Adaptation of English Liquid Loans in Korean: An OT Analysis on the Distinct Patterns of /r/ and /l/*

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This study aims to investigate the patterns of English liquid loans in Korean by an OT analysis. The liquid representations of loanwords in Korean have general patterns according to the syllable position. However, there are a few exceptions: an intervocalic /l/ has two representations (e.g., *melon* [mel.lonˀ]/[me.ronˀ]) and in some words, the coda /r/ is not deleted (e.g., *organ* [o.rɨ.gan]ˀ) without abiding by the general rule, the coda /r/-deletion. This paper suggests that the exceptions are not subject to two co-existing phonologies (loanword phonology and Korean phonology) but due to the input difference through indirect and direct borrowing from another language besides English. The paper also claims that a single loanword phonology can account for liquid loanwords from different languages in Korean.

Keywords: OT analysis, loanword phonology, indirect borrowings, liquid alternation

1. Introduction

Every language has a different phoneme inventory. Therefore, when a word is adapted into another language which lacks the phonemic feature the word possesses, the perception of the word may not be successful. This paper mainly focuses on Korean words that are borrowed from English. English liquid phonemes /r/ and /l/ have no distinct phonemes in the phoneme inventory of Korean. Thus, English loan

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words composed of /r/ or /l/ have only one possible orthographic representation in Korean. Nevertheless, O.-M. Kang (1996) argued that Koreans perceive liquids /r/ and /l/ differently and pronounce them distinctively when they are borrowed (loanwords which contain a liquid phoneme will be referred to as "liquid loans" henceforth).

Moreover, many researchers (O.-M. Kang 1996, Kim 2003, Y. Lee 2001) revealed that Korean native speakers distinguish English liquid loans differently according to their syllable position. The liquid representation of loanwords in Korean in the onset position shows that English liquids /r/ and /l/ are undistinguishable in the onset, being realized as [r] in all cases. As for the coda position, most of the input /r/ in loanwords is deleted in Korean, whereas most of /l/ is represented as [l]. However, there are some exceptions where the coda /r/ survives in the process of loanword adaptation. Many studies tried to explain the patterns of loanwords by an Optimality Theory (OT) analysis. The loanword phonology previously suggested for liquid loanwords (O.-M. Kang 1996, Kim 2003, Y. Lee 2001) failed to account for these exceptions; this paper will introduce the loanword phonology with new constraints that covers the unexplained exceptions.

In the intervocalic position, the representations of /l/ show a free variation; that is, /l/ is sometimes represented as a geminate [ll] and sometimes as a singleton [r]. Kim (2003) and Y. Lee (2001) argue that this variation of the liquid representation in the intervocalic position is due to the different constraint ranking between loanword phonology and Korean native phonology. However, the current paper claims that the variation of representation is not the result of applying two different constraint ranking systems but the result of direct or indirect borrowing from other languages besides English. In other words, the free variation in intervocalic liquid loans can be explained by the single loanword phonology with different input structures. This approach also suggests that a single loanword phonology for Korean can be applied to loanwords from various language backgrounds including English loans.

The purpose of this study is to investigate the overall patterns of English liquid loans in Korean. This paper is organized as follows: Section 2 deals with the previous research on the issue. Different patterns

of liquid loanwords in Korean according to the segment's syllable position will be dealt with in section 3 by observing the pronunciation of loanwords and examining the previous studies about OT and English loanwords in Korean. Section 4 summarizes the paper and concludes that the patterns of loanwords are well explained by a single loanword phonology.

2. Previous Research

2.1. The Necessity for Loanword Phonology

To give an account of the patterns of liquid loans in Korean, we have to look into the patterns of liquid sounds in Korean first.[1] In Korean, the word-initial liquids in the input are never realized as liquids. This rule is called Twuum Law (i.e., Word-Initial Liquid Law), which prohibits liquids in the word-initial position. Word-initial liquids are deleted as in (1b) or replaced by nasals as in (2b):

(1) a. tori[2]   /to.ri/   [to.ri][3]   'duty'
    b. iron   /ri.ron/   [i.ron˺][4]   'theory'

(2) a. toro   /to.ro/   [to.ro]   'road'
    b. nosen   /ro.sən/   [no.sən˺]   'route'

The examples in (1) and (2) are "[t]he words originated from the Korean reading of the Chinese letters" (B. Lee 2001: 106). The input segment

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1) In Korean, a liquid phoneme in the onset and in the intervocalic position is realized as an alveolar tap or flap [ɾ] and a liquid phoneme in the coda position is pronounced as a lateral [l]. However, the syllable onset [ɾ] in the output form of Korean will be transcribed into [r] for simplicity.

2) In this paper, the representations for Korean words will follow Yale Romanization.

3) The phonetic alphabets - except for liquid phonemes - used in the current paper are based on O.-M. Kang's (1996) representation of Korean phonemes. The liquid phonemes /l/, /ɾ/, /ʀ/, and /ʁ/ in the input form of loanwords will be represented separately in order to analyze their distinction. [.] shown in [to.ri] refers to a syllable boundary.

4) [˺] shown in [i.ron˺] is used to represent an unreleased sound in the coda.

ri in (1) and *ro* in (2) are each originated from a single Chinese letter with the same root. However, Twuum Law plays a role in both of the cases in (1b) and (2b), so the liquids are either deleted or nasalized.

