

Morphological Effects in Loanword Adaptation: Adaptation of the English Plural Suffix into Korean*

Mira Oh · Syejeong Kim**
(Chonnam National University)

Oh, Mira & Kim, Syejeong. 2012. Morphological Effects in Loanword Adaptation: Adaptation of the English Plural Suffix into Korean. *Linguistic Research* 29(2), 299-314. Most previous studies related to the input to loanword adaptation have centered on the division between phonological mapping (LaCharité & Paradis, 2005) and perceptual mapping (Silverman 1992). However, few have considered morphological information in loan adaptation. Investigating adaptation of the English plural suffix into Korean by analyzing the corpus data from NIKL (1991), Bae (2002) and Google searches (2010), the present study makes four claims. First, the morphology of a borrowed word should be referred to in calculating sound mappings in loanword adaptation since the same consonant can be adapted differently depending on whether it is morphemic by itself or morpheme-internal. Second, phonetic information of the incoming new word still influences loan adaptation. Different phonetic realization of allomorphs between voiced and voiceless allomorphs determine different rates of vowel epenthesis. Further, adaptation of the allomorphs /ts, dz/ into a single sound in Korean supports this perceptual account. Third, comparison of sound mappings over two decades suggests that sound mappings move toward uniform mappings (Kang 2010). (Chonnam National University)

Keywords loan adaptation, English plural suffix, perceptual salience, sound mappings, morphological information, allomorphs

1. Introduction

Lexical inventory in the borrowing language is expanded by adapting new words from the source language through language contact. Loan adaptation reflects borrowers' perception of relative similarity between the source word and candidate

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** Corresponding author

translations of it in the borrowing language. Most previous studies on loan adaptation have centered on the debate over how much information is referred to in loan adaptation. There are two main contrasting views within this debate. First, loan adaptation is phonological in that it is not directly based on surface phonetic forms but is based on the phonemic categories of the source language (Lacharité and Paradis 2005). From this viewpoint, most subphonemic variants are disregarded in adapting loanwords by borrowers who are bilinguals. Second, loan adaptation is phonetic since the acoustic output in the source language provides the input for perception in the borrowing language (Silverman, 1992; Peperkamp & Dupoux, 2003). Thus, subphonemic realization of each language plays a crucial role in this view.

Few have considered the degree to which morphological information affects initial perception of the incoming new words. Oh's (2012) study investigates the adaptation of complex English words, consisting of two component words such as "make up" or "all in", into Korean. This work proposes that each component of a complex word is a unit for loanword adaptation in calculating sound mappings. To be specific, "all in" is not adapted as *[ollin] but as [orin] after turning the stem-final /l/ to [r] between vowels, whereas "olive" is adapted as [ollibi] in Korean. In other words, if "all in" were borrowed as a whole, the /l/ would be geminate. This suggests that a morphologically complex word is not borrowed as a single unit but that each component word is parsed and adapted separately and independently of the other component, as given in (1).

- (1) "all in": /ol/ + /in/ → [orin]

Oh's (2012) study focuses on the adaptation of complex words which consist of multiple free morphemes. The main interest of this paper, however, lies in investigating the adaptation of incoming words which consist of a free morpheme and a dependent morpheme.

By examining adaptation of the English plural suffix into Korean, we address several questions. Firstly, does morphological structure also affect adaptation of suffixed words? Secondly, do suffixed loanwords behave in the same way as unsuffixed loanwords with respect to vowel epenthesis and segmental mappings? Thirdly, how many allomorphs of the English plural suffix are perceived by Korean

borrowers? Fourthly, how much does the phonetic quality of the allomorph of the English plural suffix affect the adaptation of the suffixed words? Fifthly, is the pattern of sound mappings in loan adaptation uniform over time?

This paper provides a quantitative analysis of the adaptation of the English plural suffix into Korean by employing a list of loanwords from the NIKL (National Institute of the Korean Language, 1991), Bae's (2002) dictionary. Additional list of loanwords with English plural suffix were collected by internet search (Google, 2010) to provide a sizable data to ensure the reliability of the statistical analysis. The Korean adaptation forms of plural suffix loanword were searched and the number of hits in the results was considered as a supportive evidence of specific adaptation of that word. Individual tokens from the three data sources were then coded for various factors for example the morphemic status of /s, z/, segmental context, adapted form, source form, orthography on Microsoft Excel spreadsheet.

