

/r/-Dissimilation Via Deletion in American English

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Seo, Hongwon. (2024). /r/-dissimilation via deletion in American English. *The Linguistic Association of Korea Journal*, 32(4), 97-110. The aim of this paper is to investigate /r/-dissimilation in American English, focusing specifically on /r/-deletion. Two types of /r/-deletion are analyzed: deletion within the same syllable, where the coda /r/ is obligatorily deleted, and deletion over a longer domain, where several phonological factors suggested by Beckman (1997), in terms of privileged positions, influence deletion. The study explores three primary factors: stress, syllable structure, and the ordering of /r/ sounds. First, regarding stress, /r/-deletion is more likely to occur in unstressed syllables than in stressed ones. Second, /r/ is more likely retained in onset positions than in coda positions; however, /r/ in onset positions is deleted, particularly when it forms part of onset clusters. Lastly, the sequential ordering of two /r/ sounds strongly influences deletion, with the first /r/ being more overwhelmingly deleted than the second. Based on these observations, we propose a Max-/r/_{Rightmost} constraint that favors retention of the rightmost /r/. Among these examined factors, /r/ ordering is shown to be the most critical in determining the deletion target in /r/-dissimilation.

Key Words: dissimilation, deletion, Obligatory Contour Principle, constraint, Optimality Theory

1. Introduction

Dissimilation is a phonological process in which two similar or identical neighboring sounds become less alike through changes in one or both sounds. While less common than assimilation, dissimilation has shaped numerous /r/-containing words. For instance, diachronic changes such as Latin *peregrinus* and *arteriae* evolving into *pelegrinus* ‘pilgrim’ and *alteriae* ‘arteries’ illustrate dissimilation through the substitution of the first /r/ with /l/, even when the sounds are not immediately adjacent (Müller, 2011). Synchronic alternations also illustrate dissimilation: for example, in English, suffix *-al* changes to *-ar* when the stem ends in /l/ to avoid identical segments in the final syllable (e.g., *circular* and *singular*).

In American English, dissimilation frequently involves /r/-deletion in words containing two /r/ sounds, as *su(r)prise*, *lib(r)ary*, and *gove(r)nor*, where the /r/ in parenthesis is commonly omitted in the surface form. Due to the fact that liquids exhibit both consonantal and vocalic characteristics in their articulation and acoustics, they are particularly susceptible to dissimilation. Hall (2007) notes that this /r/-deletion is prevalent even among rhotic American English speakers. Despite its widespread occurrence, synchronic dissimilation is often viewed as less productive than other phonological patterns, underscoring the need for a systematic analysis.

Cross-linguistically, dissimilation may occur via segment deletion or substitution. This paper focuses on dissimilation involving /r/-deletion rather than substitution. According to Ohala’s Co-articulation Hyper-correction Theory (1981), segmental deletion occurs when a listener cannot perceive a segment, while substitution results from misidentification. Until now, previous studies on /r/-dissimilation have typically used Obligatory Contour Principle (henceforth, OCP: Leben, 1973; McCarthy, 1981, 1986), which involves segment substitution with structure preservation. However, diverse syllabic positions of /r/ complicate the application of the OCP in cases of /r/-deletion.

This paper analyzes /r/-dissimilation data to explain why dissimilation occurs both within single syllables and over longer domains, employing Optimality Theory (hereafter OT; Prince & Smolensky, 1993, 2004). The structure of this paper is organized as follows: Section 2 presents examples of /r/-dissimilation and its phonological environment in which it occurs. Section 3 provides an OT analysis of /r/-deletion in American English. Finally, section 4 summarizes the findings and proposes directions for future research.

2. Data and Description

This section will look into various types of /r/-deletion across American English varieties, revealing a general tendency towards dissimilation. Most examples,¹⁾ primarily drawn from Hall (2007), show that /r/-deletion frequently occurs in unstressed syllables adjacent to /ə/. Two main deletion types are presented: in Type 1, /ər/ simplifies to [ə] through /r/-deletion in the coda of an unstressed syllable, whereas in Type 2, /rə/ reduces to [ə] with deletion in the onset position of an unstressed syllable. Hall suggests that in Type 2, metathesis between /r/ and /ə/ may result in a structure similar to Type 1, facilitating /r/-deletion. Although the sequences of metathesis and deletion remain unclear, the simplification of complex onsets to single onsets aligns with cross-linguistic preferences.

