Base-Identity Effects in Some Morphophonemic Alternations in English

Heeyong Kim
(Kookmin University)

Kim, Heeyong. 2002. **Base-Identity Effects in Some Morphophonemic Alternations in English.** *Korean Journal of English Language and Linguistics* 2-2, 185-205. Within the framework of Generalized Sympathy (GS) (Jun 1999), this paper investigates the reasons why phonological rules such as Cluster Simplification, Closed Syllable *æ*-Tensing, and Belfast Dentalization overapply or underapply in Class 2 affixed words in English. According to GS, a morphologically independent word can be treated as a derived word in that it is assumed to have any possible outputs as bases to resemble. As a result, a correspondence relation is triggered between a morphologically independent word being represented as Derived (D) and any possible outputs represented as Base (B), i.e., BD-Faith. In analyses of affixed words, BA-Faith is evoked, instead of BD-Faith. Furthermore, as Benua (1997) suggests, BA-Faith is classified into two correspondence relations; BA_1-Faith between Base and Class 1 affixed words, and BA_2-Faith between Base and Class 2 affixed words. When the BA_2-Faith takes precedence over phonological constraints three rules misapply in Class 2 affixed words. In other words, the misapplications are driven by base-identity effects.

1. Introduction

This paper deals with three morphophonemic alternations in English discussed by Borowsky (1993) and Benua (1997). First, certain consonant clusters such as [mn], [gn], and [ŋg] are simplified in word-final position by Cluster Simplification, as in words like *damn* [dam]. Second, Closed Syllable *æ*-Tensing refers to the phenomenon that the low front vowel [æ] becomes the tense vowel in closed syllables, as in words like *class* [klEs].

Third, in the dialect of English spoken in Belfast, alveolar consonants become dentals when followed by tautosyllabic *r*, as in words like *spider* [spayd̪r]. When words ending with alveolar consonants are followed by *r*-initial suffix, the application of the rule depends on the suffix classhood. It is noteworthy that these rules tend to misapply in Class 2 affixed words. The misapplication of these rules have been accounted by many linguists in terms of level-ordering or cyclic effect in Lexical Phonology.

In an attempt to account for these characteristic behaviors within the framework of Optimality Theory (Prince and Smolensky 1993), I adopt the correspondence relations proposed in Jun's (1999) Generalized Sympathy (GS). The basic assumption of GS is that since a failed output of morphologically independent words can be a model for an optimal output to resemble, the failed output is entitled as Base (B). Also, the optimal output may be represented as Derived word (D) in that it is under correspondence relation with Base. As a result, even in an analysis of morphologically independent words, a faithfulness constraint is assumed to be triggered between Base and Derived word (D), i.e., BD-faithfulness constraint. In analyses of affixed words, I adopt Hwangbo's (1996) proposal that affixed words are represented as Affixed word (A), and in turn BA_1-/BA_2-Faithfulenss constraints are evoked between bases and Class 1 affixed words and Class 2 affixed words, respectively.

The morphophonemic alternations can be explained in terms of the interaction of these faithfulness constraints with phonological constraints. The phonological rules above mentioned normally apply in unaffixed words and Class 1 affixed words when either a phonological constraint or a faithfulness constraint between input and Derived or Affixed word (ID-/IA-Faith) takes precedence over BD-/BA_1-Faithfulness constraints. Every misapplication occurring in Class 2 affixed words is uniformly explained by the constraint hierarchy in which BA_2-Faith dominates over phonological constraints or IA-Faith.[1)]

2. Cluster Simplification

2.1. A Rule-based Approach

The rule of English phonology simplifies syllable final consonant clusters in English such as [mn], [mb], [ŋg], and [gn], as in pairs of words below.

