Vowel-length neutralization at word-final edges: A prominence-based account[*]

Daiki Hashimoto

Abstract

　日本語では母音の長さが弁別性を持っている。そのため我々は母音の長さにより単語を区別できる。（例：ほら vs. ホラー / サブ vs. サーブ 等）しかし一部の語彙クラス・形態構造では、語末位置で母音の長短の対立が解消されることが知られている。例えば単純語短縮語では、語末位置では長母音が現れることができず、短母音のみが生起できる。（例：マネージャー → マネ（*マネー）　グリーティング → グリ（*グリー））こうした語末位置での長短の対立の中和は、一部の外来語や複合語短縮語でも見られる。これらの中和現象に関する先行研究は現象の記述及び一般化に関しては十分であるが、2つの問題が残されている：①異なる語彙クラス・形態構造（外来語・単純語短縮語・複合語短縮語）に見られる3種類の母音長短中和現象が関連付けて議論されていないこと②十分な理論分析がされていないこと。本研究の狙いは、これらの2つの問題を解消することである。具体的には、以下の2点を明確にする：① 3種類の母音長短中和現象は共通の有標性制約階層で説明出来ること ② その有標性階層はアドホックなものではなく、2つの独立した音韻的概念（卓立度、調和的整列）にサポートされていること。

Key Words: vowel length, neutralization, prominence, Harmonic Alignment, markedness scale

1. Introduction

In Japanese, vowels are distinctive in length. For example, *hora* 'lie' and *horaa* 'horror' are distinguished in the length of the final vowels. Also, *sabu* 'sub' and *saabu* 'serve' differ only in the length of the initial vowels. However, previous studies (Xue 2012, Labrune 2002, 2007) have pointed out that length of word-final vowels is neutralized in certain lexical or morphological classes. In particular, long vowels at word-final edges are neutralized to their short correspondents in certain classes. There are three kinds of lexical or morphological classes where vowel-length neutralization takes place at word-final edges: minor loan words, truncated compound loan words, and truncated simple loan words:

(1)   Three kinds of vowel-length neutralization in a word-final position

a. Final /aa/ is shortened to /a/ in minor loan words. (Xue 2012)

erebeetaa 'elevator' → *erebeeta*

kompuressaa 'compresser' → *kompuressa*

saabaa 'server' → *saaba*

b. Final /aa, ee, oo/ is shortened to /a, e, o/ in compound word truncation. (Labrune 2007)[1]

terefon-kaado 'phone card' → *tere-ka* / **terekaa*

mini-meeru 'mini-mail' → *mini-me* / **mini-mee*

c. Final /aa, ee, oo, ii, uu/ is shortened in simple word truncation. (Labrune 2002)

anaakizumu 'anarchism' → *ana* / **anaa*

fandeesyon 'foundation' → *fande* / **fandee*

guriitingu 'greeting' → *guri* / **gurii*

Although the three previous studies have offered descriptive generalization of these phenomena well, there are still two challenges: (i) separate consideration of them and (ii) absence of satisfactory theoretical analysis. As for the first challenge, they have been analyzed separately in the previous studies, despite the fact that they are all instances of vowel-length neutralization at word-final edges. Needless to say, similar phenomena should be given an integral account. As for the second problem, the previous studies did not offer satisfactory theoretical analyses at all. As for Xue (2012), she described the phenomenon (1a) and offered a statistic analysis, but she did not offer any theoretical analyses. On the other hand, Labrune (2002, 2007) gave not only a descriptive generalization of the phenomena (1b, c), but also a theoretical analysis. However, her theoretical analysis is not satisfactory, because the constraints, *H#, *H# [+high], and *H# [-high], in her paper are ad hoc and stipulative in that they lack any independent phonological or phonetic evidence. In sum, all the three neutralization phenomena in (1) have not been given any satisfactory accounts theoretically yet.

The purpose of this study is to solve these two problems. Specifically, the aim of this study is to demonstrate (i) that the three vowel-length neutralization phenomena at word-final edges in (1) are motivated by one and the same markedness hierarchy and (ii) that the markedness hierarchy is derived from two well-attested independent phonological concepts, 'prominence' and 'Harmonic Alignment (HA),' instead of ad hoc stipulated constraints, such as *H#, *H# [+high], and *H# [-high], in Labrune (2002, 2007).

