Base Identity and Affix Classes in English

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Shinsook Lee and Mi-Hui Cho. 1998. Base Identity and Affix Classes in English. *Studies in Phonetics, Phonology, and Morphology* 4, 207-226. In this paper we account for the different phonological behavior of level 1 and level 2 suffixes in English within the framework of Correspondence Theory. We show that the constraint-based analysis provides a better explanation of this phenomenon than does the rule-based model. Specifically, we propose that the Base Identity Constraint, which requires an identity relation between the source word base and the suffixed-form, is responsible for the phonological differences between level 1 and level 2 suffixes. We also demonstrate that a constraint ranking, which reflects the sonority principle and markedness, accounts for the realization of nasals and labials as codas over obstruents and coronals, respectively. In addition, we show that the Sonority Sequencing Principle and the Peak Constraint contribute to accounting for Sonorant Syllabification. **(Hoseo University and Pukyong National University)**

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1. Introduction

It is a well-known fact that several phonological phenomena in English, such as /n/-deletion, voiced obstruent deletion, /g/-deletion, and sonorant syllabification show different behavior with respect to level 1 and level 2 suffixes. Lexical Phonology (Kiparsky 1985, Borowsky 1986, 1993) captures this fact by positing ordered levels and permitting phonological rules to interleave within morphological operations. In particular, Borowsky (1993) proposes that the phonology precedes rather

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than follows the morphology at level 2, unlike at level 1. Recently, however, Lexical Phonology has been challenged because of the level ordering paradox. Moreover, Borowsky's model cannot differentiate lexical-level voicing assimilation from a postlexical one.

In this paper we provide a constraint-based account of phonological differences between level 1 and level 2 suffixes in English within Correspondence Theory (McCarthy and Prince 1995). Specifically, like the proponents of Lexical Phonology, we argue that English suffixes are divided into level 1 and level 2 suffixes; however, unlike them we do not appeal to the level ordering hypothesis. Rather, we show that the Base Identity Constraint (Kenstowicz 1995), which can be ranked differently with respect to level 1 and level 2 suffixes, plays a crucial role in accounting for this phenomenon, along with the Coda Cluster Constraint and the Sonorant Sequencing Principle (Selkirk 1984). We also demonstrate that Max(nasal) is ranked above Max(obstruent), as is Max(labial) above Max(coronal), which reflects the sonority principle (Goldsmith 1990) and markedness, respectively.

The paper is organized as follows: Section 2 presents data involving level 1 and level 2 suffixes in English: /n/-deletion, voiced obstruent deletion, /g/-deletion, and sonorant syllabification. Section 3 reviews a previous analysis and its problems, mostly focusing on the lexical phonology and morphology model in Borowsky (1993). Section 4 covers the theoretical assumptions of Correspondence Theory and the constraints relevant for this paper. Section 5 gives a unified account of several phonological phenomena involving level 1 and level 2 suffixes. Section 6 summarizes the conclusions reached.

2. Phonological Phenomena Involving Level 1 and Level 2 Suffixes

In this section we provide data on /n/-deletion, voiced obstruent deletion, /g/-deletion, and sonorant syllabification which show different behavior with respect to level 1 and level 2 suffixes. Consider the examples given in (1)-(4) (Halle and Mohanan 1985, Borowsky 1986, 1993, Inkelas 1993):

(1) /n/-Deletion

n ---> ϕ / m___]σ

a. word-final	b. level 2 suffixes	c. level 1 suffixes
hymn	hymns	hymnal
damn	damner	damnation
condemn	condemning	condemnation
[m]	[m]	[mn]

(2) Voiced Obstruent Deletion

b/g ---> ϕ / N___]σ (where N = homorganic nasal)

a. word-final	b. level 2 suffixes	c. level 1 suffixes
iamb	iambs	iambic
bomb	bombing	bombard
crumb	crumby	crumble
[m]	[m]	[mb]
strong	strongly	strongest
long	longing	longest
prolong	prolonged	prolongation
[ŋ]	[ŋ]	[ŋg]

