Preference for Deletion vs. Epenthesis in Japanese Phonological Adaptations: Lexical Stratification and Input Medium

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Abstract

This study investigated phonological adaptation of non-loan words in Japanese and their preference for either deletion or epenthesis. Earlier studies argue that non-loan Japanese words prefer deletion while loanwords prefer epenthesis. Studies further show that the input medium affects the adaptation; text-input leads to epenthesis while sound-input to deletion. The present study experimented with text-input of non-loan nonce words and investigated how native Japanese speakers adapt their causative, passive, and potential forms. Results showed a strong preference for deletion in causative forms, a relatively weak preference for deletion in potential forms, and no significant preference in passive forms. The outcome indicates that deletion is not present by default, and further investigation is needed to define factors that influence the selection.

Keywords: Japanese, phonological adaptation, deletion, epenthesis, verb formation

Povzetek

Ta študija je raziskala fonološko prilagoditev neizposojenih besed v japonščini in njihovo naklonjenost izbrisu oziroma vstavljanju. Prejšnje študije kažejo, da se neizposojene japonske besede nagibajo k izbrisu, izposojene pa k vstavljanju. Študije nadalje kažejo, da vhodni medij vpliva na prilagajanje; vnos besedila vodi do epenteze, medtem ko vnos glasu do brisanja. Ta študija je eksperimentirala z neizposojenimi besedami v obliki besedila in raziskala, kako materni japonski govorci prilagajajo vzročne, pasivne in potencialne oblike besed. Rezultati so pokazali močno naklonjenost izbrisu v vzročnih oblikah, razmeroma šibko naklonjenost izbrisu v potencialnih oblikah in nejasne smernice v pasivnih oblikah. V splošnem lahko sklepamo, da izbris ni privzeto prisoten, zato so za opredelitev dejavnikov, ki vplivajo na izbiro, potrebne nadaljnje raziskave.

Ključne besede: japonščina, fonološka prilagoditev, izbris, vstavljanje, tvorba glagola

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1 Introduction: phonological adaptation in Japanese

Phonological adaptations are widely discussed in a great amount of linguistic research, especially in the field of studies on loanwords. In general, certain sounds and phonological patterns are often unique to a group of languages, which may or may not exist in the phonetic and phonological systems of the other languages. Thus, when a language imports (or loans) new words from another language, and if the words include some sounds or phonological patterns that the borrower language does not have, then the pronunciations of the loanwords have to be adapted to be compatible with the borrower language's sound system. Among many adaptation methods, two of them are deletion and epenthesis; non-existent sounds or phonological patterns in the borrower language are deleted, or additional sounds are epenthesized so that the non-existent phonological patterns do not violate the borrower language's system.

In the case of Japanese loanwords from other languages, the phonological adjustment relies on epenthesis by default, rather than deletion (McCawley, 1968; Smith, 2006; Shoji & Shoji, 2014), to dissolve consonant clusters and coda in most cases, due to the language not allowing consonant clusters or coda (with a few exceptions). Specifically, the vowel [ɯ] is epenthesized in many loanwords. This is because, in principle, the adaptations should be done in a way which "do as little violence as possible" to the source language's system (Sapir, 1921, p.210). Among Japanese vowels, [ɯ] is the most unmarked and perceptually the least salient, as supported by the facts that [ɯ] is 'the most readily subject to devoicing' and to 'weakening and elimination' (Lovins, 1975, p. 106; Mori, 1929, p. 58 as cited in Lovins, 1975, p. 106), which allows the loanword to be minimally different from its source word (Kubozono, 2002). An exception is, [i], which is epenthesized when the first consonant in clusters or coda is [tʃ] or [dʒ] in the source words. Also, [o] is epenthesized when the first consonant in clusters or coda is [t] or [d]. These adaptations are shown in the words such as an English word 'little [lɪtl]' turning into [ritoɾɯ] and 'beach [bitʃ] becoming [biːtɕi] as loanwords in Japanese.[1] Shoji and Shoji (2014) experimented with native Japanese speakers utilizing English nonce words as the experimental items. Participants were given the nonce words written in the English alphabet that included consonant clusters and coda (e.g., 'krito'), and the task of the participants was to rewrite the given words in Japanese katakana text.[2] Because it is impossible to write consonant clusters or coda in Japanese orthography, the participants were forced to either delete a consonant

[1] It should be noted that this tri-partite epenthesis pattern with [ɯ], [i], and [o] may not rigidly default adaptations. In terms of which vowel is epenthesized, studies including that of Mattingley, Hall, and Hume (2019) show that the vowel that native Japanese speakers epenthesize in resolving consonant clusters vary to a great extent, loosely consistent with traditional patterns regarding [ɯ], [i] and [o].