Now consider the word-initial liquids in English loanwords in Korean:

(3) latio   [ra.di.o] 'radio'   lipon   [ri.bonˀ] 'ribbon'
    leyisu   [re.i.sɨ] 'lace'   leymon   [re.monˀ] 'lemon'

It is easily noticeable that Twuum Law is not applied to English loanwords. The liquid feature in loanwords is maintained in the word-initial position as shown in (3). This distinct application between Korean words and loanwords is clear evidence for asserting that there is a separate phonological system for loanwords besides Korean native phonology. Therefore, loanword phonology apart from Korean phonology is necessary to indicate the patterns of loanword adaptation in Korean.

If we admit that loanword phonology is necessary in explaining English loans, the subsequent question is whether we need distinct loanword phonology for loanwords from different languages besides English loans (Lee & Lee 2007). By setting up new constraints for loanword phonology, the latter part of this paper will argue that loanword phonology is affected more by the recipient language's native phonology than by the source languages' phonological system. That is to say that the sole loanword phonology sufficiently accounts for loanwords in Korean from various language backgrounds.

2.2. Phonological Properties of Loanwords in Korean

English loanwords in Korean undergo some changes due to phonological constraints in the recipient language's native phonology (i.e., Korean phonology), phonetic features of the source language (i.e., English), orthographic representations, and indirect borrowing (Lee & Kim 2011). Moreover, cognitive factors (Shim 2009) and media effects (Lee & Lee 2007) are other factors affecting the loanword adaptation in Korean. The phonological influences and the notion of indirect borrowing covered by many other accounts will be dealt with in the current study.

First, English loanwords are affected by Korean phonology. Kim (2003) accounts for the patterns of English liquid loans in Korean by the constraint ranking of Korean phonology (O.-M. Kang 1996). When phonemes in the source language have no equivalence in the phoneme inventory of the recipient language, these phonemes in loanwords either fail to be perceived or undergo feature changes into a similar sound based on the recipient language's phonology. Vowel insertion is one example of feature changes. Even though there are orthographic representations of consonant clusters in Korean, Korean phonology does not allow consonant clusters in the onset and the coda (i.e., *COMPLEX, no consonant clusters). To preserve this markedness constraint, the faithfulness constraint Dep-IO (no insertion) is violated by English loanwords:

(4) suthuleyithu [sɨ.tʰɨ.re.i.tʰɨ] 'straight' khephusu [kʰə.pʰɨ.sɨ] 'cuffs'

The consonant clusters *str-* and *-ffs* are separated into different syllables by inserting the default vowel /ɨ/.[5] Therefore, the outputs of each word in (4) have five syllables and three syllables respectively.[6]

Second, English phonology has effects on loanword adaptation. In some cases, Korean speakers perceive the phonetic feature of English source word and maintain some features of the source word when the word is borrowed. As discussed in section 2.1, "Korean speakers now perceive and pronounce a liquid in the word-initial position despite the articulatory difficulty and phonotactic avoidance of word-initial liquid in native and Sino-Korean phonology" (H. Kang 2003: 320). This reveals that even if there is no equivalence in the recipient language, loanwords are adapted with the effort of perceiving and pronouncing similarly to the source language.

Lastly, the patterns of loanwords in Korean are highly dependent on

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5) There are some cases where other vowels instead of /ɨ/ are inserted in Korean. For example, the English word *flash* [flæʃ] in Korean is *phullaysi* [pʰɨl.lɛ.ʃi]; a vowel /i/ is inserted in this case.

6) The final /ɨ/ inserted in each word in (4) cannot be explained by the constraint *COMPLEX alone. For details about the vowel insertion after the word-final consonant, see E. Jun's (2002) study on the effect of release of English syllable final stops on vowel epenthesis in English loanwords.

the importation channel. Disregarding the possible differences of where the loanwords are borrowed from, Y. Lee (2001) and Kim (2003) argued that the alternation of liquids between /r/ and /l/ in the intervocalic position is subject to two co-existing rankings. That is, when intervocalic /l/ is realized as a geminate [ll], it is affected by loanword ranking, and when intervocalic /l/ is realized as [r], it is influenced by Korean ranking. Their constraint rankings for English liquid loans in Korean are as follows:

(5) Y. Lee's (2001) ranking for liquid loanwords in Korean[7)]
    a. Loan: *NonMoraic-*l* » **Ident-IO(lateral)** » **Dep-IO(μ)** » *r » *l
    b. Native: *NonMoraic-*l*, **Dep-IO(μ)** » *r » **Ident-IO(lateral)**, *l

(6) Kim's (2003) ranking for liquid loanwords in Korean[8)]
    a. Loan: *NonMoraic-*l*, CodaCond » **Ident-IO(liquid)** » Max-IO(μ) » **Dep-IO(μ)**
    b. Native: *NonMoraic-*l*, CodaCond » **Dep-IO(μ)** » **Ident-IO(liquid)** » Max-IO(μ)

In both ranking systems above, the ranking between Dep-IO(μ) and Ident-IO(lateral)/(liquid) is reversed in loanword phonology and Korean native phonology. The following tableaux show the free variation of the English word *chocolate* resulted from the distinct application of constraint ranking (the output is [cʰo.kʰol.letˀ] in loanword ranking, and it is [cʰo.kʰo.retˀ] in native ranking).

