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A Constraint-based Analysis of Dissimilation in English*

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This paper deals with two different cases of dissimilation in English: traditional and r-deletion dissimilation examples. The structure preservation case of dissimilation[1] is analyzed by adopting the meta-constraint ranking, which distinguishes root/stem and affix in their faithfulness realization in phonological processes. The trigger of dissimilation is related to the OCP requirement banning identical elements within a word. The second type of dissimilation is about non-structure preserving case where either of the two retroflex liquids is deleted in the output. The concept of positional faithfulness is adopted in the account of [r] dissimilation. It is revealed in this study that positional faithfulness needs to be specified more to reflect various combinations of category proposed in positional faithfulness.

[constraint/dissimilation/deletion/ranking/obligatory contour principle]

I. INTRODUCTION

This paper focuses on two groups of dissimilation examples of English: a traditional case of dissimilation examples where a feature of a relevant segment changes, and r-deletion examples in which a structure is not preserved but deleted. Both types of examples can be explained by adopting Obligatory Contour Principle (hereafter, OCP: Leben, 1973; Goldsmith, 1976; McCarthy, 1981, 1986). It has been proposed that structure preservation case of dissimilation is readily accounted for by the notion of OCP

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[1] For possible motivations for dissimilation in languages, see Boersma (1998), Frisch (2004), and Alderete and Frisch (2007).

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This is because feature change occurs in affixes rather than stems, which we construe as free standing independent forms. That is, the OCP idea framed in rules differentially applies to stems and affixes only targeting a segment in affixes. However, dissimilation examples of r-deletion are different from the feature preservation examples because the retroflexed liquid appears in various syllabic positions, which causes difficulties in defining the target of deletion between the two retroflexed liquids.

The goal of this paper is to provide a constraint-based analysis of both structure preservation dissimilation data and r-deletion examples. The structure preservation case will be dealt with the meta-constraint ranking which asymmetrically treats root/stem and affix element. For the second type of dissimilation, the constraint-based analysis does not have to face problems in formulating various kinds of r-deletion rules but one constraint ranking framed in Optimality Theory (hereafter OT; Prince and Smolensky, 1993, 2004) and Correspondence Theory (McCarthy and Prince, 1995) is inclusive enough to explain all the r-deletion examples. In the analysis, a crucial role is played by constraints based on positional faithfulness (Beckman, 1997, 2004).

The format of the paper is as follows: Section 2 introduces two groups of dissimilation examples in English, which are followed by complete description of them. Section 3 briefly reviews rule-based approach of feature changing dissimilation examples. Section 4 provides an OT account of dissimilation in English, which is also followed by conclusion and implications of the paper for phonology and English education in section 5.

II. DATA PRESENTATION

In this section, we first present the dissimilation examples where a segmental feature in the affixes is modified in order not to have two identical segments in the output forms. The examples of this type are subdivided into two groups: the first group is composed of consonant final nouns which are followed by the adjective forming suffix {-al} and the second group consists of vowel final nouns followed by the {-al} suffix. The examples of the first group are given in (1).

(1) The affixation of {-al} in consonant final nouns

a. hymn	→	hymnal	g. title	→	titular
b. region	→	regional	h. angle	→	angular
c. orbit	→	orbital	i. single	→	singular
d. culture	→	cultural	j. circle	→	circular
e. adjective	→	adjectival	k. line	→	linear
f. baptism	→	baptismal	l. column	→	columnar

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In English, a noun converts to an adjective by affixing an adjective forming suffix such as {-al} as presented in the examples from (a) to (f). However, the adjective forming suffix is realized as [-ar] when a noun contains the lateral liquid /l/, which occurs close to the adjective forming suffix as shown by the data from (g) to (l). That is, the lateral liquid occurring in nouns does not have to be near to the suffix lateral liquid. This has been understood as the effect of dissimilation which does not allow two lateral liquids occurring close to each other within derived words. Since the requirement of dissimilation does not call for adjacent laterals, it is possible that some segments intervene between the two laterals within words. There are two interesting examples in (1): they are (d) and (j), which have one lateral and one retroflex respectively, but the order of them is opposite. The reason why the distribution of them in words is intriguing is that if the retroflex occurs closer to the lateral in the suffix, then the lateral suffix is preserved in the output. This indicates that the intervening retroflex blocks the application of dissimilation in English as evidenced by 'culture → cultural.' If, however, the retroflex precedes the lateral as in (j), the two laterals which are not separated by the retroflex blocker undergo dissimilation, changing the suffix lateral to retroflex. Thus, the domain of dissimilation is within a word and segments can interpose between two laterals acting transparently except for the retroflex. Since the change of feature is from lateral to retroflex, the modification of feature is minimal.

Second group of data is presented in (2). The examples are comprised of vowel final nouns followed by the adjective forming suffix.

