	*!			

[] = left and right morphological word boundaries

The difference between the Jeju dialect and the other dialects with regard to Consonant Copy comes from the relative ranking between DEP-IO and STEMR. In the Jeju dialect, STEMR dominates DEP-IO crucially, driving the insertion of a consonant: it is better to insert a consonant and satisfy the alignment constraint. In the other dialects, the ranking is reversed such that STEMR is dominated by DEP-IO at least, and (16a) is chosen as the optimal output. There is no insertion of a consonant in this context.

The evaluation clearly shows the crucial role of the constraints of Edge-Demarcation, especially that of STEMR in Consonant Copy. It is often true that the right edge of a morphological unit is disrupted under the pressure of purely phonological requirements, such as SYLLCON or ONSET and NOCODA, and faithfulness constraints such as DEP-IO. However when a constraint of Edge-Demarcation is suitably high-ranked, Edge-Demarcation takes effect at the right edge and it is kept intact.

So far, I have shown that SYLLCON and STEMR drive Consonant Copy in the Jeju dialect. However it is not that the demarcation of a right edge exerts its effect only in the Jeju dialect. In fact we do have a case in which SYLLCON plays an active role across dialects in Korean phonology. In the next section, I present n-Epenthesis in Korean, which is also driven by Edge-Demarcation at the right edge of a morphological word, though in a more restricted segmental environment.

5. n-Epenthesis and consonant copy in Korean

Korean has a peculiar distributional restriction on the word initial [n], such that it is not allowed to appear preceding a high front vocoid [i] or [j], as illustrated in (17).

(17) [nj, ni] are not allowed word initially⁷

- | | | | |
|----|--------------------------|----------------|------------------------|
| a. | /jək/ | jək | ‘train/subway station’ |
| b. | /kaŋnam jək/ | kaŋ.nam.njək | ‘Kangnam Station’ |
| c. | /ip ^h / | ip | ‘leaf’ |
| d. | /ɪnhɛŋ ip ^h / | ɪn.hɛŋ.nip | ‘ginko leaf’ |
| e. | /kwangcu jək/ | kwang.cu.jək | ‘Kwangju Station’ |
| | | *kwang.cu.njək | |

(18) Monomorphemic forms

- | | | | |
|----|----------|----------|----------|
| a. | /ani/ | a.ni | ‘no’ |
| b. | /cuməni/ | cu.mə.ni | ‘pocket’ |

The words in (17a-b) and (17c-d) show the alternation of /n/~∅/: word-initially they do not have an /n/, but an /n/ appears when they are preceded by another word ending with a consonant in a compound in (17b) and (17d). Note that there is no alternation observed after a word ending with a vowel in (17e). Word-medially, no such alternation is observed as shown in mono-morphemic forms in (18). Thus, the alternation is restricted to the word initial position only.

Historically, the alternation of /n/~∅/ in this particular environment is a result of neutralization that occurred in the late 18th century in Korean, by which the coronal /n/ started to delete in word initial position before an /i/ and an /j/ (Lee 1977, Martin 1992, Cho 1995). At this stage, the words with and without /n/ in the word initial position were distinctive, and needed to be specified as such in their underlying representations.

It is not easy to decide if there is an underlying [n] in the present day Korean at all. However there is more evidence toward the analysis of n-Epenthesis than that of n-Deletion. First, there is no evidence for the presence of [n] underlyingly in the present day Korean. The appearance of [n] is prosodically conditioned, and this applies regardless of whether a given form had an /n/ etymologically or not. It is impossible to distinguish which words have an underlying /n/ and which do not. At best, the decision is arbitrary.

Second, the environment of *n*-Epenthesis suggests the epenthesis analysis. /n/ is not epenthesized between two vowels. It is inserted only when the preceding word ends with a consonant. If the [n] were present underlyingly, the deletion rule will have two disjunctive environments: delete [n] either word initially or after a vowel final word. Note that the second environment is not well motivated: the deletion of the /n/ will lead to vowel hiatus. On the other hand, if /n/ is epenthesized, the environment for the process is simpler and more general: [n] is inserted after the consonant final word, just like Consonant Copy.