(7) Intervocalic /l/ with Y. Lee's (2001) loanword ranking

chocolate [tʃokolet]	*NonMoraic-*l*	Ident-IO (lateral)	Dep-IO(μ)	*r	*l
a. cʰo.kʰo.letˀ	*!				*
b. ☞ cʰo.kʰol.letˀ			*		**
c. cʰo.kʰo.retˀ		*!		*	
d. cʰo.kʰor.retˀ		*!	*	**	

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7) ***NonMoraic-*l***: Do not have [l] in a non-moraic position.
    Dep-IO(μ): Do not insert a mora.
    Ident-IO(lateral): Correspondent segments have identical values for feature [lateral].
                                                                (Y. Lee 2001)
8) **CodaCond:** Only voiceless stops, nasals, and laterals for coda.
    Max-IO(μ): Do not delete a mora.   (Kim 2003)
    Ident-IO(liquid): Correspondent segments have identical values for feature [lateral] and [flap].   (Kim 2003)

(8) Intervocalic /l/ with Y. Lee's (2001) native ranking

chocolate [tʃokolet]	*NonMoraic-*l*	Dep-IO(μ)	*$_r$	Ident-IO (lateral)	*l
a. cʰo.kʰo.letˀ	*!				*
b. cʰo.kʰol.letˀ		*!			**
c. ☞ cʰo.kʰo.retˀ			*	*	
d. cʰo.kʰor.retˀ		*!	**	*	

(9) Intervocalic /l/ with Kim's (2003) loanword ranking

chocolate [tʃokolet]	*NonMoraic-*l*	CodaCond	Ident-IO (liquid)	Max-IO (μ)	Dep-IO (μ)
a. cʰo.kʰo.letˀ	*!				
b. ☞ cʰo.kʰol.letˀ					*
c. cʰo.kʰo.retˀ			*!		
d. cʰo.kʰor.retˀ		*!	*		*

(10) Intervocalic /l/ with Kim's (2003) native ranking

chocolate [tʃokolet]	*NonMoraic-*l*	CodaCond	Dep-IO (μ)	Ident-IO (liquid)	Max-IO (μ)
a. cʰo.kʰo.letˀ	*!				
b. cʰo.kʰol.letˀ			*!		
c. ☞ cʰo.kʰo.retˀ				*	
d. cʰo.kʰor.retˀ		*!	*	*	

Likewise, *melon* ([mel.lonˀ] and [me.ronˀ]), *jelly* ([ǰel.li] and [ǰe.ri]), and *ambulance* ([ɛm.bul.lanˀ.s'i] and [ɛm.bu.ranˀ.s'i]) are the examples of free variation of liquid loanwords in the intervocalic position (Y. Lee 2001).

However, if these loanwords are indirectly borrowed from other language's English loans, there is no need to apply Korean native phonology when explaining the patterns of liquid loanwords. For example, the English word *chocolate* is pronounced as [cʰo.kʰo.re.t'o] in Japanese. Many words in Korean are influenced by Japanese, and loanwords are huge evidence for this influence. If the word *chocolate* is borrowed from either English (the output becomes [cʰo.kʰol.letˀ]) or Japanese (the output becomes [cʰo.kʰo.retˀ]),[9] the free variation comes from the input differ-

ence, not from the separate application of loanword phonology and na-
tive phonology. The apparent loans from English might have been in-
directly borrowed from another language's English loanwords. We will
come back to this issue in section 3.2.

3. The Analysis by the Syllable Position

3.1. Onset Position

3.1.1. Single Consonant

(11) laithu   [ra.i.tʰɨ]   'right'   laithu   [ra.i.tʰɨ]   'light'
     leyisu   [re.i.sɨ]   'race'   leyisu   [re.i.sɨ]   'lace'
     lite   [ri.də]   'reader'   lite   [ri.də]   'leader'

As in the examples above, English loanwords starting with a single con-
sonant, either /r/ or /l/, are always represented as a flap [r] in Korean.
Previous researches suggested that the change of [l] into [r] is due to
the higher ranking of *NonMoraic-*l* constraint (Kim 2003, Y. Lee 2001).
This constraint is based on Hayes's (1989) moraic phonology. A mora
is the concept for measuring the phonological weight of the segment.
There is no mora if the segment is light, and there exists a mora if the
segment is heavy. Hayes (1989) claimed that there is no mora in the
onset position. The constraint *NonMoraic-*l* thus explains the phenom-
enon of /l/ being eliminated in the onset position.

   However, as Shim (2009) pointed out, assuming Korean natives to
have the notion that a mora does not exist in the onset of the words
borrowed from English means that Korean speakers have the overall
phonological knowledge up to the level of the native speakers of English.
In the borrowing stage, we adopt the surface form of the English words

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9) The unexplained deletion of word-final /o/ in the output [cʰo.kʰo.retˀ] can be due
   to the avoidance of inserting phonetically longer vowels - instead of the default
   epenthetic vowel /ɨ/ - which are not present in the spelling of a word (Oh 2005).
   It suggests that both the phonological factors and the orthographic cues may have a
   concurrent influence on loanwords in Korean (Oh 2005).

and its phonetic information; it lacks logic to presume that Korean native speakers share the phonological intuition of the base forms of English words with English native speakers in this stage (Shim 2009).[10] Therefore, I will introduce simpler constraints for the liquid representation in the onset position.