(3) /g/-Deletion

g ---> ϕ / ___[+nasal]]σ

a. word-final	b. level 2 suffixes	c. level 1 suffixes
paradigm	paradigm-shift	paradigmatic
sign	signer	signal
resign	resigning	resignation
[n]	[n]	[gn]

(4) Sonorant Syllabification

[+son] ---> [+syll]/C___]σ

a. word-final	b. level 2 suffixes	c. level 1 suffixes
theater	theater-goer	theatrical
meter	metering	metrical
wonder	wondering	wondrous

center	centering	central
[sɛn.tr̩]	[sɛn.tr̩.ɪŋ]/[sɛn.trɪŋ][1]	[sɛn.trəl]/*[sɛn.tr̩.əl]
cycle	cycling	cyclic
[saɪ.kl̩]	[saɪ.kl̩.ɪŋ]/[saɪ.klɪŋ]	[sɪ.klɪk]/*[sɪ.kl̩.ɪk]

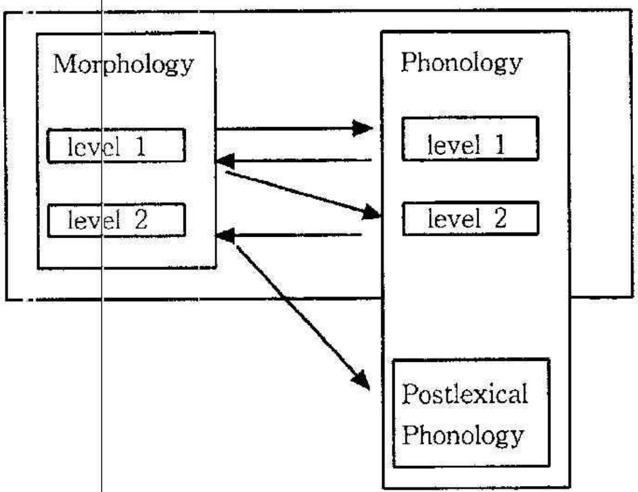
In (1), word-finally and in level 2 suffixed forms, /n/ after /m/ is deleted, whereas it surfaces before level 1 suffixes. In (2), voiced obstruent stops /b/ and /g/ after homorganic nasals are also deleted, while they are realized before level 1 suffixes. Likewise, in (3), pre-nasal /g/ deletes word-finally and in level 2 suffixed forms, whereas it surfaces in level 1 suffixed forms. Sonorant Syllabification shows the same pattern; the post-consonantal liquids /l/ and /r/ become syllabic when they show up word-finally and in level 2 suffixed forms, but not in level 1 suffixed forms. For example, *cycle* and *cycling* are pronounced as [saɪ.kl̩] and [saɪ.kl̩.ɪŋ]/[saɪ.klɪŋ], respectively, while *cyclic* is produced as [sɪ.klɪk]/*[sɪ.kl̩.ɪk]. Therefore, the examples in (1)-(4) illustrate that several phonological phenomena show differences with respect to level 1 and level 2 suffixes.

3. Previous Analysis and Problems

Lexical Phonology captures the phenomena given in section 2 by positing ordered levels and permitting phonological rules to interleave within morphological operations. Borowsky (1993), in particular, proposes a model of Lexical Phonology in which the morphology precedes and feeds phonology in a usual cyclic fashion at the stem level, whereas the phonology precedes, rather than follows, all morphological operations at the word level. Moreover, she contends that at the word level there is a word cycle before any morphological operation, which is the only phonological domain at this level. Borowsky's model is given in (5) (Borowsky 1993: 200):

[1]Borowsky (1993) argues that we could get an unsyllabic form by postlexical syllabification, which is optional.