⁷ There are only a few exceptions in native Korean words which do not conform to this generalization such as [ni] ‘you (derived from [ne])’, [njəsək] ‘fellow, chap’, [njamnjam ~ jamnjam] ‘yammy sound’, [nim ~ im] ‘lord, sweetheart’ (Sohn 1995).

Third, there is an issue of the phonological system itself: the deletion analysis would predict that Korean does not have a word which begins with a high vocoid /i/ or /j/. The words that begins with /i/ or /j/ will be the result of the deletion of /n/. This is an unexpected anomaly, considering that all the other vowels may appear word initially as illustrated in (19).

(19) Vowel-initial words

a.	/emi/	e.mi	‘mother’
b.	/ɛt ^h a-ta/	ɛ.t ^h a.ta	‘to get worried’
c.	/aki/	a.ki	‘baby’
d.	/əce/	ə.ce	‘yesterday’
e.	/onɪl/	o.nɪl	‘today’
f.	/uli/	u.ri	‘we, us’
g.	/ik ^ʔ ε-ta/	ɪ.k ^ʔ ε.ta	‘to crush’
h.	/waŋ/	waŋ	‘king’

In OT, the alternation of /n/ ~ ∅ is regulated by two different constraints regardless of whether there is an [n] underlyingly or not. One is a general markedness constraint to militate against the word-initial sequence of /ni-, nj-/ , which makes sure that the sequence does not appear word-initially. The other constraint is a context sensitive markedness constraint to militate against the sequence of the consonant final word and an /i, j/-initial word, which guarantees the appearance of [n] in this environment.

Given this, I assume that n-Epenthesis in Korean is a phonological process by which an [n] is optionally inserted between words in compounds in (20) and across words in phrases in (21),⁸ when the first one ends with a consonant and the next one begins with a high front vocoid /i/ or /y/ (Kang 1993, Han 1994, Cho 1998, Hong 1997, Kang 1998, 2003). Inserted [n]’s are bold-faced.

(20) n-Epenthesis in Compounds

a.	/əkiɪm i/ molar tooth	ə.kɪm. ni	‘molar’
b.	/nun jak/ eye medicine	nun. njak	‘eye drops’
c.	/sɛk juli/ color glass	sɛŋ. nju.ri	‘colored glass’
d.	/k ^ʔ oc ^h ip ^h / flower leaf	k ^ʔ on. nip	‘flower petal’

⁸ n-Epenthesis applies across a prefix-stem boundary as in (a) while it does not apply across a stem-suffix boundary.

a.	/hot ^h -ipul/	hon. ni .pul	‘sheet [one layer-comforter]’
b.	/c ^h εk-i/	c ^h ε.ki, *c ^h εk.ni	‘book-Nominative’

(21) *n*-Epenthesis across words

- | | | |
|----|--|-----------------------------------|
| a. | /c ^h am jep'ɪ-n jəca/ | c ^h am.nje.p'ɪn.njə.ca |
| | very pretty girl | 'a very pretty girl' |
| b. | /os ip-ko/ | on.nip.k'o |
| | clothes wear-and | 'wearing clothes' |
| c. | /cip jəkiceki-lɪl/ | cim.njə.ki.ce.ki.rɪl |
| | house here-there-Acc | 'everywhere in the house' |
| d. | /nɛ-ka ha-n ijaki-nɪn/ | nɛ.ka.han.ni.ja.ki.nɪn |
| | I-Nom do-Adn story-Top | as for the story I told |
| e. | /əce-s-pam jəsəs si-e manna-n jəca-ka ceil jep'ɪ-ko/ | |
| | yesterday-night six hour-at meet-Adn woman-Nom best pretty-and | |
| | →ə.ce.p'am.njə.sə.s'i.e.man.nan.njə.ca.ka.ce.il.lje.p'ɪ.ko. ⁹ | |
| | 'the woman who I met at six last night is the prettiest' | |

The epenthesis of the [n] does not apply within a monomorphemic word, nor between a stem and its suffix, as shown in (22). Nor is *n*-Insertion applied between two words when the first one ends with a vowel, as shown in (23).

