

Salience and typology of epenthetic vowels: case from loanword adaptation*

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Lee, Juhee. 2008. Salience and typology of epenthetic vowels: case from loanword adaptation. *Linguistic Research* 25(1), 83-101. Lombardi (2002) assumes that epenthetic vowel is central vowels such as [ɪ], and [ə]. They are universally the least marked, followed by [i], which is an optimal epenthetic vowel in languages that do not have central vowels. On the other hand, Kenstowicz (2003) and Steriade (2003) argue that similar judgments derive from a perceptual map that allows speakers to access the relative similarity of any pair of sounds in a given context. In this paper, I shall focus on the default pattern of vowel epenthesis from a typological perspective. To do so, I examined the typology of epenthetic vowels. Focusing on default patterns, I also showed how loanword models function and run through cross linguistic data. Throughout the study, I argue that front and high vowels are preferred when compared with back, low or rounded vowels since they are articulatorily simple and then minimize pronunciation efforts. (Kyung Hee University)

Keywords typology, epenthesis, default vowel, salience, markedness

1. Introduction

The phonology of loanwords has received tremendous attention in recent literature (Hyman 1970, Lovins 1973, Silverman 1992, Yip 1993, 2002, Shinohara 1997, Katayama 1998, Paradis and Lebel 1994, Paradis 1995a, b, 1996, Paradis and LaCharité 1997, 2005, Broselow 2000, Lee 2003, 2004, Uffmann 2004, Kenstowicz 2003, Kenstowicz and Suchato 2005, Dupoux et al. 1999, Peperkamp and Dupoux 2003 and many others). Nonetheless, the exact nature of loanword phonology is still not entirely clear, nor is what the precise input should be. Another important, related issue is whether loanword phonology is actually a component of native grammar. Whatever the answers to these questions may be, the phonology of loanwords provides a privileged window by which to help further our understanding of the native phonology of the language and *vice versa*.

* I would like to thank anonymous reviewers for valuable suggestions. Of course, all remaining errors are mine.

In the first significant study, Silverman (1992), put forward a concrete model of loanword phonology with a perceptual level added to the loanword input. This view, in essence, distinguishes between a perceptual level at which segmental adaptations take place and which is phonetic and automatic in nature and an operative level, which is phonological in nature. Silverman's model is reflected in the latest attempts by Dupoux et al. (1999) and Peperkamp and Dupoux (2003), which has been discussed in the psycholinguistic experimental work in the loanword context.

On the other hand, Paradis and LaCharité (2005) argue the tradition of "Category and Preservation and Proximity" to pursue the theory that loanword adaptation is, largely, based on perception by bilingual speakers' contrastive categories in the source language.

Recently, there has also been some tendency for researchers to take the intermediate position into account (Kenstowicz 2003, Kenstowicz and Suchato 2005, Shinohara 1997, Steriade 2003). Consequently, the adaptation process can take into account a variety of factors to achieve the best match to the source word, including phonetics as well as orthography.

To recapitulate these studies, the model of loanword adaptation can be divided into three types.

(1) Types of the model of loanword adaptation

- a. Phonological model (Paradis and her collaborators)
- b. Perception-based phonetic model (Silverman 1992, Peperkamp and Dupoux 2003)
- c. Functional-perceptual OT model (Kenstowicz 2003, Steriade 2003)

In this paper, I shall focus exclusively on the default pattern of vowel epenthesis from a typological perspective. As is widely known, epenthesis constitutes one of the most common strategies used to make imported foreign words conform to the syllable structure of a native language. Indeed, vowel epenthesis is a much more frequent repair strategy in loanwords and L2 errors than consonant deletion or segmental change.¹⁾

1) Uffmann (2004) argues that vowel epenthesis in loanword adaptation is not a very surprising or unnatural phenomenon, when compared to deletion. Deletion does occur frequently in first language acquisition or historically. However, it can be shown that the reasons for deletion are not to be found in the universally unmarked status of deletion itself but rather in additional constraints which militate against epenthesis in specific contexts, most notably prosodic constraints in the shape of size restriction. Thus, I also contend that deletion involves greater cost for the

This obviously reveals a motivation by speakers to maximally preserve the original input, and an intuitive construal of epenthesis as implementing the least distortion of the source words. To investigate vowel epenthesis in loanword situation, if necessary, we shall bring forth the issue of the model presented in (1). We will discuss exactly what epenthesis is and how can it be explained in OT grammar.