Both types show that /r/-deletion is consistently associated with the unstressed position. Additionally, regarding the relationship between /r/ and schwa, Gick et al. (2002) argue that the two sounds share similar pharyngeal configuration involving tongue root retraction, which may potentially contribute to perceptual dissimilation. This shared articulatory feature supports the observed tendency for /r/-deletion in unstressed, schwa-adjacent environments.

(1) Type 1: /r/-deletion in the unstressed coda position

a. /ædvərsəri/	→	[æ'd.və(r).sə.rɪ]	'adversary'
b. /pərfɔrməns/	→	[pə(r).fɔ'r.məns]	'performance'
c. [æ'.pə(r).ʃər]	→	[æ'.pə(r).ʃər]	'aperture'
d. /kʌmfərtər/	→	[kʌ'm.fə(r).tər]	'comforter'

(2) Type 2: /r/-deletion in the unstressed onset position

a. /prəfəsər/	→	[p(r)ə.fɛ'.sər]	'professor'
b. /ləbrədər/	→	[lə'.b(r)ə.dər]	'Labrador'
c. /fətagrəfər/	→	[fə.tá.g(r)ə.fər]	'photographer'
d. /prəpɔrʃənəl/	→	[p(r)ə.pór'.ʃənəl]	'proportional'
e. /prəgrɛsɪv/	→	[p(r)ə.grɛ'.sɪv]	'progressive'
f. /səribrəl/	→	[sə.rɪ.b(r)əl]	'cerebral'

1) Regarding data, see Hall's footnote 2 (Hall, 2007).

The examples of /r/-deletion in Type 1 and Type 2 illustrate a pattern where dissimilation typically involves the deletion of the first /r/, with the notable exception of (2f), where the second /r/ is deleted. Hall (2007) highlights that dissimilation tends to be anticipatory, meaning the first /r/ is more likely deleted due to the influence of a subsequent /r/. Deletion of the final /r/ in a word is rare, occurring in only 8 out of 85 examples in Hall's data. She further observes that these exceptional cases generally occur when the first /r/ is in a stressed syllable or intervocalic position, both of which are phonetically prominent. This prominence decreases the likelihood of deletion, as stressed or intervocalic /r/ sounds are more perceptually salient and resistant to dissimilation. This analysis underscores that the position of the /r/, particularly when it appears in unstressed syllables or in non-prominent syllables, is critical to /r/-deletion patterns in American English, supporting the anticipatory nature of dissimilation.

Type 3 demonstrates that /r/-deletion is often co-occurs with syncope, a process where an unstressed schwa is deleted, simplifying the word's structure. For instance, in *laboratory* /ləbərətɔːrɪ/, /r/-deletion first produces the form [ləˈbə.(r)ə.tɔːrɪ]. This deletion can then trigger syncope, resulting in forms like [ləˈbə.(rə).tɔːrɪ] or [ləˈb(ə)rə.tɔːrɪ], which avoid consecutive vowels across syllable boundaries. This interaction between /r/-deletion and syncope exemplifies how dissimilatory processes contribute to phonological simplification in American English, aligning with preferred syllable patterns.

(3) Type 3: Dissimilation following syncope

a. /ləbərətɔːrɪ/	→	[ləˈbə.tɔːrɪ]	'laboratory'
b. /rɛspərətɔːrɪ/	→	[rɛˈspə.tɔːrɪ]	'respiratory'
c. /tɛmpərəʃər/	→	[tɛˈm.pə.ʃər]	'temperature'
d. /vɛtərənəriən/	→	[vɛˈtə.nɛˈrɪ.ən]	'veterinarian'

In Type 4, dissimilatory /r/-deletion is observed in stressed syllables, particularly in coda positions. Hall (2007) notes that /r/-deletion more common following certain vowels, such as /ɔ/ as in (4a) - (4c), or /a/ as in (4d). Certain words, such as *forward* and *formerly*, exhibit two possible dissimilated forms²⁾: either the first or second /r/ may be

