The Adaptation Pattern of Coda Rhotic Consonants in Korean Loanword Phonology

Hyeyeon Lee
(Seoul National University)

Lee, Hyeyeon. 2013. The Adaptation Pattern of Coda Rhotic Consonants in Korean Loanword Phonology. *SNU Working Papers in English Linguistics and Language 11, 74-85.* This paper investigates the adaptation of rhotic consonant codas in Korean loanword phonology. The hypothesis is that different rhotic consonant codas (/ɾ/, /r/ and /ɹ/) will be adapted differently in Korean loanword phonology. The prediction is based on existing loanwords. This is then tested through an experiment with Korean native speakers. The analysis that follows is based on OT constraints and the role of perception. I propose that the difference between the adaptation patterns of /ɾ/, /r/ and /ɹ/ should be explained on a perceptual level. (**Seoul National University)**

Keywords: loanword phonology, rhotic consonants, coda, Korean, perception, Optimality Theory

1. Introduction

A study of the adaptation of loanwords is interesting in that it reflects many aspects of native phonology and perception that differ from those of the source language. I focused on the adaptation patterns of coda rhotic consonants in Korean loanword phonology. This phenomenon involves the alternation of liquid allophones and vowel epenthesis of Korean, and the characteristic perception patterns of Korean native speakers.

In Korean, there is a single liquid phoneme which alternates between a tap [ɾ] (intervocalic onset position) and a lateral [l] (coda position) (Heo and Lee 2004). Therefore, I assumed that, to conform to the phonotactics of Korean, there would be three logical

possibilities of coda rhotic sound adaptation into Korean: 1) onset [ɾ], 2) coda [l], or 3) deletion (ø).[1] It is interesting to observe which option is selected depending on what rhotic sound is in the source language.

In this paper, I will closely look at the adaptation pattern of the rhotic codas /ɾ/ (tap), /r/ (trill) and /ɹ/ (approximant). I will base the predictions on existing loanwords, and then analyze the actual patterns from experiment results. I propose that the difference between the adaptation patterns of /ɾ/, /r/ and /ɹ/ should be explained on a perceptual level.

2. Prediction

Most of the loanwords in Korean have their sources in English. (American) English coda [ɹ] is deleted in Korean loanwords, as in (1).

(1) a. English *fur* [fɚ]/[fəɹ] → Korean [pə]
b. English *car* [kɑɻ]/[kaɹ] → Korean [ka]
c. English *north* [nɔɻθ]/[nɔɹθ] → Korean [nosɨ]

However, and interestingly, rhotic codas from other source languages come into the onset [ɾ], followed by an epenthetic vowel [ɨ]. Examples are provided in (2).

(2) a. Russian *Vladimir* [vlɐdʲimʲɪr] → Korean [bɨlladimiɾɨ]
b. Spanish *Argentina* [aɾxentina] → Korean [aɾɨhentina]

This, of course, results from the fact that [ɹ] and other rhotic sounds ([r] and [ɾ]) are not phonetically identical. However, there is evidence

[1]Other possibilities, (for example, an onset [d]) were to be ruled out, for they would be too much a severe violation of the faithfulness constraint.

that the similarities between these rhotic sounds are more significant in loanword adaptation between English (which has coda /ɹ/), French (which has coda /R/) and Spanish (which has coda /ɾ/), as in (3).

(3) a. English *bar* [baɹ] → Spanish *bar* [baɾ], French *ba'* [baR]
b. English *surf* [səɹf] → Spanish *surf* [suɾf]
c. English *parking* [pʰaɹkɪŋ] → French *parking* [paRkiŋ]
d. French *chauffeur* [ʃofœR] → English *chauffeur* [ʃoʊfə˞], Spanish *chofer* [tʃofeɾ]
e. Spanish *armada* [aɾmaða] → English *armada* [aɹmadə]

English, Spanish and French phonotactics also allow the adaptation of the foreign rhotic sound as /ø/ or as coda /l/. However, they never choose these possibilities, and always adapt the foreign rhotic coda as the rhotic coda that exists in their own native phonology (/ɹ/, /ɹ/→/ɾ/ (Spanish), /ɹ/, /ɾ/→/ɹ/ (French), /ɾ/, /ɹ/→/ɹ/ (English)).