The results of this quantitative study reveal several findings. To begin with, the suffixed loanwords do not pattern with the unsuffixed ones with respect to segmental mappings and vowel epenthesis. The word-final /z, s/ are always mapped to the perceptually closest sound in Korean with the help of vowel epenthesis when they are not morphemic by themselves, while they can be deleted when they denote the plural meaning. This indicates that the morphological structure of the suffixed words plays a role in loan adaptation. Next, the stem-final /t, d/ and the following plural suffix constitute /ts, dz/, which are perceived as a single sound by Korean borrowers. This suggests that borrowers are aware of the morphological structure of the incoming words but that phonetic variants also affect loan adaptation. Further, the allomorphs of the English plural suffix, /s, z, ts, dz, ɪz/, are adapted differently in Korean with respect to sound mappings and vowel epenthesis. That indicates that phonetic realization of each allomorph strongly influences adaptation of the suffix. Finally, sound mappings in loan adaptation move over time toward becoming uniform mappings.

The rest of this paper is organized as follows: section 2 provides a brief review of adaptation of the English plural suffix. This section also discusses Korean phonology that is relevant to this study. Section 3 analyzes the adaptation of the English plural suffix based on corpus data from NIKL (1991), Bae (2002) and Google searches (2010) and provides evidence for morphological effects in loan adaptation. This section also investigates the role of the perceptual salience of each

allomorph of the English plural suffix in sound mappings. Section 4 discusses the diachronic change of sound mappings and vowel epenthesis by comparing the data corpus, which represents a different period of time. Section 5 presents our findings in light of several theoretical issues surrounding loanword adaptation and offers a conclusion.

2. Adaptation of the English Plural Suffix into Korean

Nearly all nouns in English become plural by appending the voiced or voiceless alveolar fricative [s], [z] or the syllable [ɪz] to the singular form of the word as shown in (2).

(2) Singular form	Plural form
a. cap	caps [s]
b. cab	cabs [z]
c. bus	buses [ɪz]

The English plural suffix is realized as [s], [z] or the syllable [ɪz] depending on the stem-final segment; it is [s] when preceded by the stem-final voiceless consonant, [z] when preceded by the stem-final voiced segment, and [ɪz] when preceded by the sibilant consonants.

A discussion of the borrowing of the English plural suffix requires a review of the coda constraint in Korean. Onsets and codas display an unequal consonant distribution in Korean. In onsets, 18 consonantal phonemes (p, t, k, p', t', k', p^h, t^h, k^h, s, ɕ, ɕ^h, ɕ', m, n, l, h) are pronounced, while only 7 can surface in codas: [p, t, k, m, n, ŋ, l]. To satisfy the coda constraint in Korean, neutralization occurs as shown in (3).

(3) Coda neutralization in Korean (Oh, 2012)

a. Neutralization in the laryngeal feature

/sup ^h /	[sup]	“forest”	/sup ^h -i/	[sup ^h i]	“forest” (Nom)
/puək ^h /	[puək]	“kitchen”	/puək ^h /	[puək ^h i]	“kitchen” (Nom)
/pak'/	[pak]	“outside”	/pak'-i/	[pak'i]	“outside” (Nom)

b. Neutralization in place and manner of articulation

/nas/ [nat]“sickle”	/nas’/[nat]“gave birth”
/nah/ [not]“give a birth”	/nač/[nat]“daytime”
/nač ^h /[nat]“face”	/nat ^h / [nat] “each”

The coda constraint prohibits the occurrence of /s/ in the coda. It is thus difficult to find a match in Korean for the plural suffix in English in the face of the Korean CVC syllable structure.

Oh (1996) contends that a morphemic /z/ or /s/ in English is hardly adapted into Korean, whereas a non-morphemic /z/ or /s/ is always adapted via vowel epenthesis as given in (4).