2. Epenthesis in phonological theory

In OT, epenthesis is directly related to a violation of DEP, since the epenthetic segment has no counterpart in the input. In the case of the loanword, the well-formedness embodied in ONSET, NO-CODA and *COMPLEX, dominates the DEP constraints. Speakers opt for epenthesis at the expense of DEP, which is opposed by the syllable markedness constraints: the cost of violating DEP is less than that of the occurrence of an impossible syllable in the native system.

In Correspondence Theory (McCarthy and Prince 1995), the presence of the epenthetic element is regulated by the DEP constraint family, and appears in optimal form with whatever degree of featural specifications the phonological constraints demand. As discussed by Prince and Smolensky (1993) and McCarthy and Prince (1994), the desirable consequence is that the choice of epenthetic material comes under some grammatical control. That is, constraints on featural markedness select the least offensive material in order to satisfy the native syllabic constraints. Following this line of analysis, I will now examine the pattern of epenthesis observed in English loanwords in Lenakel (Kager 1999), within an OT grammar.

In the literature, Pre-OT grammar, the distribution of the epenthetic segment is defined as follows (Selkirk 1982, Itô 1989, Lowenstamm and Kaye 1986):

(2) Distribution of epenthetic segments

- a. Epenthetic segments tend to be ‘minimally marked’ qua feature composition.
- b. Epenthetic segments tend to be contextually coloured.

hearer (loss of contrast, removal of perceptual cues, high lexical ambiguity). militate against epenthesis in specific contexts, most notably prosodic constraints in the shape of size restriction. Thus, I also contend that deletion involves greater cost for the hearer (loss of contrast, removal of perceptual cues, high lexical ambiguity).

The very essence of an epenthetic segment is that it does not occur in the input; consequently it has no lexical feature specifications with which to be faithful. Thus, in OT grammar, input faithfulness constraints (IDENT-IO) are irrelevant, the feature content of epenthetic segments depends on the *contextfree markedness* constraints. According to Kager (1999), cross-linguistically, featurally unmarked vowels such as [i], [ɪ], and [ə] are often selected as epenthetic vowels.

- (3) Factorial typology of quality of epenthetic segments
- a. Context-free markedness >> Contextual markedness
Epenthetic segment is minimally marked.
 - b. Contextual markedness >> Context-free markedness
Epenthetic segment is contextually coloured.

For example, there are seven vowels in the Lenakal inventory. Let us consider the following:

(4) Lenakel vowel inventory (Kager 1999)

	Front	Central	Back
High	i	ɪ	u
Mid	e	ə	o
Low		a	

As seen above, vowels such as [ɪ], and [ə] are chosen for epenthesis for this language. More specifically, the epenthetic vowel [ɪ] appears after coronals and this vowel is almost like schwa's status.²⁾ That is, this vowel is minimally marked. Let us examine the data in (5):

- (5) [ɪ] epenthesis: default pattern (data from Kager 1999)
- a. /t-n-ak-ol/ tɪ.na.ɔl 'you (sg.) will do it'
 - b. /ark-ark/ ar.ga.rɪk^h 'to growl'
 - c. /kam-n-mān-n/ kam.nɪ.mā.nɪn 'for her brother'
 - d. /r-n-ol/ rɪ.nɔl 'he has done it'

2) The concept of schwa, to denote a lack of a vowel between two consonants, originated in traditional Hebrew grammar. Under certain conditions, there was a phonetically zero vowel, but under certain other conditions, a short epenthetic vowel was inserted. The concept was adopted by European grammarians and linguists, who used it to refer to the epenthetic vowel itself. In European languages, the epenthetic vowel is often the mid-central vowel; it later came to be used as a phonetic term for this vowel.