(2) The affixation of {-al} in vowel final nouns

a. pupa	→	pupal	e. ulna	→	ulnar
b. flora	→	floral	f. lamina	→	laminar
c. fauna	→	faunal	g. uvula	→	uvular
d. aura	→	aural	h. luna	→	lunar

As illustrated by the examples in (2), the implementation of dissimilation is identical to what we have observed in (1), but the issue to be discussed in (2) is to resolve adjacent vowels over a morpheme boundary. This is because only one of the two vowels over a morpheme boundary appears in the output after affixation. Thus, it is difficult to identify which vowel has survived in the word formation process: is it a vowel from a noun or a vowel from the suffix? This shortening or deletion of the vowel is motivated to avoid a vowel hiatus. We assume that the suffix vowel is deleted in word formation process in order to reflect the idea that a segment in affixes rather than stems or words becomes the general target of phonological process. This concept has also been exercised in the examples in (1) in which the suffix lateral underwent feature changing in order to avoid

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two laterals occurring closely within a word.

The examples in (1) and (2) have been discussed frequently as exemplary cases of dissimilation in English. However, there are also examples which can be explained by adopting dissimilation concept. This type of dissimilation occurs in words that contain two retroflex liquids. In such examples, one of the retroflex liquids is deleted in the surface representation. Unlike the data given in (1) and (2) where we can find consistent target of feature change or vowel deletion, it is not easy to identify the target of r-deletion examples. The r-deletion examples are also subdivided into three groups depending on where the target appears in the prosodic structure of syllables. In the first group, the target of deletion occurs in the syllable coda position. The examples are from Hall (2007). The [r] that is not realized in the surface representation is parenthesized.

(3) Deletion of /r/ in the syllable coda position

a. /pərfɔ̀rm/	→	[pə(r).fɔ́rm]	'perform'
b. /fɔ̀rmərlɪ/	→	[fɔ́r.mə(r).lɪ]	'formerly'
c. /gʌ́vərnər/	→	[gʌ́.və(r).nər]	'governor'
d. /hǽmbərgər/	→	[hǽm.bə(r).gər]	'hamburger'
e. /ædvərsɛ̀rɪ/	→	[æ̀d.və(r).sɛ.rɪ]	'adversary'
f. /pærəfərnélyə/	→	[pæ̀.rə.fə(r).né.lyə]	'paraphernalia'

The examples in (3) show that the normal target of deletion occurs in the syllable coda position. When both retroflex liquids are in the syllable coda of a stressed and an unstressed syllable, the [r] in the unstressed syllable is deleted as in (a) and (b). If the two [r]s occur in the unstressed syllable, the coda [r] in the medial syllable is elided while the word final [r] survives as in (c) and (d). In the case where the two [r]s occur in the syllable onset and coda position each, the [r] in the onset position survives in the output while the one in the coda position fails to be realized in the surface representation as shown in (e) and (f).

The next group of data shows that the [r] in the syllable onset position is deleted when the other [r] appears in various environments.

(4) Deletion of /r/ in the syllable onset position

a. /ɪnfrərɛ̀d/	→	[ɪ̀n.f(r)ə.réd]	'infrared'
b. /prəgrɛ́sɪv/	→	[p(r)ə.gré.sɪv]	'progressive'
c. /frætrəsayd/	→	[frǽ.t(r)ə.sàyd]	'fratricide'
d. /sɛ̀ləbrətɔ̀rɪ/	→	[sɛ́l.lə.b(r)ə.tɔ̀.rɪ]	'celebratory'
e. /prəfɛ́sər/	→	[p(r)ə.fɛ́.sər]	'professor'

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When the two [r]s occur in stressed and unstressed onset of the syllable, the [r] in the stressed syllable appears in the surface representation while the other [r] in the unstressed onset of the syllable is deleted as shown in (a), (b), and (c). On the other hand, when the [r]s occur both in the unstressed syllables, the [r] in the onset cluster is deleted whereas the [r] in the singleton onset survives. We attribute the survival of singleton onset to vowel hiatus, an undesirable syllable structure over a syllable boundary, which will be created if the singleton onset is elided. Thus, the singleton onset [r] in that environment is protected. The final case of [r] deletion is when one [r] occurs as the second member of an onset cluster in the unstressed syllable and the other [r] appears as the coda of the final syllable in a word. In this case, the second member of the onset cluster is deleted while the coda of the word final syllable is realized. It might be assumed that the reason why the word final [r] is protected compared to the one in the onset position is that a word final edge plays a role here.

The final set of examples in which we can observe the deletion of [r] in stressed syllables is presented in (5).