(4) (Oh 1996: . denotes a syllable boundary.)

a. Adaptation of a nonmorphemic /s/ or /z/: [s’i] or [ci]

‘bus’ [p’ə.s’i 뺑쓰]

‘rose’ [ro.ci, 로즈]

b. Adaption of a morphemic /z/: Ø

‘stockings’ [si.t^ha.k^hiŋ, 스타킹] * [si.t^ha.k^hiŋ.ci, 스타킹즈]

‘gloves’ [kil.lo.bi, 글로브] * [kil.lo.bi.ci, 글로브즈]

The word-final /s/ of the monomorphemic word, ‘bus’, is adapted as [s’] along with vowel epenthesis as in [p’ə.s’i, 뺑쓰]. However, the plural suffix in ‘stockings’ is deleted. From this, Oh (1996) claims that the plural suffix of English is not adapted into Korean but her analysis is based on a limited set of data.

Kang (2009) investigates English loan adaptation in 1930s Korean and shows that an allomorph of the plural suffix in English, /z/, is mapped to three different sounds in Korean, [c] (1%), [s] (65%) or [s’] (34%), but the non-morphemic /z/ is adapted as /c/ (68.3%), [s] (22.2%) or [s’] (8.7%) in 1930’s Korean. On the other hand, Kang contends that the morphemic /z/ is usually adapted as /s/ in modern Korean which contrasts with the non-morphemic /z/ as it is normally adapted as /c/ (Kang 2009, footnote 3). To be specific, ‘news’ is more likely to be adapted as [nju.si, 뉴즈] than [nju.ci, 뉴즈] but ‘cheese’ is more likely adapted as [c^hi.ci, 치즈] than [c^hi.si, 치즈]. Likewise, her study shows that the morphemic /z/ does not pattern with the nonmorphemic /z/ with respect to sound mapping in both 1930s

Korean and present-day Korean. Further, it suggests that the pattern of sound mapping for the plural suffix /z/ changes over time.

As Oh (1996) and Kang (2009) have exemplified, it is clear that adapters are aware of the morphological structure of the source word and treats the morphemic /z/ and the non-morphemic /z/ differently. Despite the fact that these studies successfully highlight the role of morphological information in loan adaptation, they did not take all allomorphs such as [s]~[z]~[iz] of the English plural suffix in English into consideration. Given that perceptual similarity in loan adaptation by and large relies on allophonic variations of the source sound (Kim and Curtis 2000; Kang 2003), adaptation of the phonetically different allomorphs of the English plural suffix need to be examined. This paper therefore investigates how each allomorph of the English plural suffix is adapted into Korean with respect to vowel epenthesis and sound mappings.

3. Adaptation of English Words Ending with /z/ or /s/

3.1 Data Collection

We examine three data sets to investigate adaptation of the English plural suffix into Korean. First corpus data is drawn from *Oylaye sayong siltay cosa*, which surveys loanword usages published by the National Institute of Korean Language in 1991 (henceforth NIKL, 1991). This list contains 79 English loanwords whose source words end with /z/ or /s/. 11 of these carry the morphemic /z/ or /s/ and the rest of them (N=68) the non-morphemic /z/ or /s/. As such, the NIKL (1991) only provides a limited number of loanwords with the English plural suffix. Thus, to complement the NIKL list we also collected more loanwords whose source words end with /z/ or /s/ from two further data sets. The second data set derives from *Oylaye sacen* (Bae, 2002), which is a loanword dictionary. It contains 332 words containing /z/ or /s/ in the word-final position. 53 out of these 332 loanwords carry the morphemic /z/ or /s/ and the remainder take the (N=279) the non-morphemic /z/ or /s/. We also collected an additional 65 loanwords that end with the morphemic /z/ or /s/ by conducting Google searches (2010).

The complete data sets, then, consist of a total of 476 words, of which 347

words end with the non-morphemic /z/ or /s/ and 129 with the morphemic /z/ or /s/. The loanwords from the three corpus data were entered into Microsoft Excel spreadsheet manually by the second author. She coded each loanword in terms of its data source, the mapping sound for the word-final /z/ or /s/, segmental context, vowel epenthesis and epenthetic vowel for the qualitative and quantitative analyses.

3.2 Results of the Analysis

3.2.1 Rate of Vowel Epenthesis and Consonant Deletion

Korean only allows seven consonants in codas. Thus, the word-final /s/ or /z/ in English cannot be adapted as such. There are two options to adapt the consonant into Korean; one is to adapt the consonant into a perceptually similar consonant along with vowel epenthesis and the other is to delete it. Data analysis reveals that the patterns of adaptation of the word-final /z/ or /s/ differ depending on its morphemic status. Figure 1 summarizes the overall rate of vowel epenthesis and consonant deletion for the word-final /z/ or /s/ depending on its morphemic status.