On the other hand, epenthetic [ə] appears after non-coronals. Consider the following in (6):

(6) [ə]epenthesis (data from Kager 1999)

a. /to-rm-n/	tɔr.mən	‘to his father’
b. /apn-apn/	ab.na.bən	‘free’
c. /k-ar-pkom/	kar.bə.gəm	‘they’re heavy’
d. /r-əm-əŋn/	rɪ.mə.ŋən	‘he was afraid of him/it’

As shown above, the central mid vowel [ə] is taken as epenthetic after non-coronal contexts. Consequently, we may raise a question as to what causes the contextual variation in vowel height among the epenthetic vowels. As we mentioned earlier, in (2) and (3), the quality of epenthetic segments is ‘minimized’ to avoid unnecessary violations of featural markedness constraints. In OT, there are markedness constraints, and default segments in (5) are simply the least marked segments or segments that violate the lowest ranked markedness constraints.

Lombardi (2002) discusses some similar observations regarding the default patterns of epenthetic vowels and vowels such as [i], [ɪ], and [ə], which are a typical epenthetic vowel pattern in many languages. Lombardi assumes that central vowels, [ɪ], and [ə], are the universally least marked, followed by [i], which is an optimal epenthetic vowel in languages that do not have central vowels.

On the other hand, Pulleyblank (1988) holds that the vowel /I/ in Yoruba is explained as a default vowel within Yoruba’s 7-vowel system. High vowels are generally considered less marked than mid vowels and front vowels are less marked than back vowels. If there is a schwa, schwa will be chosen as the default vowel, since it has no place and therefore does not violate any faithfulness constraints with respect to places of articulation (Beckman 1998, Uffmann 2004). In order to understand the default patterns of vowel epenthesis, we shall examine default and non-default patterns of epenthesis in the various languages.

3. Typology of epenthetic vowels

Based on a survey of the data,³⁾ default vowel epenthesis is clearly demonstrated in a number of languages. Consider Table 1.:

Table 1. Epenthetic vowel quality

Language	Epenthetic vowel quality
Dutch	Unrounded mid central
English	Unrounded mid central, but often realized as a high central.
French (Europe)	Rounded mid front
Modern Greek	Tense [e]
Modern Hebrew	[e] in epenthesis and filled pauses.
Japanese	[u] (Unrounded high back, Phonetically ɯ)
Lushootseed	The quality of English schwa, [i] before laryngeals
Makassarese	[o]
Micmac	Unrounded mid central
Polish	a. default vowel is unrounded mid central. b. [e] for epenthesis and [i] for other default uses.
Portuguese (Brazilian) Portuguese (European)	[i] in epenthesis (Brazilian) Unrounded high mid-back in epenthesis and stress-induced alternation, same quality or unrounded mid central in filled pauses.
Russian	Unrounded high mid-back
Serbo-Croatian	[a]
Somali	Copy of any lexical vowel quality in epenthesis
Spanish	[e]
Turkish	Unrounded high back
Yawelmani	Copy of lexical high vowel in epenthesis

As seen above, in numerous languages, the epenthetic vowel is either an unrounded mid central vowel or a front high vowel. Of course, there are also cases where we could find some unusual choices for the epenthetic vowel. However, as shown in Table 1, the overall tendency is highly systematic regardless of a language's vowel system. Based on our data, I suggest the following markedness relationship among vowels.

(7) *Mid >> *High: mid vowels are marked than high vowels

*[+Round] >> *[-Round]: round vowels are marked than other vowels

*[Back] >> * [Front]: Back vowels are marked than front vowel

3) I summarize the data from the Linguist List (<http://www.linguistlist.org/>) and mainly rely on Cruz-Ferreira's question and answer materials, which are based on numerous opinions from a number of scholars.

In a similar vein, Lombardi (2002) also finds the following free ranking of height markedness constraints. Consider the following (8):

- (8) Languages may vary in whether low or nonlow vowels are less marked.
- a. If low vowels are less marked the epenthetic vowels will be /a/.
 *low, *nonlow: rerankable
 - b. If nonlow vowels are less marked, other constraints choose among them:
 Back vowels are less marked than front vowels: *Front >> *Back
 Mid vowels are marked: *Mid
 Round vowels are marked: *[+Round] >> *[-Round]

In (8b), Lombardi suggests the ranking of *Front >> *Back because back vowels are less marked than front vowels. However, the ranking she proposes is unnatural in the sense that the front high vowel [i] can be found as a default pattern of epenthetic vowels in many languages and this vowel also appears in a default pattern for the loanword adaptation.