(12) ***(V)./V:** Do not have [l] in the (intervocalic) syllable onset.

(Kenstowicz 2005)

(13) **Pres(mnr(#[liq])):** Preserve perceptual cues for manner of articulation [liquid] of a word-initial position.

(J. Jun 2004)

The constraint in (12) is adopted from Kenstowicz's work which stated that "the lateral is barred from (intervocalic) onset position" in Korean grammar (2005: 21-22). The constraint in (13) which is developed from J. Jun's (2004) analysis is used to preserve liquids in the onset from being nasalized or deleted. These new constraints are ranked higher than Ident-IO(liquid), Max-IO(seg)[11] (no phonological deletion), and Dep-IO (seg)[12] (prohibits phonological epenthesis). The next two tableaux present the optimal output for liquid loans in the onset position.

(14)

reader	[ridər][13]	*(V)./V	Pres (mnr(#[liq]))	Ident-IO (liquid)	Max-IO (seg)	Dep-IO (seg)
a.	li.də	*!		*	*	
b. ☞	ri.də				*	
c.	ni.də		*!		*	
d.	i.də		*!		**	

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10) *NonMoraic-*l* is hard to connect with Korean phonology such as Twuum Law (this law prohibits both /l/ AND /r/), since there is no rule separating the patterns of /r/ and /l/ in Korean due to the lack of distinction in the phoneme inventory.

11) **Max-IO(seg):** Every segment of the input has a correspondent in the output.

(McCarthy & Prince 1995)

12) **Dep-IO(seg):** Every segment of the output has a correspondent in the input.

(McCarthy & Prince 1995)

13) The input form [ri.dər] used in this tableau are the output of the English word *reader.* Henceforth, every input for loanword examples in the current paper will be

(15)

leader	[lidər]	*(V).*l*V*	Pres (mnr(#[liq]))	Ident-IO (liquid)	Max-IO (seg)	Dep-IO (seg)
a.	li.də	*!			*	
b. ☞	ri.də			*	*	
c.	ni.də		*!		*	
d.	i.də		*!		**	

In both (14) and (15), the optimal output is (b) [ri.də]. Candidates (14a) and (15a) crucially violate the highest ranking *(V).*l*V*. Candidates (14c-d) or (15c-d) would be selected for the output if the input word is Korean according to Twuum Law (no word- initial liquids).[14] However, word-initial liquid phonemes never get nasalized nor deleted in loanwords. The fact that the liquids take the word-initial position proves that loanword phonology is different from Korean phonology.

3.1.2. Consonant Cluster

(16) phuleyi [pʰɨ.re.i] 'prey'   phullayi [pʰɨl.lɛ.i] 'play'
     phulai   [pʰɨ.ra.i] 'fry'   phullai   [pʰɨl.la.i] 'fly'

As in (16), the onset clusters in English loanwords are broken into separate syllables by a vowel epenthesis. Along with the insertion, English /r/ in the initial consonant clusters stays as [r] when adopted in Korean, whereas /l/ is pronounced as a geminate [ll]. The aforementioned constraint *(V).*l*V* enables us to account for loanword grammar preventing the pronunciation of the intervocalic [l], just as Korean phonology does.[15]

The following two tableaux explain the contrastive patterns of flap [r] and lateral [l] in English loans in the onset consonant cluster.

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decided according to the output form of which it is borrowed.

14) Pres(mnr(#[liq])) was included in the tableaux (14) and (15) to present the distinct patterns of Korean and loanword phonology. It can be replaced by Faith[liquid] (H. Kang 2003). This constraint will be left out henceforth.

15) Some liquid phonemes in Korean are nasalized by manner assimilation in the word-medial onset position as in hamlak [ham.nakˀ] 'capture' and *umlyo* [ɨm.nyo] 'beverage'. Similarly, /l/ in the word-medial onset preceded by nasals in English loanwords (such as *only* /on.li/ [on.ni]) is nasalized (H. Kang 2003).

(17)

fry	[frai]	*(V).*IV*	Ident-IO (liquid)	Max-IO(seg)	Dep-IO(seg)
a.	pʰi.la.i	*!	*		*
b.	pʰil.la.i		*!		**
c. ☞	pʰi.ra.i				*
d.	pʰir.ra.i				**!

(18)

fly	[flai]	*(V).*IV*	Ident-IO (liquid)	Max-IO(seg)	Dep-IO(seg)
a.	pʰi.la.i	*!			*
b. ☞	pʰil.la.i				**
c.	pʰi.ra.i		*!		*
d.	pʰir.ra.i		*!		**

The candidate (17c) is chosen to be optimal[16] since it only violates the lower-ranked constraint ranking Dep-IO(seg). In (18), the optimal candidate is (18b), which contains the geminate [ll]. The output in (18) is another example of the vowel insertion discussed in section 2.2. Bearing the violation of the faithfulness constraint, Dep-IO(seg), a default vowel /ɨ/ is inserted in this loanword to prohibit the consonant cluster in the onset position.

3.2. Intervocalic Position

Corresponding to the patterns of liquid loans in the onset consonant cluster discussed earlier, English /r/ between vowels stays as [r] when adopted in Korean, whereas /l/ becomes a geminate [ll].