However, in Korean, these rhotic consonants, despite their similarities, are adapted differently. Therefore, I think that it is worth exploring the pattern of rhotic coda adaptation in Korean.

The two predictions based on already existing loanword data are suggested in (4) and (5).

(4) The coda alveolar trill [r], alveolar tap [ɾ] of the source language will be adapted as [ɾɨ] in Korean.

(5) The coda alveolar approximant [ɹ] of the source language will be deleted in Korean.

3. Experiment

To investigate if the above predictions are correct, I tested if new foreign words would follow the above pattern if they were to become loanwords in Korean.

3.1 Consultants

I employed seven native Korean speakers as consultants. All consultants have learned English, but had no knowledge of any of the other source languages of my sample words. Six of the consultants were university students (age 19-26) and the seventh consultant was 49 years old. Three of the consultants were male and the other four were female.

3.2 Collection of sample words

I gathered foreign words that each contained coda [ɾ], [r], and [ɹ] (five words each). I tried to include both 1) words that have the coda rhotic sound in the word-final position and 2) words that contain the coda rhotic sound in a non-final syllable. Also, I included 18 more random foreign words that do not have rhotic consonants in them from random foreign languages. This was to prevent consultants from noticing the aim of the experiment. I will not include the analysis of these words here. The recordings of the native pronunciations of each word were from the website www.forvo.com.[2] The list of the words used in the experiment can be found in the appendix.

[2]This website contains pronunciations of words from hundreds of languages all over the world. Native speakers can record their pronunciations of the language's words.

3.3 Experiment procedure

The words were then put in random order. I played each word five times to the consultants on the computer, without showing or telling them how it is spelled. Then I asked them to write down the 'Koreanized' version of these words. I asked the consultants to imagine that these foreign words were brand names of new foreign crackers, or names of international companies. Then I asked how Koreans would adapt this in a 'Koreanized' form.

I chose to ask for the written form because when asked to speak out loud the adapted version of these words, the consultants tended to imitate the foreign pronunciation with sounds or syllable structures that do not exist in Korean. I figured that in loanwords, the gap between orthography and phonology was not significant, and that I could write the transcriptions by just looking at the orthography.

3.4 Experiment results

The results are summarized in (6), (7), and (8).

(6) coda [ɾ] → onset [ɾ] (82.85%)
(Source → Korean)

(6) indicates that when the coda [ɾ] is adapted into Korean, it is adapted as the onset [ɾ] 82.85% of the time. The rest 17.15% were instances where the word-final [ɾ] in Spanish [desiɾ] was perceived as [d].

(7) coda [r] → onset [ɾɨ] (100%)
(Source → Korean)

In (7), it is shown that when coda [r] is adapted to Korean, it is adapted as onset [ɾ] 100% of the time, and the epenthetic vowel was always [ɨ]

except for one instance where Estonian [iŋkwer] was adapted as [inkəɾəp]. This result confirms the prediction in section 2.

(8) coda [ɹ] → coda [l] (40%)
→ ø (60%)
(Source → Korean)

When coda [ɹ] is adapted to Korean, it is not always deleted, contrary to the original prediction. It was deleted in 60% of the responses but was adapted as coda [l] in the rest of the responses (40%). Still, it was confirmed that it is never adapted as onset [ɾ]. Therefore, the prediction that [ɹ] would behave differently from [r] and [ɾ] in Korean loanword phonology is confirmed.

Also, the range of epenthetic vowels differs from the prediction. Not only [ɨ] but also [i], [ə], and even [o] were used.

4. Analysis

4.1 An OT Analysis

The results of the experiment can be analyzed within the framework of the Optimality Theory. Tableaux for the adaptation of coda /ɾ/, /r/, and /ɹ/ follow in table 1, 2 and 3, respectively.