2) Hall (2007) points out that certain words allow for two different dissimilated forms. For instance, *forward* may be pronounced as either [fɔˈr.wə(r)d] or [fɔˈ(r).wərd] and *formerly* as [fɔˈr.mə(r).lɪ] or [fɔˈ(r).məɪ.lɪ], respectively.

deleted, resulting in alternative pronunciations. Hall further suggests that vowel identity in /rC/ sequences plays a minor role in deletion patterns, as vowels are often neutralized before /r/, diminishing their impact on /r/-deletion. In addition, the presence of multiple possible forms for some words indicates that stress patterns and phonological structure contribute to pronunciation variability, allowing for alternative dissimilated forms.

(4) Type 4: /r/-deletion in the stressed coda position

a. /dɔrmətɔːrɪ/	→	[dɔː(r).mə.tɔː.rɪ]	‘dormitory’
b. /kɔməɹ/	→	[kɔː(r).nəɹ]	‘corner’
c. /pɔːtrət/	→	[pɔː(r).trət]	‘portrait’
d. /fɑməɹ/	→	[fɑː(r).məɹ]	‘farmer’
e. /fɔrwəɹd/	→	[fɔː(r).wəɹd]	‘forward’
f. /fɔməɹli/	→	[fɔː(r).məɹ.li]	‘formerli’

In Type 5, /r/-deletion shows an exception regarding stress patterns, where deletion occurs in a stressed onset position rather than in an unstressed one. Hall (2007) offers an explanation for examples like *f(r)ustrated*, suggesting that /r/-deletion in this case might stem from a back-formation influenced by *f(r)ustration*, where deletion typically occurs in an unstressed syllable. However, words like *lib(r)ary* remain challenging to explain within this point of view, as the deletion occurs in a way that defies the usual stress patterns associated with dissimilation.

These cases suggest that directionality of /r/-direction takes precedence over stress, with the rightmost /r/ generally being preserved while the initial /r/ is deleted. In other words, dissimilation in these examples seems to be influenced more by position within the word rather than by stress alone, highlighting directionality as a key factor in determining which /r/ undergoes deletion.

(5) Type 5: /r/-deletion in stressed onset position

a. /frʌstretəd/	→	[f(r)ʌˈs.tre.təd]	‘frustrated’
b. /ləɪbrɛɹiən/	→	[ləɪ.b(r)ɛˈrɪ.ən]	‘librarian’
c. /prəstreɪt/	→	[p(r)əˈstreɪt]	‘prostrate’

Lastly, Type 6 presents cases of /r/-dissimilation occurring within the same syllable, in which one of two /r/ sounds is obligatorily deleted. Unlike long-distance dissimilation, which allows for optional deletion across syllables, short-distance /r/ deletion is driven by phonological constraints within a single syllable. In this case, the rVr sequence simplifies to rV, resulting in the deletion of one /r/ sound.

Examples in (6a) and (6b) illustrate word-final /r/ deletion, while (6c) shows a similar process in a medial position. Furthermore, in cases like (6d), function words also exhibit similar deletion patterns, demonstrating the wide application of short-domain dissimilation.

(6) Type 6: Dissimilation over a short domain

- | | | | |
|----------------|---|---------------------------|-------------|
| a. /mɪrər/ | → | [mɪ.rə(r)] | ‘mirror’ |
| b. /tɛrər/ | → | [tɛˈ.rə(r)] | ‘terror’ |
| c. /háyərarkɪ/ | → | [háyə.rà(r).kɪ] | ‘hierarchy’ |
| d. /ðɛər ar/ | → | [ðɛr.]~[ðɛr]~[ðəɹ.]~[ðr.] | ‘there are’ |

While dissimilation is predominantly anticipatory-where the preceding /r/ is typically deleted in response to a following /r/-root-initial /r/ tends to be preserved due to its privileged, phonological position. This protection against deletion prevents words like *river* from undergoing dissimilation to forms like *[ɪvər].

In the following section, we will apply OT to analyze the phonological mechanisms behind /r/-dissimilation via deletion. This approach will provide a systematic understanding of how various phonological constraints operate to govern deletion patterns in different linguistic contexts.

