A CORRESPONDENCE-THEORETIC APPROACH TO PARTIAL REDUPLICATION IN KOREAN*

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This study provides a correspondence-theoretic account of partial reduplication in Korean sound symbolic words. The reduplication can be divided into two types: single partial reduplication and multiple partial reduplication. I offer a unified analysis of the patterns found with single partial reduplication and then extend the analysis to multiple partial reduplication.

1. Introduction

Korean has a large number of ideophones or sound symbolic words that have their own phonological and morphological characteristics. Phonologically, ideophones are characterized by vowel harmony (Lee 1992, Lee 1993, and Cho 1994). Morphologically, ideophones can be affixed by particular morphemes, which cannot be suffixed or prefixed to non-ideophonic words. These phonological and morphological characteristics differentiate ideophones or sound symbolic words from non-ideophonic words. Moreover, Korean ideophonic words display several patterns of reduplication which have been studied by several phonologists, including McCarthy & Prince 1986, Lee 1992, Jun 1991, 1993, 1994, and Davis & Lee 1994.

The purpose of this study is to provide an account of Korean partial reduplication under Correspondence Theory, as developed by McCarthy & Prince 1995. In this study, two types of reduplication are accounted for by one constraint ranking: single partial reduplication with bases of various lengths and multiple partial reduplication. This study provides a simpler account of partial reduplication in Korean than other previous accounts.

The organization of the paper is as follows. In section 2, I introduce data on partial reduplication in Korean. In section 3, I briefly review previous analyses of Korean partial reduplication and show some problems they encounter. In section 4, I provide the main points of Correspondence Theory. In section 5, I analyze two patterns of reduplication under Correspondence Theory. Finally in section 6, I summarize the analysis.

2. Data

In this section, I present examples of Korean partial reduplication, which are divided into several groups that exhibit common characteristics in terms of reduplication.

First, I will describe infixing reduplication. The examples will be divided into several groups according to the number of syllables in their base form. The

data mostly come from Davis & Lee 1994, Lee 1993, and Jun 1991, 1993, and 1994.

(1) Monosyllabic base

Base	Partial reduplication	Base	Partial reduplication	
a. piŋ	pi-**pi**-ŋ 'in circles'	f. k'waŋ	k'wa-**kwa**-ŋ 'boom, bang'	
b. tʰaŋ	tʰa-**ta**-ŋ 'bang'	g. cʰaŋ	cʰa-**ca**-ŋ	'clanging'
c. p'aŋ	p'a-**pa**-ŋ 'exploding'	h. cik	ci-**ci**-k	'tearing'
d. sak	sa-**sa**-k 'crisp'	i. tʰak	tʰa-**ta**-k	'with a slap'
e. tuŋ	tu-**tu**-ŋ 'tum'	j. tʰok	tʰo-**to**-k	'with a snap'

The examples in (1) are all monosyllabic. In partial reduplication, the onset and nucleus (or 'syllable core') of the base are reduplicated rightward, and the copied elements (in bold face) are infixed between the syllable core and coda of the original base. The laryngeal features (fortis or aspiration) of the stem consonant are never realized in copied elements. In (1) only the CV of the second syllable is copied in partial reduplication; the coda of the second syllable of the base is not affected at all by the reduplication.

(2) Disyllabic base

Base	Partial Reduplication	Base	Partial Reduplication	
a. t'aliŋ	t'ali-**li**-ŋ 'sound of a bike bell'	i. utuk	utu-**tu**-k	'with a clatter'
b. p'utik	p'uti-**ti**-k 'grinding teeth'	j. c'ilik	c'ili-**li**-k	'with a slurp'
c. culuk	culu-**lu**-k 'rain dropping'	k. c'iliŋ	c'ili-**li**-ŋ	'sound of a bell'
d. asak	asa-**sa**-k 'crunching'	l. holok	holo-**lo**-k	'flapping'
e. ucik	uci-**ci**-k 'cracking'	m. k'iluk	k'ilu-**lu**-k	'honking'
f. wacak	waca-**ca**-k 'munching'	n. kʷataŋ	kʷata-**ta**-ŋ	'with a thump'
g. p'itik	p'iti-**ti**-k 'creaking'	o. kʰuŋc'ak	kʰuŋc'a-**ca**-k 'rhythmic sound'
h. otok	oto-**to**-k 'with a clatter'	p. p'otok	p'oto-**to**-k 'rubbing'

The examples presented in (2) are all disyllabic, and all show the same reduplicating pattern. The pattern is characterized by reduplication of the CV of the second syllable without the coda.