Table 1
An OT tableau for the adaptation of coda /ɾ/

/desiɾ/	*[-lateral]]$_{\sigma}$	ɯɑχ(ɾ)	IDENT([±lateral])	DEP(V)
[de.siɾ]	*!			
[de.sil]			*	
☞[de.si.ɾɨ]				*
[de.si]		*!		

Table 2

An OT tableau for the adaptation of coda /r/

/gʰər/	*[-lateral]]$_{\sigma}$	MAX(r)	IDENT([±lateral])	IDENT([trill])	DEP(V)
[kər]	*!				
[kəl]			*		
☞[kə.ɾɨ]				*	*
[kə]		*!			

Table 3

An OT tableau for the adaptation of coda /ɹ/

/kʰɑɹ/	*[-lateral]]$_{\sigma}$	IDENT([±tap])	MAX(ɹ)	IDENT([±lateral])	DEP(V)
[kʰɑɹ]	*!				
☞[kʰɑl]				*	
[kʰɑ.ɾɨ]		*!			*
☞[kʰɑ]			*		

The constraint ranking from these three tableaux is as in (9):

(9) *[-lateral]]$_{\sigma}$>>IDENT([±tap])=MAX(ɾ) = MAX(r)
>>MAX(ɹ) IDENT([±lateral]) >> DEP(V)

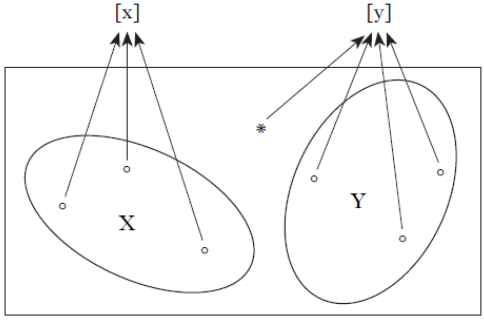
*[-lateral]]$_{\sigma}$ is the highest ranking constraint because segments that are [-lateral] can never occur in the coda position, according to the Korean phonotactics. DEP(V) is the lowest ranked constraint, as the insertion of an epenthetic vowel is a very common strategy to keep with the phonotactic constraints in Korean loanword phonology.

This analysis does not provide a perfectly satisfactory explanation. The questions that remain are 1) the reason why MAX(ɾ) and MAX(r) are ranked higher than MAX(ɹ), and 2) the reason why IDENT([±tap]) is ranked higher than IDENT([±lateral]). These rankings are very important because the fact that MAX(ɾ) and MAX(r) are ranked high keeps /ɾ/ and /r/ from ever being deleted, while the deletion of /ɹ/ is a much more natural process. Also, the high-ranked IDENT([±tap]) is what keeps /ɹ/ from ever being adapted as the /ɾ/ of the onset. These questions are to be answered in the next section by treating loanword adaptation as a perceptual process.

4.2 An analysis based on a perception model

The remaining questions for explaining the gap between the adaptation pattern of /ɾ/ and /r/ on one hand and /ɹ/ on the other can be explained by considering the role of perception in loanword adaptation. In this section, I follow a perceptual model of loanword adaptation by Peperkamp and Dupoux (2001). In this model, the phonetic decoding module plays a major role in loanword adaptations. Phonetic decoding is a process that transforms universal phonetic representations into language-specific ones. During this process, a phenomenon called *perceptual assimilation* occurs. When perceptual assimilation occurs, a non-native sound is assimilated to the closest available phonetic category. Two sounds are said to be ‘close’ in terms of acoustic proximity and or proximity of fine-grained articulatory gestures (Peperkamp, Vendelin& Nakamura 2008). The process is well illustrated in the below figure, from Peperkamp, Vendelin and Nakamura (2008). The non-native sound, indicated by ‘*,’ is closer to Y than X and is thus decoded as [y].

