

## PERCEIVING L2 PHONOLOGICAL CONTRASTS: KOREAN AND ENGLISH SIBILANTS

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### ABSTRACT

Two perceptions of Korean and English sibilants by two different L2 groups were examined: the identification of Korean (KO) contrast /s-s\*/ by American English (AE) learners of Korean and the identification of English (EN) contrast /s-ʃ/ by Korean ESL learners. The results of the first experiment showed that AE beginning learners of Korean poorly identified the Korean contrasts (with chance accuracy) and AE advanced learners of Korean showed perceptual improvement, but not as good as those of native speakers of Korean. However, the results of the second experiment showed that both Korean ESL beginning and advanced learners identified the English contrast with native-like accuracy. The conclusion is that L2 experience made a difference in perceptual improvement in L2 phonology acquisition. However, the contradictory results in terms of the dramatically different degrees of improvement may result from different phonetic similarity between L1 and L2 sounds and each sound of an L2 contrast.

**Keywords:** sibilants, perception, Korean, American English, L2 contrast

### 1. INTRODUCTION

Much research on perception of L2 contrasts has focused on vowels, but not on consonants. The objective of the present study was to examine the effect of L2 experience on the perception improvement of L2 consonant contrasts by 1) AE Korean as a second language (KSL) learners and 2) Korean ESL learners. Korean and English voiceless sibilants (KO lax /s/ vs. KO tense /s\*/ and EN alveolar /s/ vs. EN palato-alveolar /ʃ/) were chosen for the study. The KO contrast /s-s\*/ is allophonic in English [3]; the EN contrast /s-ʃ/ is allophonic in Korean as well [4]. It is considered the most difficult situation in L2 phonology acquisition when two sounds are in contrast in L2 but are the allophones of a single phoneme in L1

[2]. It is predicted that AE KSL learners would have difficulty perceiving KO /s-s\*/ and Korean ESL learners would have difficulty perceiving EN /s-ʃ/ because the L2 contrasts do not carry phonemic significance in their L1. It is also predicted that perceptual abilities develop for an L2 contrast that is allophonic in L1, as L2 learners gain experience in the L2, e.g. [8].

### 2. EXPERIMENT

#### 2.1. Subjects

In Experiment 1, twenty seven subjects participated: eighteen AE KSL learners in the experimental groups and nine native speakers of Korean in the control group. All subjects were male students at the University of Hawai'i at Mānoa. If AE KSL learners had studied the Korean language for more than five years, then they belonged to the advanced learners' group. In contrast, if the subjects were exposed to the Korean language for less than one year, then they belonged to the beginning learners' group. The average length of study of the Korean language was 6.5 years for the AE KSL advanced learners and 9 months for the AE KSL beginning learners.

In Experiment 2, thirty subjects participated: twenty Korean ESL learners from Seoul and ten AE speakers. Korean subjects belonged to two different proficiency-level groups, depending on the length of their stay in the United States. If Korean subjects had stayed for more than 5 years in the United States, then they belonged to the advanced learners' group. If they were exposed to English for less than one year, then they belonged to the beginning learners' group. The average length of U.S. residence was 5.6 years for the ESL advanced group and 11 months for the ESL beginning group. None of the subjects who participated in the two identification tasks reported any history of speech or hearing disorder.

#### 2.2. Stimuli and procedures

In Experiment 1, Korean stimuli were constructed

from sibilant-vowel sequences consisting of one of the initial sibilants /s, s\*/ followed by one of the three vowels /i, a, u/. Each stimulus was composed of sibilant contrasting pairs such as *si* 'poem' and *s\*i* 'seed'. In Experiment 2, English stimuli consisted of the initial sibilants /s, ʃ/ followed by one of the three vowels /i, a, u/. The procedures used in Experiment 2 were the same as those used in Experiment 1. Each of the two sibilants before the vowels /i, a, u/ was recorded five times. A total of 6 tokens (2 sibilants x 3 vowels) were chosen to create stimuli. Each token was repeated five times, and the resulting 30 tokens were randomized.

The subjects who participated in Experiments 1 and 2 were tested individually in a sound attenuated booth of the University of Hawai'i at Mānoa Laboratory. Experiments 1 and 2 were conducted on a Power Macintosh G4 running PsyScope with a button-box. The experiment began with a familiarization test. Subjects were asked to listen to the stimuli and then to identify the sound by pressing one of the two buttons, each of which represented a symbol of a sibilant displayed on the button box.

