

L1 phonotactic restrictions and perceptual adaptation: English affricates in Contemporary Korean

Yoonjung Kang

Received: 22 October 2010 / Accepted: 3 May 2012 / Published online: 22 August 2012
© Springer Science+Business Media B.V. 2012

Abstract The current paper examines the adaptation of English postalveolar affricates /tʃ dʒ/ in Contemporary Korean (1890–present). The English affricates are transcribed orthographically as affricates of Korean, often with a palatal glide <j> despite the fact that a post-affricate palatal glide is not perceptibly realized in the surface pronunciation in Korean. The paper examines the distribution of the palatal glide in English affricate transcription in three time periods of Contemporary Korean: Enlightenment Period Korean (1890–1910), the 1930s, and Present Day Korean (PDK). The results show that despite the normative conventions against it, post-affricate palatal glide transcription persists throughout Contemporary Korean. Also, the fact that the palatal glide distribution in affricate adaptation interacts with the phonotactic restriction against a palatal glide before front vowels indicates that the palatal glide transcription bears phonological reality. It is proposed that this is a case where the adapters make a distinction that is not sanctioned by the surface contrast of the native language, but is allowed by the orthography, in order to represent the subtle phonetic difference between the native and foreign sounds. It is suggested that a model of loanword adaptation where the adaptation is equated with L1-based perception mediated solely by surface sequential phonotactic restrictions of the L1 may be too strict. At the same time, the downward trajectory of <j> transcription in PDK suggests that such covert perceptual contrast is not likely to be maintained unless it develops into actual surface contrast.

Keywords Loanword phonology · Diachrony · Affricates · Orthography

Y. Kang (✉)

University of Toronto Scarborough, 1265 Military Trail, HW314, Toronto, ON M1C 1A4, Canada
e-mail: yoonjung.kang@utoronto.ca

1 Introduction

The current paper examines the adaptation of English postalveolar affricates /tʃ dʒ/ in Contemporary Korean (1890–present). In the literature, there are conflicting descriptions of the adaptation patterns; most studies state that English affricates /tʃ/ and /dʒ/ are adapted as simplex Korean affricates /tʃʰ/ and /dʒʰ/, respectively (Oh 1992; Hahn 2005; Iverson and Lee 2006), while Kim (2009) states that English affricates are adapted as a sequence of an affricate plus a palatal glide before a back vowel. The disagreement is due to different interpretations of the transcription of English affricates in Korean orthography. English affricates are sometimes transcribed with an additional palatal glide in Korean orthography, which Kim (2009)'s position seems to be based on. However, a post-affricate palatal glide in both English loanwords and native words is not pronounced perceptibly (Kang 2006, 2009a), and in the actual pronunciation of English loanwords, English affricates are realized as the simplex affricates of Korean.

If the palatal glide is not actually realized in the surface pronunciation, the question arises as to why English affricates are transcribed with a palatal glide at all in the first place. Shin (1998) observes that the <j> transcription is an attempt to more accurately represent the input sound characteristics and is more likely to be used by speakers with knowledge of English, whereas the transcription without <j> reflects the surface pronunciation.¹ Given that Korean orthography is largely morpho-phonemic and may represent a level deeper than the surface pronunciation, it is possible that the <j> represents a genuine phonological structure at a more abstract level, even if it is not distinctively pronounced on the surface. In other words, by <j>, the adapters (=the transcribers) are representing a subtle difference between English and Korean affricates, discussed in Sect. 4.1, that they perceive even though the distinction is not sanctioned by the native surface phonotactic restrictions and is in fact not produced distinctively.

This suggests that the view that loanword adaptation reflects the perception of L2 sounds constrained by L1 surface phonotactics is too strong (cf. Boersma and Hamann 2009; Peperkamp et al. 2008). While it is true that interlanguage perception is influenced by the phonotactic restrictions of the native language (cf. Massaro and Cohen 1983; Hallé et al. 1998; Dupoux et al. 1999), the adapters may still perceive subtle differences between the native and foreign sounds (Best 1995) and even represent them differently in their underlying phonological representation although they are produced with no perceptible difference in the surface realization.

The main goal of this paper is to examine the distribution of the palatal glide in English affricate adaptation in Contemporary Korean from Enlightenment Period Korean (EPK) to Present Day Korean (PDK) to verify if the palatal transcription indeed occurs often enough to be taken seriously in light of the general spelling practices and phonological constraints of these periods. The results show that <j> transcription for /tʃ dʒ/ occurs at a non-negligible rate and is also constrained by a general restriction against a post-consonantal [j] before a front vowel, lending support to the view that the palatal glide spelling reflects phonological reality.

¹ < > represents orthographic representations.

The paper is organized as follows: Sect. 2 provides background on Korean phonology and the phonetics of affricates. Section 3 presents the empirical findings of the study on the distribution of the palatal glide in English affricate adaptation. Section 4 provides the discussion. Section 5 concludes the paper.

2 Background

EPK (1890–1910) marks the beginning of Contemporary Korean (CK, 1890–present). Except for the changes that will be pointed out below, the phonology of Korean has not changed significantly from EPK to PDK. The phoneme inventory of Korean is provided in Table 1.

The syllable template of Korean is CGVC. There are various co-occurrence restrictions on the glide and its adjacent segments. The restrictions on glide + vowel (GV) sequences are summarized in Table 2.

The high central vowel /ɨ/ is not allowed with either glide—*/jɨ/, */wɨ/. Furthermore, /j/ cannot occur with /i/ and /w/ cannot occur with /u/ or /o/. These restrictions hold categorically as Morpheme Structure Constraints and surface-level constraints in both native words and loanwords.

In addition to these categorical restrictions, glides are frequently deleted in casual speech in post-consonantal position. The palatal glide is systematically deleted post-consonantly before a front vowel (Hong 1994; Kang 1997; Choi 2002; Chung

Table 1 Phoneme inventory of Korean

i	ɨ	u	p p ^h p'	t t ^h t'	k k ^h k'
e	ʌ	o		ts ts ^h ts'	
(æ) ^a	a			s s'	h
			m	n	ŋ
				L ^b	
			w	j	

^a In PDK, the distinction between /e/ and /æ/ has essentially been lost, even though it is retained in the orthography (Hong 1988; Choi 2002; Silva and Jin 2008). The merger of /e/ and /æ/ is a fairly recent development, only dating back to the 1950s in the standard dialect (Kim 2000; Chung 2002); the two vowels were reliably distinguished in 1930s Korean (Han 2005) and in EPK (Park 2005; Han 2007b)

^b /L/ represents the liquid phoneme that is realized as [l] or [r] allophonically

Table 2 Co-occurrence restrictions on glide + vowel sequences (Cho 1988; Kang 1997)

*ji	*jɨ	ju	wi	*wi	*wu
je	jʌ	jo	we	wʌ	*wo
(jæ)	ja		(wæ)	wa	

2002; Cha and Ahn 2004). Kang (1997) found that /j/ deleted before /e/ 90 % of the time post-consonantly in PDK. Chung (2002) analyzed recordings of news broadcasts from the 1950s to 2000s and found that the rate of /j/-deletion before a front vowel was as high as 80 % even in the 1950s, which indicates that post-consonantal /j/-deletion before a front vowel is not a very recent change. In fact, this deletion was also attested in 1930s Korean (Han 2005) and EPK (Kim 2000). Examples are given in (1). Henceforth, I refer to this restriction against post-consonantal /j/ before a front vowel as *Cje.

(1) Deletion of post-consonantal /j/ before front vowels in native Korean words

a.	PDK (Hong 1994)		
	/kjɛ̃sip/	[kɛ̃sip]	‘girl (<i>pejor.</i>)’
	/hjet ^h æk/	[het ^h æk]	‘benefit’
	/kjæ/	[kæ]	‘that kid’
b.	1930s Korean (Han 2005)		
	/kjesitaka/	[kɛʃitaka]	‘stay (<i>hon.</i>)-while’
	/hæsikje/	[hæʃike]	‘sundial’
c.	EPK (Kim 2000)		
	/kwankje/	[kwanke]	‘relation’
	/ʃihje/	[ʃihe]	‘wisdom’

There are also co-occurrence restrictions against certain consonant + glide (CG) sequences (Kim 1994). Particularly relevant to our current discussion is the restriction against sequences of a coronal obstruent and /j/ (***Tj**) where T is any of /t, t^h, t', ts, ts^h, ts', s, s'/ . These consonant + glide sequences, which are disallowed within a morpheme, can arise through morpheme concatenation and glide formation. According to Han (2005) and Park (2005), in EPK and in the 1930s, in derived contexts, the palatal glide was deleted following fricatives and affricates, as shown in (2). For example, the verb /jʌki-/ ‘to consider’ ends in /i/ and when a vowel-initial suffix /-ʌ/ is added, the vowel becomes a glide as in [jʌkʲʌ]. When the stem-final /i/ is preceded by an affricate or a fricative as in /p'atsi-/ ‘to fall out’ or /mosi-/ ‘to bring (*hon.*)’, the high vocoid is simply deleted before a vowel-initial suffix, as in [p'atsʌ] or [mosʌtaka]. In other words, even in morphologically derived contexts, sequences of sibilants and /j/ were still disallowed.