(5) The English Lexicon



According to her, the differences in the phonology of the two lexical levels can be explained in terms of prosodic licensing (i.e., syllabification) under the model. An illustrative derivation for /n/-deletion is given in (6):

(6) Examples of /n/-Deletion

a. hymn	b. hymns	c. hymnal		
hym(n)	hym(n)	hym(n)	Level 1:	/n/-deletion blocked (extrametrical)
		+ al		morphology
		[hIm.nəl]		syllabification
			Level 2:	word cycle
hym	hym			/n/-deletion
	hym + s			morphology
[hIm]	[hImz]			syllabification

In Borowsky's account, the final /n/, which is extrametrical, becomes the onset of the vowel-initial suffix at the stem level. As a result, there is no deletion before a level 1 suffix, as shown in (6c). In contrast, the final /n/ is no longer extrametrical on the word cycle at level 2. At this point, prosodic licensing forces the final /n/ to be deleted before level 2 morphology occurs. Thus, /n/-deletion occurs word-finally and before level 2 suffixes, as in (6a) and (6b), respectively. Borowsky further argues that by positing a word cycle at level 2 before any morphological operation, other processes, such as voiced obstruent deletion /g/-deletion, and Sonorant Syllabification can also be accounted for in terms of a single process of prosodic licensing, as in /n/-deletion.

Although Borowsky tries to explain the different phonological behavior of the two lexical levels by proposing the particular model given in (5), her analysis has the following drawbacks. First, her theory has a problem of the level ordering paradox. That is, nasal assimilation in English appears to skip level 2, even though it applies at level 1 as well as postlexically, as shown in (7) (Borowsky 1993: 216):

(7) Nasal Assimilation

a. level 1:

in + possible	--->	impossible
in + duce	--->	induce
in + crease	--->	increase[2]

b. level 2:

un + perturbable	--->	unperturbable/ *u[m]perturbable[3]
un + traditional	--->	untraditional
un + governable	--->	ungovernable/ *u[ŋ]governable

c. postlexical:

unbelievable	--->	u[m]believable
pumpkin	--->	pu[ŋ]kin
Vancouver	--->	Va[ŋ]couver

Borowsky argues that the facts on nasal assimilation follow from the architecture of the system proposed above (cf. (5)); no nasal assimilation takes place between the level 2 prefix *un-* and a following morpheme at the word level since the morphemes are not adjacent at

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[2] Borowsky (1986, 1993) claims that the Structure Preservation Principle prevents nasal assimilation from applying to this form because [ŋ] is not a phoneme of English.

[3] Borowsky claims that we get u[m]perturbable, by postlexical application of nasal assimilation.

this point. However, we cannot say that *un-* is a level 2 prefix because of the level ordering paradox. That is, forms like *ungrammaticality* are expected to be analyzed as [[un[grammatical]]ity] because *un-* attaches only to adjectives. But *-ity* is a level 1 suffix and *un-* is a level 2 prefix. Thus, if *-ity* attaches to *ungrammatical*, the level ordering paradox occurs.[4] This suggests that we cannot appeal to a word cycle to account for why nasal assimilation does not apply at level 2, hence contradicting Borowsky's argument.

Borowsky's analysis has another problem. The regular preterite and participial ending, and the plural suffix in English, /d/ and /z/ respectively, undergo voicing assimilation and epenthesis at level 2.[5] Under Borowsky's analysis, however, these phenomena cannot apply to forms like *love-d, like-d,* and *hate-d/ bee-z, cat-z,* and *rose-z* since the level 2 phonology precedes the level 2 morphology. In other words, voicing and epenthesis can apply only after the morpheme concatenation at level 2. But because there is no phonology at level 2 after the morphology, we cannot apply these rules at this word level. For this reason, Borowsky concludes that voicing assimilation and epenthesis are postlexical and do not take place at level 2 at all. However, Kiparsky (1982, 1985) and Myers (1992) assume that the inflectional suffixes /d/ and /z/ do induce voicing assimilation and epenthesis at the word level but not at the postlexical level. For example, voicing assimilation at the word level is different from that of the postlexical level, which creates allophones (e.g., [r̥] in *cry*, [l̥] in *play*, etc.).[6] This is because voicing assimilation at the lexical level is subject to the Structure Preservation Principle, whereas that at the postlexical level is not. Therefore, we cannot assume that voicing assimilation and epenthesis occur

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[4] Because of the level ordering problem, Szpyra (1989) alternatively suggests that *un-* forms a prosodic word on its own unlike level 1 suffixes.