The following two tableaux present the distinct patterns of /r/ and /l/ in the intervocalic position by comparing *siren* and *silent*:

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16) The phoneme /f/ in *fry* [frai] is realized as [pʰ] in Korean, so it is presumed that the English phoneme /f/ is not in the phoneme inventory of Korean. Like the liquid phonemes /r/ and /l/, the phonemes /f/ and /p/ in English words will have different patterns of adaptation when they are borrowed in Korean.

(19)

siren	[sairen]	*(V).*l*V	Ident-IO (liquid)	Max-IO(seg)	Dep-IO(seg)
a.	sa.i.len	*!	*		
b.	sa.il.len		*!		*
c. ☞	sa.i.ren				
d.	sa.ir.ren				*!

(20)

silent	[sailənt]	*(V).*l*V	Ident-IO (liquid)	Max-IO(seg)	Dep-IO(seg)
a.	sa.i.lən.tʰɨ	*!			*
b. ☞	sa.il.lən.tʰɨ				**
c.	sa.il.len˺			*!	
d.	sa.i.rən.tʰɨ		*!		*
e.	sa.ir.rən.tʰɨ		*!		**

Candidates (19a) and (20a) both crucially violate the highest ranked markedness constraint *(V).*l*V. Candidates (19b) and (20d-e) violate the faithfulness constraint Ident-IO (liquid). Between the two remaining candidates in the tableau (19), the completely faithful candidate (19c) is chosen to be the optimal candidate. In the case of (20), (20c) violating Max-IO(seg) is ruled out and (20b) is selected as optimal, satisfying all the constraints except for the lower-ranked Dep-IO(seg).

However, there are exceptions for the patterns of English intervocalic /l/ in Korean.

(21) [pɛl.lən.sɨ]/[pa.ran.sɨ]   'balance'
     [sɛl.lə.dɨ]/[sa.ra.da]   'salad'
     [pɨl.la.u.sɨ]/[pɨ.ra.u.sɨ]   'blouse'
     [kʰil.lo]/[kʰi.ro]   'kilo'

In these examples, Korean natives use either [ll] or [r] when pronouncing these English loanwords containing intervocalic /l/. Let us consider these alternating loanwords as indirect borrowings from Japanese. The syllable structure of Japanese does not allow consonant coda (i.e., CV-CV structure only). Due to this structure, English /l/ is always realized as a singleton [r] in the onset position in Japanese. When adopted

in Korean, if words are secondarily borrowed from English loanwords
in Japanese, the input already loses the feature [l] and maintains the fea-
ture [r] of Japanese.

(22) Direct borrowing from English to Korean

television	[televiʒən]	*(V).ᴌ	Ident-IO (liquid)	Max-IO (seg)	Dep-IO (seg)
a.	tʰe.le.bi.ǰənˀ	*!			
b. ☞	tʰel.le.bi.ǰənˀ				*
c.	tʰe.re.bi.ǰənˀ		*!		
d.	tʰer.re.bi.ǰənˀ		*!		*

(23) Indirect borrowing via Japanese to Korean

television	[te.re.bi]	*(V).ᴌ	Ident-IO (liquid)	Max-IO (seg)	Dep-IO (seg)
a.	tʰe.le.bi	*!	*		
b.	tʰel.le.bi		*!		*
c. ☞	tʰe.re.bi				
d.	tʰer.re.bi				*!

The candidate (22b) is the optimal output, violating the least number
of constraints and the candidate (23c) is optimal, satisfying all the
constraints. It is clear that the example word in (23) is indirectly bor-
rowed from Japanese since the last syllable of *television* is not present
in both Korean and Japanese (the phonological representation [tʰ
e.re.bi.ǰənˀ] is rarely used in Korean).[17)] Therefore, the previous analysis
of the intervocalic /l/ in loanwords asserting that the intervocalic /l/

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17) The Google search results were 2.65 billion for [tʰel.le.bi.ǰənˀ] and 2.61 billion for
[tʰe.re.bi], but 32.6 million for [tʰe.re.bi.ǰənˀ]. This comparatively sparse but ob-
vious presence of the use of [tʰe.re.bi.ǰənˀ] can be attributed to the influence of the
orthographic representation - another crucial factor in formulating loanwords (Lee
& Kim 2011) - apart from phonological effects on loans replacing the single letter
/l/ in *television* with a single phoneme [r]. The influence of English spelling on
loans is supported by Oh, suggesting "[s]pelling affects the [ll]-[r] variation in
loans" (2005: 359). However, in the case of the English word *collar* /kala/ with
two representations [kʰa.ra] and [kʰal.la], the orthographic cues solely cannot ex-
plain the presence of [kʰa.ra] since the input spelling contains two liquid
phonemes. Thus, taking account of the influence of indirect borrowing from
Japanese for the alternation of intervocalic /l/ is necessary.

is in free variation is not affirmative anymore.

3.3. Coda Position

3.3.1. Single Consonant

In English liquid loans, the single consonant /r/ in the coda position is deleted when adopted in Korean, whereas the singleton /l/ in coda maintains the feature lateral and stays as [l]. The following markedness and faithfulness constraints have to be applied in order to explain the liquid patterns in the coda position.