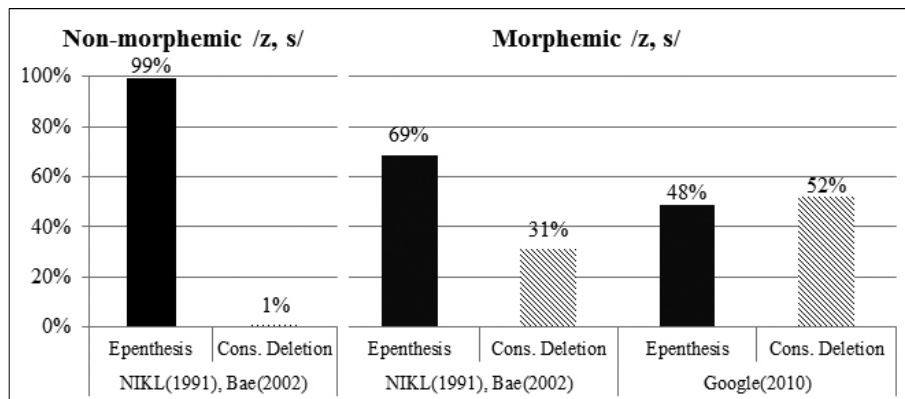


Figure 1. Rate of Vowel Epenthesis and Consonant Deletion

The morphemic /z/ and /s/ include the allomorphs /z, dz, iz/ and /s, ts/, respectively.¹ The non-morphemic /z, s/ are 99% mapped to perceptually similar

¹ Each allomorph of the English plural suffix will be discussed in next subsection in detail.

consonants in Korean through vowel epenthesis, while the morphemic /z, s/ are 69% mapped to perceptually similar consonants in Korean through vowel epenthesis in the corpus data from the NIKL (1991) and Bae (2002). Further, the morphemic /z, s/ are only 48% adapted to the corresponding consonant in Korean with vowel epenthesis from the Google search result data (2010). These results indicate two findings. The first of these is that the rate of vowel epenthesis after the nonmorphemic /z, s/ is higher than that after the morphemic /z, s/. To be specific, the rate of vowel epenthesis of the non-morphemic /s/ is significantly higher than that of the morphemic /s/ ($\chi^2=76.701$, $df=1$, $p<0.000^*$). In the same vein, the rate of vowel epenthesis of the non-morphemic /z/ is significantly higher than that of the morphemic /z/ ($\chi^2=35.586$, $df=1$, $p<0.000^*$). This means that morphological information of the source language plays a role in loanword adaptation.

The second finding is that the rate of deletion of the morphemic /z, s/ is lower in the NIKL (1991) and Bae (2002) data than for Google search result words (2010). This suggests that the deletion rate of the morphemic /z, s/ increases over time.

3.2.2 Phonetic Salience of Allomorphs of the English Plural Suffix

We have shown in section 2 that the English plural suffix is realized as [s], [z] or [ɪz]. Most previous studies simply considered [s, z] as being variants of the plural suffix in English. However, close examination reveals that the English plural suffix is further realized as alveolar affricates after the stem-final alveolar stops, i.e., ‘cats’ [ts], ‘cads’ [dz]. These two sounds are usually adapted as single sounds into Korean, [c^h] and [c], respectively, and thus are treated as separate allomorphs in the present study. The English plural suffix then takes five different allomorphs; i.e., [s], [z], [ɪz], [ts], [dz].

The question now arises of how each allomorph is adapted into Korean. Data analysis reveals that each allomorph is adapted differently with respect to vowel epenthesis as given in figure 2.