The organization of this paper is as follows. Section 2 reviews the two well-attested phonological concepts, 'prominence' and 'HA,' which form the theoretical foundation of this study. Following this, in Section 3, we will deduce a markedness scale from these two

phonological concepts. In Section 4, it will be demonstrated that the deduced markedness scale can capture all three vowel-length neutralization phenomena in (1) integrally. Finally, a summary is offered in Section 5.

2. Prominence and Harmonic Alignment

The purpose of this section is to review the two phonological key concepts: 'prominence' and 'Harmonic Alignment (HA).' These two concepts are reviewed in 2.1 and 2.2 respectively. As will be shown in Section 3, these two concepts play key roles in deducing a markedness scale, which can incorporate the three kinds of vowel-length neutralization phenomena in (1).

2.1 Prominence

The concept 'prominence' is useful in considering various phonological processes, such as stress assignment, tone assignment, and segmental alternations. It will be demonstrated in section 3 that this concept also plays crucial roles in capturing the three vowel-length neutralization phenomena in (1). In this sub-section, we will consider two perspectives of prominence: 'positional prominence' and 'segmental prominence.'

2.1.1 Positional prominence

To begin with, let us consider 'positional prominence.' Specifically, we examine what position is strong and weak. As for positional prominence, Zoll (2003) proposed the following criteria:

(2)   Diagnosis for prominent position

	Strong Position	Weak Position
I. *Contrast*	Supports more contrasts	Supports less contrasts
II. *Reduction*	Resists reduction	Yields to reduction
III. *Stress*	Attracts stress	Does not attract stress
IV. *Tone*	Attracts H tone	Attracts L tone
V. *Harmony*	Triggers harmony	Target of Harmony

The focus of this study is on vowel-length neutralization, where a contrastive property, length, is lost at word-final edges. Hence, the criterion (2I), *Contrast*, is relevant to us. According to the criterion (2I), contrastiveness is lost in non-prominent positions, while it is preserved in prominent positions. In that case, where is a prominent position and where is a non-prominent position? It seems that one of the answers is as follows:

(3) Positional Prominence

Non-word-final position > word-final position

This prominence scale indicates that a non-word-final position is more prominent than a word-final position. Various pieces of evidence for this prominence scale come from many languages. That is, there are many instances where contrastiveness is lost in a word-final position but is preserved in a non-word-final position.[2] Let us survey three well-known examples of them here.

The first example comes from Dutch and German. In these languages, voicing of consonants is neutralized in a word-final position. Specifically, obstruents contrast in voicing in non-word-final positions, while they do not contrast in voicing in word-final positions, and therefore word-final /d/ is neutralized to /t/. For example, in German, the distinction between *bunt* 'variegated' and *bund* 'union' is preserved when they appear as genitive forms whereas it is neutralized when they are uninflected forms, since their stem-final obstruents are not word-final in genitive forms while they are word-final in uninflected forms:

(4) Final devoicing in German

e.g. [bunt] 'union' ― [bund-əs] 'union' (Gen.)

[bunt] 'variegated' ― [bunt-əs] 'variegated' (Gen.)

Next, vowel neutralization in a word-final position is reviewed. In Malay, /a/ and /ə/ are contrastive in a non-word-final position, while they are not contrastive in a word-final position. In particular, word-final /a/ is neutralized to /ə/ word-finally (Onn 1980: 47-48). For instance, for a stem /suka/, the stem-final vowel is preserved in the causative form, whereas it is neutralized to [ə] in the non-affixed form, since it is not word-final in the causative form while it is word-final in the non-affixed form:

(5) Final schwalization in Malay

e.g. [sukə] 'forget' (non-affixed form) ― [di-suka-ʔi] 'like' (causative affixed form)

Finally, syllable-type neutralization takes place in a word-final position in some languages, such as Italian and Telugu (Harris 1994: 162). In these languages, both CV and CVC can appear in a non-word-final position, while only CV can appear and CVC cannot appear in a word-final position. That is, the contrastiveness between CV and CVC exists in a non-word-final position whereas it is lost in a word-final position, and thus all the words end with CV while no words end

with CVC:

(6) Final syllable restriction in Italian

    e.g. [kasa] 'house' (actual word) vs. [*kas, *kasas] '?' (systematic gap)

As was seen in (4-6), it is common that a contrastive pair in a non-word-final position loses its contrastiveness in a word-final position. Therefore, it can be concluded that the positional prominence scale in (3) is universally valid in terms of the criteria (2I), *Contrast*.