(24) ***[liq,-lat]σ:** No syllable final [-lateral] liquid consonants (no final [r] or [ɹ]).
(Hayes & Wilson 2008)

(25) **Dep-IO(flap):** Every feature [flap] of the output has a correspondent in the input.
(O.-M. Kang 1996)

From Hayes and Wilson's (2008) description, I have modified *[-lat]# to *[liq,-lat]σ sinc Korean does not allow the feature [-lateral] not only in the word-final position but also in the syllable-final position. The final liquid consonant should have [+lateral] feature in Korean regardless of native words or loanwords. In accordance with Korean phonology, the markedness constraint *[liq,-lat]σ is positioned in the undominated rank of loanword phonology. In addition, P. Lee and many other phoneticians indicated that "the sequence vowel plus /r/ is pronounced in a single rhotacized segment /ɚ/" (1995: 141). Based on this explanation, O.-M. Kang (1996) suggested that Koreans perceive /R/ (the coda /r/) sound as a ghost segment having only the timing slot without possessing any features. Therefore, the faithfulness constraint Dep-IO(flap) is violated if /R/ is realized in the output. The tableau (26) presents the /R/-deletion, and the tableau (27) shows that lateral /l/ survives as [l] in the output for English loanwords in Korean.

(26)

car	[kʰaR]	*(V).*lV*	*[liq,-lat]σ	Ident-IO (liquid)	Max-IO (seg)	Dep-IO (seg)	Dep-IO (flap)
a.	kʰal					*!	
b. ☞	kʰa						
c.	kʰar		*!			*	*
d.	kʰa.rɨ					*!*	*

(27)

cool	[kʰul]	*(V).*lV*	*[liq,-lat]σ	Ident-IO (liquid)	Max-IO (seg)	Dep-IO (seg)
a. ☞	kʰul					
b.	kʰu				*!	
c.	kʰur			*!		
d.	kʰu.rɨ			*!		*
e.	kʰu.lɨ	*!				*

The candidate (26c) is eliminated by the undominated *[liq,-lat]σ. The candidate (26d) resolves the avoidance of the coda /r/ (/R/) by inserting a vowel, but it violates Dep-IO, adding a feature [flap] when there was no feature [flap] in the input. The optimal candidate (26b) does not violate Max-IO(seg) since /R/ is a ghost segment. Therefore, the tableau (26) shows that the input /R/ is deleted in the optimal candidate (26b). In the second tableau, the completely faithful candidate (27a) is chosen to be optimal. This indicates that the coda /l/ survives in the surface form of the loanword.

However, there are exceptions in which the coda /r/ representation survives as the onset /r/ in the output as in the following examples:

(28) a. [kʰo.rɨ.setˀ]   'corset'   [pʰa.rɨ.tʰi.jan]   'partisan'
     b. [e.nə.ji]/[e.ne.rɨ.gi] 'energy'   [al.lə.ji]/[al.le.rɨ.gi] 'allergy'

The apparent English loanwords in (28) are actually originated from other languages; *corset* and *partisan* are borrowed from French and *energie* and *allergie* from German. The loanword examples given in (28b) have two output forms in Korean: one is indirectly borrowed via English, and the other is directly borrowed from German. Indirect borrowings from English lose the liquid phoneme /r/ in the coda like all the other direct

loanwords from English (O.-M. Kang 1996). However, French /r/ and German /r/ are pronounced and heard more strongly compared to English /r/. A rhotic phoneme in these languages is realized as either uvular trill [ʀ] or uvular fricative [ʁ], which has a [+back] feature unlike the alveolar [ɾ] that we have dealt with so far. To account for the examples above, the constraint concerning the place of articulation on the feature dorsal should be added to our ranking:

(29) **Pres(pl(dor)):** Preserve acoustic place cues of [dorsal] consonants.[18]

(J. Jun 2004)

J. Jun (2004) introduced this constraint to explain the place assimilation in Korean. In this paper, the constraint is reused in order to preserve the strong liquid /ʀ/ or /ʁ/ from being deleted. The modified constraint ranking including Pres(pl(dor)) is given below.

(30)

allergy	[aləʀdʒi]	*(V).N	*[liq, -lat]σ	Ident-IO (liquid)	Pres (pl(dor))	Max-IO (seg)	Dep-IO (seg)	Dep-IO (flap)
a.	al.ləl.ji			*!			*	
b. ☞	al.lə.ji							
c.	al.lər.ji		*!				*	*
d.	al.lə.ɾi.ji						*!*	*

(31)

allergie	[aləʁgi]	*(V).N	*[liq,-lat]σ	Ident-IO (liquid)	Pres (pl(dor))	Max-IO (seg)	Dep-IO (seg)
a.	al.lel.gi			*!			*
b.	al.le.gi				*!		*
c.	al.ler.gi		*!				*
d. ☞	al.le.ɾi.gi						**

In (30), (30b) is optimal, being the most faithful candidate. The result is consistent with the general rule: the input /r/ in the coda position is deleted. However, (31d) is chosen as the optimal output in (31) since

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18) This constraint is essential in explaining why /ʀ/ and /ʁ/ are preserved whereas /ɾ/ is not in the coda position. Pres(liq) does not sufficiently distinguish the distinct patterns between the coronal /ɾ/ and the dorsal phonemes /ʀ/ and /ʁ/.

(31b) violates Pres(pl(dor)), failing to preserve the place cue for /ʁ/ in the output.