(3) Trisyllabic base

Base	Partial Reduplication	
a. ususu	usu-**su**-su	'sound of falling leaves'
b. salili	sali-**li**-li	'quietly'
c. wacaŋcʰaŋ	waca-**ca**-ŋcʰaŋ	'clashing'
d. utaŋtʰaŋ	uta-**ta**-ŋtʰaŋ	'banging'
e. wataŋtʰaŋ	wata-**ta**-ŋtʰaŋ	'clattering'

The examples in (3) all display the same reduplicating pattern, which entails reduplicating the CV of the second syllable without the coda. The examples in (3) are trisyllabic. Ideophones of this length are less common than disyllabic ideophones.

Ideophonic words of Korean can have different connotations if they are partially reduplicated. For example, the ideophonic word /t'aliŋ/ denotes the single

occurrence of a sound of a bike bell. If the ideophonic word /t'aliŋ/ is partially reduplicated, the resultant form [t'ali-**li**-ŋ] denotes two very fast occurrences of the sound of the bell.

The infixing partial reduplication examples presented in (1), (2), and (3) indicate a similar reduplicating pattern: First, assuming that the first two syllables of a Korean word form a foot, the reduplicant (the phonological exponent of a reduplicative affix) is realized by the phonemes of the syllable core of the foot-final syllable. This readily describes (2) and (3), and it also describes the words in (1), where the base (the string supplying the phonemic content) is monosyllabic, since in such forms the foot would constitute just a single syllable. Second, the laryngeal features (fortition or aspiration) of a base consonant are lost in the reduplicant. Aside from this pattern, however, there is an additional distinct reduplicating pattern that the examples in (1)-(3) can display: the bases of all the data presented in (4) can undergo full reduplication with preservation of laryngeal features.

(4) Full reduplication

Base	Full Reduplication	
a. p'aŋ	p'aŋ-p'aŋ	'bang'
b. t'aliŋ	t'aliŋ-t'aliŋ	'sound of a bike bell'
c. ususu	ususu-ususu	'sound of falling leaves'

Third, the partial reduplication examples in (1)-(3) not only can undergo full reduplication as shown in (4), they also can undergo *multiple* partial reduplication, as presented in (5).

(5) Multiple partial reduplication

Base	Multiple Reduplication	
a. p'aŋ	p'a-**pa-pa-pa**-......-**pa**-ŋ	'bang'
b. t'aliŋ	t'ali-**li-li-li** -......**li**-ŋ	'sound of a bike bell'
c. ususu	usu-**su-su-su**-......-**su**-su	'sound of falling leaves'

The semantic relation holding between the base and the multiple partial reduplication can be construed as the extension of the same semantic relation holding between the base and the single reduplicant. Thus, /t'aliŋ/ indicates the sound of a bike bell, whereas [t'aliŋ-t'aliŋ] indicates the repetitive sound of a bike bell. And the multiply reduplicated form [t'ali-**li-li-li** -......**li**-ŋ] denotes the fast, numerous occurrences of the sound of a bike bell.

In this section I have presented examples of two different types of partial reduplication: the infixing partial reduplication pattern, shown in (1)-(3), and multiple partial reduplication in (5). In the following section, I introduce several previous studies on Korean partial reduplication.

3. Previous analyses

In this section I review several previous studies on Korean partial reduplication. These include McCarthy & Prince 1986, and Jun 1991, 1993, and 1994.

McCarthy & Prince 1986 analyze Korean infixing reduplication, focusing on the data presented in (6).

(6)	a. t'aliŋ	t'ali-**li**-ŋ	'ting'
	b. culuk	culu-**lu**-k	'dribbling'
	c. asak	asa-**sa**-k	'with a crunch'
	d. holok	holo-**lo**-k	'sipping'
	e. allok	allo-**lo**-k	'mottled'

The analysis within the framework of Prosodic Morphology developed in McCarthy & Prince 1986 can be summarized as presented in (7).

(7)   With the final consonant being extraprosodic, the reduplicative template

is a core syllable which is suffixed to the word. The phonemes of the base word are copied, and the linking between the copied phonemes
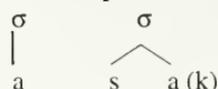
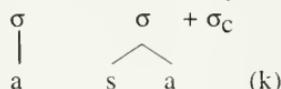and

the reduplicative template is Right-to-Left.

The derivation of a representative example under McCarthy & Prince's theory given in (7), is shown in (8).