(5) Deletion of /r/ in the syllable coda position

a. /kɔrpərešən/	→	[kɔ̀(r)pə.ré.šən]	'corporation'
b. /ɪnkɔrpəret/	→	[ɪn.kɔ́(r).pə.rèt]	'incorporate'
c. /dɔrmətərɪ/	→	[dɔ́(r).mə.tɔ̀.rɪ]	'dormitory'
d. /ɔrdənɛrɪ/	→	[ɔ́(r).də.nɛ̀.rɪ]	'ordinary'
e. /pɔrtrət/	→	[pɔ́(r).trɪt]	'portrait'
f. /fɔrmər/	→	[fɔ́(r).mər]	'former'

As presented in (a) and (b), when the [r]s occur in coda of the stressed syllable and onset of the stressed syllable, the [r] in the syllable coda is deleted in the output. When the coda [r] of the stressed syllable and the singleton onset [r] of the unstressed syllable occur within a word, the coda of the stressed syllable is deleted as shown by the examples in (c) and (d). This is possibly due to avoiding vowel hiatus creation, which will be created if the singleton onset [r] is deleted in final syllable of 'dormitory' and 'ordinary.' Another scenario where the [r] in the stressed syllable is deleted is that one [r] occurs as the coda of the stressed syllable and the other as the second member of onset cluster in the unstressed syllable. In this case, the coda element of the stressed syllable is deleted as shown in (e). Finally, when one [r] appears as the coda of the stressed syllable and the other [r] is the coda element of the word final syllable, the coda element of the stressed syllable is deleted as shown by the example in (f).

The description of [r] deletion data from (3) to (5) reveals some consistent facts about the well-protected environment. One such environment is when the syllable onset

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position is only occupied by the [r] as in (3e), (4d), (5c) and (5d). This single onset [r] survives even if the other [r] appears in the coda of the stressed syllable. Thus, the effect of stress in the syllable is seemingly weakened in the syllable coda position. The other environment where the [r] is consistently protected is the coda position of the word final syllable as in (3c), (3e), (4e), and (5f). The word-final [r] is not preceded by a stressed nucleus but it survives while the second member of the onset cluster or the coda of the stressed syllable is deleted as in (4e) and (5f). It is interesting when we compare (5f) and (3b) where the two dissimilation target [r]s appear in the stressed and unstressed coda position each. This is because the [r] in the stressed coda position wins over the one in the unstressed coda position in (3b), whereas the word final [r] in the unstressed syllable coda position survives in (5f), which is achieved at the cost of deleting the [r] in the stressed syllable. Thus, it might indicate some special positional effect of word final position, which will be discussed more in the analysis section. In what follows, we briefly review previous analysis of structure preserving dissimilation.

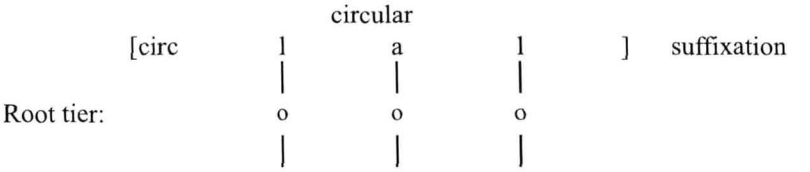
III. PREVIOUS ANALYSIS

This section deals with an analysis based on rules and the concept of OCP. Since the examples presented in (1) are the case of feature changing dissimilation motivated by a requirement that two lateral liquids occurring close to each other are not allowed within a word. Such structure preservation dissimilation has been explained by adopting the notion of OCP. Lee (1992:150) adopted the OCP concept to account for the structure preservation dissimilation or allomorphy between {-al/-ar} suffix examples where the basic suffix lateral liquid changes to retroflex liquid to avoid the OCP violation when the stem ends with a lateral. He adopted the following notion of OCP from McCarthy (1981; 1986) who tried to explain that the adjacent homorganic consonants do not occur in the Semitic segmental phonology.

(6) OCP: At the melodic level, the adjacent identical elements are prohibited.

Based on (6), Lee argues that the OCP violation occurs in the following representation:

(7)



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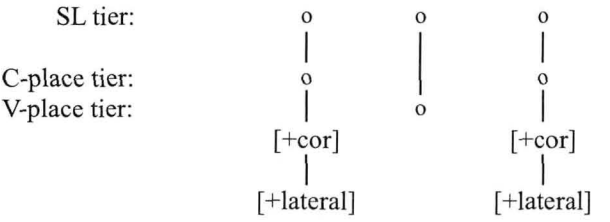

Since OCP does not allow two neighboring laterals within a word, the suffix lateral undergoes feature change becoming [r] in the surface representation, which results in satisfying the OCP requirement.

Adopting the notion of OCP in accounting for dissimilation examples presented in (l) looks valid but the OCP requirement can also be avoided if the lateral in the stem changes to retroflex liquid. Thus, since the theoretical tools to evade the OCP requirement does not specify which lateral in a word should undergo feature change, the resulting forms that have undergone feature change such as *circular* and *circural* are equally valid output forms. That is, the theoretical framework used in rules and the motivation of dissimilation given in (7) do not provide a reason why the lateral in the suffix undergoes feature change rather than the one in the stem.

With respect to the vowel shortening observed in the examples in (2), we could not find previous analysis of such process. So in order to look at the comprehensive aspect of dissimilation in English, an account for the vowel shortening cases should be provided As for the [r] deletion examples, which can be viewed as an extended case of dissimilation, we assume that a rule-based analysis might face some complexity problems of formulating rules because either [r] can be the target of deletion when it occurs in specified environments.