[5] Borowsky assumes that /-əd/ and /-əz/ are underlying forms of the regular preterite and participial ending and the plural suffix in English, respectively, and we need vowel deletion and voicing assimilation rules. But Borowsky (1993) notes in footnote 20 (p.231) that we can also claim that /-d/ and /-z/ are underlying forms of inflectional suffixes along with vowel epenthesis, which is assumed in this paper.

[6] [r̥] and [l̥] represent voiceless [r] and [l], respectively.

postlexically in order to keep Borowsky's model.

In sum, the problems indicated above clearly show that we cannot appeal to the word cycle within Lexical Phonology in order to account for the different phonological behavior of the level 1 and level 2 suffixes In the following section, we examine the Correspondence Theory framework and constraints to give a unified account of the phonological phenomena in English.

4. Correspondence Theory and Constraints

Correspondence Theory as proposed by McCarthy and Prince (1995) is a recent development of Optimality Theory (Prince and Smolensky 1993, McCarthy and Prince 1993a, McCarthy and Prince 1993b). Like Optimality Theory, Correspondence Theory is a model of constraints and constraint interaction which claims that an optimal output form is selected through the evaluation of an array of candidate outputs in a parallel mode. However, Correspondence Theory emphasizes more an identity relation between input and output, as the definition given in (8) illustrates.

(8) Correspondence (McCarthy and Prince 1995: 14):
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 $\alpha R \beta$.

In the context of Correspondence Theory, faithfulness constraints in Optimality Theory (Prince and Smolensky 1993) are thus redefined as constraints on correspondence. Namely, the Parse and Fill Constraints in Optimality Theory are replaced by Max and Dep, respectively. In the following, we examine constraints relevant for this paper.

While McCarthy and Prince (1995) establish base and reduplicant correspondence and input and output correspondence, other researchers like Benua (1995, 1997) extend correspondence relation to source word and truncated word in truncation, implying output-to-output correspondence. Kenstowicz (1995) also propposes a similar output-to-output correspondence named Base Identity, given in (9):

(9) Base Identity
Given an input structure [X Y] output candidates are evaluated for how well they match [X] and [Y] if the latter occur as independent words.

This constraint demands identity between the source word base and the suffixed form. For example, it is more important for the output of suffixed form /hymn + z/ to resemble the output form of /hymn/, that is, [hIm], than to resemble the underlying input form.

Now let us turn to the Coda Cluster Constraint, shown in (10):

(10) The Coda Cluster Constraint
*[nasal][voiced peripheral]%]σ

(10) prohibits the sequence of [nasal] and [voiced peripheral] in syllable-final position.[7] That is, the constraint bans any clusters involving nasals and voiced labial or velar stops in the coda position whatever their relative input order is. So this constraint penalizes clusters like *mn*, *gŋ*, *mb*, and *gn* in syllable-final position.[8] Because the Coda Cluster Constraint is highly ranked, any string of sequences having [nasal] and [voiced peripheral] must undergo some change.

The constraint of NonComplexity given below requires that, in nasal obstruent sequences, nasals should share place features with the following obstruents, due to ease of articulation or lenition (Kirchner 1998).

(11) NonComplexity
Nasals must share place features with the following obstruents.

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7 The feature [peripheral] groups labials and velars together.

8 Clusters such as mp, nt, and nd can be realized in syllabe-final position because they do not violate the Coda Cluster Constraint.

The Sonority Sequencing Principle as proposed by Selkirk (1984) explains the types of consonant clusters that can appear before and after the vowel of a syllable.

(12) Sonority Sequencing Principle
In any syllable, there is a segment constituting a sonority peak that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values.

The Peak Constraint, given in (13), requires that syllables have one vowel (Archangeli 1997):

(13) Peak
Syllables have one vowel.

Now let us consider the Dep Constraint. This constraint penalizes segment insertion, as shown in (14):

(14) Dep (McCarthy and Prince 1995: 16)
Every segment of the output has a correspondent in the input (No phonological insertion).