Consequently, in the choice of epenthetic vowels, the front vowel [i] and [e] are more frequent than the [u] and [o], since the front vowel is shorter and thus less salient, as discussed by Beckman (1998). In the loanword adaptation in Fijian, Kenstowicz (2003) also argues that the choice of [i] is due to its relatively low perceptibility in score. Therefore, I contend that the front vowel is less marked than the back vowel so the markedness ranking should be *[Back] >> *[Front] as proposed in (7).

Nevertheless, typologically the least marked vowels are /i/ and /ə/. They are back and unrounded. The vowel /i/ is the least marked among them, since it is not Mid. In cases where they are not already in the inventory, languages will choose the least marked vowel possible. Based on our survey of data, high vowels are less marked than low vowels, since the majority of languages are taking high vowels as a default case. Consequently, we may posit the rest of the possible circumstances among the typical epenthetic vowels [i], [i̥], and [ə].

- (9) a. Epenthetic /i/ : If unrounded mid central vowel (/i̥/) is present in the inventory, the choice is /i̥/.
- b. Epenthetic /ə/ (schwa): If unrounded mid central vowel (/i̥/) is not present in the inventory, the choice is [ə].
- c. Epenthetic /i/ : If neither schwa nor /i̥/ is present in the inventory, the common epenthetic vowel is /i/.

So far, we have discussed the general typological tendency for the default choice of epenthetic vowels. For the most part, we expect epenthesis to result in unmarked segments, but vowels like /u/ and /e/, (see the case of Japanese and Spanish in Table 1.), are marked under any views of the facts about vowels.

Maddieson (1984) notes that /u/ is the most marked vowel and /e/ the second most marked. Faithfulness constraints do not apply to epenthetic vowels, which have no counterpart in input. The common epenthetic vowels such as Schwa and /i/ are low marked, however, these vowels do not occur all languages.

Nevertheless, we have seen that, among them, there are some general tendencies to be ascertained. In order to better understand the default pattern of the epenthetic vowel, we will consider cross-linguistic cases for the adaptation of loanwords.

4. Case study

4.1 Type 1: Yoruba and Fijian

In Yoruba (Pulleyblank 1988), 7-vowel system, the usual epenthetic vowel is [i] but there is also the case that the vowel [u] appears in certain lexical items. The most frequent repair strategy for loanwords in Yoruba is to insert either the vowel [i] or the vowel [u] after a syllabifiable consonant. Pulleyblank holds that the fact that [i] is often inserted should come as no surprise, since this vowel is either the only vowel that is subject to certain rules or is the only vowel that is not subject to certain rules in Yoruba. Pulleyblank analyzes [i] as differing from all other vowels in Yoruba because it has no lexical feature specifications. In other words, the special property of [i] is that of an underspecified, underlying representation. Consider the unmarked pattern of the epenthetic vowel in Yoruban loanwords.

- | | |
|--------------------------------------|------------------|
| (10) a. Onset cluster simplification | b. Coda to onset |
| dírẹ̀bà ‘driver’ | fọ̀ọ̀kì ‘fork’ |
| sílípáàsì ‘slippers’ | fílípì ‘Phillip’ |
| bíríkì ‘brick’ | sẹ̀ẹ̀tì ‘shirt’ |
| gírámà ‘grammar’ | yáàdì ‘yard’ |

In (10), the examples involving [i] are not problematic. However, the rounded vowel

[u] occurs in some instances of Yoruban loanwords. Let us look at cases where the epenthetic vowel [u] surfaces instead of the [i] (data from Pulleyblank 1988):

- | | |
|--------------------------------------|------------------|
| (11) a. Onset cluster simplification | b. Coda to onset |
| búrédì ‘bread’ | kòṣṣètù ‘court’ |
| búlòṣṣkù ‘(cement) blocks’ | bòṣṣlù ‘ball’ |
| ṣùkùrù ‘school’ | páànù ‘pan’ |
| búlùù ‘blue’ | góòlù ‘gold’ |

The issue here is why the epenthetic vowel is sometimes [u] rather than the default [i]. Pulleyblank (1988) presents the work of Awobuluyi (1967) and Bamgboṣe (1967), which both provide a clear rationale for this asymmetric behaviour. According to them, the behaviour of loanwords involving an epenthetic [u] falls, almost without exception, into one of two categories:

- (12) a. [u] appears in words like góòlù ‘gold’ and bòṣṣlù ‘ball’ where considerations of *Back Harmony* lead one to expect a back vowel rather than a front vowel in final position.
- b. [u] appears in búrédì ‘bread’ and jīpù ‘jeep’ where considerations of *Labial Consonant Harmony* would also lead one to expect a back vowel.