(1) Cluster Simplification

	Simplex Base	Class 1 Affix	Class 2 Affix
a.	condemn	condemnation	condemning
	damn	damnation	damning
	hymn	hymnal	
	column	columnar	
	solemn	solemnity	
b.	bomb	bombard	bombing
	crumb	crumble	crumby
c.	long	elongate	longing
	strong	strongest	strongly

The simplification of syllable final consonant clusters in English depends on the classhood of the affixation because it does not occur in Class 1 affixed words. For example, the root-final coronal nasal does not surface in *damn* for the phonotactic constraint that nasal clusters cannot be part of coda. While the coronal nasal must be present in *damnation*, where it is syllabified as an onset to a vowel-initial Class 1 suffix, the coronal nasal with Class 2 affixation in *damning* fails to surface regardless of the same syllabification as Class 1 affixed words.[2)]

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[1]Compared with Benua's (1997) Transderivational Correspondence Theory, BA-Faith and IA-Faith are equivalent of OO-identity and IO-Faith, respectively.

[2]Siegel (1974) claims that there are two different classes of affixes in English:

In dealing with this phenomenon, Borowsky (1993) postulates the two lexical levels; Stem level and Word level. In her view, at the Stem level, which is equivalent to Level 1 in standard lexical phonology, the morphology and phonology interact with each other. Basic lexical items pass through the Level 1 morphological system and are sent back into the phonology where they undergo the set of rules. The result may undergo further morphological operation and will then be returned to phonology after each operation. This level sticks to a set of properties of lexical phonology: the rules at this level are cyclic, structure-preserving, and obey the Strict Cyclic Condition.[3)]

At the Word level, phonology precedes morphology, not vice versa. In other words, since a set of rules apply before any morphological operation, no further lexical phonology takes place. Rules at this level completely contrast with those in the Stem level; they are not cyclic, non-structure-preserving, and not affected by strict cyclic effects.

Cluster Simplification is one of the rules which operate at the Word level (Level 2) so that it cannot apply until all Level 1 affixes have been added. The level-ordering derivation of (1a) is as follows:

(2) Level 1:

	damn	damn + ation	
	—	—	*n*-deletion
Level 2:			
Cycle 1	dam	dam	*n*-deletion
Cycle 2		dam + ing	

(a) Class 1 affixes: in+, de+, re+, +ic, +ity, +ous, +ate, +ion, +ive, +ize, +al(A), +y(N), etc.

(b) Class 2 affixes: un#, ex#, re#, anti#, pre#, extra#, non#, #less, #ness, #ful, #er, #able, #ly, #ish, #al(N), #y(A), etc.

[3]For the previous works in Lexical Phonology, see Kiparsky (1982, 1985).

At Level 2 the unsyllabified nasal of *damn* is deleted, and then at Cycle 2 *-ing* is suffixed to [dam], rendering the correct surface form [dæ.ming].

Now, let us see how this level-ordering effect is explained within the framework of Correspondence Theory (CT).

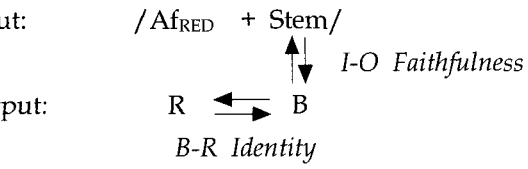
2.2. Correspondence Theory

In the account of misapplication of phonology in reduplicants, McCarthy and Prince (1993, 1994, 1995) introduce the notion of correspondence, defined as follows:

(3) Correspondence
Given two strings S_1 and S_2, correspondence is a relation R from the elements of S_1 to those of S_2. Elements $\alpha \in S_1$ and $\beta \in S_2$ are referred to as correspondents of one another when α R β.

Correspondence Theory (CT) is an approach to faithfulness that makes direct use of the identity ideally existing between input and output and generalizes it to other circumstances in which a substantially similar relationship exists.[4] As an example, the basic model of CT given by McCarthy and Prince (1995) includes input-output faithfulness and base-reduplicant identity, as illustrated in (4).

(4) Basic Model



[4]McCarthy and Prince (1995) suggest that correspondence relations may be extended to other kinds of elements, such as features or prosodic units. This suggestion is accepted in the OT literature by many linguists.

The identity between base and reduplicant and the faithfulness between input and output are enforced by ranked and violable constraints that demand complete and exclusive correspondence between strings, such as ones in (5) and (6).[5]

(5) Constraints on correspondent segments
   a. MAX
      Every segment of S_1 has a correspondent in S_2.
   b. DEP
      Every segment of S_2 has a correspondent in S_1.