(8)   asak → asa-**sa**-k   'with a crunch'

a. Unreduplicated form   b. Affixation of core syllable

$$\sigma \qquad \sigma \qquad\qquad \sigma \qquad \sigma + \sigma_C$$
$$| \qquad \wedge \qquad\qquad\quad | \qquad \wedge$$
$$a \qquad s \quad a\,(k) \qquad\qquad a \qquad s \quad a \quad (k)$$

c. Phoneme copying and R-Llinking

$$\sigma \qquad \sigma \quad + \quad \sigma_C$$
$$| \qquad \wedge \qquad\quad \wedge$$
$$a \quad s \quad a \quad a \quad s \quad a \quad (k) \; = \; asa\text{-}sa\text{-}k$$

Even though McCarthy & Prince's analysis is entirely based on the data presented in (6), their analysis can also account for the data given in (1), (2), and (3a-b) which were presented in section 2. But there is a certain class of data which McCarthy & Prince failed to consider. The data presented in (3c-e), which consist of three syllables with a final consonant, appear problematic for McCarthy & Prince's analysis, in that these data seem to reduplicate the onset and the nucleus of the second syllable, not the final syllable. Examples of (3c-e) are reproduced in (9).

(9) Consonant-final trisyllabic word

a. wacaŋcʰaŋ	waca-**ca**-ŋcʰaŋ	'clashing'
b. utaŋtʰaŋ	uta-**ta**-ŋtʰaŋ	'banging'
c. wataŋtʰaŋ	wata-**ta**-ŋtʰaŋ	'clattering'

If we analyze the data given in (9) based on the analysis presented in (7), we will have the wrong infixing reduplication forms, as given in (10). Thus, McCarthy &

Prince's 1986 analysis does not account for the full range of Korean infixing partial reduplication data.

(10)	a. wacaŋcʰaŋ	*wacaŋcʰa-**cʰa**-ŋ	'clashing'
	b. utaŋtʰaŋ	*utaŋtʰa-**tʰa**-ŋ	'banging'
	c. wataŋtʰaŋ	*wataŋtʰa-**tʰa**-ŋ	'clattering'

Jun 1991, 1993, and 1994 analyzes partial reduplication in Korean ideophones based on the three main assumptions given in (11): assumptions which are relevant to the partial reduplication pattern.

(11) Jun's assumptions about Korean partial reduplication

   a. Reduplication occurs if the base consists of a single unbounded foot with a heavy foot-final syllable.
   b. Fortis and aspirated consonants are geminates.
   c. Coda consonants (including word-final consonants) are moraic.

He also proposes that the number of feet in the output of partial reduplication, which he terms 'partial extension', must be identical to that in the input. This can be termed Metrical Weight Consistency. Thus, the process of Korean partial reduplication in Jun's approach can be characterized informally as presented in (12).

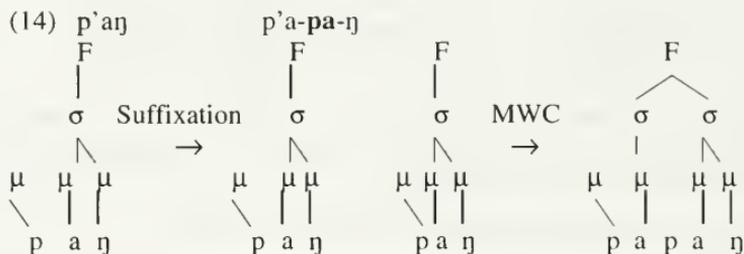(12) Reduplicate the foot-final heavy syllable as a suffix, and then Metrical Weight Consistency (MWC) applies.

Given (11) and (12), the derivation of (2c) under Jun's analysis would be as in (13):

(13)	Base /culuk/	Output [cululuk]
	Base	culuk
	Suffixation	culuk+luk
	MWC	cululuk
		[*culukluk]

In (13) there is a metrical weight consistency between the input and the output with reduplication: the input is a single iambic foot, ending in a heavy or bimoraic syllable, and the output is also a single iambic foot, ending in a heavy syllable. Because of MWC, the output cannot contain two bimoraic syllables (*cu.luk.luk): it would constitute two feet[1] -- a violation of MWC. So in Jun's analysis, the syllable-final /k/ of the base is deleted, as shown in (13).

As for the derivation of reduplicated words with laryngeal features (aspiration or fortis), the derivation of (1c) would be as shown in (14). As presented in (11), Jun assumes that fortis and aspirated consonants are underlyingly moraic (or geminate), and that coda consonants are moraic too.[2] Thus, in (14) if only the coda of the first syllable is deleted, the mora from the initial fortis consonant of the second syllable will be associated to the first syllable, making its output two feet.