[2] In Japanese, katakana texts are used to write loanwords (except those from China) and hiragana texts are used to write non-loan words.

(e.g., 'rito') or epenthesize a vowel (e.g., 'kurito'). The results indicated that the participants significantly tended to epenthesize vowels in consonant clusters and after coda, rather than deleting consonants. The outcome confirms that epenthesis is the preferred method for the phonological adaptation of loanwords.

While phonological adaptations are widely discussed in the studies of loanwords, similar phenomena are also found within a language in its word formations. In Japanese, early studies, including that of McCawley (1968), argue that its native vocabulary exhibits its tendency for deletion rather than epenthesis. For example, in Japanese verb formation, deletion is preferred to epenthesis by default when the verb stem ends with a consonant. For example, when a verb, *yomu* 'read', becomes its causative form, passive form, and potential form, the stem of the verb *yom* has to be suffixed by *sase* (causative), *rare* (passive), and *re* (potential). The combinations of stems and suffixes, *yom-sase*, *yom-rare*, and *yo*m-*re*, should be adjusted to dissolve the clusters with stem-ending consonants and suffix-initial consonants. Deletion is applied for these formations, i.e., the causative form is *yom-ase* (*yom-~~s~~ase*) rather than *yom-V-sase*, the passive form is *yom-are* (*yom-~~r~~are*) rather than *yom-V-rare*, and the potential form is *yom-e* (*yom-~~r~~e*) rather than *yom-V-re*.

As mentioned above, Japanese seems to have different preferences between epenthesis and deletion depending on whether the words are non-loan or loanwords. This discrepancy is compatible with the explanation by lexical stratification, as Fukazawa, Kitahara, and Ota (1998) argue. In their analyses of native Japanese words and loanwords, these words behave differently in their phonological adaptations. A part of Fukazawa et al's analyses is related to the conflict between the markedness constraint and the faithfulness constraint, which are applied, for example, to a native Japanese word, *kan-da* 'bit (past tense of 'bite')', and a loanword, *komp^{j}uutaa* 'computer'. In the native Japanese word, *ta* is the past tense morpheme, but *ta* is voiced to become *da* in *kan-da*. It is not *kan-ta* but *kan-da* because the markedness constraint (i.e., Post Nasal Voicing) has priority over the faithfulness constraint (i.e., IDENT[voice]); *ta* after *kan* needs to be voiced to be *kanda*.[3] In contrast, the other loanword is not *komb^{j}uutaa* but *komp^{j}uutaa* because the faithfulness constraint (i.e., IDENT[voice]) has priority over the markedness constraint (i.e., Post Nasal Voicing); the *p* in *komp^{j}uutaa* has to be voiceless (and thus must not be *komb^{j}uutaa*) to be faithful to the source word 'computer'. These examples indicate that phonological constraints are applied in different rankings depending on whether the word is native or loaned. If we apply the idea of lexical stratification to the deletion vs. epenthesis conflict in the current study, we could suggest that a constraint DEP-IO (that applies deletion) has a priority over MAX-IO (that applies epenthesis) in non-loan Japanese words, while a

[3] This word, *kan-da*, includes a consonant cluster, which is usually unacceptable in Japanese. As mentioned earlier in this paper, however, there are exceptions that can stand in the coda position, which are voiceless obstruents and nasals (Kubozono, 2002), the latter applying in this case.

constraint MAX-IO has priority over DEP-IO in loanwords. However, this account is not convincing enough because there are some instances of loanwords that include deletion, not epenthesis, e.g., 'handkerchief [hæŋkərtʃɪf] is [hankatɕi] as a loanword in Japanese, which deletes the coda [f].