Figure 1
Phonetic decoding of native and non-native sounds (Peperkamp, Vendelin & Nakamura 2008)



In the analysis of rhotic coda adaptation patterns, perceptual assimilation in terms of articulatory gestures is to be taken into account. The gestural similarities are based on the model of gestural phonology (Goldstein & Browman 1986), and they refer to temporal and spatial properties (that is, the degree and location of constriction) of the dynamic movements of vocal tract articulators.

From this view, there is a remarkable difference between /ɾ/, /r/ and /ɹ/. When articulating taps and trills, there is contact between the tongue tip and the alveolar ridge, and thus a high degree of constriction. On the other hand, the approximant /ɹ/ is articulated without any contact between the tongue and the alveolar ridge, as in Figure 2.

Figure 2
Possible tongue positions for an r-colored vowel in American English (Ladefoged & Johnson 2010: 230)

In Figure 2, the tongue does not meet the passive articulators in any of the possible tongue positions.

Tap and trill codas have high constriction at the central position, while approximant rhotic codas (or rhotacized vowels) do not have such a high constriction. I propose that high constriction at the central position is necessary for the Korean native speakers to perceive a non-native sound as [ɾ]. Therefore, the approximant [ɹ] would be perceptually too far from [ɾ] for Korean native speakers, and is more likely to be perceived as a vowel, for its lack of high constriction would render it close to the gestural properties of vowels.

Experimental results from Best and Strange (1992) support the plausibility of such a pattern of perception. They, too, based their study on the model of gestural phonology and perceptual assimilation. Their experimental results show that Japanese native speakers perceived the American English rhotic sound [ɹ] as Japanese /w/ rather than their tapped /ɾ/. This shows that Japanese speakers and Korean speakers both never perceive [ɹ] as /ɾ/, but rather as a vowel in Korean and as a glide in Japanese, due to perceptual distance.

5. Further Discussion

The reason why a coda [ɹ] can be adapted as a coda [l] is still a mystery. My hypothesis is that Korean native speakers of relatively high English

proficiency, which was the case for my consultants, are able to perceive the detail of rhotacity. That is, while most Korean native speakers perceive a rhotacized vowel as a vowel with no coda, some speakers with much English experience are able to notice the rhoticization of the vowel, which lead them to keep the coda in some way, that is, by a coda [l]. This is to be confirmed by further research.

6. Conclusion

This paper shows that the adaptation of loanwords depends both on acoustic perception and native phonology. The most basic constraints and possibilities for the phonology of loanword adaptation is grounded in the native phonotactics, as is shown by the high-ranked constraint *[-lateral]]$_{\sigma}$. Perception works beyond this point to pattern the details of loanword phonology. The most basic prediction of this paper that [ɹ] and [r]/[ɾ] would follow different patterns in the adaptation process was confirmed by my data. This was explained in terms of the role of perception.

References

Best, C., & Strange, W. (1992). Effects of phonological and phonetic factors on cross-language perception of approximants, *Journal of Phonetics, 20*, 305-331.

Goldstein, L., & Browman, C. P. (1986). Representation of voicing contrasts using articulatory gestures. *Journal of Phonetics, 14*, 339-342.

Heo, Y., & Lee, A. (2004). The phonological adaptation of foreign liquids in Korean. *LSO Working Papers in Linguistics, 4*, 47-52.

Ladefoged, P., & Johnson, K. (2010). *A course in phonetics*. Wadsworth Publishing Company.

Peperkamp, S., & Emmanuel, D. (2001). *Loanword adaptations: Three problems for phonology (and a psycholinguistic solution)*. Unpublished manuscript, Laboratoire de Sciences Cognitives et Pscyholinguistique, Universite de Paris 8, Paris.

Peperkamp, S., Vendelin, I., & Nakamura, K. (2008). On the perceptual origin of loanword adaptations: Experimental evidence from Japanese. *Phonology*, *25*(1), 129-164.

Hyeyeon Lee
hyeyeon000@snu.ac.kr