(2) Derived sequences of coronal obstruent + /j/ in 1930s Korean and EPK (Han 2005; Park 2005)

a.	/p'atsʌ-/	[p'atsʌ], *[p'atsʲʌ]	‘to fall out’
	/p'atsi-ko/	[p'atsiko]	‘to fall out-AND’
	/ʃits ^h i-ʌsʌ/	[ʃits ^h ʌsʌ], *[ʃits ^h ʲʌsʌ]	‘to be tired’
	/ʃits ^h i-ko/	[ʃits ^h hiko]	‘to be tired-AND’

b. /mosi-ʌtaka/	[mosʌtaka] cf. PDK [moʃʌtaka]	‘to bring (<i>hon.</i>)’
/mosi-ko/	[moʃiko]	‘to bring (<i>hon.</i>)-AND’
/ha-si-ʌs-sʌpnita/	[hasʌsʌʌʌmnita]	‘do- <i>hon.</i> -past-
	cf. PDK [haʃʌsʌʌmnita]	state (<i>polite</i>)’
/ha-si-ko/	[haʃiko]	‘do- <i>hon.</i> -AND’
cf. /ʌki-ʌ/	[ʌkʌjʌ]	‘to consider’

In PDK, on the other hand, a derived sequence of a coronal stop or fricative and [j] is retained in the output, as shown in (3a). A sequence of [sj] is realized as a posterior fricative [ʃ] due to an allophonic palatalization rule (Hwang 2004; Kang 2009a). But a derived sequence of an affricate and [j] simplifies to an affricate (Cho 1988; Shin 1998; Kang 2009a), as shown in (3b). The derived palatal glide is written in standard orthography in both post-affricate and post-fricative positions.

(3) Derived sequences of coronal obstruent + /j/ in PDK

a. /pʌtʰi-ʌ/	[pʌtʰjʌ]	<pʌtʰjʌ>	‘to withstand’
/pʌtʰi-ko/	[pʌtʰiko]	<pʌtʰiko>	‘to withstand-AND’
/masi-ʌ/	[masjʌ] (→[maʃʌ])	<masjʌ>	‘to drink’
/masi-ko/	[masiko] (→[maʃiko])	<masiko>	‘to drink-AND’
b. /kʌtsi-ʌ/	[kʌtsʌ], *[kʌtsjʌ]	<kʌtsjʌ>	‘to have’
/kʌtsi-ko/	[kʌtsiko]	<kʌtsiko>	‘to have-AND’
/tʌtsʰi-ʌ/	[tʌtsʰʌ], *[tʌtsʰjʌ]	<tʌtsʰjʌ>	‘to get hurt’
/tʌtsʰi-ko/	[tʌtsʰiko]	<tʌtsʰiko>	‘to get hurt-AND’

Kang (2009a) examined the acoustic characteristics of simplex affricates vs. derived affricate + [j] sequences in native words and found that overall, while there was a marginal acoustic difference between /tʃ/ vs. /tʃj/ and /tʃʰ/ vs. /tʃʰj/, almost all these differences were statistically non-significant. Kang (2009a) also found that in a perception study of the same stimuli, the correct rate of identification for affricate vs. affricate + [j] contrasts hovered around 50 %.² On the other hand, the /s/ vs. /sj/ contrast is acoustically distinct and was correctly identified at a rate of 95 %.

To summarize, the restriction against sequences of a coronal obstruent and /j/ in native words holds as a Morpheme Structure Constraint for all coronal obstruents throughout Contemporary Korean, but in morphologically derived contexts, the pattern diverges depending on the manner of articulation of the obstruents. Specifically, affricate + /j/ sequences are banned at all levels. Stop + /j/ sequences and fricative + /j/ sequences were banned in EPK and the 1930s but are allowed in PDK.

Unlike native words, in loanwords, sequences of a coronal obstruent and /j/ are allowed even in underived contexts. Some examples from PDK are given in (4).

² It is possible that the post-affricate <j> deletion is a case of “incomplete neutralization,” where the underlying distinction is marginally maintained in production but whatever difference is present is imperceptible to native speakers (Warner et al. 2004).

(4) Sequences of coronal stop /fricative + /j/ in loanwords

a.	<i>tuna</i>	→	/t ^h juna/	[t ^h juna]
	<i>duo</i>	→	/tjuo/	[tjuo]
b.	<i>shopping</i>	→	/sjop ^h iŋ/	[s ^h op ^h iŋ]
	<i>show</i>	→	/s'jo/	[s'o]

A coronal stop + /j/ sequence in English is adapted without simplification in Korean, as shown in (4a), and the English voiceless postalveolar fricative /ʃ/ is adapted as a sequence of an alveolar fricative and /j/, as shown in (4b), which is realized as the posterior fricative [ʃ] (or [ʃ']). As mentioned above, the occurrence of /j/ following an affricate in loanwords is controversial. Current normative conventions on foreign word transcription (available on-line at http://www.korean.go.kr/09_new/dic/rule/rule_foreign_index.jsp) dictate that English affricates /dʒ/ and /tʃ/ be transcribed as the simplex affricates /tʃ/ and /tʃ^h/, respectively, in pre-vocalic position. But in actual usage, these affricates are often transcribed with a palatal glide (i.e., <tʃj> and <tʃ^hj>) (Kang 2006; Shin 1998), as the examples in (5) illustrate. There are additional variant spellings for these particular English words, but only the two representative forms shown here are relevant for the purposes of our discussion.

(5) Sequences of affricate + /j/ in loanwords

<i>Choice</i>	→	<tʃ ^h joiɫ> ~ <tʃ ^h oiɫ>
<i>Junior</i>	→	<tʃjuniʌ> ~ <tʃuniʌ>

Kim (2009) states that English posterior coronal affricates are adapted as sequences of an affricate and /j/ before back vowels. Kim (2009) does not explicitly address the issue of whether the glide in these loans is phonetically realized or not, when they are produced as L1 output. The only study that directly examined the phonetics of these words is by Kang (2006) who found that an affricate + glide sequence in these transcriptions is not produced perceptibly differently from a simplex affricate. In this study, three native speakers of Korean produced sentences embedded with various loanwords containing adaptations of English affricates, spelled with or without a palatal glide. The produced stimuli were subjected to a perception test, where 55 native speakers of Korean were asked to listen to each stimulus and choose between two orthographic representations for the word—one with a palatal glide and the other without. The results show that the rate of correct identification (i.e., where responses matched the spelling of the form produced by the speakers) was barely above chance, at only 54 % for the aspirated affricate (corresponding to the English voiceless affricate) and 55 % for the lenis affricate (corresponding to the English voiced affricate), similar to the perception of the native affricate vs. affricate + /j/ contrast (Kang 2009a). Regardless of whether the particular stimuli were read from glide-ful vs. glide-less orthographic representations, participants in the perception study were more likely to identify the stimuli with the orthographic representation most frequently associated with that particular lexical item.

I also examined a report on current loanword pronunciations produced by the National Institute of the Korean Language (Choi 2001). The report provides a detailed transcription of 170 commonly used loanwords as produced by 411 Seoul Korean speakers, 34 of whom were professional TV or radio news broadcasters.³ The study also provides detailed transcriptions of broadcasters' pronunciation of loanwords, collected from 17 television programs produced in 2001. In all of the data, there is no indication that any of the adapted forms of English posterior coronal affricates were produced with a palatal glide, i.e., as distinct from the simplex affricates of Korean. Given these results, it is quite puzzling as to why these affricates are transcribed with a <j> at all in the orthography.

Shin (1998) observes that the <j> transcription is an attempt to "more accurately represent the input sound characteristics" and is more likely to be used by speakers with knowledge of English, whereas the transcription without <j> reflects the surface pronunciation. In other words, given that Korean orthography is largely morpho-phonemic and represents a level deeper than the surface pronunciation, it is still possible that the <j> represents a genuine phonological structure at a more abstract level, even if it is not distinctively pronounced on the surface.

Before we can go on to assume the psychological reality of the palatal transcription in English affricate adaptation, we first need to examine (i) how prevalent the palatal transcription is in the actual data, and (ii) how the transcription of the affricates evolved over time in Contemporary Korean. With the above background in mind, we can now examine the data.