The following two tableaux repeat the rankings of Y. Lee (2001) and Kim (2003).

(32) Y. Lee's (2001) loanword ranking

allergie	[alɛʁgi]	*NonMoriac-*l*	Ident-IO (lateral)	Dep-IO(μ)	*ʳ	*ˡ
a.	al.lel.gi		*!	*		***
b. ☞	al.le.gi			*		**
c.	al.ler.gi			*	*!	**
d. ☜	al.le.rɨ.gi			**!	*	**

(33) Kim's (2003) loanword ranking

allergie	[alɛʁgi]	*NonMoriac-*l*	CodaCond	Ident-IO (liquid)	Max-IO (μ)	Dep-IO (μ)
a. ☞	al.lel.gi					*
b.	al.le.gi				*!	*
c.	al.ler.gi		*!			*
d. ☜	al.le.rɨ.gi					**!

The tableaux (32) and (33) wrongly rule out the candidate [al.le.rɨ.gi] and choose (32b) [al.le.gi] or (33a) [al.lel.gi] as optimal. These rankings fail to explain the exceptional case of the non-lateral liquid phoneme in the coda position being realized as [rɨ] in the output. Unlike the ranking presented in the current paper, these rankings are restricted to general cases without taking exceptions into account.

Now the discussion is extended to loanwords from other languages in addition to English borrowings. A few more examples of loanwords that avoid /r/-deletion in the coda position are listed below:

(34) German: [a.rɨ.ba.i.tʰɨ] 'arbeit'
     Italian: [pʰo.rɨ.tʰe] 'forte'   [ra.rɨ.go]   'largo'
               [o.rɨ.gan]   'organ'   [mo.cʰa.rɨ.tʰi] 'Mozart'
     Greek: [ho.rɨ.monˀ] 'hormone' [sɨ.pʰa.rɨ.tʰa] 'Sparta'

In the previous research on liquid loanwords, these examples of the /r/-maintenance in the coda are simply excluded, mentioned as exceptions (B. Lee 2001), or explained by reversing the ranking of the constraints (O.-M. Kang 1996).

To explain these exceptions with the phonological constraints that the current study has proposed (without reversing the order of the ranking), we need to take the influence of Japanese on Korean into account again. Some of the representations of loanwords in Korean are deeply related to the phonological features of the Japanese's representations, so they can be judged as indirect borrowings from Japanese (Lee & Kim 2011). For example, Italian loanwords in (34) are all related to *um-ak,* which is the term for music in Korean originated from Japanese (Min 2004). The fact that the origin of the musical terminologies is from Japanese can be justifiable since the period when Western music was introduced to Korea matches the Japanese colonial era. During the occupation period, music education became a part of regular schooling. Therefore, "the [musical] terms which are not translated but pronounced in their original sounds in a Japanese style are also used by Koreans" (Min 2004: 297).

Likewise, all the other examples in (34) may be the results of Japanese's indirect borrowings. In Japanese, loanwords containing the liquid /r/ in the coda lose the feature [-lateral] in the output as in Korean. As for the liquid /l/ in loanwords, Japanese inserts a vowel after /l/ in order to prevent any consonants placed in the coda position. Therefore, Japanese and Korean share the general rule for the patterns of loanwords in the coda, accepting the deletion of /r/ and preserving the maintenance of /l/. Interestingly, /r/ survives in the output of the examples given in (34) in Japanese, too.[19]

Considering that the examples like (34) are indirectly borrowed from Japanese, the tableau below explains the avoidance of /r/-deletion in the coda.

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19) More examples of the anti-/r/-deletion via Japanese indirect borrowings:
   a. brand names: *Lamborghini* → [ramʼ.bo.ɾi.gi.ni], *Porsche* → [pʰo.ɾi.ʃe]
   b. country names: *Norway* → [no.ɾi.we.i], *Portugal* → [pʰo.ɾi.tʰu.gaɭ]
   c. city names: *Versailles* → [pe.ɾi.sa.ju], *Barcelona* → [pa.ɾi.sel.lo.na]), *Gorgonzola* → [ko.ɾi.gon.jʼol.la]

(35)

largo	[rarugo]	*(V).*lV*	*[liq,-lat]σ	Ident-IO (liq)	Pres (pl(dor))	Max-IO (seg)	Dep-IO (seg)
a.	lar.go	*!	*			*	
b.	rar.go		*!	*		*	
c.	ra.go					*!*	
d. ☞	ra.rɨ.go						
e. ☞	ra.ru.go						

Candidates (35a) and (35b) are eliminated by violating the top-ranked markedness constraints. (35c) would be the output based on /r/-deletion, but since the coda /r/ in Italian became the onset /r/ through adaptation in Japanese, the input /r/ no longer has to be deleted. Therefore, (35c), which crucially violates Max-IO(seg), is also eliminated. However, the tableau chooses both of the remaining candidates (35d) and (35e) as optimal. The fact that Korean speakers pronounce *largo* as [ra.rɨ.go] at the expense of the perfectly faithful form *[ra.ru.go] suggests that there is an extra-phonological factor - the orthography - when adapting loanwords (Lee & Lee 2007). As mentioned earlier in the case of *[cʰo.kʰo.re.t'o], loanwords' spelling works together with phonetic information when a vowel is added to the source word. Rather than applying /u/-epenthesis, Korean tends to insert the phonetically shorter vowel /ɨ/ into the original spelling; thus, the output becomes [ra.rɨ.go]. It follows that Japanese's phonetic cues and the word's spelling jointly define the representation of loanwords in Korean (Oh 2005).[20]