So to satisfy MWC, both the coda consonant of the first syllable and the laryngeal feature of the initial consonant of the second syllable are deleted, making its output one foot, as shown in (14).

(14) p'aŋ   p'a-**pa**-ŋ

[tree diagram: F → σ → μ μ μ / p a ŋ, Suffixation → F → σ → μ μμ / p a ŋ, F → σ → μ μ μ / p a ŋ, MWC → F → σ σ → μ μ μμ / p a p a ŋ]

But consider the examples (3a) and (3b), which are reproduced in (15).

(15) Base   Partial Reduplication
      a. ususu   usu-**su**-su   'sound of falling leaves'
      b. sali li   sali -**li**-li   'quietly'

The examples in (15) do not have any heavy syllable and as a result fail to meet the input requirement of Jun's analysis (11a). Thus, the examples in (15) should not undergo partial reduplication if we follow Jun's analysis. Thus, Jun's analysis is inadequate because of counterexamples like those in (15) and its questionable assumption regarding the geminate status of fortis (and aspirated) consonants. In the next section, I present the brief theoretical background needed for the analysis I offer in section 5 of this paper.

4. The theoretical background

In this section, I briefly introduce the theoretical background on Correspondence Theory which is developed by McCarthy & Prince 1995, which I will make use of for my analysis. Since Correspondence Theory is couched within Optimality Theory (Prince & Smolensky 1993, and McCarthy & Prince 1993a), the fundamental ideas of OT play a crucial role in Correspondence Theory. The main principles of Optimality Theory (Prince & Smolensky 1993, and McCarthy & Prince 1994) are given in (16).
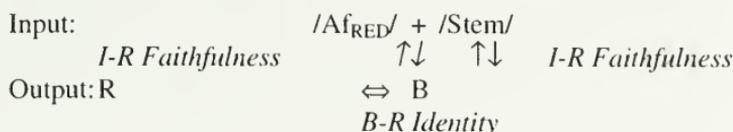
   (16) PRINCIPLES OF OPTIMALITY THEORY

   a. UNIVERSALITY. UG provides a set of constraints Con that are universal
      and universally present in all grammars.
   b. VIOLABILITY. Constraints are violable, but violation is minimal.
   c. RANKING. The constraints of Con are ranked on a language-specific
      basis; the notion of minimal violation is defined in terms of this
      ranking. A grammar is a ranking of the constraint set.
   d. INCLUSIVENESS. The constraint hierarchy evaluates a set of candidate
      analyses that are admitted by very general considerations of structural
      well-formedness.
   e. PARALLELISM. Best-satisfaction of the constraint hierarchy is computed
      over the whole hierarchy and the whole candidate set. There is no serial
      derivation.

As McCarthy & Prince state regarding the nature of Correspondence Theory, it 'extends the reduplicative copying relation of McCarthy & Prince 1993a to the domain of input output faithfulness, and indeed to any domain where identity relations are imposed on pairs of related representations' (McCarthy & Prince 1995:252).

So the theory of reduplication involves correspondence between stem and base (B), between base and reduplicant (R), and between stem and reduplicant. The diagram in (17) shows those correspondence relations.

(17) Full Model

Input: /Af$_{RED}$/ + /Stem/
              I-R Faithfulness $\uparrow\downarrow$ $\uparrow\downarrow$ *I-R Faithfulness*
Output: R $\Leftrightarrow$ B
                                            B-R Identity

Under Correspondence Theory, reduplicative morphemes are represented in the input as an abstract phonologically empty morpheme. The input is empty because the segmental content of the empty reduplicative morpheme can only be determined from the base. The segmental content of a reduplicant is achieved through a correspondence relation with the base. Correspondence is a relation pairing up strings of various types, defined in (18).

(18) Correspondence (McCarthy & Prince 1995:262)
Given two strings S_1 and S_2, CORRESPONDENCE is a relation R from the elements of S_1 to those of S_2. Segments $\alpha \in S_1$ and $\beta \in S_2$ are referred to as CORRESPONDENTS of one another when $\alpha R \beta$.

The correspondent relation between base and reduplicant holds between output strings. The identity between base and reduplicant is evaluated by a number of constraints that decide the closeness of the correspondence. If the correspondent relation between the base and reduplicant is perfect, reduplication is total. But if the correspondent relation between the base and reduplicant is not perfect, the reduplication is partial. There are two key faithfulness constraints between reduplicant and base, MAX and DEP: MAX ensures total copy in the reduplicant, indicating full reduplication, and DEP bars all non-base material.

