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## What Do Korean Speakers Learn about English Fricatives?

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### 1. Introduction

This study investigates the possibilities for Korean learners acquiring English oral fricatives based on the second language theory of Brown (1997). Since Korean has only two fricatives (excluding the consideration of /h<sup>1</sup>) – lax /s/ and tensed /s'/ (DY Lee 1998; HM Sohn 1999; I Lee and Ramsey 2000) - we expect problems to occur when Korean speakers are learning the eight English fricatives (/f/, /θ/, /s/, /ʃ/, /v/, /ð/, /z/, /ʒ/). Unlike stops, which have a three-way distinction (plain, tense, aspirated), Korean fricatives maintain only a two-way distinction (plain, tense). The two-way distinction in Korean fricatives does not correspond to the glottal width contrast in English fricatives (Avery & Idsardi; 2001). The plain /s/ and tensed /s'/ have neither manner nor place contrasts. Following Avery and Idsardi, we assume the small difference in glottal width in Korean fricatives is not significant. The main contrastive difference between the two Korean fricatives is length. Because of this, the principle of initial mapping for several English fricatives is to the shorter one, /s/, not /s'/.

There are at least three major stages in second language (L2) acquisition. Our methodology in this paper will be to idealize the acquisition process. For the initial stage, the first language (L1) loan word data will be employed as a model. That is, the initial stage may be approximated by the loan word data observation. The final stage, which is our main interest in the present study, is represented by our observations for the end points of Korean including fossilization. At the present stage, studies are lacking for the intermediate stages. Thus, we will ignore such stages in this paper by idealizing into Chomsky's idea of "instantaneous acquisition" (Chomsky, 1975).

From the loan word data we observe various ways of mapping which Korean speakers use in adopting English fricatives into Korean system.

<sup>1</sup> English /h/ maps to Korean /h/ with no difficulty because they share the same features – [aspirated, glottal, fricative]. Consequently we will dismiss /h/ in the present paper.

In the present paper we focus on English voiceless fricatives and how they are mapped in Korean grammar. Furthermore, we examine the possibilities of Korean speakers learning English fricatives by introducing three analyses, which lead to different second language (L2) acquisition predictions.

In section 2 of this paper, we will first review the fricative systems of both English and Korean. We will also introduce the L2 theory related to the features, which serves as the base for the three analyses. Section 3 is devoted to the three phonological analyses for Korean fricative system. Next, a discussion of the three analyses based on the L2 theory of feature accessibility is followed. The following section provides more proofs and information about which of the three analyses best fit for Korean speakers learning English fricatives, including the phenomena of chain shift effect displayed by the Korean learners. Finally, a conclusion for the best analysis and some implications for further studies are presented in section 6.

### 2. A Review of English and Korean System

Table 1 shows the phonological and broad phonetic features of the English obstruents, which will be the focus of this paper. There are four voiceless fricatives (excluding /h/) in English inventory. The posterior stop, /k/, is also implemented as an affricate. Redundant features are enclosed in parentheses. We are interested in *if* (whether) and *how* Korean speakers will learn the four English voiceless fricatives.

	Labial	Coronal		Velar	
		(Plain)	Strident		
		(Anterior)	Posterior		
Stop	p	t		ç	k
Fricative	f	θ	s	ʃ	

Table 1: English Voiceless Obstruents

Table 2 gives the *phonetic* descriptions of the Korean plain obstruents inventory. As can be seen from table 2, Korean has only one plain fricative /s/ in its inventory.

	Labial	Coronal		Velar
		(Plain)	Strident	
		(Anterior)	Posterior	
Stop	p	t		k
Fricative			s	
Affricate				c

Table 2: Korean Plain Obstruents

A continuing question in Korean phonology is the correct phonological representation of the phonetic over-differentiation of the sounds in Table 2. If one believes in representing all the redundant features in Korean, then one would suggest the following table to be in the minds of Korean speakers

	Labial	Coronal			Velar
		(Plain)	Strident		
			(Anterior)	Posterior	
Stop	p	t	c	k	
Fricative	f	θ	s	ʃ	x
Affricate	pʰ	tʰ	tʰ	c	kʰ