3 Data

I examined the English affricate /tʃ dʒ/ adaptation in three time periods of Contemporary Korean: EPK, 1930s Korean, and PDK. I also examined the development of the English postalveolar fricative /ʃ/ transcription for comparison. The data for EPK come from three loanword lists: Kang (1971), Park (1997), and Han (2007a).⁴ The data for the 1930s loanwords come from the *Modern Chosun Loanword Dictionary* (Lee 1937), and the data from PDK were drawn from two sources: the National Institute of the Korean Language (NIKL 1991) and *Google* searches (July–August 2009). All data were entered into a *Microsoft Excel* spreadsheet and loanforms from these sources containing one of the English posterior obstruents /tʃ tʃ dʒ/ were further coded for various characteristics. The rates of adaptation with a palatal glide were calculated. The numbers of relevant forms from each source are summarized in Table 3. More detailed discussion about the

³ In this study, the speakers were asked to read sentences containing the target loanword in standard orthography, where all instances of English affricates were written without the glide. The complete absence of glide-ful pronunciations may thus be attributed to the way the stimuli were presented. However, the data set viewed as a whole presents evidence of various kinds of deviations from the pronunciation expected if orthography were the sole factor, such as in the tensification of initial lenis consonants and /s/. The lack of even a single instance of a glide-ful pronunciation is thus a telling result.

⁴ I thank Professor Han Sung-Woo for generously allowing me to access this valuable list, which he compiled from original sources.

Table 3 Number of loanforms containing a posterior coronal obstruent from the four sources

	/ʃ/	/tʃ/	/dʒ/
EPK (Kang 1971; Park 1997; Han 2007a)	66	63	158
1930s (Lee 1937)	798	540	714
PDK (NIKL 1991)	285	210	215
PDK (Google, 2009)	47	74	62

data sources is found in Kang (2010a), which examined the distribution of the labial-velar glide <w> and its evolution in the same data.

Before we turn to the diachronic data, I will discuss how current normative conventions dictate these consonants to be adapted and transcribed. First, English /ʃ/ is adapted as Korean <s> before /i/ and as <sj> before other vowels. Both are pronounced as [ʃ] on the surface due to an allophonic palatalization rule in Korean (Hwang 2004; Kang 2009a, 2010b). Examples are provided in (6a). Korean does not allow fricatives in non-prevocalic position; when /ʃ/ occurs word-finally, an epenthetic vowel /i/ is inserted and when /ʃ/ occurs before /ɹ/, an epenthetic vowel /u/ is inserted, as shown in (6b). As discussed above, it is notable that sequences of a coronal fricative and /j/, not found within native morphemes (cf. ***Tj**), are nevertheless allowed in loanwords. The examples in (6) through (9) are from the guidelines on loanword transcription established by the Ministry of Education. Transcription conventions do not provide phonetic transcriptions of how these words are, or should be, actually pronounced. Phonetic representations are based on the regular application of allophonic rules of Korean to the underlying representation, as expected based on the orthographic representation.

(6) Adaptation of English /ʃ/ according to normative conventions

a.	<i>shank</i>	→	<sjæŋk ^h i>	[ʃæŋk ^h i]
	<i>shopping</i>	→	<sjop ^h iŋ>	[ʃop ^h iŋ]
	<i>fashion</i>	→	<p ^h æsjʌn>	[p ^h æʃʌn]
	<i>shim</i>	→	<sim>	[ʃim]
b.	<i>flash</i>	→	<p ^h iLLæsi>	[p ^h iʎlæʃi]
	<i>shrub</i>	→	<sjuLʌp>	[ʃurʌp]

According to convention, English /tʃ/ is adapted as Korean /tʃ^h/ and English /dʒ/ and /ʒ/ are both adapted as Korean /tʃ^h/. Similar to /ʃ/, in non-prevocalic position, an epenthetic vowel /i/ is added following these consonants. Some examples are provided in (7), (8), and (9).

(7) Adaptation of English /tʃ/ according to normative conventions

a.	<i>chart</i>	→	<tʃ ^h at ^h i>	[tʃ ^h at ^h i]
b.	<i>switch</i>	→	<sɪwɪtʃ ^h i>	[sɪwɪtʃ ^h i]

(8) Adaptation of English /dʒ/ according to normative conventions

a.	<i>virgin</i>	→	<pʌtʃin>	[pʌtʃin]
b.	<i>bridge</i>	→	<pɪLɪtʃi>	[pɪritʃi]

(9) Adaptation of English /ʒ/ according to normative conventions

- a. *vision* → <piʃʌn> [piʃʌn]
 b. *mirage* → <miLʌʃi> [mirʌʃi]

Previous descriptions of the adaptation of English affricates in the literature generally agree with normative conventions (Oh 1992; Hahn 2005; Iverson and Lee 2006; Kim 2009; Heo 2010, among others).⁵ The only divergence is on the occurrence of the palatal glide; Kim (2009) states that the affricates are adapted as simplex affricates before a front vowel and as affricate + /j/ sequences before back vowels. Shin (1998) observes that despite normative conventions and the fact that the glides are not actually pronounced on the surface, many English words with posterior coronal affricates are transcribed with <j>. As mentioned above, Shin (1998) attributes the retention of the <j> transcription to usage by speakers who are more familiar with the actual English words. We will now examine the distribution of <j> in the adaptation of English posterior coronals in the three time periods of Korean.

3.1 Distribution of <j> in EPK

During Late Middle Korean (16–17th century), /j/ was deleted following sibilants and the contrast between simplex sibilants and sibilant + /j/ sequences was lost. However, the spelling of earlier times (i.e., post-sibilant <j>) was still in use and both spellings, with or without <j>, were used interchangeably to indicate simplex sibilants regardless of whether or not the words had originally contained /j/. Examples include <saLam> ~ <sjalLam> ‘person,’ pronounced [saram]; and <ʃʌʃim> ~ <ʃʌʃjʌʃim> ‘first,’ pronounced [ʃʌʃim] (Kim 1998; Chung 1999; Park 2005). In fact, bilingual texts such as Korean textbooks for Japanese speakers and Korean-French dictionaries published during EPK specifically state that following sibilants, both <V> and <jV> spellings indicate a simplex vowel without a glide (Park 2005). Due to this lack of correspondence between spelling and pronunciation in EPK, there is some uncertainty about the intended pronunciation of transcriptions of English consonants with <j>, and this poses an interesting challenge for the interpretation of loanword data from this period. In fact, the interchangeable use of <jV> and <V> following sibilants permeated to loanword transcriptions—the English alveolar fricative /s/ was variably transcribed as <s> or <sj>, both of which

⁵ English /ʃ/ and /dʒ/ are sometimes realized as fortis obstruents in Korean in actual pronunciation, as in *fashion* [pʰʌʃʌn] and *jam* [cʰæm] (Choi 2001). Normative conventions discourage the use of fortis consonants in loanword transcriptions; thus, written forms usually do not reflect distinctions between fortis and lenis consonants in the actual pronunciation of the loanwords. The main concern of the paper is the occurrence of glides in posterior coronal obstruent adaptation so we abstract away from the issue of laryngeal adaptation.

likely actually indicated /s/ (Han 2007b). The English posterior coronal obstruents /ʃ tʃ dʒ/ were also variably transcribed with or without <j>. Examples are provided in (10) through (13).

(10) English /s/ in EPK

- a. without <j> *Sardinia* <saLtiːjnia>
Harrison <haLison>
- b. with <j> *Massachusetts* <massjatsʰjusestʰΛL>
Sudan <sjutan>⁶

(11) English /ʃ/ in EPK

- a. without <j> *Shannon* <sannon> ~ <swænon>
Fashoda <pʰasota>
- b. with <j> *Pasha* <pʰasja>
chateau <sjatʰo>

(12) English /tʃ/ in EPK

- a. without <j> *chartered* <tsʰatʰΛtiː>
Manchester <mantʰesitʰΛ>
- b. with <j> *cherry* <tsʰjeLi>
Massachusetts <massjatsʰjusestʰΛL>

(13) English /dʒ/ in EPK

- a. without <j> *budget* <patʰsestʰiː>
Johnson <tsɔnson>
- b. with <j> *New Jersey* <nwiu tsjeLsi>
Rio de Janeiro <Ljo te tsjanetʰo>

If we were to assume that loanwords used the same spelling conventions prevalent in native words at the time, we would be led to the conclusion that all English posterior coronal obstruents were adapted without /j/ in conformity with native phonotactic constraints. However, there are reasons to believe that not all cases of <j> spellings in these EPK loanwords were spurious. First, <j> occurred at a higher rate in the transcription of posterior coronals than in the transcription of the alveolar consonant /s/. Figure 1 summarizes the rates of <j> occurrence in the transcription of these consonants among cases where the following vowel could combine with <j> orthographically (i.e., /u o a Λ e æ/). Across vowel contexts, both /ʃ/ (55.0 %, $N = 40$) and the affricates (32.2 %, $N = 152$) occur with <j> at a significantly higher rate than /s/ (19.1 %, $N = 141$) (/ʃ/ vs. /s/: $\chi^2(1, N = 181) = 20.29, p < 0.0001$; affricates vs. /s/: $\chi^2(1, N = 293) = 6.52, p < 0.05$).

⁶ In RP English, a post-coronal vowel is pronounced as /ju/ in many words, where a simplex /u/ appears in GA English, as in *super* and *Zeus*. Such words are excluded from the counts based on *Oxford English Dictionary* (accessed on-line 2009) as we cannot be sure whether <j> transcription is due to the vowel or the consonant. See footnote 11 for a related discussion.