(19) MAX (McCarthy & Prince 1995:264)
Every segment of S_1 has a correspondent in S_2.
DEP
Every segment of S_2 has a correspondent in S_1.
                          Where S_1 (base, input, etc.)
                                    S_2 (reduplicant, output, etc.)

MAX inhibits illegal deletion, and DEP prohibits any insertion of a segment. When both MAX and DEP constraints are satisfied, full reduplication is achieved. When MAX is violated under compulsion of some highly ranked constraints, partial reduplication results. With this brief theoretical background on Correspondence Theory, we can analyze Korean partial reduplication.

5.   Analysis

In this section, I discuss the crucial constraint interactions and provide a nonderivational analysis of Korean partial reduplication based on the theoretical background presented in section 4. I first consider infixing partial reduplication.

The infixing partial reduplication data presented in (1)-(3) show a similar pattern of reduplication: the onset and nucleus of the second syllable are reduplicated in (2) and (3). As described in section 2, the data presented in (2) and (3) just reduplicate the onset and nucleus of the second syllable — partial reduplication. In Correspondence Theory, partial reduplication occurs when the MAX constraint is violated under compulsion of some higher ranked constraint(s). For the shape of the infixing partial reduplicant, I follow McCarthy & Prince's 1994 proposal (cited by Urbanczyk 1995) that the invariance of reduplicative morphemes need not be defined templatically.[3] Instead they propose that the invariance of reduplicative morphemes can be determined by the interaction of faithfulness constraints with general phonological constraints (termed 'phono-constraints'). McCarthy & Prince propose the notion of Generalized Template, as presented in (20):

(20) Generalized Template (McCarthy & Prince 1994, cited by Urbanczyk 1995)

Templatic targets are determined by structural conditions, which interacting through constraint ranking, properly characterize the desired invariance structure.

In addition to phonological constraints, the idea of Generalized Template requires constraints which can serve to restrict the size of a reduplicant; such constraints should refer to morphological and prosodic categories. McCarthy & Prince propose a constraint (21) that can restrict the size of a reduplicant.

(21) Afx ≤ σ   (McCarthy & Prince 1994, and Urbanczyk 1995)
The phonological exponent of an affix is no larger than a syllable.

As already described at the beginning of section 5, the infixing partial reduplication of Korean reduplicates only the onset and nucleus of the initial foot-final syllable, with the coda being extraprosodic. The constraint presented in (21) is very highly ranked in Korean partial reduplication because the violation of this constraint means that the reduplicant is larger than a syllable; in the Korean partial reduplication data presented in section 2, however, none of the forms has a reduplicant larger than a syllable; therefore in Korean partial reduplication, the Afx ≤ σ constraint is very highly ranked. There are two other constraints that interact to restrict the size of a reduplicant in partial reduplication. The constraints are No-Coda and MAX-BR, which are presented in (22).

(22) a. NoCoda : Syllables are open (McCarthy & Prince 1994).

b. MAX-BR: Every segment of the base has a correspondent in a redu-
plicant (McCarthy & Prince 1995).

The following table (23) indicates a constraint conflict between NoCoda and
MAX-BR. The reduplicant in each of the output candidates is in boldface in the
constraint table.

(23) t'aliŋ → t'ali-li-ŋ 'sound of a bike bell'

t'aliŋ -RED	Afx≤σ	NoCoda	MAX-BR
a. t'aliŋ- **liŋ**		**!	**
☞b. t'ali - **li**-ŋ		*	***
c. t'aliŋ - **t'aliŋ**	*!	**	
d. **t'a** -t'aliŋ		*	***
e. t'aliŋ - **li**		*	***

The constraint table[4] exhibits that the NoCoda constraint should outrank the
MAX-BR constraint to ensure that the infixing partial reduplication reduplicates
the foot-final onset and nucleus of /t'aliŋ/, but not the coda. The ranking of
NoCoda over MAX-BR leads to an extra violation of MAX-BR in (b). If MAX-
BR were ranked higher than NoCoda, the optimal output form would wrongly turn
out to be (a). The optimal output form is (b) in the constraint table if we do not
consider (d) and (e). The constraint ranking Afx≤σ >> NoCoda >> MAX-BR in
the table ensures the winning candidate. As for the candidates (d) and (e), these
fare on Afx≤σ, NoCoda, and MAX-BR exactly the same as the winning output
form. But neither (d) nor (e) is the correct output form. Thus we need some other
relevant constraint(s) which should eliminate (d) and (e). Constraints relevant to
this are presented in (24).