2.1.2 Segmental prominence

Next, let us survey inherent prominence of segments. In this section, we will survey two kinds of inherent prominence: 'sonority' and 'length.' According to Ladefoged (2005: 239), the sonority of sound is its loudness relative to that of other sounds with the same length, stress, and pitch. On the other hand, according to Trask (1996: 200), the length of sound is its duration. Their prominence scales and the relation between the two scales of inherent prominence are explained in order below.

First of all, let us survey the first inherent prominence, 'sonority.' The following prominence scale is assumed in many studies:

(7) Sonority Prominence

    a > e, o > i, u > glides (j, w) > liquids (l, r) > nasals (m, n) > obstruents (z, s, d, t)

The scale means that more leftward, more sonorous, and vice versa. For example, a low vowel [a] is more prominent than middle vowels [e, o] and high vowels [i, u], and middle vowels are more prominent than high vowels. This prominence scale has been supported by various phonological phenomena, such as stress assignment (Hayes 1995) and syllable weight (Gordon 2006).

As for the other inherent prominence, 'length,' Beckman (1997: 1) claimed that the following scale exists:

(8) Length Prominence

    Long vowel > Short vowel

This prominence scale indicates that long vowels are more prominent than short vowels. For example, a low long vowel, [aː], is more prominent than the short correspondent, [a], and a high long vowel, [iː], is more prominent than the short one, [i]. This prominence scale has also been

supported by lots of accentual phenomena (Hayes 1995).

As for the relation between sonority and length, Tanaka (2003) claimed that the latter, length, is more prominent than the former, sonority. This relation is on the phonetic basis that length involves more articulatory efforts than sonority. According to his phonetically motivated proposal, long vowels are always more prominent than short vowels regardless of their sonority, and sonority plays a rôle in determining prominence only between length-equal vowels. Hence, we can gain the following prominence scale with respect to sonority and length:

(9)　Length sonority prominence

aa > ee, oo > ii, uu > a > e, o > i, u

2.2 Harmonic Alignment (HA)

The concept 'Harmonic Alignment (HA)' also plays an important role in forming the theoretical foundation of this study. HA is based on the idea that the more prominent position prefers the more prominent elements; the less prominent position prefers the less prominent elements. To put it another way, the less prominent elements are unlikely to appear in the more prominent position; the more prominent elements are unlikely to appear in the less prominent position. In accordance with this idea, HA can deduce markedness scales by aligning more prominent elements with the less prominent position and aligning less prominent elements with the more prominent position.

For example, Prince & Smolensky (2004: 161-162) deduced the following two markedness scales, Peak Hierarchy and Margin Hierarchy, by aligning two independently motivated prominence scales, Syllable Position Prominence and Segmental Sonority Prominence. The former markedness scale, Peak Hierarchy, indicates that less prominent elements are more marked and less harmonic in the prominent position, Peak, than more prominent elements, whereas the latter markedness hierarchy, Margin Hierarchy, indicates that more prominent elements are more marked and less harmonic than less prominent elements in the non-prominent position, Margin:

(10)　Syllable Position Prominence: Peak > Margin

　　　 Segmental Sonority Prominence: a > i > … > t

　　 → Peak Hierarchy: *P/t >> … >> *P/i >> *P/a

　　　　 Margin Hierarchy: *M/a >> *M/i >> … >> *M/t

Prince & Smolensky (2004) explains universal syllabification strategy with these two markedness scales. In particular, these two markedness scales explain why consonants are less likely to appear

in a nucleus position than vowels and why vowels are less likely to appear in a margin position than consonants.

As with Prince & Smolensky (2004), we will align the two above prominence scales, Positional Prominence in (3) and Length Sonority Prominence in (9), and deduce two markedness scales in the next section, one of which can capture vowel-length neutralization phenomena in (1) integrally.