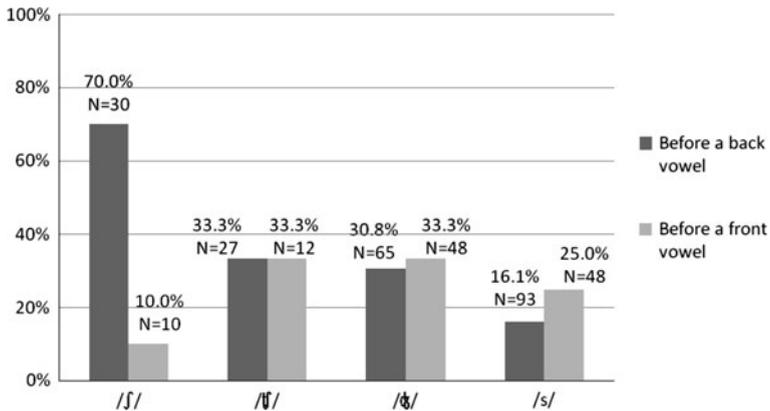


Fig. 1 The rates of <j> occurrence before back vs. front vowels allowing /j/ in the adaptation of English consonants during the Enlightenment Period

We cannot be certain as to the intended pronunciation of <sj> and <ts^(h)j> transcriptions in these loanwords in EPK—i.e., whether <sj> was realized as [ʃ], [sj], or even [s] and whether <ts^(h)j> was realized as [tʃ^(h)], [ts^(h)j], or [ts^(h)]—and it is likely that not every transcriber had the same intentions in their use of <j>. However, the substantial difference in the occurrence rates of <j> transcription for English posterior vs. anterior coronal consonants indicates that transcribers were utilizing Ø vs. <j> spellings to signal contrast between a posterior and anterior place distinction of sibilants in loanwords, albeit in a less than systematic way.

For /ʃ/ adaptation, another indication that the <j> spelling was not simply spurious is that the <j> distribution was conditioned by the backness of the following vowel. For /ʃ/ adaptation, <j> occurred mostly in back vowel contexts and there was only a single instance where <j> occurred before a front vowel.⁷ This vowel backness effect may be attributed to the native restriction *Cje in Contemporary Korean discussed in (1).⁸ The pattern found in /ʃ/ adaptation is in contrast with that found in /s/ adaptation, where the occurrence of <j> was not systematically affected by the backness of the following vowel. In fact, <j> occurred at a slightly *higher* rate before front vowels. In other words, whereas the <sj> spelling for /s/ is likely subject to random variation, the <sj> spelling for /ʃ/ likely represents an actual /j/, whose distribution is phonologically conditioned. The affricates, on the other hand, do not show any conditioning due to the following

⁷ The postalveolar fricative and affricates are also often transcribed with <w> in Contemporary Korean reflecting the lip rounding gesture present in the English input. It is possible that the vowel backness effect is merely an artifact of the restrictions against the co-occurrence of /j/ and /w/ and against the occurrence of /w/ preceding back rounded vowels (see Table 2). However, if we compare the <j> occurrence rate for /ʃ/ in front vowel contexts (10.0 %, N = 10) with the <j> occurrence rate in back unrounded vowel contexts (57.1 %, N = 14), where both /j/ and /w/ can potentially occur, the difference still persists. This is true of all vowel backness effects on <j> distribution observed in the rest of the paper.

⁸ An alternative possibility is that the conditioning environment for allophonic palatalization of /s/ was different in EPK and /s/ was palatalized before all front vowels even without <j>.

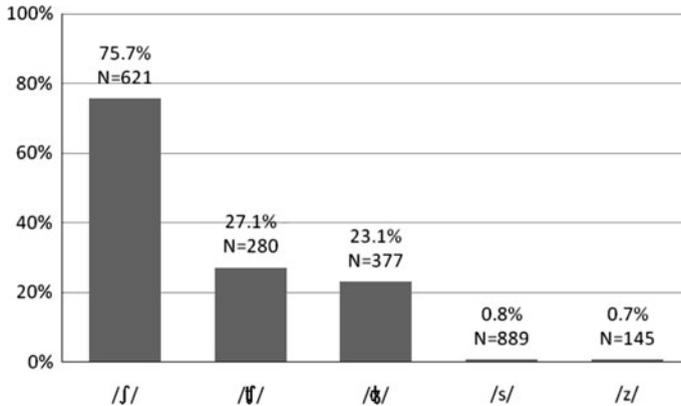


Fig. 2 The rates of <j> occurrence before vowels allowing /j/ orthographically in the adaptation of English consonants in 1930s Korean

vowel, which makes the phonological status of the <j> spelling for affricate adaptation in EPK somewhat unclear.

3.2 Distribution of <j> in 1930s Korean

By the 1930s, spelling conventions of the language had changed considerably. In the two decades following the Enlightenment Period, a series of spelling reforms intended to remove archaisms and to bring the written language closer to the actual pronunciation of the Seoul dialect were implemented, the first of which was *Pothonghakkyoyong Enmunchelcapep* (Hangul Spelling Conventions for Primary School) in 1912. *Pothonghakkyoyong Enmunchelcapep* and subsequent revisions to the conventions all dictate that post-sibilant <jV> spellings, which are actually pronounced as simplex V, be replaced with <V> (Lee 1987).

Accordingly, in Lee's (1937) dictionary, which is a compilation of material published in the 1930s, the rate of occurrence of <sj> spelling for English /s/ adaptation was negligible. There were 889 loanforms containing a word-initial /s/ followed by a vowel that could potentially combine with /j/ orthographically and there were only seven cases where /s/ was transcribed as <sj>, which amounts to a rate of less than 1%.⁹ Similarly, English /z/, which was adapted as the lenis affricate /tʃ/ in the majority of cases in Lee (1937) (cf. Kang 2009b), was transcribed with <j> in only a single case, *sympathizer* <simp^hasaitʃjʌ>, out of 145 cases where the <j> could potentially have combined with a following vowel orthographically.

⁹ In the 1930s data, all instances of *super-* are transcribed as <sj>, which is pronounced with a palatal glide in some dialects of English, including RP. Thus, these cases are not counted as instances of /s/ being transcribed as <sj>. In PDK, even though American English is the dominant influence, *super-* as in *supermarket* and *superman* is still written with <sj> more often than not (Google searches: <sjup^hʌ>: 1,680,000 vs. <sup^hʌ>: 370,000) and is variably pronounced as /sj/ or /s/ (Choi 2001). *Sofa* is another example, which was transcribed as <sj> in the 1930s data and is still frequently written with <j> in PDK (Google searches: <sjop^ha>: 94,200 vs. <sop^ha>: 244,000).

- b. before front vowels *sherry* <seLi>~<sweLi>
shepherd <sepa:t^hi>~<sepΛ:t^hi>~<sep^ha:t^hi>
 ~<sep^hΛti>~<swep^hΛ:t^hi>
- (15) English /tʃ/ in 1930s Korean
- a. before back vowels *charge* <ts^hja:tswi>~<ts^hja:tsi>~
 <ts^hja:tsi>~<ts^hwa:tsi>
charm <ts^hjaLm>~<ts^haLm>~<ts^hwaLm>
- b. before front vowels *change* <ts^hent^hsi>~<ts^hwent^hsi>~<ts^hweint^hsi>
chapel <ts^hæp^huL>~<ts^hep^huL>
- (16) English /dʒ/ in 1930s Korean
- a. before back vowels *pajamas* <p^hatsjama>~<p^hatsama> ~
 <p^hatsjama>~<p^hatsama>
joker <ts^hjo:k^hΛ:>~<ts^ho(:)k^hΛ:>
- b. before front vowels *jelly* <ts^heLi>
Japan <ts^hæp^hæn>~<ts^hæp^hΛn>

To summarize, by the 1930s, the spurious use of <j> in post-sibilant position is mostly eliminated in both native and loanword transcriptions. In loanwords, the <j> transcription was restricted to the adaptation of English posterior coronal consonants /ʃ tʃ dʒ/ but absent in the adaptation of anterior coronal consonants /s z/. For /ʃ/, the <j> transcription likely signaled an actual surface contrast in pronunciation, while for /tʃ dʒ/ transcriptions, <j> was not likely realized perceptibly, if at all.

3.3 Distribution of <j> in PDK

The distribution of the <j> transcription in PDK was examined in the NIKL (1991) data, which mainly reflect normative orthographic conventions, and in *Google* searches (2009), which are less constrained by normative conventions.

Figures 3 and 4 summarize the rates of occurrence of <j> for each consonant in PDK. For /ʃ/ adaptation, the combined rate of occurrence of <j> increased further, from 75.7 % in the 1930s to 86.9 % (*Google* 2009) and 97.1 % (NIKL 1991), whereas the occurrence rate of <j> for affricates decreased slightly from above 20 % in the 1930s to below 20 % in *Google* searches (2009) and more drastically to below 5 % in NIKL (1991) data. It is notable, however, that despite the normative conventions, <j> continues to persist at a non-negligible rate in the *Google* data. The distribution of <j> in affricate adaptation continues to show sensitivity to the backness of the following vowel; this is in agreement with Kim (2009). For the affricates, <j> is categorically absent before front vowels. In short, as in previous time periods, in PDK, the <j> in affricate adaptation occurs more frequently than would be expected if it were purely an alternative spelling of the simplex affricate and also shows sensitivity to the backness of the following vowel.¹¹

¹¹ The persistence of <j> transcription in affricates is also in contrast to the near categorical disappearance of <w> in affricate transcription in the same sounds in PDK (Kang 2010b).