Since a rule-based approach may not provide an analysis which can include various types of dissimilation examples, we use constraints and their ranking which can explain more examples without resorting to specific conditions to derive the surface forms because all so called specific conditions are reflected in constraints.

IV. ANALYSIS

In this section, we provide a constraint-based analysis of dissimilation examples in English. For structure preservation examples given in the second column of (1), we first propose constraints utilized to account for them.

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(8) Constraints for structure preserving dissimilation

a. No lateral: Avoid lateral liquid. (cf. Alderete, 1997; Lombardi, 2001)

b. No lateral^2: Two neighboring lateral liquids occurring within a word are not allowed.

c. Ident-lat(stem): An input lateral segment of the stem has the identical correspondent in the output.

d. Ident-lat(affix): An input lateral segment of the affix has the identical correspondent in the output.

No lateral (*Lat) is a context free constraint, which applies across the board. Whenever a form has this segment, it violates this constraint. No lateral^2 (*Lat^2) is more specific constraint than *Lat since it prohibits two neighboring laterals within a word. Neighboring means that one lateral is followed by another lateral but between them consonants might occur, and this can be regarded as neighboring laterals. However, if a retroflex liquid intervenes between the laterals, the two laterals are not neighboring laterals any more. This type of sound distribution within a word does not violate *Lat^2. Following Pāṇini's theorem (Prince and Smolensky, 2004: 97-99), *Lat^2, which is a more specific constraint, dominates *Lat, which is a more general constraint.

One of the two faithfulness constraints Ident-lat(stem) calls for the faithful realization of the stem lateral in the output. If the feature of the lateral changes in the output, it leads to a violation of the constraint. Ident-lat(affix) requires that affix lateral be faithfully realized in the output. Between these two identity constraints, we rank Ident-lat(stem) higher than Ident-lat(affix) following the proposal from McCarthy and Prince's (1995) meta ranking constraint: Faith-Root/Stem 》 Faith-Affix. Between the two groups of constraints such as markedness and faithfulness constraints, we rank *Lat^2 and Ident-lat(stem) over the other markedness and faithfulness constraints. The high ranking constraints do not show particular ranking between them but the lower ranking constraints show ranking between them. Ident-lat(affix) is ranked higher than *Lat in order to explain both dissimilatory and non-dissimilatory examples in (1). In non-dissimilartory examples, the input suffix /-al/ maintains its lateral feature in the output but it incurs a violation of the lowest ranking *Lat, which does not affect the selection of the most harmonic candidate. The following Table 1 shows how the constraints and their ranking can account for feature changing dissimilation in English. In the following table, we regard two identical segments over a syllable boundary [l.l] and [r.r] as one segment since they are behaving as an ambisyllabic consonant.

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TABLE1

/kalʌmn + əl/	*Lat[2]	Id-Lat(stem)	Id-Lat(affix)	*Lat
a. kal.lʌm.nəl	*!			**
b. kar.rʌm.nəl		*!		*
☞ c. kal.lʌm.nər			*	*

As shown in Table 1, the high ranking *Lat[2] and Ident-lat(stem) eliminates candidates (a) and (b) which are faithful to the input and stem lateral undergoes feature change, respectively. The constraint ranking in Table 1 only targets the affix lateral to change its feature in order to obviate the OCP violation. This specific targeting of the affix lateral is implemented by the high ranking *Lat[2] and Ident-lat(stem). The constraint ranking in Table 1 can also explain the non-dissimilation examples as illustrated by Table 2.

TABLE 2

/hɪmn + əl/	*Lat[2]	Id-Lat(stem)	Id-Lat(affix)	*Lat
☞ a. hɪm.nəl				*
b. hɪm.nər			*!	

As shown in Table 2, a non-dissimilation example can be explained by the same constraint ranking. The important role is carried out by the lower ranking constraints while the high ranking constraints are trivially satisfied.

The proposed constraint ranking, however, cannot explain the dissimilation examples that end with a vowel given in (2) because the constraints are only focusing on laterals and their feature change. Thus, we propose three new constraints, which will be used along with the constraints given in (8).

(9) Additional constraints

a. *Vowel Hiatus: Vowels over a syllable boundary is prohibited.

b. Max-V(stem): Input stem vowels have their correspondents in the output.

c. Max-V(affix): Input affix vowels have their correspondent in the output.

*Vowel Hiatus (*VH)[2] is ranked high in the analysis because it is avoided cross-linguistically. The two Max constraints specify the faithful appearance of vowels in the output. We rank Max-V(stem) over Max-V(affix), which reflects the meta constraint ranking proposed by McCarthy and Prince (1995). *Vowel Hiatus and Max-V(stem) do not show particular ranking between them and Max-V(affix) is ranked low along with

[2] Concerning the cross-linguistic Vowel Hiatus resolution, readers are referred to Casali (1997, 1998, and 2011), who thoroughly describes how languages adopt different strategies to solve the problem.