3. Deduction of 'Word-final-edge Hierarchy'

In this section, as was seen in 2.2, we will attempt to derive a markedness scale by aligning the two well-attested prominence scales, Positional Prominence Scale in (3) and Length Sonority Prominence Scale in (9). It will be shown in Section 4 that the derived markedness scale can capture the three vowel-length neutralization phenomena in (1) integrally.

To begin with, the two prominence scales, as shown in 2.1, are repeated as follows:

(11) Positional prominence (=3): Non-word-final position > Word-final position
      Length sonority prominence (=9): aa > ee, oo > ii, uu > a > e, o > i, u

Next, as deduced in (10), let us derive two markedness hierarchies by aligning more prominent elements with the less prominent position and aligning less prominent elements with the more prominent position. The derived hierarchies are named 'Word-final edge hierarchy' and 'Non-word-final edge hierarchy' respectively:

(12) a. Word-final edge Hierarchy: *aa# >> *ee#, *oo# >> *ii#, *uu# >> … >> *i#, *u#[3]
      b. Non-word-final edge Hierarchy: *uX, *iX>> … >> *eeX, *ooX >> *aaX

These hierarchies mean that the most prominent vowel /aa/ and the least prominent vowels, /i/ and /u/, are the most harmonic and the least marked when they appear in the prominent position __X and the non-prominent position __# respectively. Conversely, they are the least harmonic and the most marked when they appear in the non-prominent position __# and the prominent position __X respectively. To be specific, the former hierarchy means that the more prominent element /aa/ is more marked in the non-prominent position __# than the less prominent elements /i, u/ whereas the latter hierarchy means that the less prominent elements /u, i/ are more marked in the prominent position __X than the more prominent element /aa/.

Note that only the former hierarchy (12a) is relevant to us in this study, because this study is limited to the explanation of vowel-length neutralization at word-final edges. Perhaps, the latter

hierarchy (12b), relevant to non-word-final edges, motivates devoicing of short high vowels /i, u/ in non-word-final edge positions. Namely, short high vowels lose their phonetic realization, because they are the most marked vowels in non-word-final positions. However, the word-medial devoicing process is out of scope in this study, and thus the role of the latter hierarchy will be examined in future studies. In the next section, it is demonstrated that the former markedness scale, 'Word-final-edge Hierarchy,' can capture the three vowel-length neutralization phenomena in (1) integrally.

4. How the three processes are captured by 'Word-final-edge Hierarchy'

Now, let us examine how the derived hierarchy, 'Word-final-edge Hierarchy,' works well to account for the three vowel-length neutralization phenomena in (1). That is, the purpose of this section is to show that all three vowel-length neutralization phenomena in (1) are motivated by one and the same markedness scale, 'Word-final edge Hierarchy,' which is not stipulative but deduced from the two well-attested phonological concepts, 'prominence' and 'HA,' as demonstrated in Section 3. Before the theoretical analysis in 4.2, we will survey the three vowel-length neutralization phenomena in (1) in more detail in 4.1.

4.1 Three vowel-length neutralization phenomena

In this section, we will take a general view of the three vowel-length neutralization phenomena in (1) more in detail. According to the three previous studies (Labrune 2002, 2007, Xue 2012), the lexical and morphological classes where vowel-length neutralization processes take place are divided into three: minor loan words, truncated compound loan words, and truncated simple loan words. They are surveyed in order below.

The first lexical context is 'minor loan word.' According to Xue (2012), in a small number of loan words, a word-final low long vowel /a:/ is neutralized to a short correspondent. For instance, the word-final low long vowels of *kompuressaa* 'compresser' and *burauzaa* 'browser' are shortened, and thus they are pronounced as *kompuressa* and *burauza* respectively. On the other hand, as for mid and high long vowels, she claimed that there are no instances where they are shortened word-finally.[4] However, it is clear that, in the majority of loan words, not only word-final mid and high vowels but also word-final low vowels are not shortened, e.g. *tuaa* 'tour' and *imbeedaa* 'invader.' Hence, it is necessary for us to divide loan words into two categories, 'major loan words' and 'minor loan words.' In the former group, the length of every kind of long vowels is preserved even word-finally, whereas, in the latter group, only low long vowels are shortened word-finally.[5] It goes without saying that this division is circular as long as it does not have other definitions than behavior of word-final long low vowels. Perhaps, the division between

minor and major loan words is also based on semantic motivations in that most of 'minor loan words' are mechanic argots. However, further investigation is required in this point, and we shall leave this issue to future research.