### 3. RESULTS

#### 3.1. Experiment 1

The mean correct identification scores on the Korean sibilant contrast were 0.99 for Korean subjects, 0.67 for AE KSL advanced learners, and 0.54 for AE KSL beginning learners.<sup>1</sup> Table 1 shows the mean correct identification scores of three groups on Korean sibilant contrast /s-s\*/ in three vowel contexts. The three-way repeated measures ANOVA yielded two significant main effects (Group and Vowel context) and one interaction effect (Sibilant contrast x Vowel context)\*.

**Table 1:** Mean correct identification scores of three groups on Korean contrast /s-s\*/ in three vowel contexts

	Control		L2 Advanced		L2 Beginning	
	s	s*	s	s*	s	s*
a	1	1	0.6	0.69	0.31	0.56
i	1	0.98	0.49	0.8	0.44	0.6
u	1	1	0.89	0.62	0.71	0.53

There was an effect of *Group* on L2 learners' ability to identify Korean contrast /s-s\*/, and subsequent post-hoc tests showed that the control group was significantly different from the L2 learners' groups; also, there was a significant

difference between AE KSL advanced and beginning learners (L2 Beginning < L2 Advanced < Control;  $F[2, 24] = 37.129, p < .0001$ )\*. AE KSL advanced learners were better at distinguishing the lax /s/ from the tense /s\*/ than were AE KSL beginning learners, indicating that the learners' language experience made a difference in the perceptual improvement. There was an effect of *Vowel context* on perception of Korean Sibilant contrasts, and a Tukey post-hoc test revealed that there was a statistically significant difference between /a/ and /u/, showing that the identification score was higher in the context of /u/ than in the context of /a/, but there were no significant differences between /a/ and /u/ and between /i/ and /u/ ( $F[2, 48] = 3.279, p = 0.0463$ )\*.

There was an interaction effect of *Sibilant contrast x Vowel context* on the perception of Korean sibilants ( $F[2, 48] = 5.553, p = 0.0068$ )\*. The perception of Korean contrast /s-s\*/ in the contexts of /a/ and /i/ is different from that in the context of /u/. In the contexts of /a/ and /i/, the tense sibilant /s\*/ was perceived better than the lax sibilant /s/ (i.e., AE advanced learners of Korean correctly identified KO /s\*i/ at a level around 80%, but identified Korean /si/ poorly, below a level of 50%), but in the context of /u/, the lax sibilant /s/ was perceived better than the tense sibilant /s\*/.

#### 3.2. Experiment 2

The mean identification scores were 1.0 for AE speakers, 1.0 for Korean advanced ESL learners and 0.98 for Korean beginning ESL learners. The three-way repeated measures ANOVA yielded two main effects (Group and Sibilant contrast) and one interaction effect (Group x Sibilant contrast).

There was a main effect of *Group* on the correct identification scores, and a subsequent Tukey post-hoc test showed that Korean ESL advanced learners differed from Korean ESL beginning learners, but did not differ significantly from the native AE speakers\*. This indicated that Korean ESL advanced learners were just as accurate as AE speakers. AE native speakers and Korean ESL advanced learners did better than Korean beginning learners of English (L2 Beginning < L2 Advanced  $\equiv$  Control;  $F[2, 27] = 6.000, p = 0.0070$ ). But surprisingly, even Korean ESL beginning learners' identification scores were all higher than 93 percent. The results occurred despite the fact that Korean contains no phonemic contrast /s-ʃ/. There was an effect of *Sibilant contrast*\*. English

/s/ was better perceived than English /ʃ/ (1.0 vs. 0.991;  $F[1, 27]=6.000, p=0.0211$ ).