Another possible account for the discrepancy between non-loan preference for deletion vs. loanword preference for epenthesis can be offered by Mathieu's (2012) and Smith's (2006) studies. According to their explanations, the selection between deletion and epenthesis depends on whether the source words were initially emerged/imported in text or sound. Mathieu and Smith argue that epenthesis is preferred when the source words were input in text, while deletion is preferred when the source words were input in sound. Mathieu shows an example, in which a Romanian word for 'step' is pronounced as [pas], which is loaned from French. The French source word is pronounced as [pa] but spelled as *pas*. Although the French pronunciation does not include the word-final [s], the Romanian loanword is pronounced as [pas], being influenced by the French text, *pas*. This is because this Romanian loanword came from the French text-based source. This argument may be supported by Altenburg and Vago (1987, as cited in Hancin-Bhatt, 2008), who maintain that a text-input new word is visually perceivable as in spelling, and thus a speaker tends to utter all the text (i.e., "spelling pronunciations"), which results in epenthesis rather than deletion. These arguments could supplement the lexical-stratification account. That is, Japanese loanwords prefer epenthesis possibly because most of them were imported as text, but a small number of loanwords that prefer deletion were imported auditorily. That could be why a small number of loanwords exhibit deletion while most loanwords show epenthesis. Also, Shoji and Shoji (2014) explain that this deletion occurred for auditorily transmitted loanwords possibly because the deleted consonant was not perceptual to the speakers of the borrower language (i.e., they did not hear the consonant).

Regarding the effect from the input medium that Mathieu (2012) and Smith (2006) argue, Shoji and Shoji's (2014) study mentioned earlier also tested native Japanese speakers with sound-input nonce words in English as the experimental items. It was predicted that participants would rewrite the English nonce words utilizing deletion when the words were auditorily input. The results indicated that, compared with the other experiment with text-input, participants' preference for deletion increased (i.e., less than 1% → less than 10%). However, the number of instances of deletion remained small, which may indicate that epenthesis is the default adaptation method for loanwords in both cases of text-input and sound-input. Nevertheless, Shoji and Shoji's second experiment exhibited the effects of input mediums to be real, as the results showed increased instances of deletion for sound-input items, compared with those when the items were text-input.

Summarizing the earlier studies mentioned in this section, default phonological adaptations appear to be epenthesis for loanwords and deletion for non-loan words in Japanese, compatible with Fukazawa, et al's (1997) lexical stratification which argues that non-loan and loan words behave differently. However, the effect from input medium that Mathieu (2012) and Smith (2006) researched is also true, although the effect is weak, as shown by Shoji and Shoji (2014). A remaining issue that should be studied is whether Japanese non-loan word adaptation prefers deletion or epenthesis when source words are text-input, which is the research question of the current study, as summarized in Table 1.

Table 1: Preferences of deletion or epenthesis

Loanwords	Text-input Significant preference for epenthesis (Default adaptation) - evidenced by existing instances, i.e., actual words - evidenced by experiment (Shoji & Shoji, 2014)	➔	Sound-input Decreased preference for epenthesis & Increased preference for deletion - evidenced by experiment (Shoji & Shoji, 2014)
Non-loan words	Sound-input Significant preference for epenthesis (Default adaptation) - evidenced by existing instances, i.e., actual words	➔	Text-input - tested in the current study

Non-loan word adaptation obtained from the experiment of the current study may exhibit the preference for deletion if it is the default method for non-loan word adaptation. Also, the effect from input-medium could be found, i.e., the adaptation might tend to rely on epenthesis when the source words are text-input.

2 Experiment

As mentioned, the objective of the current study is to investigate whether non-loan Japanese word adaptation prefers deletion or epenthesis when source words are text-input. To empirically test this, an experiment in written test format was conducted. The experiment was participated in by 20 native Japanese speakers from the community, whose ages ranged from 23-61 (*M* = 39.2). As the experimental items, the participants were given 5 nonce words written in Japanese hiragana texts. Because hiragana texts

were normally used to write non-loan words in Japanese, the participants should interpret the given nonce words as non-loan, not as loanwords. The experimental items were all verbs with consonant-ending stems, and participants were tasked to create the nonce verbs' causative, passive and potential forms by adding the suffixes *sase*, *rare*, and *re*, respectively.[4] Also, the items' stem-final consonants were avoided to be *s* or *r* because, otherwise, the formation with the stem-final *s* or *r* and suffix-initial *s* or *r* (in *sase*, *rare*, and *re*) would make a succession of two identical consonants, which tends to be avoided in general (McCawley, 1968). The items, their stems, suffixes, and expected formations with deletion and epenthesis are shown in Table 2.