To paraphrase McCarthy and Prince (1995), MAX and DEP are functionally equivalent to PARSE and FILL (Prince and Smolensky 1993), respectively. MAX prohibits deletion, requiring every segment in strings S_1 (base, input, etc.) to have a correspondent in the related strings S_2 (reduplicant, output, etc.). Violating the DEP constraint is a case of inserting any segment in string S_2, which is not in strings S_1.

(6) Constraint on correspondent features
   IDENT(F)
   Let α be a segment in S_1 and β be any correspondent of α in S_2. If α is [γF], then β is [γF].

Correspondent segments are required to be identical in terms of featural composition by IDENT(F) constraint, which is a parameterized family of constraints, one for each distinctive feature.

Now, let us see if CT can account for the alternation in (1a). A required phonological constraint is *COMPLEX that bans tauto-

[5]In addition to the three constraints, three more constraints are given in McCarthy and Prince (1995): CONTIGUITY militating against medial epenthesis and/or deletion, LINEARITY for anti-metathesis, and ANCHORING forcing 'edge-in' mapping.

syllabic consonant clusters.[6] In order to force deletion of one of consonant clusters, the *COMPLEX has to take precedence over a faithfulness constraint, Input-to-Output Faithfulness (IO-MAX), that bans deletion of any segment from inputs. The interaction of the phonological constraint with IO-MAX in an unaffixed word *damn* is illustrated as follows:

(7)

/damn/	*COMPLEX	IO-MAX
a. damn	*!	
b. ☞ dam		*

The candidate (a) violates the outranked constraint *COMPLEX, and is defeated by the candidate (b) that does not. This constraint hierarchy, however, is not appropriate for an analysis of a Class 2 affixed word *damning*, as shown in the following tableau.

(8)

/damn/+/ing/	*COMPLEX	IO-MAX
a. ☞ dam.ning		
b. da.ming		*!

Since the coronal nasal can be syllabified as an onset to a vowel-initial Class 2 suffix, Cluster Simplification does not need to apply in Class 2 affixed words. Nevertheless, the optimal output, [dæ.ming], in which this rule overapplies cannot be selected as the optimal output, violating IO-MAX.

This level-ordering effect poses a crucial challenge to CT. In order to overcome this challenge, many linguists provide either other correspondence relations besides IO-Faith or a different

[6]Benua (1997) uses *mn]σ for *n*-deletion. This constraint, however, is so restricted that it cannot be used for *g*-deletion in words like *sign* and *resign*.

way of representing candidates. In the following section, the latter will be briefly illustrated and employed in the analysis of the level-ordering effect.

2.3. Base-Identity Effects

A suggestion to differently represent candidates is made by Jun (1999) in his study of opacity occurring in Tiberian Hebrew.[7] Consider the following example.

(9) Interaction of Epenthesis and ʔ-Deletion in Tiberian Hebrew

UR	/deš?/
Epenthesis	dešeʔ
ʔ-Deletion	deše

In (9) an epenthetic vowel [e] is inserted in a word-final cluster. And then, [ʔ] is deleted in the coda position. This rule ordering is a counterbleeding one which leads to opacity because it derives phonetic representation that does not meet the structural description of the vowel epenthesis. In other words, the vowel epenthesis gratuitously applies in the phonetic representation.

Following the standard OT, *deš* is unexpectedly selected as an optimal output.[8] In dealing with this problem, Jun (1999) finds that an optimal candidate tends to be faithful to one of failed outputs; that is, the optimal output (deše) is under a correspondence relation with the failed output (dešeʔ) as well as

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[7]Kiparsky (1971) defines opacity as follows:
A rule A → B / C ___ D is opaque to the extent that there are surface representation of the form

(i) A in environment C ___ D, or
(ii) B in environment other than C ___ D

The first clause of this definition merely characterizes counterfeeding orders. The second clause refers to counterbleeding orders, inducing rule-overapplication and gives rise to opacity.