(24) a. Align (RED, L, Ft, R)
Align the left edge of the reduplicant with the right edge of the
foot.
b. Foot Binarity (McCarthy & Prince 1993a)
Feet must be binary under syllabic or moraic analysis.

Align (RED, L, Ft, R) [Align-Red] requires that the reduplicant must be suffixed
to the right edge of the initial foot, and Foot Binarity calls for the bimoraicity of
the initial foot. Thus Align-Red will eliminate candidate (23d), and Foot Binarity
[FTBIN] will eliminate candidate (23e), which violates FTBIN by suffixing the
reduplicant to the initial foot which has three moras; the two nuclei and the coda
of the second syllable count as three moras (I do not include exhaustive foot
strucutre unless it is relevant to the analysis). Constraint table (25) shows the result
of including the relevant constraints. Candidate (a) is suboptimal because of two
violations of NoCoda. Candidate (c) is eliminated because it violates Align-Red. It
violates Align-Red twice since the reduplicant is two syllables away from the right
edge of the foot. Candidate (d) violates FTBIN since the foot is trimoraic. Because
of this violation, candidate (d) is eliminated. Thus, candidate (b) emerges as the
optimal form after we include Align-Red and FTBIN.

(25)

t'aliŋ-RED	Afx≤σ	NoCoda	Align-Red	MAX-BR	FTBIN
a. [t'aliŋ]_F- **liŋ**		**!**		**	*
☞ b. [t'ali]_F- **li-ŋ**		*		***	
c. **t'a** -[t'aliŋ]_F		*	**!**	***	*
d. [t'aliŋ]_F – **li**		*		***	*!

The constraint ranking revealed in (25) is given in (26).

(26) Afx≤σ >> NoCoda, Align-Red, >> MAX-BR >> FTBIN

The next constraint that plays an important role in infixing partial reduplication is the alignment constraint, and this constraint is presented in (27).

(27) Align (Ft, L, PrWd, L) (McCarthy & Prince 1993b)
    Align the left edge of the foot with the left edge of the prosodic word.

Align (Ft, L, PrWd, L) [Align-Ft] ensures that the left edge of every foot must coincide with the initial syllable of the prosodic word. This constraint plays an important role in examples which involve more than two syllables in the base. The following constraint table exemplifies (3c), whose base consists of three syllables.

(28) wacaŋcʰaŋ → waca-**ca**-ŋcʰaŋ 'clashing'

wacaŋcʰaŋ-RED	Align-Ft
☞ a. [waca]_F-**ca**-ŋ cʰaŋ	
b. wa[caŋ cʰa]_F-**ca**-ŋ	*!

Align-Ft plays a crucial role in examples with more than two syllables in the base, in that it delimits the place in the base where the reduplicant should be affixed. Thus, Align-Ft and FTBIN ensure that the reduplicant must be suffixed to the foot, which begins at the left edge of the prosodic word, exemplified by candidate (a). If any foot does not begin at the left edge of the prosodic word, it will violate Align-Ft, as is shown by candidate (b). It violates Align-Ft once since the left edge of the foot is separated from the left edge of the prosodic word by one syllable.

The next constraint that plays a role in the infixing partial reduplication is the Featural Identity constraint, shown in (29).

(29) Featural Identity (McCarthy & Prince 1995)
    The ± values of features are identical in correspondent segments'.

Featural Identity (Identity (F)) can be established between an input and a base, and between a reduplicant and a base, as illustrated in the faithfulness relations of the full model (17). For example, if any feature of a base or input element does not appear in the correspondent segment in the reduplicant or output, it is a violation of Identity (F).

In addition to the featural identity (Laryngeal) constraint, there are other constraints which are related to laryngeal features and are relevant to Korean

partial reduplication. Such featural constraints employed in this paper are presented in (30).

(30) Featural constraints

a. Input-Output Identity (Laryngeal) : [IDENT-IO (Laryn)]
   The laryngeal feature (fortis or aspiration) is identical in corre-spondent segments between the input and output.

b. Base-Reduplicant Identity (Laryngeal) : [IDENT-BR (Laryn)]
   The laryngeal feature of a base segment is identical to that of its correspondent segment in the reduplicant.

c. No laryngeal : [*Laryngeal][5]
   Laryngeal features (fortis or aspiration) are disallowed.

The following constraint table (31) shows the ranking between IDENT-IO (Laryn) and *Laryngeal; there is a conflict between the two constraints.