Finally, the Max Constraint Family, which is divided into a set of constraints, is given in (15):

(15) The Max Constraint Family (McCarthy and Prince *ibid.*)
Every segment of the input has a correspondent in the output (No phonological deletion).
a. Max(nasal)
b. Max(obstruent)
c. Max(labial)
d. Max(coronal)

Here note that the Max Constraint Family punishes segment deletion and its subconstraints reflect the ideas of the sonority principle (Goldsmith 1990) and markedness. Thus, Max(nasal) is ranked above Max(obstruent) since the sonorant segment surfaces as a coda in the sequence of obstruent and sonorant. Lkiewise, Max(labial) is ranked higher than Max(coronal) because coronals are universally the least marked segments. With these constraints we provide a constraint-based analysis of English word-level phenomena in the following section.

5. A Constraint-Based Analysis

In this section we show that the different phonological behavior of level 1 and level 2 suffixes comes from the different ranking of Base Identity between these two levels. In particular, we contend that Base Identity is an undominated constraint in level 2 suffixes while it is a dominated one in level 1 suffixes. We propose the following constraint ranking given in (16):

(16) Constraint Ranking (level 2 suffixation)
Base Identity, Coda Cluster, NonComplexity, Sonorant Sequencing, Dep, Max(labial), Max(nasal) >> Max(coronal), Max(obstruent) >> Peak

The ranking in (16) states that there are no crucial rankings among Base Identity, Coda Cluster, NonComplexity, Sonorant Sequencing, Dep, and Max(labial)/(nasal). But it clearly shows that Max(labial) is ranked higher than Max(coronal), as is Max(nasal) higher than Max(obstruent). This demonstrates markedness and the sonority principle, as discussed in the previous section.

First, let us consider the tableaux in (17)-(19).[9]

[9] The constraint Sonorant Sequencing is only relevant to Sonorant Syllabification. So in the following we omit this constraint for convenience.

(17) /n/-Deletion

Base form

/hymn/	Coda Cluster	Dep	Max(lab)	Max(cor)
a. ☞ hIm				*
b. hIm.nə		*!		
c. hImn	*!			
d. hIn			*!	

(18) Level 1 suffixed form

/hymn + al/	Coda Cluster	Dep	Max(lab)	Max(cor)	Base Ident
a. ☞ hIm.nəl					*
b. hIməl				*!	
c. hIm.nə.əl		*!			*
d. hInəl			*!		*

(& hIn)

(19) Level 2 suffixed form

/hymn + z/	Base Ident	Coda Cluster	Dep	Max(lab)	Max(cor)
a. hImnz	*!	*			
b. ☞ hImz					*
c. hInz	*!			*	
d. hIm.nəz	*!		*		

(& hIn)

In (17) the optimal output (a) with the deleted coronal [n] is selected because it only violates the low-ranked Max(cor) Constraint. In contrast, candidate (b) incurs a highly ranked Dep violation in order to avoid the equally high-ranked Coda Cluster Constraint which forbids the sequence of nasal and voiced peripheral in syllable-final position. Candidate (c) violates the Coda Cluster Constraint, although it satisfies other faithfulness constraints (i.e., Dep and Max). Candidate (d) is also out since it deletes [m], thus resulting in a highly ranked Max(lab) violation. In (18) candidate (a) is chosen as optimal because it violates the low-ranked Base Identity. However, candidate (b) is ruled out due to the violation of the high-ranked Max(cor). Likewise, candidates (c) and (d) are also out of competition since they violate Dep and Max(lab), respectively. In (19) candidate (b) emerges as optimal because it satisfies the highly ranked Base Identity Constraint, although it violates the low-ranked Max(cor). Namely, the optimal output of so-called level 2 suffixed form /hymn + z/ is [hImz] (candidate (b)) because it resembles its source word base [hIm] more than other candidates, and its violation of the low-ranked Max(cor) does not have any influence on the selection of the optimal output form. In contrast, candidates (a), (c), and (d) are all ruled out due to their fatal violation of the Base Identity Constraint. Here note that Base Identity is high-ranked in level 2 suffixes while it is not in level 1 suffixes. Therefore, the tableaux (17)-(19) show that the deletion of /n/ after /m/ in word-final position and in level 2 suffixed forms can be accounted for by the different ranking of Base Identity between level 1 and level 2 suffixes.