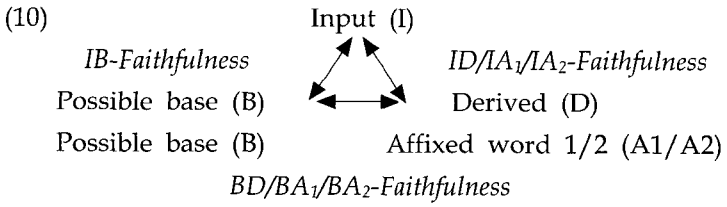
[8]For the evaluation of *dešʔ*, see McCarthy (1998).

with the input (deš?). The issue is that how to accommodate the influence of the failed output and how to select the failed output. For the first matter, Jun suggests that the correspondence relations between an optimal candidate and a failed output can be represented in parallel to those in Benua's (1997) Out-to-Out-correspondence Theory (OO-Correspondence). While the base of OO-Correspondence Theory includes an actual word such as reduplicant, truncatum, and derived word, the base in GS is any possible output, i.e., a failed output. As the opaque output of nonderived word in Hebrew is under correspondence relation with possible outputs (Base) for the opaque output to resemble, the nonderived word can be represented as Derived (D). Therefore, three faithfulness constraints are imposed on Input and Base, Base and Derived, and Input and Derived.

For the second matter of selecting a failed output as a model for an optimal output to resemble, Jun proposes that failed outputs be represented as being paired with derived words, and each member of candidates is simultaneously evaluated by markedness constraints.

As many linguists mention, faithfulness constraints are necessary that require similarity between bases and affixed words. Of those linguists, Benua (1995) argues that BA-Faithfulness correspondence relation between bases and Class 2 affixed words is triggered. Also, Kenstowicz (1996) maintains that BA-Faithfulness correspondence is triggered by Class 1 affixes as well as Class 2 affixes and terms it Base-Identity. The following shows that correspondence relations mentioned so far that will be used in analyses of morphophonemic alternations.

(10)



Now, let us turn to how the faithfulness constraints interact with the phonological constraint. The normal application of *n*-deletion in an unaffixed word like *damn* is illustrated in the following tableau.

(11)

/damn/	*COMPLEX	MAX-IB	MAX-ID	DEP/MAX-BD
a. {damn} damn	**!			
b. ☞ {dam} dam		*	*	
c. {damn} dam	*!		*	*
d. {dam} damn	*!	*		*

The candidates (a,c,d) fail because they violate the dominant constraint *COMPLEX in either their Bases or Derived words. In the evaluation of unaffixed words the ranking between ID-faithfulness and BD-faithfulness constraints is not decisive as long as the phonological constraint is dominant.[9)]

The normal application of Cluster Simplification in Class 1 affixed words is accounted for by the domination of IA-Faithfulness constraint over the BA_1-Faithfulness constraint. In other words, the Base-identity is less important than the faithfulness between an input and an affixed word.

(12)

/damn/+/ation/	*COMPLEX	MAX-IB	MAX-IA_1	MAX/DEP-BA_1
a. {damn} dam.nation	*!			
b. ☞ {dam} dam.na.tion		*		*
c. {damn} da.ma.tion	*!		*	*
d. {dam} da.ma.tion		*	*!	

[9]As shown in tableau (11), while the Derived word of the candidate (c) violates MAX-BD, the Derived word of the candidate (d) violates DEP-BD. Therefore, BD-Faith must be doubly specified as DEP and MAX.

The candidates (a,c) are out of competition, violating the dominant constraint *COMPLEX. The candidates (b,d) do not have a correspondent segment *n* in their input and equally violate DEP/MAX-IB. While the candidate (d) violates MAX-IA, the candidate (b) does not violate it. Therefore, the candidate (b) is selected as an optimal output. If the faithfulness constraint between Base and Affixed word is ranked over the faithfulness constraint between Input and Affixed word (equivalent of IO-Faith in the standard CT), the incorrect result comes out, as in the following tableau.

(13)

/damn/ +/ation/	*COMPLEX	MAX-IB	MAX/DEP-BA_1	MAX-IA_1
a. {damn} dam.nation	*!			
b. {dam} dam.na.tion		*	*!	
c. {damn} da.ma.tion	*!		*	*
d. {dam} da.ma.tion		*		*

The overapplication of Cluster Simplification in Class 2 affixed words is driven by the Base-identity effects; the faithfulness constraint between Base and Affixed word is ranked over the faithfulness constraint between Input and Affixed word.