The epenthetic vowel [u] appears only in contexts where the back or labial feature is required to distinguish it from [i]; consequently, it is *contextually motivated*. Therefore, it is clear that the epenthetic vowel [u] of loanwords in Yoruba is contextually assigned. Otherwise, the vowel [i] is the default choice.

In Fijian, however, Kenstowicz (2003) discusses the variations in the quality of the epenthetic vowel. He cites the data from Schütz’s (1978) study of Fijian languages. Both of their studies focus on the predominance of the vowel [i] in Fijian loanwords. According to Schütz, we can observe a striking disparity between the distributions of vowels inserted to repair violations of the open-syllable canon in loan adaptations vs. their frequency rank in Fijian running text. That is, the front region of vowel space is over 75%.⁴) Consider the following in Figure 1.:

4) Uffmann (2004) studies vowel epenthesis in Shona, a language with a 5-vowel system. He discusses the frequencies and percentages of epenthesis that occur in this language and reveals that the vowel [i] is the most frequently chosen epenthetic vowel.

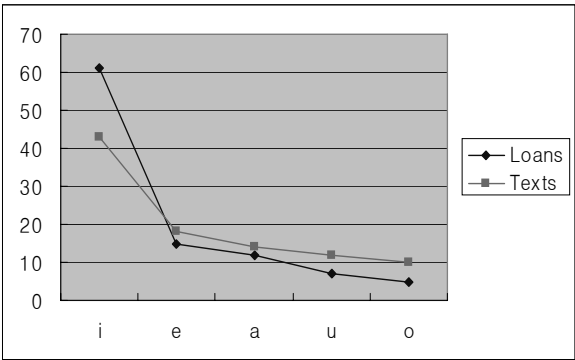


Figure 1. Variations in the quality of the epenthetic vowel in Fijian loanwords.⁵⁾

As seen above, it is apparent that the inserted vowel in Fijian is within the front region of vowel space, which can be understood by the principle of minimal saliency. That is, that the inserted vowel is to be the shortest one. Given that, we may conjecture Steriade’s (2003) P-Map hypothesis. She argues that epenthetic segments are those segments, which are most confusable because they are least perceptible. In other words, it is closest to zero in a given context. Along these lines of analysis, she suggests that schwa is shorter in duration than other vowels and that makes it less salient or perceptible.

Consequently, in Fijian, the choice of [i] receives a relatively low perceptibility score. Kenstowicz also attributes the choice of [i] as being due to its inherent shortness in duration in comparison to the other vowels.

Table (i). Frequencies of all epenthetic vowels in Shona loanwords (Uffmann 2004).

Vowel	/i/	/e/	/a/	/o/	/u/	Σ
Frequency	1190 69.5%	49 2.9%	106 6.2%	140 8.2%	226 13.2%	1711 100%

5) For convenience, I obtained the data for Figure 1-3 from the original papers where the authors provide each vowel’s frequency rate.

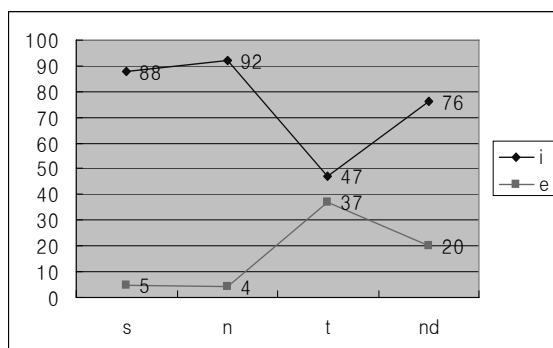


Figure 2. The dental stops [t, ^hd] vs. [s, n] in Fijian loanwords (data from Schütz 1978).