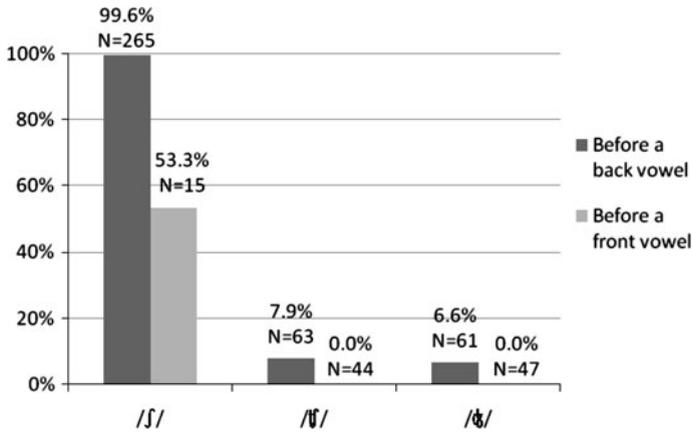


Fig. 3 The rates of <j> occurrence before back vs. front vowels allowing /j/ in the adaptation of English consonants in PDK (based on NIKL 1991)

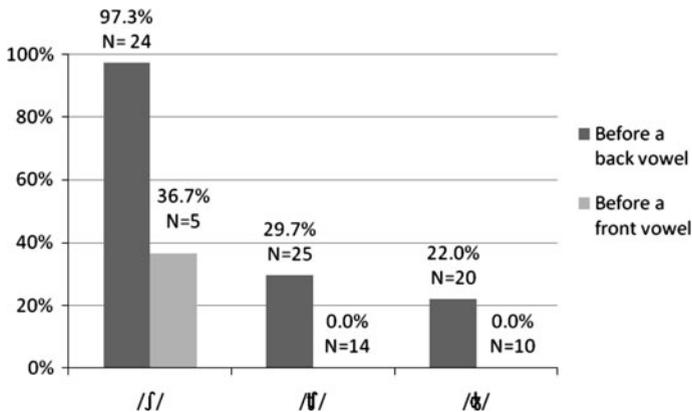


Fig. 4 The rates of <j> occurrence before back vs. front vowels allowing /j/ in the adaptation of English consonants in PDK (based on Google searches 2009)

As reviewers point out, the overall rate of the <j>-spelling is fairly low in PDK and given the general downward trajectory of the <j> transcription, one would like to see more evidence that the current <j>-ful spellings in PDK are not simply remnants of <j>-spellings from previous time periods. In principle, we can look for evidence of the productivity of <j>-spelling by examining the transcription of loanwords that entered the language more recently. However, given the prevalent use of English loanwords even in the 1930s, there are few words, if any, that we can identify as recent loanwords for certain. For example, the name of a popular Korean boy band, *Super Junior*, officially spelled as <ʃʌniʌ> but also often spelled as <ʃʌjʌniʌ>, is certainly a new coinage but it is made up of component words that are

already well attested in 1930s Korean. Similarly, *George Clooney* spelled as <ʧsoʧsi> or <ʧsjotʧsi> may be a new import but *George* is likely not novel.

Again, we can put the rate of <j> occurrence in affricate adaptation in context by comparing it with the rate of <j> occurrence in alveolar fricative adaptation. In NIKL (1991), there were no examples of alveolar fricatives /s z/ adapted with <j>. We also conducted *Google* searches of 28 English loanwords with /z/ before various vowels that may co-occur with <j> (i.e., /a o u e æ ʌ/) and found that <ʧsj> spellings were attested at a negligible rate (<1 % for most words except when the following vowel was /ə/, which is adapted as /ʌ/ of Korean. For example, *advisor* is spelled as <ʌʧiʧpaiʧʌ>, but also as <ʌʧiʧpaiʧsjʌ> frequently. *Advertiser* (25.4 %), *bulldozer* (9.8 %), *buzzer* (4.2 %), *desert* (31.8 %), and *razor* (18.5 %) are examples that show a high rate of palatal transcription. This peculiar distribution of <j> in /z/ transcription is likely due to the fact that in native words, affricate + <j> transcription only arises in limited morpho-phonological environments (cf. (3)), and /ʌ/ is essentially the only vowel context where the affricate + <j> spelling is frequently used in native words. Affricate + <j> spelling is also possible in a contracted form of /ʧʌ æ/ 'that kid' (<ʧsjæ>, pronounced [ʧsæ]) and in the contracted form of /-ʧsi-jo/ 'SUPPOSITIVE (verbal ending)' (<ʧsjɔ>, pronounced [ʧso]) in native words. However, these contractions are optional casual speech phenomena and are rarely written as such.

As mentioned above, the affricate + /j/ sequences are pronounced as perceptually indistinguishable from simplex affricates in native words (cf. Kang 2009a) and before /ʌ/, and only before /ʌ/, both affricate + <j> and affricate transcriptions are frequently used to represent simplex affricates in native words. For example, /kaʧsi-ʌ/ 'to own' and /taʧʰi-ʌ/ 'to get hurt' are spelled as <kaʧsjʌ> and <taʧʰsjʌ>, respectively, and are pronounced as [kaʧʌ] and [taʧʰʌ]. In other words, as affricate + <j> sequences are already frequently used to represent a surface sequence of simplex affricate + [ʌ] in native words, this transcription carries over to the transcription of simplex affricates, which correspond to English /z/, in loanwords. No such restriction to /ʌ/ is found in the palatal transcription for /ʧʤ/ adaptation, which is attested for all back vowels. The rise of this novel use of <j> in /z/ transcription may be an indication that the <j> transcription in loanwords is undergoing a reanalysis in PDK, as a marker of foreignness. We leave this issue for future research.

To summarize, in Contemporary Korean, although the rate of occurrence of <j> for affricates remained relatively low compared to the rate in /ʃ/ adaptation, it was consistently higher than the rate of occurrence of the spurious <j> found in alveolar fricative adaptation in each time period. The distribution of the palatal glide is also sensitive to the restriction *Cje, except in EPK, indicating that the palatal glide transcription reflects phonological reality. Also noticeable are some diachronic trends (cf. Fig. 5). The rate of occurrence of <j> for /ʃ/ adaptation increased over time and concurrently, the native restriction against fricative + /j/ has also relaxed over time (cf. (2) and (3)). However, the rate of occurrence of <j> for the affricate adaptation, which is not supported by a surface contrast, did not increase but rather decreased over time. Figure 5 provides a summary.

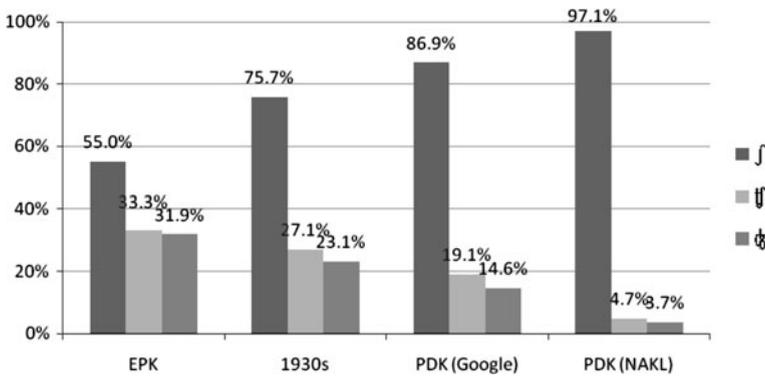


Fig. 5 The (average) rates of <j> occurrence in the adaptation of English /ʃ/, /tʃ/, and /dʒ/ in different time periods of Contemporary Korean

4 Discussion

I established that the palatal transcription in affricate adaptation in Contemporary Korean is not merely an orthographic oddity but reflects phonological reality by demonstrating that it occurs at a substantial rate despite normative conventions against it and that its distribution shows phonological conditioning. In this section, I briefly review studies on the phonetics of the affricates of English and Korean to consider the phonetic difference between them that motivates the palatal glide transcription (4.1). Then I discuss the implications of the data on the general model of loanword adaptation (4.2).