3. Analysis

In our analysis of /r/-deletion in American English, we employ the following constraints and ranking hierarchy:

(6) Constraints for dissimilation within the syllable

- a. *[rVr]: Two [r] sounds should not be separated by only a vowel.
- b. Max-Onset: Onsets in the output should have correspondents in the input.

c. Max-C: Consonants in the output should have correspondents in the input.

To prevent two /r/ sounds within a short domain, primarily within the same syllable, we employ the undominated constraint *[rVr]. This constraint mandates the deletion of one /r/. Since the vowel between two /r/ sounds is typically /ə/, we can further specify *[rVr] as *[rər] and other contexts. Furthermore, deletion of /r/ in the coda position is predominantly preferred over deletion in the onset position, which is explained by the higher ranking of Onset over Max-C.

(7) Constraint ranking for dissimilation within the syllable

*rVr ≫ Max-Onset ≫ Max-C

Tableau 1 illustrates how the markedness constraint *[rVr] and the faithfulness constraint Max-Onset evaluate /r/-dissimilation within the same syllable. Given the proposed constraint ranking, candidate (a) is first eliminated due to a *[rVr] violation. Candidate (c) is chosen as the optimal output, as it preserves the /r/ in the onset, surpassing candidate (b).

Tableau 1. /mirər/ → [mɪ.rə] ‘mirror’

/mirər/	*[rVr]	Max-Onset	Max-C
a. mɪ.rər	*!		
b. mɪ.ər		*!	*
☞ c. mɪ.rə			*

Next, we turn to an analysis of a long-distance dissimilation. The constraints applied in this analysis are as follows:

(8) Constraints for dissimilation over a long distance³

- a. *[r...r]: Two [r] sounds should not co-occur within a word. (Alderete, 1997)⁴
- b. Max-Final: Each segment in the final syllable of the input must have correspondents in the output.

3) Certain constraints, such as Max-Onset (♂) and Max-Coda(♂), are adopted from Chung (2012).

4) Alderete (1997) uses self-conjoined markedness constraints to account for dissimilation. Following his approach, we can replace *[r...r] with *r².

- c. Max-Onset($\acute{o}$): Onsets in a stressed syllable in the input must have correspondents in the output.
- d. Max-Coda($\acute{o}$) : Codas in a stressed syllable in the input must have correspondents in the output.
- e. Max-C: Consonants in the input must have correspondents in the output.

In American English, multiple occurrences of /r/ within a word are disfavored, leading to the deletion of repeated /r/ sounds and the prohibition of two /r/ sounds within the same syllable. To address this, we apply the constraint *[r...r], which mandates that more than one /r/ should not be realized, preventing the repetition of /r/. This constraint comes from Alderete's (1997) concept of locally conjoined markedness constraints.

As noted, /r/ deletion in American English is predominantly anticipatory, meaning that the rightmost of two /r/ sounds typically survives through the dissimilation process. In particular, when /r/ is in the final syllable, it is generally immune to deletion, except in cases of rVr sequences. Therefore, we allow Max-Final to ensure that /r/ in the final syllable remains intact.

The constraints Max-Onset($\acute{o}$) and Max-Coda($\acute{o}$) dictate that all segments in a stressed syllable, considered a privileged position according to Beckman (1997), must be retained in the output. Two remaining constraints also emphasize the distinction between privileged onset positions and non-privileged coda positions. Cross-linguistically, Max-Onset is typically favored over Max-Coda, reflecting a general preference for the preservation of onset segments. Similarly, Max-Onset($\acute{o}$) is ranked higher than Max-Coda($\acute{o}$) within the framework. However, when conflicts arise between Max-Coda($\acute{o}$) and Max-Onset conflict concerning their application to privileged positions, it becomes crucial to ascertain which constraint will significantly influence the selection of the optimal output.