Conversely in Figure 2., [t, ^hd] and [s, n] are used between the dental stops in determining the choice of epenthetic vowel between [i] and [e]. Kenstowicz (2003) also presents his own interpretation regarding this particular context. Consider Figure 3:

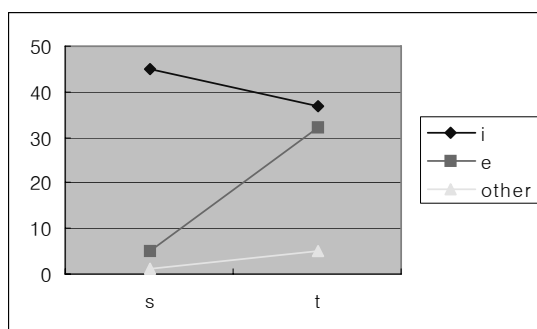


Figure 3. Word-final epenthetic vowels after [s] vs. [t] (data from Kenstowicz 2003)

In order to explain the epenthetic vowel pattern from Figure 1-3, the Principle of Minimal Saliency (Lehiste 1970) and Steriade's (2003) Similarity Model both play an important role. Following Steriade's (2003) reasoning, I suggest that Steriade's similarity model of OT Correspondence plays a crucial role in that faithfulness is evaluated along a dimension of auditory similarity. As discussed in Kenstowicz (2003) and Steriade (2003), similar judgments derive from a perceptual map that allows speakers to access the relative similarity of any pair of sounds in a given context.⁶ The relative

⁶ Kenstowicz further discusses the occurrence of [e] after dental stops, which is analogous to the phenomenon noted by Shinohara (1997). In Japanese, the epenthetic vowel is [u] in the loanword

distance is then translated into an analogous ranking of OT faithfulness constraints. So this is translated into the ranking like this: *Ø-a, *Ø-u, *Ø-e >> *Ø-i.

4.2 Type 2: Korean and Lenakal

The epenthetic pattern of English loanwords in Korean has received much attention in the literature (Lee 2003, 2004 and etc.) and the default pattern of [i]-epenthesis shares a tremendous similarity with that of Lenakal.⁷⁾ Consider the following (13):

(13) Korean vowel inventory (with epenthetic vowels are shaded)

	front	central	back
high	I	i	u
mid	e	ə	o
low	ε	a	

As seen above, the epenthetic vowels in Korean occupy the high region of the vowel space. Let us consider the pattern in (14) and (15):

(14) Christmas	[k ^h i .ri.s i .ma.s i]	trump	[t ^h i .rəm.p ^h i]
strike	[s i .t ^h i .ra.i.k ^h i]	style	[s i .t ^h a.il]
sandwich	[s'ɛn.d i .wi.c ^h i]	serve	[s'ə.b i]
kiss	[k ^h i.s i]	dance	[tɛn.s i]
(15) blouse	[pu .ra.u.s i]	golf	[kol.p ^h u]
bench	[pen.c ^h i]	coach	[k ^h o.c ^h i]
page	[p ^h e.i.j i]	massage	[ma.s'a. j i]

In (15),⁸⁾ the crucial fact is that after a labialized consonant the insertion of the

adaptation except for the condition that stops the vowel that appears as [o] not [u]. Subsequently, the adaptation of [e] in Fijian and [o] in Japanese is contextually assigned. This Japanese situation will be discussed in more depth in section 4.4.

7) I will not recapitulate Lenakal's vowel inventory and its adaptation pattern, which is already presented in section 2.

8) Anonymous reviewer points out the asymmetric of data like *sports* <siphochi> and *Cheese* <chici>. I assume that the difference between *sports* and *bench* is [±anterior]. In the case of *spor[ts]*, the distinctive feature [+anterior] does not trigger [i] epenthesis. Thus, <siphochi> is filled by the default vowel. In the similar vein, the case of *Cheese*[z] <chici> is same. The distinctive feature [-anterior] in the syllable initial position is triggered by the vowel [i], while [z] is not. Since its feature is [+anterior]. Hence, palatal attraction is sensitive to the feature [±anterior].

default vowel is overridden by the spread of the place of articulation of the preceding consonant. We could assume that there is a negative constraint for each feature, e.g. *FEATURE.⁹⁾ This constraint *FEATURE is obviously outranked by the MAX-Feature, otherwise no features would surface in the output of loanwords. However, as previously mentioned, epenthetic vowels do not have a UR, and therefore are not subject to faithfulness constraints. Consequently, other constraints must be acting on them. The next question must be what kind of epenthesis will surface in the output of loanwords.