As for truncation of loan compound words, Labrune (2007) generalized that word-final low long vowels /aa/ and mid long vowels, /ee/ and /oo/, are shortened whereas word-final high long vowels, /ii/ and /uu/, are preserved. For example, *tere-ka* is produced rather than *tere-kaa from its base compound word, *terefon-kaado* 'phone card,' whereas *bata-pii* is selected rather than *bata-pi through truncation of its base compound word, *bataa-piinattu* 'butter and peanuts.' Although this generalization has some exceptional instances, where word-final low and mid long vowels remain intact, e.g. *pato-kaa* 'patrol car' or *suno-boo* 'snow board,' and where word-final high long vowels are shortened, e.g. *ofu-mi* 'offline meeting' or *wan-pi* 'one piece,' it succeeds in capturing approximately 70 percent of her data. (In her data, ii# is preserved in 12 of 16words and uu# is preserved in 8 of 9words whereas ee# is shortened in 16 of 21 words, oo# is shortened in 14 of 22 words, and aa# is shortened in 28 of 45 words. That is, her generalization can capture 78 of 113 words.) Hence, we will follow her generalization.[6]

Finally, let us take a glance at truncation of simple loan words. According to Labrune (2002) and Hashimoto (2012), simple word truncation never produces such outputs as end with long vowels. That is, all the kinds of long vowels /aː, eː, oː. iː, uː/ are neutralized at word-final edges to their short correspondents /a, e, o, i, u/ respectively. For example, *maneejaa* 'manager' is truncated to *mane* rather than *manee, and *guriitingu* 'greeting' is truncated to *guri* rather than *gurii.[7] In the data of Hashimoto (2012), there are no instances where truncated forms of simple loan words end with long vowels.

The generalization of the four classes is summarized as follows:

(13) Three kinds of vowel-length neutralization phenomena

Lexical or morphological class	Word-final shortened vowels
Major loan words	φ
Minor loan words	/aː/
Compound truncated words	/aː, eː, oː/
Simple truncated words	/aː, eː, oː. iː, uː/

4.2 Incorporation into Word-final edge Hierarchy

Now, it is time to demonstrate that the three vowel-length neutralization processes, as summarized in (13), are motivated by one and the same markedness hierarchy, 'Word-final-edge Hierarchy,' in (12a). As I have repeatedly said, this markedness hierarchy is neither stipulative nor

ad hoc in that it is supported strongly by two independent phonological concepts, 'prominence' and 'Harmonic Alignment,' as demonstrated in Section 3. The well-supported markedness hierarchy is repeated as follows:

(14) Word-final-edge Hierarchy (=12a)
    *aa# >> *ee#, *oo# >> *ii#, *uu# >> … >> *i#, *u#

In addition to this markedness scale, a faithfulness constraint, WT-IDENT, is also necessary to our theoretical analysis. This faithfulness constraint requires identical length between correspondents in two strings, such as *input* vs. *output* or *base* vs. *truncant*:

(15) WT-IDENT (Kager 1999: 271)
    If α ∈ Domain (f)
        if α is monomoraic, then f (a) is monomoraic. (= 'no lengthening')
        if α is bimoraic, then f (a) is bimoraic. (= 'no shortening')

The following tableaux demonstrate that all three neutralization phenomena in (1) are accounted for by one and the same markedness scale 'Word-final-edge Hierarchy,' and the faithfulness constraint, WT-IDENT. In other words, these phenomena, which have been discussed separately in the previous studies, are incorporated into a single markedness scale. Note that the markedness hierarchy remains intact in all the lexical and morphological classes and the only difference between them is only the position of WT-IDENT. This account with reranking of only a faithfulness constraint is valid empirically in that various phonological variations have been explicated in this way (Antilla 2002, Tanaka 2003, Ito & Mester 2008 among others):

(16) Major loan words: **WT-IDENT** >> *aa# >> *ee#, *oo# >> *ii#, *uu#

a. *tuaa* 'tour' → *tuaa* (length-preservation)