(31) kʰuŋc'ak → kʰuŋc'a-**ca**-k 'rhythmic sound'

kʰuŋc'ak-RED	Afx≤σ	IDENT-IO (Laryn)	*Laryngeal
☞ a. kʰuŋc'a-**ca**-k			**
b. kʰuŋca-**ca**-k		*!	*

Candidate (a) is the optimal form, and the constraint conflict between IDENT-IO (Laryn) and *Laryngeal is resolved in favor of the IDENT-IO (Laryn) constraint. The constraint ranking established in (31) is presented in (32).

(32) IDENT-IO (Laryn) >> *Laryngeal

Table (33) shows the ranking between *Laryngeal and IDENT-BR (Laryn).

(33) tʰaŋ → tʰa-**ta**-ŋ 'bang'

tʰaŋ-RED	IDENT-IO (Laryn)	*Laryngeal	IDENT-BR (Laryn)	NoCoda
☞ a. tʰa-**ta**-ŋ		*	*	*
b. ta-**tʰa**-ŋ	*!	*	*	*
c. ta-**ta**-ŋ	*!			*
d. tʰa-**tʰa**-ŋ		**!		*
e. tʰaŋ-**taŋ**		*	*	**!

The optimal output form is (a). If we consider candidate (d), which violates the *Laryngeal constraint twice while satisfying the IDENT-BR (Laryn) constraint, *Laryngeal should be ranked higher than IDENT-BR (Laryn). If we reverse the ranking between the two constraints, the winning candidate would be (d), which is not the optimal output form. The crucial constraint ranking established in table (33) is given in (34).

(34) *Laryngeal >> IDENT-BR (Laryn)

The next constraint that plays a role in infixing partial reduplication is MAX, which was presented in (19). The constraint is reproduced in (35).

(35) MAX (McCarthy & Prince 1995: 264)

> Every segment of S_1 has a correspondent in S_2.
> Where S_1 (base, input, etc.)
> S_2 (reduplicant, output, etc.)

The MAX constraint requires full reduplication of the base, so every partial reduplication case inevitably violates the MAX constraint. Constraint table (36) illustrates the ranking between MAX-IO and MAX-BR.

(36)

kʰuŋc'ak-RED	MAX-IO	MAX-BR
☞ a. kʰuŋc'a-**ca**-k		****
b. kʰuŋc'a-**ca**	*!	***

The winning candidate is (a). The ranking of MAX-IO over MAX-BR implies that the faithfulness between the input and output is more important than the faithfulness between the base and reduplicant. If we reverse the ranking between MAX-IO and MAX-BR, then the optimal output form would be (b), which is not the actual optimal form. Thus, the MAX-IO constraint should be ranked higher than MAX-BR. The constraint ranking achieved in (36) is given in (37).

(37) MAX-IO >> MAX-BR

Table (38) displays a constraint conflict between MAX-IO and NoCoda.

(38) p'aŋ → p'a-**pa**-ŋ 'exploding'

p'aŋ-RED	MAX -IO	IDENT- IO(Laryn)	*Laryn- geal	IDENT- BR(Laryn)	No Coda	MAX -BR
☞ a. p'a-**pa**-ŋ			*	*	*	*
b. p'a-**p'a**-ŋ			**!		*	*
c. pa-**p'a**-ŋ		*!	*	*	*	*
d. p'aŋ-**p'aŋ**			**!		**	
e. p'a-**pa**	*!		*	*		

The optimal output form is (a). Candidate (e) violates MAX-IO because one element of the input is deleted in the output. Because of this violation, (e) is not the winning candidate. MAX-IO must be ranked higher than NoCoda in the table. If NoCoda were ranked over MAX-IO, the winning candidate would be (e), which is not the correct output form. The constraint ranking achieved in (38) is given in (39).

(39) IDENT-IO (Laryn) >> NoCoda

Constraint table (38) also displays *emergence of the unmarked,* as discussed in McCarthy & Prince 1994 and 1995. The basic idea of the emergence of the unmarked is that the phonologically unmarked structure emerges in reduplicated forms. McCarthy & Prince argue that this can be achieved by the constraint ranking presented in (40).

(40) Skeletal Ranking for Emergence of the Unmarked (McCarthy & Prince 1995:329)

I-O Faithfulness >> Phono-Constraint >> B-R Identity

Korean partial reduplication is interesting in this respect in that NoCoda and *Laryngeal are not required in Korean as a whole, but they emerge in partially reduplicated forms. The emergence of the unmarked in Korean partial reduplication is achieved by the constraint ranking presented in (41), which was displayed in (38).