(22) No *n*-Epenthesis between Stem-Suffix¹⁰

- | | | | |
|----|-----------------------|--|------------------|
| a. | /c ^h ɛk-i/ | c ^h ɛ.ki, *c ^h ɛŋ.ni | 'book-Nom' |
| b. | /cim-ita/ | ci.mi.ta, *cim.ni.ta | 'It is a burden' |

(23) No *n*-Epenthesis at ...V][V...

- | | | | |
|----|---------------|---------------------------|--------------------|
| a. | /capci ilkki/ | capci illki, *capci nilki | 'magazine reading' |
| b. | /kamki jak/ | kamki yak, *kamki njak | 'cold medicine' |

Note that the segmental environment for *n*-Epenthesis is parallel to Consonant Copy. It does not apply to rescue an onsetless syllable, since /n/ is not inserted between vowels as in (23). The insertion occurs only when a word ends with a consonant and is followed by an /i/ or a glide /j/, as illustrated by the contrast of (17a-b) vs. (17c-d). In addition, an /n/ is inserted preceding a glide, although the presence of the glide satisfies ONSET. What is critical in *n*-Epenthesis is the sonority requirement at the syllable contact, SYLLCON.

To analyze *n*-Epenthesis, I propose a constraint militating against the sequence of [ni] or [nj] in the initial position of a prosodic word. This should override the violation of MAX-IO, forcing the deletion of [n] in this position. Since this is true in word-initial position, I propose a word-initial phonotactic constraint as follows.

⁹ When a coronal nasal /n/ is next to a liquid /l/, as in /nl/ or /ln/, they become /ll/ independently in Korean, as in /cinli/ 'truth' becoming [cil.li]. Thus the gemination of the liquid in [ce.il.lje.p'ɪ.ko] 'the prettiest' shows that the /n/ is inserted before [j], surfacing as a liquid.

¹⁰ The only suffixes that begin with a high front vocoid is *-i* 'Nominative' and the copular *-i*. There is no suffix that begins with the [j] in Korean.

(24) Word-Initial Condition (WI-CON)¹¹*_{PrWd}[ni/nj](The sequence of *ni/nj* is not allowed in the prosodic word initial position.)

At the same time, there seems to be a constraint militating against the sequence of C]_{PrWd} PrWd[i/j]. Instead of stating this as a constraint, I propose that the sonority condition at syllable contact is responsible for this, as was proposed for Consonant Copy. The constraint ranking for the insertion or deletion of word initial /n/ in the above mentioned context is given as follows.

(25) Ranking hierarchy of the Constraints for *n*-Epenthesis

SYLLCON >> WI-CON >> DEP-IO(n), MAX-IO(n)

Note that the morphological environment of *n*-Epenthesis is exactly the same as that of Consonant Copy, i.e., between two words. The difference between *n*-Epenthesis and Consonant Copy is that the former applies only in a very specific segmental environment: The insertion is limited to an /n/, and it occurs only when the following segment is a high vocoid /i/ or /y/. It is an interesting question why *n*-Epenthesis is so restricted. However, it is an orthogonal issue to our analysis.¹² I simply assume that the insertion of /n/ in this environment violates DEP-IO(n).¹³ *n*-Epenthesis is schematized as follows.

$$(26) \quad \text{Mwd}[\dots \text{VC}] \left[\begin{array}{c} \uparrow \\ \text{i/y} \dots \end{array} \right] \text{Mwd}$$

n

Given this, we can extend the proposed analysis of Consonant Copy to *n*-Epenthesis naturally: an /n/ is inserted between two words to satisfy SYLLCON and STEM, parallel to Consonant Copy. Tableau (27) shows the interaction of the constraints relevant to *n*-Epenthesis. In (27a), the syllabification of the stem final consonant in the coda of the first PrWd satisfies the constraints of Edge-Demarcation. However this fatally violates SYLLCON and loses. Candidates (27b) and (27c) do not violate SYLLCON, but suffer from a fatal violation of STEM, because the prosodic constituents straddle the morphological boundaries. The candidate (27d) is selected as a

¹¹ I borrow the term Word Initial Condition from traditional Korean grammar, in which the term Twu-Um-Pep-Chik (Word Initial Sound Laws) is generally used to describe any restriction on word initial sounds.