Table 3: Korean Full Specification

If all redundant features are represented in the Korean phonological system then this would imply that all of the sounds in Table 3 are "accessible" sounds for Korean speakers learning other languages. In other words, Korean speakers can and will acquire all the "accessible" sounds given the proper conditions. However, no languages have all of these contrasts. Most phonological analyses therefore try to account for the predictable patterns and eliminate redundancy in the feature specifications. That is, in most analysis, the mental representations do not record redundant information. Next, processes of enhancement re-introduce non-contrastive features in pronunciation. Given the lack of place contrast for Korean fricatives, the one fricative can be sparsely represented as [fricative]

Although phonetically [s] has the feature [strident], phonologically /s/ in Korean is regarded as "plain" (see also Avery & Idradi). A perspicuous underlying representation requires minimum specification that is, a "plain", not a strident fricative. In other words, since stridency is not necessary in Korean underlying representations for fricatives, /s/ is not represented as [strident, fricative] but rather as [fricative] only. With these prerequisites for analyses in mind, we now investigate three different analyses, which make different L2 acquisition predictions, when combined with Brown (1997). Based on Brown's theory (see section 4), the *potentially accessible* sounds for L2 learners are different in the three analyses

### 3. Phonological Analyses for Korean Fricative System

There are three general types of analyses for the Korean obstruents, summarized in Tables 4-6. We indicate *potentially accessible* new sounds of Korean in the following tables by enclosing them in brackets

	Labial	Coronal		Velar
		(Anterior)	Posterior	
Stop	p	t	c	k
Fricative	[f]	s	[ʃ]	[x]

Table 4: Korean Place Analysis

	Labial	Coronal	Velar
Stop	p	t	k
Fricative	[f]	s	[x]
Affricate	[pʰ]	c	[kʰ]

Table 5: Korean Manner Analysis

	Labial	Coronal		Velar
		(Plain)	Strident	
Stop	p	t	c	k
Fricative	[f]	θ → [s]		[x]

Table 6: Korean Strident Analysis

The *Place analysis* (table 4) is the most common analysis employed in studies of Korean phonology (DY Lee 1998; HM Sohn 1999; I Lee and Ramsey 2000). The *Place analysis* analyzes Korean obstruents to be different in the places of articulation. One argument given for this analysis is that it formally unifies the lexical process changing /t/ to /c/ before /i/ with the post-lexical process palatalizing /s/ before /i/. Affricates are predictable in the *Place analysis*, since posterior stops are affricates. Since fricatives are distinguished only by points of articulation in this analysis, it predicts four fricatives – [f], [s], [ʃ], [x] – to be accessible for Korean speakers. It predicts that Korean learners should be able to acquire as English L2 sounds /t/, /s/ and /ʃ/ but not /θ/.

In table 5, the *Manner analysis* cross-classifies place (labial, coronal, velar) with manner (stops, fricatives and affricates). This analysis is consistent with the proposals by Hyunsoon Kim (1999). Kim offers arguments for the separation of the /t/ to /c/ process as one of affrication followed by a phonetically variable co-articulation with a following /i/. She finds variability in articulation of affricates due to front vowels in Korean. The *Manner analysis* predicts three fricatives – [f], [s], [x] – to be within reach for Korean speakers. It implies that both /ʃ/ and /θ/ should be out of the reach of Korean L2 learners. Furthermore, this analysis also predicts three affricate sounds – [pʰ], [c], [kʰ] – to be learnable by Korean speakers, which is quite a different prediction from the other two analyses.

The *Strident analysis* (table 6) takes its point of departure from the claim that affricates are strident stops, as argued by Rubach (1994) and Clements (1999). This analysis combines the basic *Place analysis* (labial, coronal, velar) and the two-way contrast in manner. The affricate /tʃ/ is represented as a strident stop. The *Strident analysis* predicts that it will be possible to introduce a contrast for [strident] into the fricative system to distinguish /θ/ from /s/, but that it will not be possible to represent /ʃ/. This analysis regards stridency to be a phonologically contrastive feature different from the other two analyses. It furthermore proposes that stridency, although not contrastive in Korean fricatives, is active. The *Strident analysis* predicts that eventually Korean speakers will be able to acquire English fricative sounds, [f], [s] and [θ], but not [ʃ]. Unlike the *Place* and *Manner analyses* the strident analysis considers stridency to be crucial in Korean inventory.