Input: *tuaa*	WT-IDENT	*aa#	*ee#, *oo#	*ii#, *uu#
☞ *tuaa*		*		
tua	*!			

b. *guree* 'gray' → *guree* (length-preservation)

Input: *guree*	WT-IDENT	*aa#	*ee#, *oo#	*ii#, *uu#
☞ *guree*			*	
gure	*!			

c. *paatii* 'party' → *paatii* (length-preservation)

Input: *paatii*	Wᴛ-Iᴅᴇɴᴛ	*aa#	*ee#, *oo#	*ii#, *uu#
☞ *paatii*				*
paati	*!			

(17) Minor loan words: *aa# >> **Wᴛ-Iᴅᴇɴᴛ** >> *ee#, *oo# >> *ii#, *uu#

a. *kompuressaa* 'compresser' → *kompuressa* (length-neutralization)

Input: *kompuressaa*	*aa#	Wᴛ-Iᴅᴇɴᴛ	*ee#, *oo#	*ii#, *uu#
kompuressaa	*!			
☞ *kompuressa*		*		

b. *disupuree* 'display'[8] → *disupuree* (length-preservation)

Input: *disupuree*	*aa#	Wᴛ-Iᴅᴇɴᴛ	*ee#, *oo#	*ii#, *uu#
☞ *disupuree*			*	
disupure		*!		

c. *entaa-kii* 'enter key' → *entaa-kii* (length-preservation)

Input: *entaa-kii*	*aa#	Wᴛ-Iᴅᴇɴᴛ	*ee#, *oo#	*ii#, *uu#
☞ *entaa-kii*				*
entaa-ki		*!		

(18) Compound truncated words: *aa# >> *ee#, *oo# >> **Wᴛ-Iᴅᴇɴᴛ** >> *ii#, *uu#[9]

a. *terefon-kaado* 'phone card' → *tere-ka* (length-neutralization)

Base: *terefon-kaado*	*aa#	*ee#, *oo#	Wᴛ-Iᴅᴇɴᴛ	*ii#, *uu#
tere-kaa	*!			
☞ *tere-ka*			*	

b. *mini-meeru* 'mini-mail' → *mini-me* (length-neutralization)

Base: *mini-meeru*	*aa#	*ee#, *oo#	Wᴛ-Iᴅᴇɴᴛ	*ii#, *uu#
mini-mee		*!		
☞ *mini-me*			*	

c. *bataa-piinattu* 'butter and peanuts' → *bata-pii* (length-preservation)

Base: *bataa-piinattu*	*aa#	*ee#, *oo#	Wᴛ-Iᴅᴇɴᴛ	*ii#, *uu#
☞ *bata-pii*				*
bata-pi			*!	

(19) Simple truncated words: *aa# >> *ee#, *oo# >> *ii#, *uu# >> **WT-IDENT**[10]

a. *anaakizumu* 'anarchism' → *ana* (length-neutralization)

Base: *anaakizumu*	*aa#	*ee#, *oo#	*ii#, *uu#	WT-IDENT
anaa	*!			
☞ *ana*				*

b. *fandeesyon* 'foundation' → *fande* (length-neutralization)

Base: *fandeesyon*	*aa#	*ee#, *oo#	*ii#, *uu#	WT-IDENT
fandee		*!		
☞ *fande*				*

c. *guriitingu* 'greeting' → *guri* (length-neutralization)

Base: *guriitingu*	*aa#	*ee#, *oo#	*ii#, *uu#	WT-IDENT
gurii			*!	
☞ *guri*				*

It was demonstrated in this section that 'Word-final edge Hierarchy,' which is supported by two independent phonological concepts, 'prominence' and 'HA,' motivates all the three vowel-length neutralization phenomena in (1), which have been discussed separately in the previous studies.

5. Summary

In this study, we have solved two challenges of the previous studies of three vowel-length neutralization phenomena: (i) separate consideration of them and (ii) absence of satisfactory theoretical analysis of them. Specifically, it was demonstrated (i) that the three neutralization phenomena are motivated by one and the same markedness hierarchy, 'Word-final-edge Hierarchy,' and (ii) that the markedness hierarchy is not stipulative but derived from the two well-attested phonological concepts, 'prominence' and 'Harmonic Alignment.'