(14)

Input: /damn/+/ing/	*COMPLEX	MAX/DEP-IB	MAX/DEP-BA_2	MAX-IA_2
a. {damn} dam.ning	*!			
b. {dam} da.ming		*		*
c. {damn} da.ming	*!		*	*
d. {dam} dam.ning		*	*!	

The candidates (a,c) are ruled out because they violate the undominated phonological constraint *COMPLEX. The candidate

(d) violates the faithfulness constraint between Base and Affixed form, and it fails. The faithfulness constraint MAX/DEP-BA_2 is crucial. Without it, the candidate (b) cannot be selected as an optimal output, but the candidate (d) would be selected as an optimal output. Since the phonological constraint *COMPLEX is less important than the faithfulness constraint in evaluating nonderived words and Class 1 affixed words, it can be ranked below the faithfulness constraints. However, it must be dominant in evaluating Class 2 affixed words, so the summary constraint ranking is as follows:

(15) *COMPLEX ≫ IB-Faith ≫ BA_2-Faith ≫ IA-/ID-Faith ≫ BA_1-/BD-Faith

3. Closed Syllable *æ*-Tensing

Consider English dialects spoken in New York and Philadelphia. There is a phonotactic constraint, Closed Syllable *æ*-Tensing, which requires the low front vowel [æ] to be tensed in closed syllables. The *æ*-tensing process is closely related to the class of affix; while the root vowel becomes tense in unaffixed words or Class 2 affixed words, it becomes lax in Class 1 affixed words.

(16)

Unaffixed		Class 1 Affix		Class 2 Affix	
class	[klEs]	classic	[klæ.sik]	classy	[klE.si]
mass	[mEs]	massive	[mæ.siv]	massable	[mE.sə.bl]
pass	[pEs]	passive	[pæ.siv]	passing	[pE.siŋ]

According to Borowsky (1993), *æ*-Tensing rule must apply at the Word level because the root vowel gets tensed in unaffixed words and Class 2 affixed words. The level-ordering derivation is

given by her, as follows:

(17) Level 1:

	class	class + ify	
	—	—	æ-Tensing
Level 2:			
Cycle 1	cl[E]ss	cl[E]ss	æ-Tensing
Cycle 2		cl[E]ss + y	

Class 1 affixed word *classify* is not affected by æ-Tensing so that the root vowel remains lax. The unaffixed word *class* undergoes the rule, becoming *cl[E]ss*. Then, morphology follows phonology, rendering the correct output *cl[E]ssy*.

The normal application of Closed Syllable æ-Tensing in unaffixed words and Class 1 affixed words and overapplication in words with Class 2 affixes could be also analyzed in terms of interaction of the faithfulness constraints in (10) with two phonological constraints which are given in Benua (1995).

(18) a. *æC]σ: lax [æ] is prohibited in closed syllables.
b. *TENSE-low: tensed low vowel is not allowed.

The normal application of æ-Tensing in unaffixed words forces the phonological constraint *æC]σ not to be dominated. Also, the faithfulness constraint on Base and Derived word is least important and ranked below other constraints.

(19)

/pæs/	*æC]σ	IDENT[tense]-IB	*TENSE-low	IDENT[tense]-BD
a. {pEs} pæs	*!	*	*	*
b. {pEs} pEs		*	**	
c. {pæs} pEs	*!		*	*
d. {pæs} pæs	**!			

The faithful candidates (a,c,d) incur a fatal violation of the dominant *æC]σ, because they have a lax [æ] in a closed syllable. The constraint ranking between *TENSE-low and IDENT[tense]-BD is not crucial in evaluating the unaffixed. If the faithfulness constraints take precedence over the phonological constraints, a wrong result comes out. The evaluation is omitted on account of limited space.

The normal application of *æ*-Tensing in Class 1 affixed words pattern together with unaffixed words. BA_1-Faithfulness constraint takes the place of BD-Faithfulness constraint.

(20)

/pæs/ + /iv/	*æC]σ	IDENT[tense]-IB	*TENSE-low	IDENT[tense]-BA_1
a. ☞ {pEs} pæ.siv		*	*	*
b. {pEs} pE.siv		*	**!	
c. {pæs} pE.siv	*!		*	*
d. {pæs} pæ.siv	*!			