3.3.2. Consonant Cluster

English /r/ in the final consonant cluster is deleted, whereas /l/ becomes a geminate [ll] when it precedes nasals and stays as [l] when it precedes other non-nasal consonants.[21] The representations of liquids in

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20) /u/-epenthesis in loanwords such as [a.ru.ba.i.tʰɨ] and [ho.ru.monˀ] is found in Korean newspapers (Dong-A Ilbo, Kyunghyang Shinmun, Maeil Business Newspaper) in the early to mid-20th century, but the number of occurrence of these representations gradually decreased to zero. It is assumed that as Koreans become aware of the orthographic information of loanwords, they tend to avoid any insertion from the given spelling except for the default vowel /ɨ/.

21) In *talk, almond,* etc., /l/ seems to be deleted in the surface form in Korean (e.g.,

the coda cluster are given below:

(36) a. phakhu [pʰa.kʰɨ] 'park' athu   [a.tʰɨ]   'art'
     b. phillum [pʰil.lɨm˺] 'film' suthokhollum [sɨ.tʰo.kʰol.lɨm˺] 'Stockholm'
     c. silkhu   [sil.kʰɨ]   'silk' solthu   [sol.tʰɨ]   'salt'

To our knowledge, /r/ is deleted due to the violation of the un-dominated constraint *[liq,-lat]σ, and /l/ survives in the output. In (36b-c), a vowel /ɨ/ plays a role to break the cluster. However, the differ-ence in the position of the vowel insertion between (36b) and (36c) - whether the vowel is inserted between the consonants or after the cluster - is left unexplained. To solve this problem, I will add the following con-straint with basis on the observations of H. Kang (1996, 2003) and Y. Kang (2003):

(37) **BeSimilar[release]:** Strings of sounds in correspondence should be similar in the release characteristics of their stops and nasals.

(Y. Kang 2003)

Y. Kang (2003) introduced BeSimilar[release] in order to explain the im-pact of released patterns of word-final stops. Her constraint is modified in this paper by including nasals to its range as stated in H. Kang's (1996, 2003) study. H. Kang noted that "released consonants are allowed only as an onset whereas unreleased consonants are allowed only as co-da in Korean" (2003: 314). Accordingly, an epenthetic vowel is inserted between the consonants /lm/ (as in (36b)) since English word-final nasal consonants are not released. The tableaux below contain the overall con-straints which have been discussed so far, including the newly and lastly added constraint BeSimilar[release].

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talk → [tʰo.kʰɨ], *almond* → [a.mon˺.dɨ], etc.). However, /l/ in these words is silent in English: the input already lost the liquid feature /l/.

(38)

film	[film˺]	*(V).N	*[liq, -lat]σ	Ident-IO (liquid)	Pres (pl(dor))	BeSimilar [release]	Max-IO (seg)	Dep-IO (seg)
a.	pʰil.im˺	*!						*
b.	pʰir.im˺		*!	*				*
c. ☞	pʰil.lim˺							**
d.	pʰil.mɨ					*!		*

(39)

silk	[silkʰ]	*(V).N	*[liq, -lat]σ	Ident-IO (liquid)	Pres (pl(dor))	BeSimilar [release]	Max-IO (seg)	Dep-IO (seg)
a.	sil.ik˺	*!				*		*
b.	sir.kʰɨ		*!	*				*
c.	sil.lik˺					*!		**
d. ☞	sil.kʰɨ							*

The first and the second candidates in both tableaux crucially violate the top-ranked constraints, *(V).N and *[liq,-lat]σ respectively. In (38), (38c) is optimal between the two remaining candidates despite the severe violation of Dep-IO(seg). It is because the other candidate (38d) is eliminated by violating the higher-ranked constraint BeSimilar[release] due to placing the unreleased nasal /m/ in the onset position. In (39), however, the situation is reversed. The vowel insertion after the released stop /kʰ/ in (39b) and (39d) satisfies BeSimilar[release], so the candidate (39c) which violates BeSimilar[release] is eliminated instead. Therefore, the optimal candidate in (39) is (39d).

4. Conclusion

This current study looked into the overall patterns of liquid loanwords in Korean. This paper revealed that Korean natives perceive English liquids /r/ and /l/ discriminately. Moreover, counter-arguing the use of moraic phonology and the alternative use between Korean phonology and loanword phonology, I proposed a new generalization on the patterns of liquids for loanwords in Korean: the distinct patterns of liquids and the variation in several syllable positions can be explained with a

single set of constraint ranking as follows:

(40) The final constraint ranking for liquid loanwords in Korean
     *(V).*l*V, *[liq,-lat]σ » Ident-IO(liq), Pres(pl(dor)) » BeSimilar[release] »
     Max-IO(seg) » Dep-IO(seg), Dep-IO(flap)

With the notion of the indirect borrowings from Japanese, this final con-
straint ranking fully explains not only the overall patterns of liquid loans
in Korean but also the exceptions of the general patterns. Moreover, this
single loanword phonology ranking satisfies all the concerns about ac-
counting for the distinction of liquid loans in Korean from English and
other languages as well.

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