Now, let us consider voiced noncoronal obstruent deletion after a homorganic nasal, which can be explained in the same line as in /n/-deletion.

(20) Voiced Obstruent Deletion (b/g deletion)

Base form

/bomb/	Coda Cluster	NonComp	Dep	Max(nas)	Max(obst)
a. ☞ bɑm					*
b. bɑmb	*!				
c. bɑm.bə			*!		
d. bɑb				*!	

(21) Level 1 suffixed form

/bomb +ard/	Coda Cluster	NonComp	Dep	Max (nas)	Max (obst)	Base Ident
a. ☞ bɑm.bard						*
b. bɑm.ard					*!	
c. bɑ.bard				*!		*
d. bɑmb.ard	*!					*

(& bɑm)

(22) Level 2 suffixed form

/bomb +ing/	Base Ident	Coda Cluster	NonComp	Dep	Max(nas)	Max (obst)
a. bɑmb.Iŋg	*!	**	*			
b. bɑmb.Iŋ	*!	*				*
c. bɑm.bIŋ	*!					*
d. ☞ bɑ.mIŋ						**
e. bɑ.bIŋ	*!				*	*
f. bɑ.mIŋg		*!	*			*

(& bɑm)

In (20) candidate (a) wins out since it meets all the high-ranked constraints. However, candidate (b) is out of consideration due to its violation of the high-ranked Coda Cluster, although it satisfies faithfulness constraints. Candidates (c) and (d) are also ruled out because of the Dep and Max(nas) violations, respectively. Here note that candidate (a) wins out over candidate (d) since Max(nas) is ranked higher than Max(obst), which reflects the sonority principle. In (21) candidate (a), which obeys all constraints except Base Identity, is selected as optimal. In contrast, alternative candidates (b) and (c) with the deleted [b] and [m], respectively, are not optimal because they violate the high-ranked Max Constraint. The faithful candidate (d) is not optimal, either, because of its violation of the high-ranked Coda Cluster Constraint. In (22) candidates (a), (b), (c), and (e) are all out of competition since they incur a violation with the highly ranked Base Identity. Candidate (f), although it obeys the Base Identity Constraint, fatally violates the Coda Cluster Constraint which prohibits a voiced peripheral stop (i.e., /b/ or /g/) after a nasal in syllable-final position. It also violates the NonComplexity Constraint which requires that nasals should share place features with the following obstruents. In contrast, candidate (d) satisfies all the high-ranked constraints, and its violation of the low-ranked Max(obst) does not have any influence on the selection of the optimal output form. As a result, candidate (d), which resembles its source word base, is optimal.

Now, let us examine /g/-deletion, given in (23)-(25).

(23) /g/-Deletion
Base form

/sign/	Coda Cluster	Dep	Max(nas)	Max(obst)
a. sɑIgn	*!			
b. ☞ sɑIn				*
c. sɑIg			*!	
d. sɑI.gən		*!		

(24) Level 1 suffixed form

/sign +al/	Coda Cluster	Dep	Max(nas)	Max(obst)	Base Ident
a. sIgn.əl	*!				*
b. ☞ sIg.nəl					*
c. sI.gəl			*!		*
d. sI.nəl				*!	*
e. sI.gə.nəl		*!			*

(& sɑIn)

(25) Level 2 suffixed form

/sign +er/	Base Ident	Coda Cluster	Dep	Max(nas)	Max(obst)
a. sɑIg.nər	*!				
b. ☞ sɑI.nər					*
c. sɑI.gər	*!			*	
d. sɑI.gə.nər	*!		*		

(& sɑIn)

In (23) candidate (b) with the deleted [g] before syllable-final [n] emerges as the winner. However, candidate (c) with [g] realized instead of [n] is out because it violates Max(nas), which is fatal. Similarly, candidates (a) and (d) are also ruled out due to their violation of the high-ranked Coda Cluster and Dep, respectively. In (24) candidate (b) wins out because it satisfies all highly ranked constraints. The faithful candidate (a), however, incurs a fatal violation with the Coda Cluster Constraint. Candidates (c) and (d) violate Max(nas) and Max(obst), respectively, in addition to Base Identity and thus are not optimal. Candidate (e), with the inserted vowel [ə], is not optimal, either, because of its fatal violation of Dep. In (25) candidate (b) is selected as optimal because it obeys the highly ranked Base Identity. In contrast, candidates (a), (c), and (d) all fatally violate the Base Identity Constraint. Thus, the violation of the low-ranked Max(obst) in candidate (b) is not relevant to the decision of the optimal output.