The candidates (c,d) have lax [æ] in their Bases, violating the dominant phonological constraint *æC]σ. The Affixed words of the candidates (a,b) are not faithful to their Bases. The candidate (a) can be selected as an optimal output because it violates *TENSE-low less than the candidate (b) does. IDENT[tense]-BA_1 must be dominated by *TENSE-low. Otherwise, the candidate (b) is incorrectly selected as an optimal candidate.

The overapplication of *æ*-Tensing in Class 2 affixed words is also driven by the base-identity effect. In other words, the faithfulness between Base and Affixed word is important than *TENSE-low so that IDENT[tense]-BA_2 must outrank *TENSE-low.

(21)

/pæs/ + /ing/	*æC]ʊ	IDENT[tense]-IB	IDENT[tense]-BA_2	*TENSE-low
a. {pEs} pæ.sing		*	*!	*
b. ☞ {pEs} pE.sing		*		**
c. {pæs} pE.sing	*!		*	*
d. {pæs} pæ.sing	*!			

The candidates (c,d) are out of competition, violating the dominant *æC]ʊ. The candidates (a,b) equally violate IDENT[tense]-IB. While the candidate (a) violates IDENT[tense]-BA_2, the candidate (b) does not. Therefore, the candidate (a) becomes a winner.

In sum, Closed Syllable *æ*-Tensing is explained by the interaction of the phonological constraints with the faithfulness constraints, represented as follows:

(22) *æ*-Tensing ≫ IB-Faith ≫ BA_2-Faith ≫ *TENSE-low ≫ BD-/BA_1-Faith

4. Belfast Dentalization

In the dialect of English spoken in Belfast, the coronal consonants become dentals when followed by tautosyllabic dental fricative or *r*.

(23) Dentalization: /t, d, n, l/ → [t̪, d̪, n̪, l̪] /____ [θ, (ə)r]

While this rule applies in both monomorphemic and Class 1 affixed words, it underapplies in Class 2 affixed words. Examples given below show this alternation.[10]

[10]These examples are quoted from Borowsky (1993) and Benua (1997).

(24) Unaffixed	Class 1 Affix	Class 2 Affix
spi*d*er	eleme*nt*ary	wider
*d*rain	sani*t*ary	louder
ma*tt*er	te*n*th	diner
la*dd*er	eigh*th*	cooler
pi*ll*ar		killer
*t*rain		bedroom
la*tt*er		later
a*n*them		

This alternation can be explained by Borowsky's two-level lexical phonology. Dentalization, classified as a Word level, must not apply on the Stem level, but apply on the Word level.

(25)	spider	wide	element + ary	
Level 1:	—	—	—	Dentalization
Level 2:		wide		
Cycle 1	spider	—	elementary	Dentalization
Cycle 2		wide + r		
	[spayd̪ɹ]	[waydɹ]	[ɛl̪əmɛn̪t̪ri]	

Since structure preservation and the SCC are observed at Level 1, the rule does not apply at all. At Level 2 it applies on the word cycle, causing dentalization in the unaffixed and Class 1 affixed words. Class 2 affixed words lose a chance to be dentalized because they are added after the phonological process is complete.

For the analysis of allophonic alternations between dental and alveolar, the feature [±distributed] is required. The dentals are [+distributed] and alveolars are [-distributed].[11] The correspondence relations between Input and Base, Base and Derived/Affixed word

[11]This feature is an equivalent of the *The Sound Pattern of English* (Chomsky and Halle 1968) distinction between apical (tongue-tip) and laminal (tongue-blade) articulations. While the former refers to alveolar and retroflex, the latter refers to dental and palatal or palatoalveolar (Keating 1988 and Kenstowicz 1994).

are represented by the faithfulness constraints in terms of [±distributed]. These constraints interact with a phonological constraint, *ALV-RHOTIC stating that Alveolar-rhotic sequences are prohibited.

The domination of the phonological constraint *ALV-RHOTIC over the BD-Faith causes dentalization of unaffixed words like *spider*, as illustrated below.

(26)

/spider/	IDENT[-dist]-IB	*ALV-RHOTIC	IDENT[±dist]-BD
a. {spider} spider		**!	
b. {spider} spid̪er		*	*
c. {spid̪er} spider	*!	*	*
d. {spid̪er} spid̪er	*!		