On the one hand, in (14), in any language, the features of a default segment are generally preferred, because they are lower in the ranking of negative constraints on features. Accordingly, the occurrence of a round vowel after a labial consonant in (15), eg. *pu.ra.u.sɨ* ‘blouse’, *kol.p^hu* ‘golf’, can be explained by the constraint hierarchy following the definition, given in (16):

(16) Labial Attraction in English loanwords in Korean

In every sequence of a [labial] consonant and a [+high] vowel, the vowel must be [+round].

In the similar vein, Palatal Attraction also trigger vowel [i] for the case of *massage* and *page* in (15). So far, we have seen that a labial consonant attracts a round vowel in English loanwords in Korean as well as in other languages. In particular, the case of the epenthetic vowel [u] in Yoruba is analogous to the tendency of English loanwords adopted into Korean: the epenthetic vowel is contextually sensitive.¹⁰⁾

9) According to Prince and Smolensky (1993:Chs. 8,9), segmental markedness is defined by a family of constraints barring *every* feature. Their ranking with respect to each other may be universally fixed.

10) In a rule-based study of Korean - Swedish interlanguage phonology, Pyun (1987:119) argues that the occurrence of the epenthetic and paragogic vowel [u] after labial sounds is adequately explained in terms of the /i/-labial process. To demonstrate this, he provides historical and synchronic evidence:

Historical evidence from Huh (1965:214, 382)

/pɨl/ > /pul/ ‘fire’ /p^hɨl/ > /phul/ ‘grass’
 /p’ɨl/ > /p’ul/ ‘horn’ /mɨl/ > /mul/ ‘water’

As shown above, Pyun states that this process is obligatory with reference to historical data. In addition, there exists no word beginning with /pɨ/, /p^hɨ/, /p’ɨ/ in modern Korean. To put it another way, the very small number of words with these initial segments are either archaic words or loanwords. However, a dominant number of lexical items begin with /pu/, /p^hu/, /p’u/ in the present day language, as discussed in Yeo (1984:73-74). G-O Kim (1977), in connection with source,

4.3 Type 3: Thai

Lombardi (2002) argues that schwa epenthesis is determined by the vowel system of the given language. According to her, schwa epenthesis is chosen in instances where the vowel /i/ is not present in the system. This language type includes: Dutch, Hindi, German, English, etc. Lombardi’s generalization is not, however, accountable for the Thai case. Let us first consider the Thai vowel inventory and data in (17):

(17) a. Thai vowel inventory				
	front	central	back	
high	i	ɨ	u	
mid	e	ə	o	
low	ɛ	a	ɔ	
b. English Thai English Thai				
scan	s ^ə kɛɛn	spare	s ^ə pēe	
sponcer	s ^ə pɔɔnsə	screen	s ^ə krīn	

As seen above, in Thai, the epenthetic vowel is [ə] and that is a reduced schwa like vowel (p.c. Youvapapong Na Ranong). In comparison to the vowel inventory in Korean, the choice of vowel [ə] is of note since the vowel inventory of both languages is nearly identical (see (13) for Korean).

Recall that, in (9b), the choice of vowel [ə] depends on whether or not an unrounded mid central vowel (/ɨ/) is present in the inventory. Moreover, cross-linguistically the mid vowel is more marked than the high vowel. Therefore, if we pursue Lombardi’s generalization, the choice of epenthetic vowel in Thai is complete asymmetry for the case of Korean in (14). In OT, however, the grammar of languages is different from that of the markedness constraint ranking. In Thai, therefore, the markedness ranking is not *Mid >> *High but *High >> *Mid in which constraints are reranked.

discusses historical facts of Korean phonology:

e.g.) Rounding rule: ɨ → u/	bilabial C	
/p ^h ulɨn/	<	/p ^h ilɨn/
/mulk'ɨləmi/	<	/milk'ɨləmi/
Fronting rule: ɨ → i	i	/palatal C
/cicili/	<	/cɨcili/
/cilkis/	<	/cilkis/