Sonorant Syllabification can be explained along the same line as above, as the following tableaux illustrate.

(26) Sonorant Syllabification
Base form

/cycle/	Sonority Sequencing	Dep	Max	Peak
a. ☞ sɑɪ.kl̩				*
b. sɑɪ.kəl		*!		
c. sɑɪk			*!	
d. sɑɪkl	*!			

(27) Level 1 suffixed form

/cycle + ic/	Sonority Sequencing	Dep	Max	Peak	Base Ident
a. ☞ sɪ.klɪk					*
b. sɪ.kl̩.ɪk				*!	*
c. sɪ.kɪk			*!		*
d. sɪ.kəl.ɪk		*!			*
e. sɪkl.ɪk	*!				*

(& sɑɪ.kl̩)

(28) Level 2 suffixed form[10]

/cycle + ing/	Sonority Sequencing	Base Identity	Dep	Max	Peak
a. sɑɪ.klɪŋ		*!			
b. ☞ sɑɪ.kl̩.ɪŋ					*
c. sɑɪ.kɪŋ		*		*!	
d. sɑɪkl.ɪŋ	*!	*			

(& sɑɪ.kl̩)

[10] Here note that sɑɪ.klɪŋ (candidate (a)) can also be optimal and it can be selected as optimal by ranking Base Identity below Peak, as in level 1 suffixed form.

In (26) candidate (a) with a violation to the low-ranked Peak emerges as optimal. Candidates (b) and (c), however, violate Dep and Max respectively, which is fatal. Candidate (d) also incurs a fatal violation with Sonority Sequencing, and is out of competition. In (27) candidate (a) only violates the low-ranked Base Identity. In contrast, candidate (b) violates the high-ranked Peak by syllabifying /l/ as a syllable peak. Candidate (c) with /l/ deleted incurs a Max violation, which is fatal. Candidate (d) violates Dep fatally by adding a vowel in order not to syllabify /l/ as a peak. Candidate (e) also incurs a fatal violation with Sonority Sequencing by syllabifying /kl/ as a coda. As a consequence, candidate (a) is selected as optimal. In (28) candidate (b) obeys Base Identity because it resembles its source word base by syllabifying /l/ as a syllable peak. Candidates (a), (c), and (d), however, all violate the highly ranked Base Identity. In addition, candidate (c) violates Max by deleting /l/ and candidate (d) incurs a violation with Sonority Sequencing by making /kl/ occupy the coda position. Thus, candidate (b) is chosen as optimal.

In sum, the tableaux in (17)-(28) clearly show that the Base Identity Constraint as well as the sonority principle, markedness, and Sonority Sequencing play a decisive role in selecting an optimal output form.

6. Conclusion

In this paper we have shown that the constraint-based analysis provides a better explanation of the phonological differences between level 1 and level 2 suffixes in English than does the rule-based model. Specifically, we have demonstrated that the Base Identity Constraint, which requires the correspondence relation between the source word base and the suffixed word, plays a crucial role in accounting for the similarity between word-level forms and level 2 suffixed forms. Namely, the different ranking of Base Identity between level 1 and level 2 suffixes is responsible for the phonological differences between these two levels. We also have shown that the constraint ranking given in (16), which reflects the sonority principle and markedness, accounts for the realization of nasals and labials as codas over obstruents and coronals, respectively. Further, we have illustrated that Sonority Sequencing and Peak contribute to accounting for Sonorant Syllabification. Therefore, we do not need to appeal to the level ordering hypothesis as in Lexical Phonology in order to account for the different phonological behavior of level 1 and level 2 suffixes in English.

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