The candidates (c,d) fail because their Bases have dentalized coronals which are not identical value for [-distributed] in their inputs. While the constraint *ALV-RHOTIC is violated in Base and Derived word of the candidate (a), it is violated only in the Base of the candidate (b). Therefore, the candidate (b) becomes a winner.

The base-identity, represented by IDENT[±dist]-BD, is less important than the phonological constraint. If the base-identity takes precedence over the phonological constraint, an incorrect output is selected.

(27)

/spider/	IDENT[±dist]-IB	IDENT[±dist]-BD	*ALV-RHOTIC
a. ☜ {spider} spider			**
b. {spider} spid̪er		*!	*
c. {spid̪er} spider	*!	*	*
d. {spid̪er} spid̪er	*!		

The normal application of Dentalization in Class 1 affixed words like *elementary* is explained by the constraint ranking, as given in (28). Instead of BD-Faithfulness constraint, BA_1-Faithfulness constraint is required.

(28)

/element/ + /ary/	IDENT [-dist]-IB	*ALV-RHOTIC	IDENT[±dist]-BA_1
a. {element} elementary		**!	
b. ☞ {element} elementary			**
c. {element} elementary	**!	**	**
d. {element} elementary	**!		

The Bases of the candidates (c,d) do not have correspondents in their input and violate the dominant constraint IDENT[-dist]-IB. The faithful candidate (a) incurs a fatal violation of the phonological constraint *ALV-RHOTIC and becomes a loser.

The underapplication of Dentalization in Class 2 affixed words like *wider* is forced by the base-identity effect. This is represented by the domination of BA_2-Faithfulness over the phonological constraint.

(29)

/wide/ + /r/	IDENT[-dist]-IB	IDENT[±dist]-BA_2	*ALV-RHOTIC
a. ☞ {wide} wider			*
b. {wide} wider		*!	
c. {wide} wider	*!	*	*
d. {wide} wider	*!		

The Bases of the candidates (c,d) violate the dominant constraint IDENT[±dist]-BA_2 and are out of competition. In the candidate (b), correspondents in an input-affixed form relation do not agree

in [±dist]. Therefore, the candidate (b) cannot be selected as an optimal output.

In sum, Belfast Dentalization is well explained by the constraint hierarchy: IDENT[±dist]-IB≫IDENT[±dist]-BA_2≫*ALV-RHOTIC≫ IDENT[±dist]-BD/BA_1.

5. Conclusion

The misapplications of phonological rules such as Cluster Simplification, Closed Syllable *æ*-Tensing, and Belfast Dentalization in only Class 2 affixed words pose a crucial challenge to the standard CT. Since these rules normally apply in unaffixed and Class 1 affixed words, phonological constraints must be ranked over IO-Faith. With this constraint ranking, however, an optimal output of Class 2 affixed words cannot be selected.

Together with the distinction of BA_1-/BA_2-Faith, if we apply correspondence relations suggested in the analyses of opacity occurring in unaffixed words to the case of misapplication, the question for the misapplications can be answered. In other words, misapplications in Class 2 affixed words occur when BA_2-Faith dominates over phonological constraints or IA-Faith.

A controversial issue is that an unaffixed word is allowed to have a base to resemble and under correspondence relation its base. Of course, this is not possible from the traditional point of view. However, by assuming that an unaffixed word is under correspondence relation with a base, one of its failed outputs, an opacity can be partially explained by a constraint-based approach. Furthermore, this assumption can pave the way for accounting for the so-called nonderived environment blocking (NDEB) because misapplication of a rule in a nonderived word is the same as an opacity occurring in an unaffixed word.

Finally, the way of representing candidates as being a pair of a base and a derived word may not meet evaluation metrics of a

grammar, maximal simplicity and generality. Given a successful study on NDEB and opacity, at the expense of simplicity, maximal generality is attained that the miapplications in non-derived words as well as Class 2 affixed words, which have been separatedly treated, are driven by base-identity effects.

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김희용
서울시 성북구 정릉동 861-1번지
국민대학교 문과대학 영어영문학과
우편번호: 136-702
전화번호: 02) 910-4370
E-mail: hhkayon@hanmail.net

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