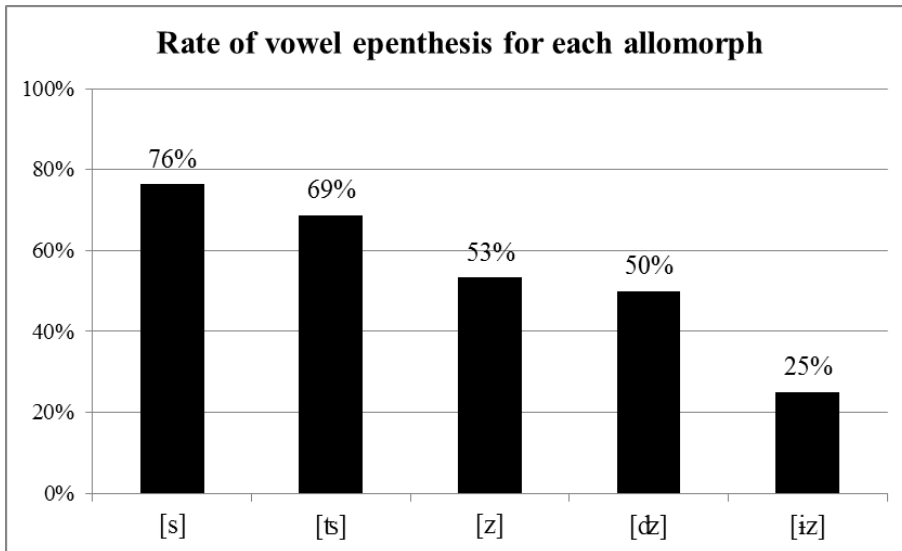


Figure 2. Rate of Vowel Epenthesis for Each Allomorph of the English Plural Suffix (NIKL, 1991; Bae, 2002; Google searches, 2010)

Figure 2 shows the extent to which each allomorph of the English plural suffix triggers vowel epenthesis based on the data from NIKL (1990), Bae (2002) and Google searches (2010). Vowel epenthesis takes place in the order of [s] > [ts] > [z] > [dz] > [iz]. This ordering indicates that the phonetic salience of the allomorphs of the plural suffix correlates to the ratio of vowel epenthesis. For example, the ratio of vowel epenthesis for the [s, ts] is comparatively higher than for the [z, dz, iz]. In other words, the voiceless fricative and the voiceless affricate are more perceptually salient and are thus more easily rescued by vowel epenthesis compared to their voiced counterparts. Specifically, the voiceless fricative /s/ is of longer duration and higher frication than the voiced fricative /z/ (Olive 1993: 172). Further, the voice bar as well as vertical striations disappear for the word-final /z/ and the /z/ is not likely to be realized as such. The result shown in figure 2 suggests that allomorphs of the English plural suffix are adapted differently with respect to vowel epenthesis according to their perceptual salience; the rate of vowel epenthesis is proportional to the perceptual salience of each allomorph.

3.2.3 Sound Mappings of the Allomorphs of the English Plural Suffix

Figure 3 illustrates how different sound mappings are conditioned by different allomorphs of the English plural suffix in Korean.

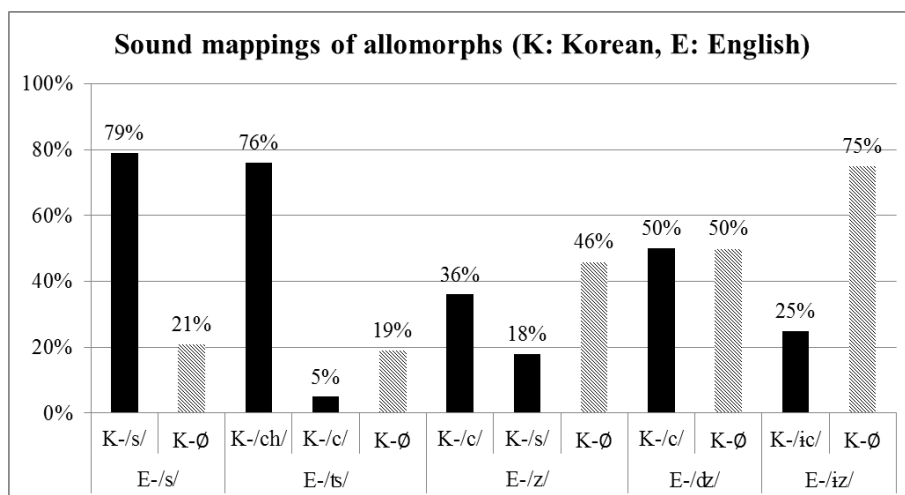


Figure 3. Sound Mappings of Allomorphs of the English Plural Suffix (NIKL, 1991; Bae, 2002; Google searches, 2010)

Two major findings are visible in figure 3. First, the allomorph /s/ after an alveolar stop, i.e., /ts/, and the allomorph /s/ after other voiceless consonants behave differently with respect to sound mapping. The allomorph /s/ is either deleted or adapted as /s/ in Korean with an epenthetic vowel, while the allomorph /ts/ is adapted in three different ways: [c^h] or [c] with an epenthetic vowel or consonant deletion. The examples in (5) illustrate this point.