¹² See Cho (1998), Hong (1997) and Kang (2004) for analyses of *n*-Epenthesis in Optimality Theory.

¹³ I am assuming that DEP-IO is relativized with regard to a segment or a feature, so DEP-IO(n) penalizes insertion of /n/ only. Thus, the constraint ranking is actually DEP-IO(α) >> STEM >> DEP-IO(n), in which α represents all the segments other than /n/.

winner, by best satisfying the constraint of Edge-Demarcation at the right edge, in spite of the otherwise offensive word initial sequence [ni-].

(27) *n*-Epenthesis: /os ip.ta / → [on.nip.ta] ‘wear clothes’

/os ip.ta /	SYLL CON	STEM L	STEM R	WI- CON	DEP- IO(n)
a. PrWd PrWd / \ σ σ σ \ / \ [o t] [i p ta]	*!				
b. PrWd PrWd / \ σ σ σ / \ \ [o t][i p ta]		*	*!		
c. PrWd PrWd / \ σ σ σ \ / \ [o t] [i p ta]		*	*!		
d. PrWd PrWd / \ σ σ σ \ / \ [on][n i p ta] ¹⁴		*		*	*

As was mentioned earlier, the /n/ does not get inserted between two vowels. This is clear considering that the active constraint in this case is SYLLCON, which does not penalize a sequence of vowels. In tableau (28), neither the candidate (28a) nor (28b) violates SYLLCON. On the contrary, insertion of a consonant makes the situation worse by inducing more violation of lower ranked constraints. Thus candidate (28a) is chosen as the optimal output as it is without any epenthesis.

¹⁴ The candidate with the final [t] will be trivially eliminated due to the fatal violation of SYLLCON, which forces Nasalization of the stop consonant in this case. See Davis and Shin (1999).

PrWd PrWd
| / \
σ σ σ
| \ / \
[o t] [n i p t a]

(28) No *n*-Epenthesis between two vowels
 /paci ip̥ta/ → [pa.ci.ip.ta] ‘wear pants’

/paci ip̥ta/	SYLL CON	STEM L	STEM R	WI- CON	DEP- IO(n)
a. PrWd PrWd / \ / \ σ σ σ σ / \ / \ / \ [p a c i] [i p̥ t a]					
b. PrWd PrWd / \ / \ σ σ σ σ / \ / \ / \ [p a c i] [n i p̥ t a]		*!		*	*

There are a couple of questions to be answered before closing the analysis of *n*-Epenthesis. First, why is a consonant epenthesized, especially when syllabification across a morpheme juncture is an option to satisfy SYLLCON as well as all the relevant alignment constraints in Korean? This is the same situation with the Consonant Copy in the Jeju dialect. When Edge-Demarcation requires crisp alignment between morphological and prosodic constituents, and is ranked above the relevant faithfulness constraint DEP-IO, the edges are demarcated through crisp edge-marking even at the cost of violation of DEP-IO.

The optionality of *n*-Epenthesis comes from the relative ranking between DEP-IO and STEM_R. When DEP-IO dominates the constraints of Edge-Demarcation, no insertion occurs. When the ranking is reversed, and STEM_R dominates DEP-IO, then insertion occurs to satisfy the higher ranked constraint. In general, STEM_R is suitably low-ranked, and allows the syllabification across words in Korean. However when it is promoted, we see its effect at surface to select the optimal output, forcing the edges to be clearly demarcated.