The ranking hierarchy for /r/-dissimilation in American English is as follows:

(9) Constraint ranking for dissimilation

*rVr, *[r...r] $\gg$ Max-Final $\gg$ Max-Onset($\acute{o}$) $\gg$ Max-Coda($\acute{o}$) $\gg$ Max-Onset $\gg$ Max-C

We analyze the deletion of /r/ in an unstressed syllable through the following two tableaux. In Tableau 2, we demonstrate the deletion of /r/ in the coda position of an

unstressed syllable. The constraint ranking in this tableau chooses candidate (b) as the optimal output. Candidate (a) is eliminated due to a violation of the undominated constraint *[r...r]. Candidate (c) is also excluded because it deletes the /r/ in the final syllable, violating Max-Final. In this tableau, Max-Onset($\acute{o}$) and Max-Coda($\acute{o}$) are vacuously satisfied in all candidates, as two /r/ sounds occur all in unstressed syllables.

Tableau 2. /ædvərsəri/ → [æ'd.və(r).s.rɪ] 'adversary'

/ædvərsəri/	*[r...r]	Max-Final	Max-Onset	Max-C
a. æ'd.vər.sɛ.ri	*!			
 b. æ'd.və.sɛ.rɪ				*
c. æ'd.vər.sɛ.ɪ		*!	*	*

In Tableau 3, we observe the deletion of /r/ in the onset position while retaining the coda /r/ of the final syllable. The conflict between onset and coda /r/ sounds, regardless of stress, is resolved by Max-Final, as the final syllable resists /r/-deletion even in the coda position. Consequently, candidate (b) is chosen as the optimal output despite /r/-deletion in the onset.

Tableau 3. /prəfəsər/ → [p(r)ə.fɛ'.sər] 'professor'

/prəfəsər/	*[r...r]	Max-Final	Max-Onset	Max-C
a. prə.fɛ'.sər	*!			
 b. pə.fɛ'.sər			*	*
c. prə.fɛ'.sə		*!		*

In Tableau 4, we observe the interaction of /r/ deletion with schwa deletion. Candidate (a) is ruled out due to a violation of *[r...r], which prohibits adjacent /r/ sounds. Candidate (d) is also removed for violating Max-Final, which requires that final segments in a word be retained. Of two remaining candidates, candidate (b) deletes the first /r/, while candidate (c) deletes both /r/ and one schwa. Under the current constraint ranking, both candidates violate Max-Onset, indicating that the additional constraints are needed.

Tableau 4. /læbərətɔːrɪ/ → [læːb(ə.rə).tɔːrɪ] ‘laboratory’

/læbərətɔːrɪ/	*[r...r]	Max-Final	Max-Onset	Max-C
a. læːb.ə.rə.tɔːrɪ	*!			
☞ b. læːb.ə.ə.tɔːrɪ			*	*
☞ c. læːb.ə.tɔːrɪ			*	*
d. læːb.ə.rə.tɔːrɪ		*!	*	*

(10) Additional constraints

- *VH: Vowels over syllable boundaries are prohibited.
- Max-V: Each vowel in the input must have correspondents in the output.

The constraint *VH ensues that consecutive vowels cannot appear across a syllable boundary while Max-V disallows vowel deletions. By ranking *VH above Max-V, we achieve an optimal form, as shown in Tableau 5.

Tableau 5. /læbərətɔːrɪ/ → [læːb(ə.rə).tɔːrɪ] ‘laboratory’

/læbərətɔːrɪ/	*[r...r]	Max-Final	*VH	Max-V	Max-Onset	Max-C
a. læːb.ə.rə.tɔːrɪ	*!					
b. læːb.ə.ə.tɔːrɪ			*!		*	*
☞ c. læːb.ə.tɔːrɪ				*	*	*
d. læːb.ə.rə.tɔːrɪ		*!	*!		*	*

Now, let us examine how stress influences /r/ deletion. As shown in Tableau 6, while the second /r/ in the stressed coda position is retained, the first /r/ in the stressed onset position is deleted in the dissimilatory process. Max-Coda(σ) can rule out candidate (c), making candidate (b) the optimal output.

Tableau 6. /prəpɔːrʃənəl/ → [p(r)ə.pɔːr.ʃənəl] ‘proportional’

/prəpɔːrʃənəl/	*[r...r]	Max-Final	Max-Onset(σ)	Max-Coda(σ)	Max-Onset	Max-C
a. prə.pɔːr.ʃənəl	*!					
☞ b. pə.pɔːr.ʃənəl					*	*
c. prə.pɔː.ʃənəl				*!		*

Tableau 7 shows that Max-Final plays a critical role by preventing the deletion of any segment in the final syllable. Consequently, /r/ deletion occurs in the stressed coda position.