(5) Adaptation of English words

a. Adaptation of the allomorph /s/: [s] or Ø

Loan sound: [s]	Loan sound: Ø
‘pumps’ [p ^h əm.p ^h i.si, 펌프스]	‘cornflakes’ [kon.p ^h il.le.i.k ^h i, 콘플레이크]

b. Adaptation of the allomorph /ts/: [c^h], [c] or Ø

Loan sound: [c ^h]	Loan sound: [c]	Loan sound: Ø
‘boots’ [pu.c ^h i, 부츠]	‘tights’ [t ^h a.i.ci, 타이즈]	‘boy scouts’ [po.i.si.k ^h a.u.t ^h i, 보오 스카우트]

The sound mappings in (5) suggest that the allomorph /ts/ is treated as a single sound, i.e., an alveolar affricate, as opposed to a cluster (cf. Ladefoged, 2006: 66). The allomorph /ts/ is never adapted as *[t^hisi] as predicted by the phonological analysis for the sequence of the stem-final /t/ and the plural suffix /s/.

The second finding is that the allomorphs /z/ and /dz/ also show a different pattern in their sound mappings. They are both adapted as /c/ in Korean but /z/ can be further mapped to the sound /s/ in Korean. This supports the claim that the phonetic surface realization plays a crucial role in sound mapping in loan adaptation because the /z/ in English optionally and partially undergoes word-final devoicing and is sometimes realized as [s]. Likewise, the allomorph /z/ is more variably adapted to a consonant in Korean compared to /dz/. The affricate /dz/ is distinct from the fricative /z/ because the affricate includes a stop closure. Although it is treated as a cluster phonologically (Ladefoged 2006), the allomorph /dz/ is mapped to a single sound as with the allomorph /ts/. This result again testifies that phonetic information plays as crucial a role in loan adaptation as does morphological information.

4. Diachronic Change of Sound Mappings

Kang (2010) claims that loan adaptation starts out with phonetic mappings between the source and the borrowing words but that sound mappings between a phoneme of the source language to various sounds in the borrowing language are gradually regularized to a uniform sound mapping. Comparison between the corpus data from NIKL (1991), Bae (2002) and Google searches (2010) can indicate the way in which adaptation of the English plural suffix has changed over the last three decades, as shown in figure 4.

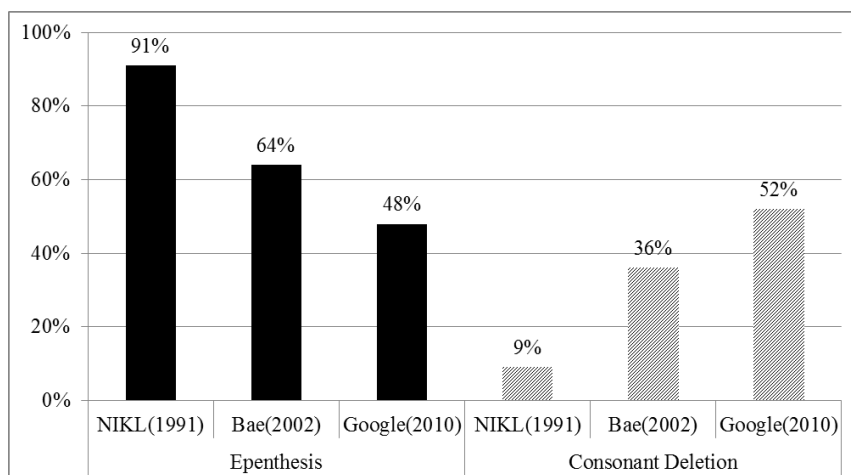


Figure 4. Change of Rates of Vowel Epenthesis and Consonant Deletion over Time

Figure 4 shows that the adaptation of the English plural suffix in Korean through vowel epenthesis has decreased over time, whereas the rate of deletion of the suffix has increased. The tendency not to adapt the plural suffix regardless of its phonetic realization is more evident when we compare adaptation of the allomorph /s/ between the corpus data from NIKL (1991) and those from Google searches (2010) in figure 5.