4.1 Phonetics of English and Korean affricates

The place of articulation of Korean affricates has been a topic of much discussion in the literature on Korean phonetics and phonology. A commonly held view in the literature has been that the affricates were dental in the 15th century and then changed to a posterior coronal place (i.e., palatal or postalveolar) in subsequent centuries in most dialects of Korean (Lee 1972, 1978, 1999; Sohn 1987; Cho 1990; Ahn 1998; Kang 2006, 2009a, among others). However, a number of articulatory studies, based on various instrumental techniques, including X-ray (Skalicková 1960), static palatography (Kim 1999, 2001; Anderson et al. 2003), MRI (Kim 2004), and electropalatography (Shin 1997; Baik 2003; Kang and Kochetov 2010), have found that Korean affricates are in fact lamino-(denti-)alveolar with the constriction variably extending to the postalveolar region. These studies found that for most speakers, the constriction location of affricates was similar to that of anterior coronal stops and/or fricatives, although the former tend to be slightly more posterior than the latter. In particular, Kang and Kochetov (2010) found that the constriction location for affricates was more anterior than that for the postalveolar fricative [ʃ], found as an allophone of /s/ before /i/ and /j/ in Korean.

English affricates /tʃ dʒ/, on the other hand, are usually described as postalveolar, and electropalatographic studies consistently find that the constriction location of English affricates is more posterior than anterior coronal stops or fricatives (Fletcher 1989; Mair et al. 1996; Liker et al. 2007). Also, the frication portion of the affricates shows a constriction location similar to the postalveolar fricative /ʃ/ (Fletcher 1989).

Acoustic data can be interpreted in the same vein. According to Kim (2001), the frequency of the release burst and frication noise was higher for Korean affricates than for English postalveolar obstruents as described in Stevens (2000). This acoustic difference may be due to the difference in the constriction location between English postalveolar affricates—i.e., more anterior constriction for Korean affricates than English affricates—and Korean alveolar affricates and also due to the lip rounding that accompanies English affricates, which lowers the frequency of frication noise.

Studies on interlanguage perception of English affricates by Korean speakers show that English affricates are, in general, perceived as similar to Korean affricates (Schmidt 1996; Park and de Jong 2008). However, these studies provided single consonant symbols as options in the perceptual mapping task and affricate + <j> sequences were not available as an option. Therefore, these studies are not informative in determining whether the subtle difference in the constriction location may give rise to mapping of English affricates to Korean affricate + <j> sequences. In a study of English speakers' perception of Korean affricates, Schmidt (2007) found that native speakers of English transcribe Korean affricates as *alveolar* stops at a non-negligible rate (/tʃ/: 13 %, /tʃʰ/: 39 %, /tʃʰ/: 18 %), which suggests that the place of articulation of Korean affricates is perceived as not as posterior as that of the English affricates.¹²

Given this difference in place of articulation of Korean and English affricates, it is plausible that the <j> transcription is a reflection of the more posterior characteristics of English affricates, parallel to the addition of <j> in the adaptation of the English postalveolar fricative /ʃ/.

To summarize, previous studies on the phonetics of the affricates of the two languages and their interlanguage perception suggest that the affricates of the two languages are different in their phonetic realization. In short, what we know about the phonetics of these consonants is at least compatible with the view that the persistence of the <j> transcription in affricate adaptation has a phonetic basis. The intuition that the <j> transcription is more likely to be used by adapters with knowledge of English (Shin 1998) is consistent with this explanation.

As a reviewer points out, the fact that affricates cannot co-occur with [j] while stops and fricatives can in PDK suggests that the affricates are patterning as posterior coronals phonologically (Kang 2009c). Acoustically, Pyo et al. (1999) and Hwang (2004) found that the affricates consistently had lower frequency frication noise than the alveolar fricatives, comparable to that of postalveolar allophones of alveolar fricatives. Also Kim (2001) found that the F₂ transition was systematically higher for the affricates than for the alveolar fricatives and stops of Korean, which is

¹² Another interpretation of these perception results is that Korean affricates have a relatively shorter frication portion than in English making them more stop-like (cf. Sohn 1999).

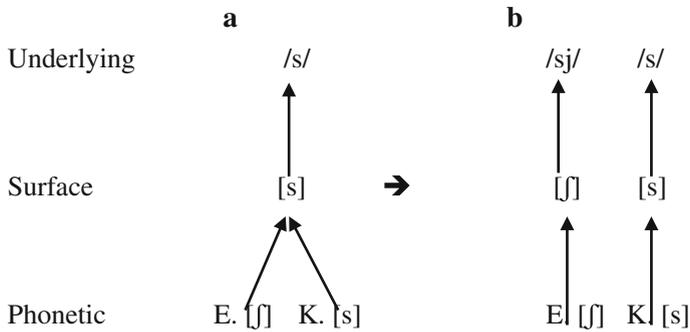


Fig. 6 Surface structure-mediated importation of [s] vs. [ʃ] contrast

indicative of a higher and fronter tongue body position for the affricates. The emerging picture is that Korean affricates are more posterior than alveolar stops and fricatives of Korean but not as posterior as English postalveolar affricates, and these intermediate phonetic characteristics give rise to the complex patterning of Korean affricates in loanwords and native phonotactics. A controlled experimental study that directly compares the affricates of the two languages and examines the link between the phonetic difference and the palatal transcription in adaptation is necessary to evaluate this proposal.

4.2 L1 phonotactics and perceptual adaptation

The palatal glide in English affricate transcription poses an interesting challenge for a model of loanword adaptation that assumes that the adaptation is mediated by the surface phonotactic representation. Peperkamp, et al. (2008) and Boersma and Hamann (2009) propose that perceptual assimilation plays a central role in loanword adaptation; namely, loanword adaptation is essentially perception of foreign language phonetic input in terms of the L1 perception mechanism. In these models, the mapping of L2 signals to the L1 structure is mediated by the “phonological surface form” of the L1; in other words, an L2 input is mapped to the licit L1 surface structure that has the most similar phonetic realization.¹³

As importation of novel structure that is previously not attested in L1 via loanwords is a common phenomenon, any model of loanwords needs flexibility to allow importation or non-adaptation of foreign structure into the system. For example, in the case of the adaptation of English /ʃ/ to Korean /sj/ (realized [ʃ]), the loanwords introduced a new contrast (between /s/ vs. /sj/) that was not available in the native phonology of early Contemporary Korean. /ʃ/ is initially adapted as /s/ frequently but subsequently more faithful adaptation as /sj/ becomes dominant,

¹³ Similarly, Kim (2009) proposes a model of loanword adaptation where acoustic cues are extracted from the source language acoustic signal and mapped to “a sequence of syllabified distinctive feature bundles stored in long-term memory”, which is in turn mapped to “L1 lexical representation”. Kim (2009) is not explicit as to whether this perception mechanism allows the perception of structure that is not allowed in the native phonological surface form.

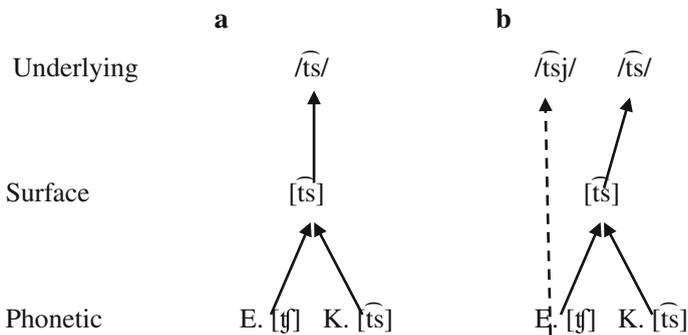


Fig. 7 Surface structure-mediated adaptation of English affricates to Korean

which has a surface realization distinct from /s/, thereby expanding the inventory of the surface (and underlying) contrast in the L1 phonology.

Figure 6 schematically represents how these adaptations may be envisioned in the models proposed by Peperkamp, et al. (2008) and Boersma and Hamann (2009). Figure 6a illustrates the mapping of English /ʃ/ to Korean /s/, which was the common pattern in early Contemporary Korean. Here, there is no surface contrast of [s] and [ʃ] in the native language and the English phonetic input of [s] and [ʃ] are both “perceived” as [s], which is then mapped to the lexical representation of /s/. Figure 6b illustrates the case of importation, where the surface and underlying contrast is expanded to accommodate the new contrast introduced by the loanwords, and English /ʃ/ and /s/ map to two distinct Korean surface and underlying representations.

Such cases of surface-mediated importation are not necessarily a problem for surface-mediated models of loanword adaptation as the perceptual distinction is supported by the expanded surface contrast. However, the palatal glide in affricate adaptation presents a different kind of challenge because it is a case where loanwords introduce a covert contrast without an overt surface realization. Under a surface structure-mediated model of adaptation, the input English affricate should be matched to the surface Korean affricate as there is no surface sequence of affricate + [j] in Korean, as illustrated in Fig. 7a. Once the foreign input is filtered through the sieve of surface phonotactics, there is no reason to expect the English affricate to be assigned an underlying representation any different from that of native Korean affricates.

The mapping in Fig. 7a works well for the majority of cases of English affricate adaptation but not for those cases of adaptation where the adapter posits an underlying contrast between /ts^(h)j/ (corresponding to English affricates) and /ts^(h)/ (corresponding to native affricates). We need an alternate route of adaptation (cf. Fig. 7b) where the perceived contrast is represented in the underlying representation without being mediated by a surface contrast.