Table 2: Experimental item words

Items (nonce words)	Stem	Suffix	Expected formation	
			by deletion	by epenthesis
rokomu	*rokom*	*sase* (causative)	*rokom-ase*	*rokom-V-sase*
		rare (passive)	*rokom-are*	*rokom-V-rare*
		re (potential)	*rokom-e*	*rokom-V-re*
tomaku	*tomak*	*sase* (causative)	*tomak-ase*	*tomak-V-sase*
		rare (passive)	*tomak-are*	*tomak-V-rare*
		re (potential)	*tomak-e*	*tomak-V-re*
ratu	*rat*	*sase* (causative)	*rat-ase*	*rat-V-sase*
		rare (passive)	*rat-are*	*rat-V-rare*
		re (potential)	*rat-e*	*rat-V-re*
darinu	*darim*	*sase* (causative)	*darim-ase*	*darim-V-sase*
		rare (passive)	*darim-are*	*darim-V-rare*
		re (potential)	*darim-e*	*darim-V-re*
jimu	jim	*sase* (causative)	*jim-ase*	*jim-V-sase*
		rare (passive)	*jim-are*	*jim-V-rare*
		re (potential)	*jim-e*	*jim-V-re*

The order of the items given to each participant was randomized by the investigator. The experiment was conducted in traditional paper-and-pencil format, which took approximately 10 minutes. The participants' responses should show whether native Japanese speakers prefer deletion or epenthesis when phonologically adapting non-loan words given in the text.

[4] Although the participants were instructed to create the causative form, the passive form, and the potential form, the suffixes were not provided to the participants. The given items in the experiments were only the nonce verbs.

3 Results

For analyzing the forms that participants created, only those that consisted of the stem and the suffix (and an inserted vowel in case of the epenthesis) were subject to the analyses. Other instances such as the ones that overly deleted non-stem-ending consonants (e.g., *rokom* + *sase* → *rom-ase*) or the ones that overly epenthesized consonants (e.g., *rokom* + *sase* → *rokom-ase-sase*) were excluded from the data analyses because these instances may indicate that participants did not correctly understand the stems and suffixes. Also, the other types of excluded instances were those showing participants' misinterpretations such as writing a causative-passive form (e.g., *rokom-ase-rare*) when a passive form was needed (i.e., *rokom-are* or *rokom-V-rare*). After excluding these instances, we obtained 85 instances for the causative form, 86 instances for the passive form, and 81 instances for the potential form. In total, 252 instances were subject to data analyses.

Results with a number of instances with deletions and epentheses are shown in Table 3.

Table 3: Results: numbers of instances

Form	Deletion	Epenthesis
Causative	64 (75.3%)	21 (24.7%)
Passive	47 (54.7%)	39 (45.3%)
Potential	58 (71.6%)	23 (28.4%)
Total	169 (67.1%)	83 (32.9%)

The repeated measure ANOVA was run for by-participant analysis and by-item analysis. The omnibus analysis for the results showed that, for all the formations, there were significant (and marginally significant) preferences for deletion over epenthesis [F_1 =11.09, p =.004; F_2 =5.90, p =.072]. In the participant analysis, there was a significant interaction between the adaptation method (deletion vs. epenthesis) and forms (causative, passive, vs. potential), although the item analysis did not find significance [F_1 =6.89, p =.007; F_2 =1.36, p =.380].

A series of individual T-test analyses were conducted for each form comparing the occurrences of deletions and epentheses. Results of the tests indicated that the passive form showed no significant preference either for deletion or epenthesis [t_1 =.44, p =.685; t_2 =.648, p =.525] although the causative form showed significant preference for deletion [t_1 =3.90, p =.018; t_2 =3.56, p =.002] and the potential form showed a significant preference for deletion in the participant analysis and a marginally significant preference in the item analysis [t_1 =3.60, p =.002; t_2 =2.75, p =.052].