All of the analyses in Tables 4-6 eliminate the representation of redundant features phonologically, and they therefore imply processes relating underlying forms to surface forms. For example, in the *Place analysis*, underlying representations containing [stop, posterior] receive the additional phonetic specification [strident, affricate]. This phonetic enhancement of phonological contrasts is straightforward in the *Place* and *Manner analyses*, but is somewhat more complicated in the *Strident analysis*. Korean has no phonological contrast for [strident] in the fricatives. Assuming that the underlying representations are as perspicuous as possible, we therefore postulate a *plain* fricative underlyingly in Korean. This fricative receives the phonetically enhancing feature [strident]. This enhancement process is different in the strident analysis case as [strident] is active in the Korean system in this analysis, serving to distinguish /t/ and /c/. That is, all the analyses contain the enhancement (1).

(1) [fricative] → [strident]

The enhancement (1) indicates that all fricatives are [strident] in Korean. Stridency is distinctive in Korean stops (in the *Strident analysis*) but not in fricatives. Since there is just one plain fricative /s/, with no contrast existing, there is no need to specify stridency. However, no need for specification does not mean that the feature [strident] is not present in Korean fricative production. This enhancement is necessary for all three analyses but plays a crucial role for the *Strident analysis*.

There are other fricative enhancements in Korean. First of all, all fricatives are coronal, leading to enhancement (2). All three analyses likewise employ the fact that Korean fricative has the feature [coronal].

(2) [fricative] → [coronal]

Furthermore, all fricatives are voiceless in Korean, enhancement (3)

(3) [fricative] → [spread glottis]

Again, all three analyses have no disagreement about the third enhancement that the Korean fricative has the feature [spread glottis]. Korean plain stops undergo allophonic voicing between two vowels. Unlike plain stops, which become voiced intervocally, Korean fricatives do not undergo allophonic voicing, and neither do tense or aspirated stops. We conclude from this that glottal width adjustment precludes voicing. Enhancement (1), ensures that fricatives receive [spread glottis], precluding voicing, even though [spread glottis] is not distinctive in Korean fricatives; but it is distinctive in Korean stops.

As we have seen with these enhancements, the three analyses give different predictions to the Acquisition of English fricatives by the Korean speakers. The analyses have different patterns for "accessible" sounds. In our paper we will use evidence from Korean speakers' acquisition of English to argue for the *Strident analysis*.

#### 4. L2 Predictions from Brown's Theory

Having only a very limited number of fricative sounds in their inventory, it is expected that the Korean learners will face difficulties when learning English fricatives. Brown (1997) shows that L2 learners are only able to use features they already have in their first language (L1) inventories for the new L2 sounds they learn, as in the following quote

"The experimental results indicate that L2 learners will, in fact, accurately perceive only those non-native contrasts that are distinguished by a feature already present in the native grammar and that they will acquire only those contrasts which they perceive as distinct" (Brown, 1997: 9)

In other words, they can use existing phonological contrast to cross-classify a somewhat enriched inventory relative to their L1, but they cannot learn any new features to use with L2 sounds. These additional representations are the *potentially accessible* sounds of the inventory, enclosed in brackets in Tables 4-6. As we see from the tables, the different analyses, coupled with Brown's L2 principle, result in different predictions for the acquisition of the English fricative system by Korean learners.

All of the analyses predict that /f/ ([labial, fricative]) can be acquired by Korean learners because all the analyses of the Korean obstruent system employ the features of [labial] and [fricative]. Thus, even though /f/ is not present in Korean phonemic inventory, it is within reach of Korean learners, by cross-classifying [labial] and [fricative] and Korean learners do successfully acquire /f/ even though they initially map it to /p<sup>h</sup>/, as can be seen in the following loan word data<sup>2</sup>

(4)

<u>Word-initially</u>	<u>Word-medially (inter-vocally)</u>	<u>Word-finally</u>
France [p <sup>h</sup> ilɑŋsi]	offer [op <sup>h</sup> ə]	beef [pip <sup>h</sup> i]
Philadelphia [p <sup>h</sup> iladelp <sup>h</sup> ia]	coffee [k <sup>h</sup> əp <sup>h</sup> i]	wife [wajp <sup>h</sup> i]

All three analyses also agree that [x] is also obtainable by Korean speakers. Since [velar, fricative] is not present in English inventory and since this paper presently focuses on English voiceless fricatives, we will leave the sound [x] for later investigations.