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Ident-Lat(affix), but we rank Max-V(affix) over *Lat, which is the lowest ranking constraint. The following Table 3 illustrates how vowels over syllable boundary are treated in dissimilation. In Table 3, we do not include the lowest ranking *Lateral.

TABLE 3

/læmənə$_1$+ə$_2$l/	*Lat^2	*VH	Id-Lat(st)	Max-V(st)	Id-Lat(aff)	Max-V(aff)
a. læ.mə.nə$_1$.ə$_2$l	*!	*!				
b. ræ.mə.nə$_1$.ə$_2$l		*!	*!			
c. læ.mə.nə$_1$ə$_2$r		*!			*	
d. læ.mə.nə$_2$r				*!	*	
☞ e. læ.mə.nə$_1$r					*	*

Candidates (a), (b), and (c) are eliminated due to their violation of high ranking *Lat^2, *Vowel Hiatus, and Ident-Lat(stem), respectively. Candidate (d) is suboptimal since it incurs a violation of Max-V(stem) by not realizing stem vowel in the output. Thus, candidate (e) emerges as the optimal form, which only violates Ident-Lat(affix) and Max-V(affix) once each. An interesting thing about the evaluation between candidates (d) and (e) is that the two candidates are phonetically identical but (d) is not chosen as optimal because its vowel in the output is the realization of the affix one, which led it to the violation of Max-V(stem). We argue that candidate (e) is optimal since it preserves the stem vowel in the output and by doing this it maintains the concept of meta-constraint ranking: Faith-Root/Stem 》 Faith-Affix. The combined constraint ranking, which can account for both examples of dissimilation given in (1) and (2) is presented in (10).

(10) Constraint raking for dissimilation in English
*Lat^2, *Vowel Hiatus, Ident-Lat(stem), Max-V(stem) 》 Ident-Lat(affix), Max-V(affix) 》 *Lateral

Next, we provide an analysis of the [r] deletion, which is also viewed as an extended case of dissimilation. First, we introduce constraints we use for the analysis of the [r] deletion in the syllable coda position. We modify some of the constraints and adopt the same constraint, which have been used for the examples in (1) and (2).

(11) Constraints for the deletion of [r] in the syllable coda position
a. *r: Avoid the retroflex liquid.
b. *r^2: More than one retroflex liquid within a word is prohibited.
c. Max-Seg(σ́): Segments preceding or following a stressed vowel in the output have their correspondents in the input.[3]

[3] An anonymous reviewer pointed out a possible problem of Max-Seg(σ́) and its subdivided

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d. Max-Seg: Every segment in the input has its correspondent in the output.
e. *Vowel Hiatus: Vowels over a syllable boundary is prohibited.
f. Anchor-Right: Right edge of input and output is identical.

*r and *r^2 are very similar to *Lateral and *$Lateral^2$ used for the analysis of the dissimilation examples given in (1) and (2). *r is a general constraint which does not allow the retroflex liquid in the output while a type of self-conjunctive constraint *r^2 requires the prohibition of two retroflex liquids occurring within a world. Thus, more specific *r^2 is ranked higher than *r. This high ranking *r^2 is a trigger of [r] deletion but it does not specify actual target of the deletion.

Max-Seg is a general faithfulness constraint which demands no deletion of the input segments in the output. The other more specified Max-Seg(σ́) calls for no deletion of segments in the stressed syllable in the output. Between these two constraints, Max-Seg(σ́) is ranked over Max-Seg, whose ranking between them reflects 'positional faithfulness' proposed by Beckman (1997, 2004). Beckman argues that there are two different types of linguistic positions: one is privileged position and the other non-privileged position. The privileged position allows more marked segments and segments in this position are resistant to become the target of phonological processes. On the other hand, segments occurring in the non-privileged position are subject to become the target of phonological processes. Some of the asymmetrical linguistic positions proposed by Beckman are given in (12).

(12) The two types of linguistic positions

Privileged positions	Non-privileged positions
Root-initial syllable	Non-initial syllable
Stressed syllable	Unstressed syllable
Syllable onsets	Syllable codas

*Vowel Hiatus calls for non-occurrence of two consecutive vowels over a syllable

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constraints such as Max-Onset(σ́), Max-Coda(σ́), and Max-Onset given in (13) with respect to their faithfulness mapping direction. The reviewer argued that because the constraints are faithfulness, the mapping should be from the input to the output rather than from the output to the input. Concerning this point, we follow a tradition view of generative phonology in which an input form or an underlying representation does not have any prosodic information such as syllabification and stress assignment. Since we are following such tradition of phonology, we cannot evaluate the faithfulness nature the corresponding segments about prosodic elements between the input and the output without specifying mapping direction from the output to the input. In reality, the theoretical framework of OT does not specify the mapping direction for the corresponding elements between the input and the output. This implies that the mapping direction could be bi-directional.