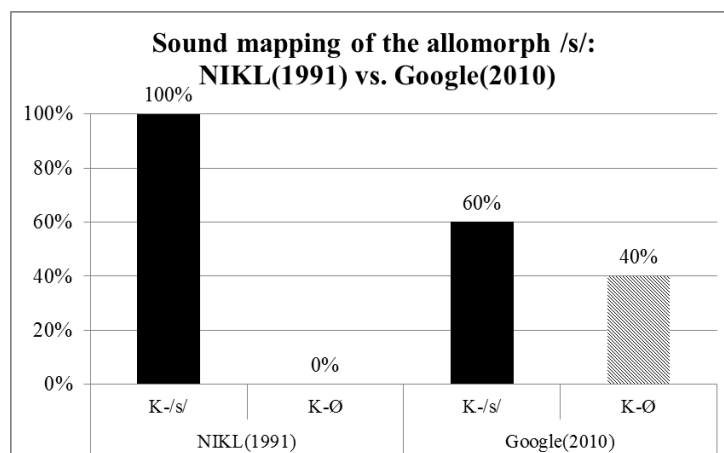


Figure 5. Sound Mapping of the Allomorph /s/: NIKL(1991) vs. Google(2010)

The phonetically salient /s/ has always been adapted as such with vowel epenthesis in NIKL (1991) and no deletion has occurred, but consonant deletion occurred 40% of the time in Google search (2010) results.

To further evidence that sound mappings have changed over time, we compare the adaptation of the allomorph /z/ between the corpus data from NIKL (1991) and those from Google searches (2010). The comparison is designed to clarify the way in which sound mappings of the English plural suffix have changed over the last three decades and is shown in figure 6.

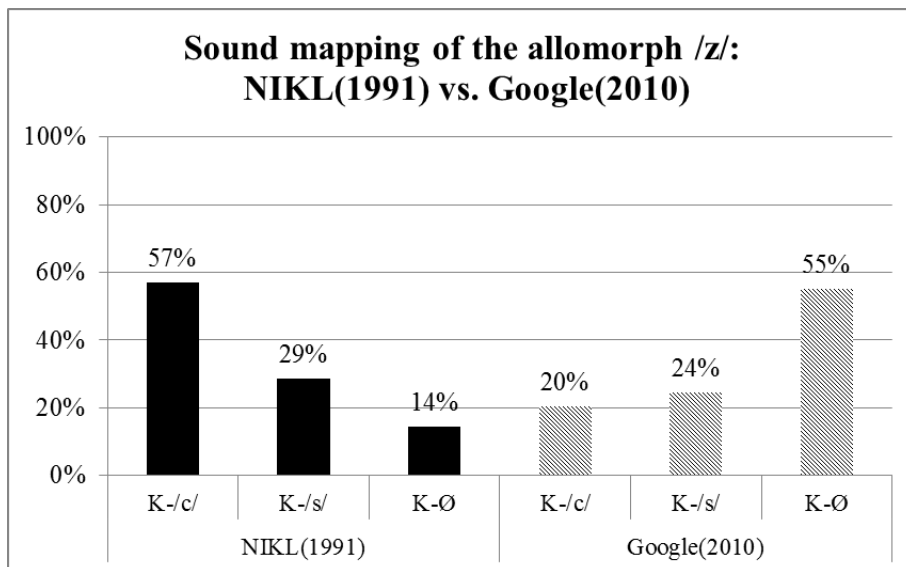


Figure 6. Sound Mapping of the Allomorph /z/: NIKL(1991) vs. Google(2010)

In figure 6, as with the allomorph /s/, the rate of consonant deletion for the allomorph /z/ increases over time. Further, the corpus data from NIKL (1991) show that the allomorph /z/ is 57% mapped to /c/ and 29% mapped to /s/ in Korean. On the other hand, the corpus data from Google (2010) show that it is more commonly mapped to /s/ than it is to /c/.

Likewise, the rate of vowel epenthesis and sound mappings of the English plural suffix in Korean shown in figures 4, 5 and 6 lend support to Kang's (2010) theory of diachronic change in loan adaptation.