Tableau 7. /kɔrnər/ → [kɔ'(r).nər] 'corner'

/kɔrnər/	*[r...r]	Max-Final	Max-Onset(ó)	Max-Coda(ó)	Max-Onset	Max-C
a. kɔ'r.nər	*!					
b. kɔ'.nər				*		*
c. kɔ'r.nə		*!				*

In Tableau 8, we encounter a different pattern. Here, both /r/ sounds appear in the onset position. We would expect the /r/ in the stressed syllable to be preserved, deleting the /r/ in the unstressed syllable. However, candidate (c) is incorrectly selected as the winner. In order to address this matter, we suggest an additional constraint, Max-/r/_{Rightmost} which requires that the rightmost /r/ should not be deleted. This adjustment reflects the most common pattern observed in American English, where the second /r/ consistently survives.

Tableau 8. /frʌstretəd/ → [f(r)ʌ's.tre.təd] 'frustrated'

/frʌstretəd/	*[r...r]	Max-Final	Max-Onset(ó)	Max-Coda(ó)	Max-Onset	Max-C
a. frʌ's.tre.təd	*!					
b. fʌ's.tre.təd			*!		*	*
c. frʌ's.te.təd					*	*

Tableau 9 demonstrates the corrected analysis with the new constraint Max-/r/_{Rightmost} which prevents deletion of the rightmost /r/, thus choosing candidate (b) as the optimal form.

Tableau 9. /frʌstretəd/ → [f(r)ʌ's.tre.təd] 'frustrated'

/frʌstretəd/	*[r...r]	Max-/r/ _{Rightmost}	Max-Onset(ó)	Max-Coda(ó)	Max-Onset	Max-C
a. frʌ's.tre.təd	*!					
b. fʌ's.tre.təd			*		*	
c. frʌ's.te.təd		*!			*	

The final constraint ranking for /r/-dissimilation in American English is summarized as follows:

(11) Final constraint ranking for dissimilation

*rVr, *[r...r] $\gg$ Max-/r/_{Rightmost} $\gg$ *VH, Max-Onset($\acute{o}$) $\gg$ Max-Coda($\acute{o}$) $\gg$ Max-Onset, Max-V $\gg$ Max-C

In this section, we have provided a constraint-based analysis of /r/-dissimilation via deletion in American English. In the next section, we will summarize our findings and discuss the implications of this study.

4. Conclusion

In this study, we have demonstrated how /r/-dissimilation via deletion in American English can be analyzed within the framework of OT. When one of /r/ sounds within the same syllable, as in /rVr/, undergoes deletion, the /r/ in the coda is obligatorily deleted rather than the one in the onset, regardless of the syllable position of words. For long-distance /r/ deletion, several phonological factors associated with positional faithfulness (Beckman, 1997) are essential for explaining the deletion patterns. In particular, we have focused on three primary factors: stress, syllable structure, and the ordering of /r/ sounds.

First, regarding stress, /r/ in stressed syllables is more likely to be retained than in unstressed syllables, usually containing /rə/ or /ər/. Second, as for syllable structure, /r/ in the coda position generally more susceptible to deletion than in the onset position. When onset /r/ is deleted, it is largely part of an onset cluster, simplifying the syllable structure by avoiding complex onsets. Finally, when it comes to the ordering of two /r/ sounds, the first /r/ is typically deleted more frequently than the second. When stress and /r/ position conflict, the ordering of /r/ sounds plays a decisive role in determining the deletion outcome, as /r/-deletion is largely anticipatory.

The constraint ranking applied in our analysis of /r/-dissimilation in America English as follows:

(11) Final constraint ranking for dissimilation

*rVr, *[r...r] $\gg$ Max-/r/Rightmost $\gg$ *VH, Max-Onset(ó) $\gg$ Max-Coda(ó) $\gg$ Max-Onset, Max-V $\gg$ Max-C

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Received on October 31, 2024

Revised version received on December 23, 2024

Accepted on December 31, 2024