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boundary and this is ranked very high in the analysis. *Vowel Hiatus prohibits deletion of singleton onset [r] in the output because the deletion of it will create a vowel sequence over a syllable boundary. The final constraint is Anchor-Right which monitors the identical right edge of the input and the output. This constraint protects the final element of the input in the output which might be violated by the insertion and deletion of the final element in the output. This constraint is also undominated in the analysis. The following Tables show deletion of [r] in the coda position.

TABLE 4

/pərfɔrm/	*r^2	Max-Seg(σ́)	*VH	Anchor-R	*r	Max-Seg
a. pər.fɔ́rm	*!				**	
b. pər.fɔ́m		*!			*	*
☞ c. pə.fɔ́rm					*	*

The given constraint ranking in Table 4 selects candidate (c) as optimal. Candidate (c) deletes the coda [r] of the unstressed syllable while it preserves that segment in the stressed syllable. This is implemented by the high ranking Max-Seg(σ́) while keeping two input [r]s in the output form is ruled out by its violation of dissimilation trigger constraint, *r^2.

TABLE 5

/ædvərsɛrɪ/	*r^2	Max-Seg(σ́)	*VH	Anchor-R	*r	Max-Seg
a. ǽd.vər.sɛ̀.rɪ	*!				**	
b. ǽd.vər.sɛ̀.ɪ			*!		*	*
☞ c. ǽd.və.sɛ̀.rɪ					*	*

Table 5 shows the deletion of [r] in the coda position while protecting the [r] as singleton onset element. Thus, it shows asymmetrical realization of elements in the two different linguistic positions.

TABLE 6

/hæmbərgər/	*r^2	Max-Seg(σ́)	*VH	Anchor-R	*r	Max-Seg
a. hǽm.bər.gər	*!				**	
b. hǽm.bər.gə				*!	*	*
☞ c. hǽm.bə.gər					*	*

As shown by Table 6, when the [r] occurs in the coda position of the medial unstressed syllable and the final unstressed syllable, the coda element of the medial syllable is deleted in the output while the word final segment is maintained in the output, which is protected by the undominated Anchor-Right. The proposed constraints and their ranking, however, may not explain the examples given in (4) and (5) where the [r] is deleted in

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the syllable onset and in the coda of stressed syllable. Thus, we add three new constraints. Two constraints, Max-Onset(σ́) and Max-Coda(σ́), are modified and split from Max-Seg(σ́) in order to reflect asymmetrical realization of the segment occurring in the syllable onset and coda of the stressed syllable. The other constraint, Max-Onset, is a more specified constraint from Max-Seg, which is a general one.

(13) Additional constraints for the [r] deletion in syllable onset position and in stressed syllable
   a. Max-Onset(σ́): Elements preceding a stressed vowel in the output are identical with their input correspondents.
   b. Max-Coda(σ́): Elements following a stressed vowel are identical with their input correspondents.
   c. Max-Onset: Elements preceding a vowel in the output are identical with their input correspondents.

Max-Onset(σ́) specifically targets the onset elements of a stressed syllable to be realized in the output whereas Max-Coda(σ́) calls for the faithful realization of the coda elements of the stressed syllable. Between these two specified constraints, we give priority to Max-Onset(σ́) over Max-Coda(σ́) to consider cross-linguistic preference for the elements in the syllable onset position, which is also classified as privileged position compared to non-privileged coda position. Between Max-Coda(σ́) and Max-Onset, we rank Max-Onset over Max-Coda(σ́), which is interesting if we consider two types of linguistic positions presented in (12). This is because Max-Coda(σ́) contains each element of the two linguistic positions: privileged stressed syllable and non-privileged coda position. In this analysis, however, the [r] in the syllable onset position survives while the [r] in the stressed coda position is deleted. We rank Max-Coda(σ́) higher than the general markedness and faithfulness constraints such as *r and Max-Seg. The following Tables illustrate [r] deletion in the syllable onset position. In the tables, we do not include constraints which do not play a crucial role in the evaluation.

TABLE 7

/ɪnfrərɛd/	*r[2]	Max-Onset(σ́)	Max-Onset	Max-Seg
a. ˋɪn.frə.rɛ́d	*!			
b. ˋɪn.frə.ɛ́d		*!	*	*
☞ c. ˋɪn.fə.rɛ́d			*	*

As illustrated in Table 7, ranking Max-Onset(σ́) over Max-Onset selects the [r] in the onset of the stressed syllable rather than the one in the unstressed syllable. Another point is that even though we do not include *Vowel Hiatus in Table 7, its effect can also be

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attributed to the selection of the optimal output.

TABLE 8

/prəgrɛsɪv/	*r^2	Max-Onset(σ́)	Max-Onset	Max-Seg
a. prə.gré.sɪv	*!			
b. prə.gé.sɪv		*!	*	*
☞ c. pə.gré.sɪv			*	*

Table 8 also shows the selection of optimal candidate, which protects the [r] in the stressed onset position while the candidate that preserves the [r] in the unstressed onset position is not chosen. As shown in candidate (b), the [r], which is the onset of the unstressed syllable, is protected in order not to have two [r]s in the output but this results in the violation of high-ranking Max-Onset(σ́). The violation of Max-Onset(σ́) turns out to be critical since candidate (b) is eliminated in the competition.