(41) Emergence of the Unmarked in Korean partial reduplication

Schema: I-O Faithfulness   >> Phono-Constraint >>   B-R Identity
Instantiation: MAX-IO   >> NoCoda   >>   MAX-BR
                     IDENT1-IO (Laryn) >> *Laryngeal   >>   IDENT-BR (Laryn)

So far we have shown constraints employed in infixing partial reduplication and have discussed some crucial constraint interactions that establish important constraint rankings. The ranking of all the constraints discussed is shown in (42).

(42) Constraint ranking for infixing partial reduplication

Afx≤σ, MAX-IO, IDENT-IO (Laryn) >> *Laryngeal >>
IDENT-BR (Laryn), NoCoda, Align-Ft, Align-Red >> MAX-BR >>FTBIN

Next, I will discuss multiple reduplication. The multiple reduplication data presented in (5) indicate that such reduplication only occurs with the infixing partial reduplication presented in (1)-(3). Since this is the case, I employ the same approach that I have used to account for infixing partial reduplication. The only difference between single and multiple partial reduplication is the input. I assume that the base of the multiple reduplication reflects an output to output relation with the singly reduplicated form. For example, the singly reduplicated form [waca-**ca**-k] 'munching' serves as the input of [wacaca-**ca**-k], and this output form also can serve as input to a subsequent reduplication [wacacaca-**ca**-k], the output of which in turn can serve as input to a subsequent reduplication. Other than this, the multiple reduplication exhibits the same mechanism that was shown in the single partial reduplication. Thus, we can extend the analysis of infixing partial reduplication to multiple partial redupulication, as illustrated in (43).

(43) t'ali liŋ → t'alili-**li**-ŋ 'sound of bike bell'

t'aliliŋ-RED	MAX-IO	NoCoda	Align-Ft	Align-Red	MAX-BR	FTBIN
a. [t'aliliŋ]_F-**liŋ**		**!			****	**
☞ b. [t'alili]_F-**li-ŋ**		*			*****	*
c. [t'alili]_F-**li**	*!				****	*
d. [t'aliliŋ]_F-**li**		*			*****	**!
e. [t'ali]_F-li-**li-ŋ**		*		*!	*****	
f. t'a[lili]_F-**li-ŋ**		*	*!		*****	

Candidate (a) violates NoCoda two times, which causes (a) not to be the optimal form. Candidate (c) fails to satisfy the high ranked MAX-IO constraint because of the deletion of one segment in the output. Candidate (d) fares the same on all the

constraints as the winning candidate, except for FTBIN, which candidate (d) violates to a greater extent than the winning candidate. Because of this violation, (d) is not the optimal output. Candidates (e) and (f) are suboptimal because they violate Align-Red and Align-Ft once, respectively. Thus, candidate (b) emerges as the optimal form.

6.   Conclusion

The analysis offered in the previous section accounts for single infixing and multiple partial reduplication. Infixing partial reduplication and multiple reduplication can be accounted for by a unified constraint ranking. The alternative account of Korean partial reduplication proposed in this study has an advantage over previous analyses, in that we do not need an input requirement (Jun 1991, 1992, and 1994). Another point is that the loss of the marked laryngeal feature of the base, which has previously been attributed to MWC (Jun 1991, 1993, and 1994), involving a serial derivation, can be accounted for by the identity faithfulness relations between the input and output, and between the base and reduplicant, without recourse to a serial derivation. Thus, the relevant constraints for partial reduplication, and their interaction illustrated in this study, offer a simpler and more extensive account than previous analyses, of Korean partial reduplication.

NOTES

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[1] According to Jun, it is assumed that Korean foot structure is quantity-sensitive, right headed, unbounded, and constructed from the left edge.

[2] See Davis & Lee 1994 for a different argument regarding such laryngeal features as fortis and aspiration. They provide some evidence that fortis and aspirated consonants are not underlying geminates.

[3] Previously, the invariance of reduplicative morphemes had been described as a template of a particular form (Marantz 1982, and McCarthy & Prince 1986, 1990).

[4] I follow standard Optimality Theory conventions regarding constraint table format, indicating the optimal candidate (the winner) by 'Y̆', violations by '*', and fatal violations by '!'. Shading in constraint tables indicates the irrelevance of a constraint to the status of the candidate. Dotted lines between constraints are normally indicative of a lack of established ranking between constraints.

[5] In Korean partial reduplication, the laryngeal features of the base consonant are not realized on the reduplicant. The *Laryngeal constraint, which bars a consonant with laryngeal features from occurring,, is ranked higher than IDENT-BR (Laryn), but lower than IDENT-IO (Laryn), since marked laryngeal consonants do occur in the base.

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