Such covert contrast in loanword adaptation may turn out to be more common than one may think. Kang (2012) examined the diachronic development of word-

initial liquid adaptation in English loanwords in Contemporary Korean. In the native phonology, a liquid is not allowed word-initially but in loanwords, initial liquids are exceptionally allowed. In written loanword data, the English initial liquids are transcribed as a liquid phoneme <L> of Korean almost categorically throughout Contemporary Korean, and a cross-language perception study shows that Korean speakers indeed perceive initial liquids of English as the Korean liquid categorically (Schmidt 1996). However, Kang (2012) shows that there is evidence to suggest that these liquids are often produced as a nasal, especially in early Contemporary Korean and even in the speech of some younger speakers of PDK, in line with the native phonotactic restriction. This is a case where an English initial liquid is perceived as such even though the native phonotactics do not fully support it. In fact, it is plausible that many if not all cases of importation of novel contrast through loanwords may undergo a similar intermediate stage where the foreign sound is perceived as distinct from any of the licit native surface forms without it being produced as distinct.

However, a novel contrast that is unsupported by the surface contrast is likely to be unstable and not easy to detect, unless the orthography happens to afford a means of representing it, as is the case with the current example. Therefore, not surprisingly, such adaptation of a covert contrast, which is perceived but not produced, is not likely to be sustained unless the contrast develops into a surface contrast. Thus, the fact that the palatal transcription in affricate adaptation in Contemporary Korean (Fig. 5) did not increase over the years, unlike the palatal transcription in fricative adaptation, is not surprising.¹⁴

The current study also demonstrates the potential value of orthography as a source of data unavailable from the spoken language. In the phonological literature, and particularly in loanword phonology, orthography is often mentioned as a grammar-external influence that should be factored out to get at the speakers' actual grammar. While it is certainly the case that the influence of normative spelling conventions is a major complicating factor, spontaneous transcriptions of native speakers that defy normative conventions and persist through a century or more are certainly telling us something that is no less valuable than experimental data collected from a laboratory setting. As Sapir (1933) pointed out, native speakers' orthographic transcriptions can reveal latent sounds that are phonetically unrealized but nevertheless psychologically real.¹⁵

¹⁴ One of the factors that could have contributed to the slight decline of <j> transcription in affricate adaptation is the diachronic change in the place of articulation of Korean affricates from a more anterior to a more posterior place (more similar to English affricates). However, there is no systematic phonetic study on the diachrony of the affricate place of articulation in Contemporary Korean and existing studies make conflicting conjectures about the change (Choi 1978; Chung 2002; Anderson et al. 2003; Kook et al. 2007). Thus, we leave this question for future study.

¹⁵ I would like to thank Michael Kenstowicz for pointing out the relevance of Sapir (1933[1949]) to this discussion.

5 Conclusion

In this study, we examined the distribution of the palatal glide in the adaptation of English affricates in Contemporary Korean. It is suggested that the palatal transcription is a reflection of a perceived difference in place of articulation between English and Korean affricates. This is a particularly interesting case to study because the contrast marked in the orthography is not contrastively realized in the surface pronunciation. Based on a survey of corpora, it was demonstrated that the palatal transcription is attested at a non-negligible rate throughout Contemporary Korean despite the normative conventions against it and despite the surface neutralization. It is suggested that while the models of loanword adaptation where the L1 to L2 mapping is mediated by the surface phonotactic restriction of the L1 is for the most part successful in accounting for the majority of data, the cases of a covert contrast present a problem. Finally, the value of written data as a source of evidence for a covert contrast was discussed.

Acknowledgments I would like to thank anonymous JEAL reviewers and Michael Kenstowicz for invaluable comments. I would also like to thank David Go, Sohyun Hong, Yeonsoo Kim, Pheba Ninan, and Seung-Joon Park for their assistance in the coding of the loanword data reported in this paper and Bethany MacLeod for proofreading the paper. Thanks also to the audiences at the *Toronto-Tromsø Phonology Workshop* (Toronto, 2009) and the 2010 *Spring Conference on General and Applied Linguistics* organized by the *Modern Linguistic Society of Korea* and the *Joongwon Linguistic Society of Korea* (Cheongju, Korea, 2010), where aspects of the study reported in the current paper were presented. This study was supported by a Connaught Start-up Award from the University of Toronto and Ontario Work Study Program.

References

- Ahn, Sang-Cheol. 1998. *An introduction to Korean phonology*. Seoul: Hanshin Publishing Co.
- Anderson, Victoria, Insung Ko, and William O'Grady. 2003. A palatographic investigation of place of articulation in Korean coronal obstruents. *Korean Linguistics* 12: 1–24.
- Baik, Woonil. 2003. On the place of articulation of the Korean lenis affricate. *Speech Sciences* 10(2): 281–285.
- Best, Catherine T. 1995. A direct realist view of cross-language speech perception. In *Speech perception and linguistic experience: Issues in cross-language research*, ed. Winifred Strange, 171–206. Timonium, MD: York Press.
- Boersma, Paul, and Silke Hamann. 2009. Loanword adaptation as first-language phonological perception. In *Loan phonology*, ed. Andrea Calabrese, and W. Leo Wetzels, 11–53. Amsterdam: John Benjamins.
- Cha, Jae-Eun, and Byoung-Seob Ahn. 2004. Swuuycek hwalum thallakey tayhan umseng, umwunloncek kochal [A phonological and phonetic study on optional glides deletion in Korean]. *Wuriemunjenkwu* 23: 279–303.
- Cho, Young-Mee Yu. 1988. Syllable structure conditions in Korean and the OCP. In *Papers from the sixth international conference on Korean linguistics*, ed. Eung-Jin Baek, 107–117.
- Cho, Young-Mee Yu. 1990. Parameters of consonantal assimilation. PhD diss., Stanford University.
- Choi, Hye-Won. 2001. *A survey of the pronunciation of loanwords* [Oylaye palum silthay cosa]. Seoul: The National Institute of the Korean Language.
- Choi, Hye-Won. 2002. *A survey of the standard pronunciation* [Phyocwun palum silthay cosa]. Seoul: The National Institute of the Korean Language.
- Choi, Se-Hwa. 1978. Hankwuke machalum phachalumuy coum thukcil [The articulatory characteristics of Korean fricatives and affricates]. *Kwukewukmunhak* 78: 41–56.

- Chung, Kil-Nam. 1999. *Kayhwaki kyokwaseuy wulimal yenkwu* [The study of Korean in the Enlightenment Period textbooks: Revised edition]. Seoul: Pakiceng.
- Chung, Myeng-Sook. 2002. Umseng calyoeu nathanan kwukeuy sacek pyenchen [Diachronic changes in Korean evidence by acoustic data]. In *Umseng ene calyowa kwuke yenkwu* [Acoustic data and research in Korean], ed. Center for the Study of Korean Culture, Korea University, 67–159. Seoul: Welin.
- Dupoux, Emmanuel, Christopher Pallier, Kazuhiko Kakehi, and Jacques Mehler. 1999. Epenthetic vowels in Japanese: A perceptual illusion? *Journal of Experimental Psychology: Human Perception and Performance* 25: 1568–1578.
- Fletcher, Samuel G. 1989. Palatometric specification of stop, affricate and sibilant sounds. *Journal of Speech and Hearing Research* 32: 736–748.
- Hahn, Jeewon. 2005. An analysis of English loanwords in Korean. *Working papers in linguistics, University of Hawai'i at Mānoa Honolulu* 36(4).
- Hallé, Pierre A., Juan Segui, Uli Frauenfelder, and Christine Meunier. 1998. Processing of illegal consonant clusters: A case of perceptual assimilation? *Journal of Experimental Psychology: Human Perception and Performance* 24: 592–608.
- Han, Sung-Woo. 2005. Pothonghakkyo cosenetokpon umsengcalyoeu tayhan umwunloncek yenkwu [Phonological study of the acoustic data from Pothonghakkyo cosenetokpon]. *Emunyenku* 33: 29–58.
- Han, Sung-Woo. 2007a. A list of loanwords in Enlightenment Period (1896–1910). Unpublished list.
- Han, Sung-Woo. 2007b. Kayhwaki sinmunuy oylaye phyokiey tayhan umwunloncek yenkwu [A phonological study on loanwords in Enlightenment Period (1896–1910)]. *Kwukmunhak* 95: 281–309.
- Heo, Younghyon. 2010. Vowel insertion as perceptual intrusion in loanword adaptation. PhD diss., University of Wisconsin-Milwaukee.
- Hong, Yunsook. 1988. A sociolinguistic study of Seoul Korean. PhD diss., University of Pennsylvania.
- Hong, Yunsook. 1994. The monophthongization phenomenon attested in broadcasting language. *Sociolinguistics* 2: 1–19.
- Hwang, Hyun Kyung. 2004. Spectral characteristics of frication noise in Korean sibilants. *Malsori* 49: 31–50.
- Iverson, Gregory K., and Ahrong Lee. 2006. Perception of contrast in Korean loanword adaptation. *Korean Linguistics* 13: 49–87.
- Kang, Hyeon-Seok. 1997. Phonological variation in glides and diphthongs of Seoul Korean: Its synchrony and diachrony. PhD diss., Ohio State University.
- Kang, Hyunsook. 2010a. Coarticulation effects of Korean sibilant fricative /s/ in various contexts. Ms., Hanyang University.
- Kang, Kyung-Shim. 2006. Are the Korean affricates alveolars or palatoalveolars?: Evidence from speech errors and loanwords. *Studies in Phonetics, Phonology and Morphology* 12(3): 431–451.
- Kang, Kyung-Shim. 2009a. A phonetic account of Korean affricates: Neutralization with a palatal glide. *Speech Sciences* 16(1): 169–186.
- Kang, Yoon-Ho. 1971. *Kayhwaki kyokwase toseey nathanan oylaye phyoki silthayey kwanhan yenkwu* [A study on the foreign word transcription in textbooks published during the Enlightenment Period]. Seoul: Korean Culture Research Institute, Ewha Womans University.
- Kang, Yoonjung. 2009b. English /z/ in 1930s Korean. In *The Simon Fraser University working papers in linguistics 2, proceedings of the 2nd international conference on East Asian Linguistics*, ed. David Potter and Dennis Ryan Storoshenko.
- Kang, Yoonjung. 2009c. A diachronic study of yod-dropping in Korean: A loanword connection. Paper presented at the Torontø-Tromsø phonology workshop, University of Toronto, Oct. 9–11, 2009.
- Kang, Yoonjung. 2010b. The emergence of phonological adaptation from phonetic adaptation: English loanwords in Korean. *Phonology* 27(2): 225–253.
- Kang, Yoonjung. 2012. The adaptation of English liquids in Contemporary Korean: A diachronic study. *Catalan Journal of Linguistics* 11: 41–63.
- Kang, Yoonjung, and Alexei Kochetov. 2010. An EPG study of Korean coronal obstruents. Paper presented at MOT phonology workshop, March 12–14, 2010. Carleton University.
- Kim, Dong-So. 1998. *Hankwuke pyenchensa* [The history of the Korean language]. Seoul: Hyengsel Publishing Co.