The final case where the [r] is deleted when it occurs in the stressed syllable is also accounted for by the current constraint ranking as shown in the following tables.

TABLE 9

/kɔrpərešən/	*r^2	Max-Ons(σ́)	*VH	Max-Cod(σ́)	Max-Seg
a. kɔ̀r.pə.ré.šən	*!				
b. kɔ̀r.pə.é.šən		*!	*!		*
☞ c. kɔ̀.pə.ré.šən				*	*

Table 9 deals with the two [r]s in the stressed onset position and in the stressed coda position. Between these two stressed syllable positions, the [r] in the onset position edges out the one in the coda position, which is exercised by ranking Max-Onset(σ́) and *Vowel Hiatus over Max-Coda(σ́).

The final Table 10 demonstrates the competition between the [r] in the unstressed onset position and the one in the stressed coda position. This is resolved by the selection of a candidate in which the [r] in the unstressed onset is realized in the output while the stressed coda [r] is deleted. This is achieved by ranking Max-Onset over Max-Coda(σ́) as illustrated in the following table.

TABLE 10

/pɔrtrɪt/	*r^2	Max-Onset	Max-Cod(σ́)	Max-Seg
a. pór.trɪt	*!			
b. pór.tɪt		*!		*
☞ c. pó.trɪt			*	*

So far we have shown how the constraint ranking selects the target between the two [r]s occurring within a word. Since two retroflex liquids appear in various syllable

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positions with the addition of prosodic feature like stress, medial and final syllable position in a word, the distribution of the retroflex liquids looks complex but the proposed constraint ranking accounts for the examples presented in (3), (4), and (5), which we regard as extended case of dissimilation in English. The constraint ranking we used for deletion of [r] is given in (14).

(14) Constraint ranking for [r] deletion
*r^2, Vowel Hiatus, Max-Onset(σ́), Anchor-Right 》 Max-Onset 》 Max-Coda(σ́) 》 *r, Max-Segment

In the next section, we summarize the study and its implications in phonology and English education.

V. CONCLUSION

In this study, we have observed two different types of dissimilation in English. In the first type where a suffix consonant feature changes in order to avoid the OCP requirement banning two neighboring lateral liquids in a word. In addition to this feature change of the suffix lateral liquid, a suffix vowel is deleted in order not to create a vowel hiatus. This feature change and vowel deletion occurring only in the suffix have been accounted for by adopting meta-constraint ranking proposed by McCarthy and Prince (1995): Faith-Root/Stem 》 Faith-Affix. The constraint ranking for the first type of dissimilation is given in (10), which is repeated in (15).

(15) Constraint raking for the first type of dissimilation in English
*Lat^2, *Vowel Hiatus, Ident-Lat(stem), Max-V(stem) 》 Ident-Lat(affix), Max-V(affix) 》 *Lateral

As presented in (15), the undominated dissimilation trigger constraint *Lat^2 and constraints related to meta-constraint ranking are interacting together to select the optimal forms of the English dissimilation data.

As for the second type of dissimilation where one of the two retroflex liquids in the input is deleted in the output, we also use the OCP related self-conjunctive *r^2 and constraints which are grounded in the concept of positional faithfulness (Beckman, 1997, 2004) are utilized to explain deletion of [r] in various positions. The constraint ranking we have used for explaining the second type of dissimilation examples repeated from (14) is given in (16).

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(16)) Constraint ranking for the second type of dissimilation in English: [r] deletion
*r^2, Vowel Hiatus, Max-Onset(σ), Anchor-Right 》 Max-Onset 》 Max-Coda(σ) 》 *r, Max-Segment

The current study reveals several things to note in phonology. First, the first type of dissimilation analysis shows that phonological processes target segments appearing in the affix if both root/stem elements and affix elements are possible targets. This indicates asymmetrical status between root/stem and affix in phonological processes. Second, the analysis of the [r] deletion implies that the major notion of positional faithfulness needs to be sub-divided into more specified categories (Chung, 2009, 2010). For example, the positional faithfulness refers to stressed syllable *vs.* unstressed syllable and syllable onsets *vs.* syllable codas. However, if these two different categories appear in one form such as a coda element of a stressed syllable *vs.* an onset segment of an unstressed syllable, which one gets the priority in phonological processes? In the analysis, the [r] in the onset position of the unstressed syllable survived while the [r] in the coda position of the unstressed syllable is deleted. However, extensive examples related to positional faithfulness need to be considered and their analysis should be conducted in order to elaborate the notion of positional faithfulness. Third, even though the analysis does not specifically mention in the analysis, the result of the study shows that r-dissimilation targets syllable-wellformedness in the output because it only targets the second member of an onset cluster and the singleton coda, except for the word-final [r]. The proposed constraints and their ranking indirectly achieve the syllable-wellformedness in the output.