The second question, which is specific to *n*-Epenthesis, is why it is such a restricted environment that triggers *n*-Epenthesis, i.e. why only before a high vocoid [i/j], and why the [n] is inserted but not any other consonant. This is not an easy question to answer, because if the syllabic conditions are all that matters, we would predict epenthesis of a consonant across the board, just like Consonant Copy in the Jeju dialect. However, in this particular case, the epenthesis is restricted to [n] in the position preceding [i/j] only.

One might think that we could provide some unmotivated phonological reasons, positing some constraint, such as, ambisyllabicity is particularly marked or offensive preceding [i/j] (cf. Hong 1997). However, this is a phonologically unmotivated, language-specific constraint. This is nothing but a restatement of the environment of *n*-Epenthesis in Korean. Considering the basic premise of Optimality Theory, i.e., constraints are universal and

only the constraint rankings vary across languages, positing an unmotivated language particular constraint is not an attractive solution at all.

Instead of providing or speculating unlikely phonological conditions or positing a language particular constraint, I propose that we admit *n*-Epenthesis is a historical remnant of phonological processes in Korean (cf. Sohn 1995, Cho 1998). Historically, there were two independent phonological processes, *n*-Deletion in word-initial position and *n*-Epenthesis before a /i, j/ initial word after a consonant final word. They were eventually reinterpreted as one process: the alternation of an [n] ~ ∅. This surface alternation becomes significant to speakers, though in a certain, language particular environment.

How to incorporate this generalization in grammar is still an open question. This could be done by a rule in Gen, which is indexed with a specific constraint, as is proposed for Gilbertese by Blevins (1997). Namely, we posit a rule by which an /n/ is inserted only before [j/i]. The candidates generated by this rule invoke a particular constraint hierarchy. This complex generation of candidates and the subsequent evaluation seem to support the optionality of the process and a peculiar syllabic evaluation in a very limited vocalic environment. The fact that there is a general version of *n*-Epenthesis in a wider environment, i.e., the Consonant Copy in the Jeju dialect, provides strong empirical evidence for the quirky nature of *n*-Epenthesis, which cannot be motivated purely phonologically.

To summarize, *n*-Epenthesis shows the robust role of right edge demarcation in Korean. Crucially, the domination of DEP-IO(n) by STEM_R is argued to be responsible for the insertion under the pressure of SYLLCON. It is argued that this analysis further supports the robust role of SYLLCON in conjunction with the right edge-demarcation in Korean.

6. Conclusion

In this paper, I presented an optimality-theoretic analysis of Consonant Copy and *n*-Epenthesis, showed the crucial role of right edge demarcation and sonority in Korean. A sonority driven constraint, SYLLCON penalizes rising sonority across syllable boundaries. A constraint of Edge-Demarcation at the right edge of word, STEM_R, prohibits the syllabification across morphological word junctures. The conflict between morphological demarcation and prosodic well-formedness is resolved in such a way that a consonant is inserted or geminated, despite a violation of a faithfulness constraint DEP-IO in the Jeju dialect.

The role of right edge Demarcation in Korean phonology was further supported by *n*-Epenthesis across dialects. It is pointed out that *n*-Epenthesis is also driven by the same conflict between SYLLCON and STEM_R as Consonant Copy, although in a highly restricted phonological environment. It is argued that it provides further empirical evidence for the

crucial role of the right edge of a morphological unit with regard to Edge-Demarcation in Korean in general, which is not limited to just one dialect.

Considering that Consonant Copy is more often observed in the speech of a younger generation (Jeong 1997), it can be seen as a generalized version of n-epenthesis, which applies in an extended, more general phonological context in the same morphological environment. The analysis of Consonant Copy and n-epenthesis thus shows that when the left edge of a morphological unit is disrupted under the pressure of the syllable structure condition, SYLLCON in these particular cases in Korean, even a limited satisfaction of Edge-Demarcation is still achieved at the right edge. In other words, symmetries of the edges of a morphological unit in Edge-Demarcation are born out even in the cases that seem to disrupt the edges across morphological units.

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Received: July 27, 2005
 Accepted: August 31, 2005