The analyses differ, however, in their predictions for the possible acquisition of the English fricatives /s/ and /θ/. Anecdotal evidence initially seems to support the *Place analysis*, as Korean speakers seem able to produce a reasonable approximation of [ʃ], but continue to have difficulty in pronouncing [θ], which they realize as [s]. We argue, however, that this naïve view is not correct.

### 5. Arguments for the Strident Analysis

In this section, we argue for two points. First, the non-production or the production difficulty of English [θ] by the Korean speakers do not mean that they do not have a representation for that sound. Next, the reasonable production of English [ʃ] does not mean that [ʃ] is present in Korean speakers' inventory. These points are supported by the evidence of chain shift data from Cho and Lee (2000).

Cho and Lee have shown that Korean learners distinguish English /θ/ from /s/ and from /ʃ/, by examining the behavior of some speakers

<sup>2</sup> It was pointed out during our presentation that there are cases in which English fricative /f/ is mapped not only to /p<sup>h</sup>/ but also to /hw/ in Korean. For example, the word "family" could be both [p<sup>h</sup>æmili] (or [p<sup>h</sup>emili]) and [hwæmili]. Note that both mappings retain the basic features of English /f/: [labial, spread]. Principles governing the choice between /p<sup>h</sup>/ and /hw/ will have to left to future research

who exhibit a chain shift before high front vowels. These speakers pronounce target "think" [θ] with [s], but target "sink" [s] with [ʃ]

(5)

#### Representative Data from Cho & Lee (2000: 139-140)

a (i) [ʃ] for target /s/ before other than [i]

[ʃ] 'shoes'	[ʃ] 'shop'
[ʃ] 'shirt'	[ʃ] 'shell'

(ii) [ʃ] for target /s/ before [i]

[ʃ] 'ship'	[ʃ] 'sheet'
[ʃ] 'she'	[ʃ] 'sheep'

b (i) [s] for target /s/ before other than [i]

[s] 'circle'	[s] 'sun'
[s] 'soap'	[s] 'sand'

(ii) [ʃ] for target /s/ before [i]

[ʃ] 'sit'	[ʃ] 'sick'
[ʃ] 'sink'	[ʃ] 'sing'

c [s] for target /θ/ before [i]

[s] 'thing'	[s] 'thick'
[s] 'think'	[s] 'thin'

d [s] for target /θ/ before other than [i]

[s] 'thank'	[s] 'thirst'
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From the above data, we see three behaviors from the Korean subjects for the three English targets - /θ/, /s/, /ʃ/. Target /θ/ is always mapped as [s], target /s/ is mapped to either [s] or [ʃ] depending on the following vowel sound, and finally target /ʃ/ is mapped to [ʃ]. The fact that there are three behaviors shows that there are three representations for these Korean subjects. In order to have different outputs for these words, they must have different inputs, indicating that they have three distinct underlying representations. That is,

different behaviors by the learners (subjects) indicate that they have different phonemes in their mental representation. We do not know for sure what representations they have in their mind, but we do know that the three sounds are *different* for the learners.

We claim [θ] is phonologically a plain fricative for the learners and [s] is [strident, fricative]. As mentioned earlier, since stridency is not necessary for Korean fricative inventory, phonologically /s/ is regarded as plain fricative and the Korean system allows enhancement (1) to be activated. Given Brown's L2 theory, we believe that Korean learners (speakers) activate [strident] for fricatives, allowing them to represent a difference between plain and strident fricatives. Based on our *Strident analysis*, Korean speakers should be fairly good at acquiring the English [θ] sound as a distinct entity in mental representations. They just need to realize that there exists the 'real' plain fricative, which is [θ], and [s] is actually [strident, fricative]. However, empirical evidences tell us that Korean speakers find English [θ] to be one of the most difficult sounds to learn to produce in L2.

The continuing problem of pronouncing [θ] for the Korean ESL learners is thus not a problem of establishing underlying representations, but a problem of suppressing their enhancement (1). The feature [strident] is automatically added to all fricatives in Korean, but English /θ/ has no surface stridency. Eckman and Iverson (1999) show that the "turning off" of L1 rules in the L2 can proceed in stages, whereby the rule is first restricted before being eliminated entirely. In other words, the learners know that [θ] is not [s] but did not or could not suppress enhancement (1). So, the enhancement obscures the fact that they actually did learn *something*.