		'light blue'
		'looking at something intently'
		'terribly'
		'tough to chew'

4.4 Type 4: Japanese

The epenthetic vowel in Japanese brought much attention for the model of loanword adaptation (Katayama 1998, Shinohara 1997). Consider the data and vowel inventory in (18)-(19):

(18) Japanese vowel inventory

i	u
e	o
a	

(19) Default vowel epenthesis in Japanese loanwords (Katayama 1998)

hedo	‘head’	raitō	‘light’
logu	‘log’	hagu	‘hug’
te:pu	‘tape’	paipu	‘pipe’

Japanese, with its 5-vowel system of short and long /i, u, e, o, a/, does not have a contrast between front unrounded and front rounded vowels. It only allows the unmarked front unrounded vowels.

As shown in (19), /u/ is a default epenthetic vowel in loanword adaptations in Japanese, except in certain situations (/o/ is epenthesized when the preceding consonant is /t, d/ since /u/ would trigger affrication of /t, s/ to [ts,dz]).

Then, we may raise a question as to why not /i/ or /e/? In Japanese, as it has been shown in both Shinohara (1997) and Katayama (1998), /u/ is the default epenthetic vowel. However, in many other languages the vowel [u] is rounded back and thus not preferred as an epenthetic one since this vowel is not easy to articulate, in comparison to the front vowel [i]. Thus, the epenthesis of /u/ receives a direct phonetic motivation.

According to Beckman (1982), the Japanese vowel [u] is reduced and has an unrounded high back (Phonetically \mathfrak{u}). Moreover, this vowel [u] is also occasionally devoiced. Subsequently, the minimal phonetic content of /u/ makes it the prime content candidate for epenthesis in Japanese.¹¹⁾ Thus, epenthesis in Japanese brings the issue of the model of loanword adaptation. I suggest that it can be explained in terms of salience and perceptibility.¹²⁾ The vowel that is inserted is the least salient or perceptible

11) Uffmann (2004) notes that vowel /i/ in Japanese is also devoiced but it is never reduced to the extent that /u/ is.

12) Dupoux et al. (1999) conduct the experiments comparing Japanese and French hearers and contend that the phonetic properties of Japanese induce Japanese listeners to perceive “illusory” vowels inside consonant clusters in VCCV stimuli. In experiments, they used a continuum of stimuli ranging

one, since it can be reduced. In this way, the vowel [u] fulfills the requirement for the epenthesis, which is phonetically closest to zero, as argued for by Kenstowicz (2003) and Steriade (2003).

5. Summary

In this paper, I examined the typology of epenthetic vowels. Focusing on default patterns, I also showed how loanword models function and run through cross-linguistic data. Throughout the study, I argue that front and high vowels are preferred when compared with back, low or rounded vowels because they are articulatesly simple and thus minimize pronunciation efforts. In order to understand cross-linguistic epenthetic patterns, depending on the individual languages, several language default patterns which represent typical types of /i/, /i̥/, /ə/, and /u/ epenthesis were examined. An optimal vowel among them is determined by language particular markedness rankings.

Moreover, following Steriade (2003) and Kenstowicz's (2003) functional-perceptual model, I have discussed the theory that default vowel is phonetically closest to zero and suggested that Steriade's similarity model of OT Correspondence plays a crucial role where faithfulness is evaluated along a dimension of auditory similarity. That is, an optimal epenthetic vowel, here default pattern, is also motivated by perceptual similarity and, therefore, a vowel which is least perceptible and most confusable to zero.

The scope of this study was restricted on the cross-linguistic default pattern of epenthesis, since we tried to pinpoint major typological effects on the epenthesis for loanwords. Of course, there are numerous exceptions and intriguing tendencies regarding context-sensitive epenthesis, but we will leave that for future research.

from no vowel (e.g. ebzo) to a full vowel between the consonants (e.g. ebuzo). According to Dupoux et al., Japanese reported the presence of a vowel [u] between consonants even in stimuli with no vowel, while no French participants reported same results.

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Received : 2008. 05. 08

Accepted : 2008. 06. 12