4. Discussion and Conclusion

This paper investigated the adaptation of the English plural suffix into Korean by analyzing corpus data from NIKL (1991), Bae (2002) and Google searches (2010). The results from the analysis shed light on three issues surrounding loanword adaptation. The first of these issues is what type of information plays a role in sound mappings in loanword adaptation. Most previous studies of loanword adaptation have centered on investigating how much phonetic and phonological information conditions sound mappings (Silverman, 1992; Kang, 2003; LaCharité & Paradis, 2005). By contrast, the present study examines how sound mappings are determined by the morphological structure of source words, proposing that the same consonant can be adapted differently depending on whether it is morphemic by itself or morpheme-internal. As shown in the adaptation of “stockings” as [si.t^ha.k^hiŋ, 스타킹] * [si.t^ha.k^hiŋ.ci, 스타킹즈] and ‘rose’ [ro.ci, 로즈] * [ro], we argue that the phone has one rendition if it is considered as morphemic and another if the same phone is considered as nonmorphemic. A statistically significant difference in the rate of vowel epenthesis and consonant deletion between the non-morphemic /z, s/ and the morphemic /z, s/ suggests that the morphology of a borrowed word should be taken into consideration in calculating sound mappings in loanword adaptation.

Second, this paper also discussed to what extent loanword adaptation is phonological or perceptual. Phonetic realization of allomorphs plays a crucial role in loanword adaptation as voiceless allomorphs [s, ts] are more rescued by vowel epenthesis than are voiced allomorphs [z, dz, iz]. Further, we examined how the allomorphs /s/ and /ts/ of the English plural suffix are adapted into Korean. We found that they are adapted to different sounds; the allomorph /s/ is mapped to /s/ but the allomorph /ts/ is mapped into the /c^h/ or the /c/ in Korean. This has two implications regarding loan adaptation. Firstly, the fact that the allomorph /ts/ is mapped into a single Korean sound, i.e., /c^h/ or /c/, provides evidence in favor of the phonetic approach. In other words, the sequence of the stem-final /t/ and the suffix /s/ is perceived as a single sound and is loaned as a single alveolar affricate. If it were a cluster as Ladefoged (2006: 66) analyzes it phonologically, we would expect * /t^hisi/ contrary to the fact. Thus, the adaptation of the allomorph /ts/ as a single sound into Korean indicates that phonetic realization is more important than the phonological structure of the source word.

The adaptation of the allomorph /ts/ in Korean also reveals what determines vowel epenthesis. The examples in (6) illustrate that an epenthetic vowel is determined by the place of articulation of the word-final consonant.

(6) (Oh 1992: 141-142; Oh 1996: 120)

- a. [k^hɪrɪsɪmasɪ] ‘Christmas’
[k^hɛik^hɪ] ‘cake’
- b. [bɛnc^hɪ] ‘bench’
[k^hoc^hɪ] ‘coach’
- c. [puc^hɪ] *[puc^hɪ] ‘boots’
[sɪp^hoc^hɪ] *[sɪp^hoc^hɪ] ‘sports’

The epenthetic vowel [ɪ] is inserted to satisfy the coda constraint for the syllable in Korean when adapting new words ending with a consonant as given in (6a). However, the word-final affricate in English is mapped to the affricate with an epenthetic vowel /i/ as shown in (6b). The data in (6c) are of interest in that the affricate allomorph /ts/ of the English plural suffix is mapped to the affricate in Korean but the epenthetic vowel is [ɪ] not [i]. Both the alveopalatal affricate and the alveolar affricate in English are perceived as an identical affricate in Korean but they are accompanied by the different epenthetic vowels, [i] and [ɪ], respectively. This suggests that the different acoustic cues of the affricates from English due to different places of articulation still affect the quality of the epenthetic vowel.

Third, we considered the diachronic change of the patterns of sound mappings. Investigation of suffixed English loanwords in Korean indicates that sound mappings change toward uniform mapping (Kang 2010).

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Mira Oh

Department of English Language and Literature
Chonnam National University
77 Yongbong-ro, Buk-gu,
Gwangju 500-757, Korea
Tel: 062-530-3165
E-mail: mroh@chonnam.ac.kr

Syejeong Kim

Department of English Language and Literature
Chonnam National University
77 Yongbong-ro, Buk-gu,
Gwangju 500-757, Korea
Tel: 062-530-3158
E-mail: syejeong.kim@gmail.com

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