We further argue that Korean learners do not accurately acquire English /s/, but rather approximate this sound by using their available L1 resources to mimic it with the sequence /sj/ or /s+[front]/. This analysis is supported by the available loan word data.

(6)

<u>Word-initially</u>	<u>Word-medially (inter-vocalically)</u>	<u>Word-finally</u>
shoes [ʃuz] → [sjuci]	fashion [fæʃən] → [p <sup>h</sup> æsjən]	cash [k <sup>h</sup> æswi]
show [ʃo] → [sjo]	mission [miʃən] → [misjən]	hush [həswi]

Moreover, English /s/ is mapped as /s + i/ while /ʃ/ is mapped to /s+[front]/ in Korean, especially in coda position. Since fricatives cannot surface in coda position in Korean, many times the insertion of the default vowel /i/ may be observed. However, in the case of /ʃ/, this is accompanied by "frontness", (7)

(7)

Miss → [misi]	Bush → [pusi]
cross → [k <sup>h</sup> i:rosi]	fish → [p <sup>h</sup> isi] / [hwisi]
tough → [t <sup>h</sup> əp <sup>h</sup> i]	cash → [k <sup>h</sup> æswi]
staff → [sit <sup>h</sup> æp <sup>h</sup> i]	hush → [həswi]

Thus, the fact that Korean speakers are able to produce a reasonable approximation of [ʃ] does not mean that they have a full grasp of the correct representation of English /ʃ/. Rather, the strategy of mimicking the sound [ʃ] works so well that it simply abrogates the Korean learners from actually learning the English /ʃ/. Since they don't find any difficulties in communicating /ʃ/, they may as well keep their mimicking strategy. Then again, this is simply an approximation of /ʃ/, not the correct English representation of it.

Ironically, what Korean speakers appears to be good at – the approximation of /ʃ/ – is actually not true; and what they seem to have the most trouble with – English /θ/ – is the problem of turning off the enhancement (1). Thus, the naive view of what the learners have for their mental representation equals what one hears is not correct. Empirical facts tell us that some Korean speakers do actually acquire English /θ/, while others fail to do so by unable to suppress the enhancement (1) and end up being fossilized.

## 6. Conclusion

After demonstrating that Korean ESL learners do acquire reasonably accurate underlying representations for /θ/, we conclude that only the *Strident analysis* is consistent with these results and Brown's L2 theory. Furthermore, we suggest that Korean speakers mimic /ʃ/ with the sequence /s+[front]/. As for the continuing problem of Korean speakers pronouncing /θ/, is a matter of turning off enhancement (1) – all fricatives are [strident] in Korean. Korean speakers eventually realize that English /θ/ is not and cannot be /s/. They have different representations for /θ/ and /s/. However, when producing the sound [θ], some Korean speakers still face difficulty of turning off enhancement (1). Thus, some may overcome this problem while others fossilize.

On the other hand, with the sound [ʃ], Korean speakers came up with a strategy of mimicking. The mimicking of [ʃ], which is a monophonemic representation, by a *sequence* of sounds existing in Korean inventory turned out to be quite useful in that even the English native speakers do not bother to notice the difference. In other words, Korean speakers found no difficulties communicating with the English native speakers even when they mimicked [ʃ] with the sequence /s+[front]/. With no communication barrier, Korean speakers will maintain their mimicking strategy. This does not mean

that Korean speakers have the correct representation of /s/. In fact, they end up having a wrong representation, with a convenient strategy to lean on to

In sum, we argue that the *Strident analysis* best explains what Korean speakers actually learn about the English fricative system. And, as Brown proposed, second language acquisition is limited to first language contrastive features. L2 learners make use of the features pre-existing in their L1. Future investigation may include the analyses on the other "potential" fricative sound /x/, which exists in German but not in English. Our analysis presented here imply that Korean learners will eventually learn the sound [x], since Korean has the features [velar] and [fricative] in its system. We would also like to propose an experiment using Korean speakers as the experimental subject. It is the prediction of our model that Korean subjects will not be able to tell the difference between [ʃ] and [s+j], i.e., [ʃa] vs [sja].

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