The results of all the statistical analyses are summarized in Table 4.

Table 4: Results: Statistic analyses

	Participant analyses	Item analyses
Omnibus	Significant preference for deletion	Marginally significant preference for deletion
Causative form	Significant preference for deletion	Significant preference for deletion
Passive form	No preference	No preference
Potential form	Significant preference for deletion	Marginally significant preference for deletion

4 Discussion

The results shown in the previous section appear to be mixed. The omnibus analyses imply that there is a trend that prefers deletion to epenthesis when native Japanese speakers adapt non-loan words with text input. This outcome supports the earlier studies, which suggests that phonological adaptation for non-loan Japanese prefers deletion by default. However, this preference was inconsistent, or possibly selective, depending on the type of formation. The causative formation showed the strong preference for deletion, but the potential formation showed a weaker preference for deletion, and the passive formation did not elicit any preference. The inconsistent outcome may not be a strong evidence for deletion to be the default method for non-loan word adaptation in Japanese.

The weak preference for deletion in the potential form as well as no preference in the passive form could be attributed to the effect from input medium. Following Mathieu (2012) and Smith's (2006) arguments, text-input may have led native Japanese-speaking participants to epenthesis for many instances. However, the possible effect from the text input was still random or selective because the occurrence possibilities of the epenthesizing instances greatly differed between the causative, passive, and potential forms. Thus, this outcome also could not be strong evidence of the effect of the input medium.

The unclear results from this experiment may indicate that deletion as the phonological adaptation for Japanese non-loan words is "weakly default", but not "absolutely default", in spite of the fact that the formations of existing Japanese verbs appear to consistently exhibit deletion. Thus, this defaultness could be subject to change depending on different forms, which could not be clarified in the current study. Also, it could be possible that the preference for deletion or epenthesis changes over time. For example, a historical anthology *Manyoshu* from the 8th century shows that, when *siru* 'know,' whose stem is *sir*, was attached by the potential suffix *yu*, the form was *sir-a-yu*; with *a* epenthesized. Likewise, the potential form of *naku* 'cry', whose

stem is *nak*, was *nak-a-yu* (Shibuya, 1993). In addition, another possibility is that the preference for deletion or epenthesis is dialectologically different. For example, in the Kansai region, the potential forms of *yomu* 'read', whose stem is *yom*, can be *yom-a-re*, with *a* epenthesized.[5] All these inconsistent instances imply that the preference for deletion in non-loan words is not always true and that there is much to be further researched.

5 Conclusions

This study investigated the native Japanese speakers' preferences for deletion and epenthesis for non-loan word adaptation. The experiment implied, but not strongly evidenced, the defaultness of deletion and/or the effect from the input medium. Further research is necessary in order to investigate such effects. Specifically, an experiment should be conducted utilizing non-loan nonce words, which could be identical to the experimental items in the current study, but with the sound input. The defaultness of deletion for non-loan word adaptation will be confirmed if the results show significant preferences for deletion to epenthesis. Also, the effect from the input medium will be ascertained if reliance on epenthesis significantly decreases in the case of sound-input items, compared to that with text-input. In addition, when utilizing sound inputs, there may be effects from accentuation, as Kubozono (1997, 2002) argues. Although Kubozono finds that loanwords tend to preserve input accent while native Japanese words do not as much, we may find some extent of effects from accentuation leading Japanese speakers to choose deletion or epenthesis, either of which would preserve the source-word accentuation. Therefore, the accents of the sound-input items should be controlled experimentally. Moreover, data from Shoji and Shoji's (2014) experiment with sound-input loanwords may need to be reanalyzed with the consideration of the items' accents.

Another possible future research study should investigate whether the preferences of deletion and epenthesis are selective in response to each formation. The current study exhibited that the causative formation significantly preferred deletion while the passive formation showed no preference. This inconsistency might be due to the phonological difference between suffixes. In addition, the preferences either for deletion or epenthesis are selective for the sake of assimilation or dissimilation between the suffix and stems. All these possibilities indicate that there are many issues remaining to be investigated.

[5] This type of epenthesis in the potential form in the Kansai region appears mostly in the negative-potential form, e.g., *yom-a-re-hen* 'cannot read' or *nom-a-re-hen* 'cannot drink'.

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