- Kim, Hyunsoon. 1994. Sonority-based conditions on the OCP: Evidence from Korean and other languages. In *Theoretical issues in Korean linguistics*, ed. Young-Key Kim-Renaud, 115–132. Stanford: Center for the Study of Language & Information.
- Kim, Hyunsoon. 1999. The place of articulation of Korean affricates revisited. *Journal of East Asian Linguistics* 8: 313–347.
- Kim, Hyunsoon. 2001. The place of articulation of the Korean plain affricate in intervocalic position: An articulatory and acoustic study. *Journal of the International Phonetic Association* 31: 229–257.
- Kim, Hyunsoon. 2004. Stroboscopic-cine MRI data on Korean coronal plosives and affricates: Implications for their place of articulation as alveolar. *Phonetica* 61: 234–251.
- Kim, Hyunsoon. 2009. Korean adaptation of English affricates and fricatives in a feature-driven model of loanword adaptation. In *Loan phonology*, ed. Andrea Calabrese, and W. Leo Wetzels, 155–180. Amsterdam: John Benjamins.
- Kim, Yoo-Beom. 2000. Hyentaekwuke umwunlonuy thongsicek comang [A diachronic examination of the phonology of Contemporary Korean]. In *Hyentay kwukeuy hyengsengkwa pyenchen* [The formation and changes of Contemporary Korean 1], ed. Jong-Sun Hong, 61–86. Seoul: Pakiceng.
- Kook, Kyounga, Eunji Kang, and Juwon Kim. 2007. Hyentay hankwuke phachalumuy coumcem cencin hyensangey tayhan yenkwu [The study of advanced articulation of the Korean affricates]. In *Proceedings of the 2007 meeting of the Korean Society of Speech Sciences*, 247–250.
- Lee, Eung-Baek. 1987. Ilceng sitayuy kwuke phyokipep [The orthographic convention of Korean during the Japanese Occupation Period]. *Kwukesayngghwal* 9: 49–59.
- Lee, Hyun-Bok. 1999. *Handbook of the International Phonetic Association: A guide to the use of the International Phonetic Alphabet: Korean*. Cambridge: Cambridge University Press.
- Lee, Jong-Keuk. 1937. *Moten cosen oylaye sacen* [Modern Chosun loanword dictionary]. Seoul: Hansung Toseo Cusikhwesa.
- Lee, Ki-Moon. 1972. *Kwuk-e Um-wun-sa Yen-kwu* [A study of Korean historical phonology]. Seoul: Tower Press.
- Lee, Ki-Moon. 1978. *Kwuk-e-sa Kay-sel* [Introduction to the history of the Korean language]. Seoul: Tower Press.
- Liker, Marko, Fiona E. Gibbon, Alan Wrench, and Damir Horga. 2007. Articulatory characteristics of the occlusion phase of /t/ compared to /t/ in adult speech. *International Journal of Speech-Language Pathology* 9(1): 101–108.
- Mair, Sheila J., Celia Scully, and Christine H. Shadle. 1996. Distinctions between [t] and [tS] using electropalatographic data. In *ICSLP 96, Proceedings of the 4th international conference on spoken language processing*, 1597–1600.
- Massaró, Dominic W., and Michael M. Cohen. 1983. Phonological context in speech perception. *Perception & Psychophysics* 34: 338–348.
- National Institute of the Korean Language. 1991. *Oylaye Sayong Silthay Cosa: 1990 A report on the current usage of loanwords: 1990*. Seoul: The National Institute of the Korean Language.
- Oh, Mira. 1992. Palatal consonants, labial consonants, and vowel epenthesis in Korean loanword phonology. *Linguistic Journal of Korean* 17: 141–161.
- Oxford English Dictionary Online. 2009. <http://oed.com/>.
- Park, Hanyong, and Kenneth J. de Jong. 2008. Perceptual category mapping between English and Korean prevocalic obstruents: Evidence from mapping effects in second language identification skills. *Journal of Phonetics* 36: 704–723.
- Park, Kee-Young. 2005. *Kayhwaki hankwukeuy umwun yenkwu-ilponeyse kanhayngtoyn hankwuke haksupselul cwungsimulo* [The phonology of Enlightenment Period Korean: Based on the Korean textbooks published in Japan]. PhD diss., Seoul National University.
- Park, Young-Seop. 1997. *Kayhwaki kwuke ehwicalyocip 5: Oylayephyen* [Words of Enlightenment Period Korean 5: Loanwords]. Seoul: Pakijeong.
- Peperkamp, Sharon, Inga Vendelin, and Kimihiro Nakamura. 2008. On the perceptual origin of loanword adaptations: Experimental evidence from Japanese. *Phonology* 25: 129–164.
- Pyo, Hwa-Young, Joo-Hwan Lee, Hung-Hee Choi, Hyun-Sup Sim, and Hong-Sik Choi. 1999. An acoustic and aerodynamic study of Korean fricatives and affricates. *Speech Sciences* 6: 145–161.
- Sapir, Edward. 1933 [1949]. The psychological reality of the phoneme. In *Selected writings of Edward Sapir in language, culture and personality*, ed. D.G. Mandelbaum, 46–60. Berkeley: University of California Press. (Originally published in French in 1933.)
- Schmidt, Anna Maria. 1996. Cross-language identification of consonants. Part 1. Korean perception of English. *Journal of the Acoustical Society of America* 99: 3201–3211.

- Schmidt, Anna Maria. 2007. Cross-language consonant identification: English and Korean. In *Language experience in second language speech learning: In honor of James Emil Flege*, ed. Ocke-Schwen Bohn, and Murray J. Munro, 185–200. Amsterdam: John Benjamins.
- Shin, Jiyoung. 1997. Consonantal production and coarticulation in Korean. PhD diss., University of London.
- Shin, Seung-Yong. 1998. Umcelhwawa Hwalum(/w/, /y/)uy Umwunloncek sengkyekey kwanhaye [Syllabification and the phonological characteristics of the glides /y/ and /w/]. *Seokang Emun* 14: 21–52.
- Silva, David James, and Wenhua Jin. 2008. The merger of non-high front vowels in Korean: Mission accomplished. Paper presented at the 16th international conference on Korean linguistics.
- Skaličková, Alena. 1960. *The Korean consonants*. Prague: CSAV, Rozprawy.
- Sohn, Ho-Min. 1999. *The Korean language*. Cambridge: Cambridge University Press.
- Sohn, Hyang-Sook. 1987. Underspecification in Korean phonology. PhD diss., University of Illinois at Urbana-Champaign.
- Stevens, N. Kenneth. 2000. *Acoustic phonetics*. Cambridge: MIT Press.
- Warner, Natasha, Allard Jongman, Joan Serena, and Rachel Kamps. 2004. Incomplete neutralization and other sub-phonemic durational differences in production and perception: Evidence from Dutch. *Journal of Phonetics* 32: 251–276.