With respect to implications of this study for English education, the result of this study will provide a useful teaching material for college students because students learning English should be exposed to various pronunciations at some stage of their acquisition process. As noted by Frisch (2004) and Alderete and Frisch (2007), a main cause of dissimilation is functional, which means dissimilation occurs to avoid processing and articulation difficulties triggered by repeated segments in a certain domain. This implies that pronouncing a certain segment twice in a word of casual speech mode is not easy for native speakers. Since this is the case, pronouncing the retroflex [r], which does not exist in the phonemic inventory of Korean, may cause a major problem for the Korea learners of English. If English learners of Korean are informed of this type of linguistic knowledge about r-dissimilation in English, this will help those English learners concerning pronunciation of the [r]. This is because English learners in Korea not only study normal speed of pronunciation but casual speech mode of pronunciation as well. The analysis proposed in this study might lead the students to an alternative realization of words containing two retroflex liquids,

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which will provide them with extra English skill with respect to their actual realization words. At the same time, if they polish their pronunciation, this will help them improve their perception of such words as well.

Another implication of this study for English education is that the result of this study will offer college students an important linguistic fact about asymmetrical status of phonological constituents and their effects on sounds (cf. Chung, 2007). As indicated in the study, there are differences with respect to undergoing changes in phonological processes such as dissimilation between segments occurring in stressed syllables and unstressed syllables; between the syllable onset and coda position. This linguistic information will help them understand pronunciation and sound realization differences of segments, which will facilitate their learning process of the English language.

REFERENCES

Alderete, J. (1997). Dissimilation as local conjunction. In K. Kusumoto (Ed.), *Proceedings of the North East Linguistic Society* (pp. 17-32). Amherst, MA: GLSA.

Alerete, J. & Stefan Frisch. (2007). Dissimilation in grammar and the lexicon. In Paul de Lacy (Ed.), *The Handbook of phonology* (pp. 379-298). Cambridge: Cambridge University Press.

Beckman, J. (1997). Positional faithfulness, positional neutralization and Shona vowel harmony. *Phonology, 14*(1), 1-46.

Beckman, J. (2004). Positional faithfulness. In J. McCarthy (Ed.), *Optimality theory: A reader* (pp. 310-342). Malden, MA: Blackwell.

Boersma, Paul. (1998). *Functional phonology: Formalizing the interaction between articulatory and perceptual derives*. Doctoral dissertation. University of Amsterdam.

Casali, Roderic F. (1997). Vowel elision in hiatus contexts: Which vowel goes? *Language ,73*, 493-533.

Casali, Roderic F. (1998). *Resolving hiatus*. New York & London: Garland.

Casali, Roderic F. (2011). Hiatus resolution. In Marc van Oostendorp at al. (Eds.), *The Blackwell Companion to Phonology* (pp. 1434-1457). Malden, MA: Blackwell.

Chung, C-W. (2007). Pronunciation of sonorant clusters in English for Korean speakers: A constraint-based approach. *English Language & Literature Teaching, 13*(3), 23-40.

Chung, C-W. (2009). An asymmetrical realization of nasal-obstruent clusters in English.

교보문고 KYOBO Book Centre

English Language & Literature Teaching, 15(2), 51-70.

Chung, C-W. (2010). The relationship between prosodic and morphological constituents in assimilation processes of English. *English Language & Literature Teaching, 16*(3), 35-57.

Frisch, Stefan. (2004). Language processing and OCP effects. In Bruce Hays ea al. (Eds.), *Phoneticaly-based phonology* (pp. 346-371). Cambridge: Cambridge University Press.

Goldsmith, J. (1976). *Autosegmental phonology.* Doctoral dissertation. MIT.

Hall, N. (2007). R-dissimilation in English. Ms., California State University, Long Beach

Leben, W. (1973). *Suprasegmental phonology.* Doctoral dissertation. MIT.

Lee, B-H. (1992). *The consonant harmony system in English.* Seoul: Hanshin Publishing co.

Lombardi, L. (2001). Why place and voice are different: Constraint-specific alternations in optimality theory. In L. Lombardi (Ed.), *Segmental phonology in optimality theory: Constraints and representations* (pp. 13-45). Cambridge: Cambridge University Press.

McCarthy, J. J. (1981). A prosodic theory of nonconcatenative morphology. *Linguistic Inquiry, 12,* 373-418.

McCarthy, J. J. (1986). OCP effects: Gemination and antigemination. *Linguistic Inquiry, 17,* 207-263.

McCarthy, J. J. & Prince, A. S. (1995). Faithfulness and reduplicative identity. In J. N. Beckman, L. W. Dickey & S. Urbanczyk (Eds.), *Papers in optimality theory* (pp. 249-384). Amherst, MA: GLSA.

Prince, A. S. & Smolensky, P. (1993). Optimality theory: Constraint interaction in generative grammar. ms., Rutgers University and University of Colorado, Boulder.

Prince, A. S. & Smolensky, P. (2004). *Optimality theory: Constraint interaction in generative grammar.* Malden, MA: Blackwell.

Examples in : English
Applicable Languages: English
Applicable Levels: College

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