Although it has been shown that the derived markedness scale, 'Word-final edge hierarchy,' in (12a) can incorporate the three vowel-length neutralization phenomena successfully, it remains unclear whether the scale can work well to account for other phonological phenomena not only in a Japanese phonological system but also in another phonological system. Further investigation is required in this point, and we shall leave this issue to future research.

Notes

* The earlier version of this study was presented at the 8th Phonology Forum at Sapporo Gakuin University in 2013. I deeply appreciate all the comments from the audiences. Further, I wish to thank two anonymous reviewers.

[1] One of the anonymous reviewers has observed that there are some instances in which word-medial long vowels are shortened in truncated compound loan words, e.g. <u>*meeru-tomodati*</u> 'e-pal' → <u>*meru-tomo*</u> / *<u>*mee-tomo*</u>, <u>*paasonaru-kompyuutaa*</u> 'PC' → <u>*paso-kon*</u> / *<u>*paa-kon*</u>. Although this shortening process is similar to the three neutralization phenomena in (1), it is of a different nature in that the latter phenomena are edge-driven phenomena whereas the former is not. Since this study is limited to neutralization phenomena at word-final edges, we shall leave this non-edge-oriented phenomenon to future research.

[2] Actually, Hayes (2007: 165) also argues that "Neutralizing phonological rules are often conditioned by word edge; that is, they have environments like / __]WORD ."

[3] Symbol # means 'word-final-edge,' whereas symbol X means 'non-word-final-edge' conventionally.

[4] However, she admitted that there is only one exceptional case where a word-final long high vowel is shortened: *safari* 'safari.'

[5] As one of the anonymous reviewers pointed out, some loan words have both shortened forms and unshortened forms, e.g. *kompyuuta* ～ *kompyuutaa* 'computer' and *purosessa* ～ *purosessaa* 'processor.' I assume that these words have two lexical entries, one of which belongs to 'minor loan words' and its final long vowel is shortened, and the other of which belongs to 'major loan words' and its final long vowel remains intact.

[6] The following examples are some of the typical ones, cf. Labrune (2006): *dansu-paatii* 'dance party' → *dan-pa* / *dan-paa*, *posuto-kaado* 'post card' → *posu-ka* / *posu-kaa*, *kanningu-peepaa* 'cunning paper' → *kan-pe* / *kan-pee*, *sukai-meeru* 'sky mail' → *suka-me* / *suka-mee*, *puratto-hoomu* 'platform ' → *pura-ho* / *pura-hoo*, *wan-kooru* 'one call' → *wan-ko* / *wan-koo*, *rongu-piisu* 'long peace' → *ron-pii* / *ron-pi*, *sukairain-jii* 'Skyline G' → *suka-jii* / *suka-ji*,   *rikuruuto-suutu* 'recruit suits' → *riku-suu* / *riku-su*, *rondon-buutu* 'London boots' → *ron-buu* / *ron-bu*.

[7] The following examples are some of the typical ones, cf. Labrune (2006): *rihaasaru* 'rehearsal' → *riha* / *rihaa*, *repaatorii* 'repertory' → *repa* / *repaa*, *esukeepu* 'escape'→ *esuke* / *esukee*, , *animeesyon* 'animation'→ *anime* / *animee*, *gurikoogen* 'glykogen' → *guriko* / *gurikoo*, *rekoodo* 'record' → *reko* / *rekoo, hankatiifu* 'handkerchief' → *hankati* / *hankatii*, *guruutin* 'a name of village' → *guru* / *guruu*.

[8] As was pointed out in 4.1, it seems that mechanic argots are likely to fall into minor loan words. Hence, two mechanic argots, *disupuree* 'display' and *entaa-kii* 'enter key' are regarded as members of minor loan words here informally.

[9] Length-determination strategy of compound word truncation is ignored in these tableaux, because this study focuses on word-final length neutralization. The interested reader should refer to Labrune (2007).

[10] Length-determination strategy of simple word truncation is ignored in these tableaux for the same reason as compound truncation. The interested reader should refer to Labrune (2002) or Hashimoto (2012).

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