There was a *Group x Sibilant contrast* interaction effect\*. In the perception of /s/, there were no statistically significant differences among the three groups, but in the perception of /ʃ/, there was a significant difference between AE speakers and Korean ESL beginning learners and between Korean ESL advanced and beginning learners, but there was no statistically significant difference between AE speakers and Korean ESL advanced learners ( $F[2,27]=6.000, p=0.0070$ ). All three groups got a perfect identification score (1.0) in /s/. AE speakers and Korean ESL advanced learners got perfect identification scores in /ʃ/, but Korean ESL beginning learners got an excellent score (0.97) in /ʃ/. Both English native speakers and Korean advanced learners of English showed perfect identification scores in all three vowel contexts. Korean ESL beginning learners also showed higher scores in the identification of /s/ than in the identification of /ʃ/. All subjects in each group showed 'excellent' identification scores.

#### 4. DISCUSSION AND CONCLUSION

The present study examined both the identification of KO /s-s\*/ contrast by AE KSL learners and the identification of EN /s-ʃ/ contrast by Korean ESL learners. The Korean voiceless lax-tense sibilant contrast /s-s\*/ is allophonic in English. The English voiceless sibilant contrast /s-ʃ/ is also allophonic in Korean. In the perception of KO /s-s\*/, less than one year of Korean language study did not enable AE speakers to reliably identify the Korean sibilant contrast. AE KSL advanced learners' identification scores were improved, but not as much as those of native speakers of Korean. In contrast, in the perception of EN /s-ʃ/, both Korean ESL beginning and advanced learners showed excellent identification performance. This raises the issue of differential success in perception of L2 phonemic categories that are allophonic in their L1.

How can we account for the low scores in perception by AE KSL learners in the face of the perfect scores by Korean ESL learners? The claim that the two different L2 contrasts have different degrees of phonetic or perceived similarity between L2 contrasting pairs or between L1 and L2 pairs could be one of the factors. For instance, the two L2 Korean sounds are both similar to one

L1 English category, but one of the L2 Korean sounds is more similar than is the other L2 Korean sound to the L1 English sound. Cheon [3] conducted AX discrimination tests to investigate degrees of phonetic similarity between English and Korean sibilants perceptually and acoustically. It has been found that the degree of phonetic similarity between the KO /s/ and KO /s\*/ is different from that between the EN /s/ and EN /ʃ/. In [3], KO /s/ is not the same as EN /s/ in articulation and in acoustics. It is KO /s\*/, rather than KO /s/, that is more similar to EN /s/, in spite of the use of different IPA symbols. Cheon [3] found that in cross-language perceived and acoustic similarities between English and Korean sibilants, the degree of perceived similarity by KO speakers was low between each sound of the L2 contrast (4% between EN /si/ and EN /ʃi/). On the other hand, the degree of perceived similarity by AE speakers was relatively high between sounds of the L2 contrast (64% between KO /si/ and KO /s\*i/ and 60% between KO /sa/ and KO /s\*a/). Accordingly, the two Korean sibilants are perceptually so similar to each other that adult L2 learners would be challenged to perceive the contrast. However, the two English sibilants are perceptually so dissimilar to each other that adult L2 learners would have no difficulty in identifying the contrast. As mentioned earlier, even some native Korean speakers, especially in the Kyungsang dialect, do not distinguish KO /s/ and KO /s\*/ accurately in both production and perception. Also, the present study found that even some Seoul speakers do not distinguish KO /s/ from KO /s\*/, occasionally, as in Table 1.

According to Flege [5], if the L1 and L2 sounds have a noticeable phonetic difference, then L2 advanced learners or bilingual speakers will perceive L2 sounds accurately. Since Korean does not have an /ʃ/ phoneme, the English /ʃ/ would be a new sound. But KO /swi/ ([ʃ<sup>w</sup>i]) may be perceived as EN /ʃi/ by Korean speakers, which should have been considered in the present study. Korean may have a surface difference in L1 ([s] vs. [ʃ<sup>w</sup>]) that is similar to the L2 contrast. On the other hand, the KO /s/ would be a similar sound to the EN /s/, but KO /s\*/ is more similar to the EN /s/. According to Sheldon & Strange [9], for example, EN /l/ and EN /r/ are known to be perceptually assimilated to Japanese /r/. In terms of perceived phonetic similarity, EN /l/ is phonetically more similar to

Japanese /r/ than EN /r/. In a perception study of English /l-r/ contrast by Japanese speakers, they found that EN /r/ (which is dissimilar to Japanese /r/) was identified correctly more often than was EN /l/. In a similar study by Flege, et al. [7], Japanese speakers were also better in perception tasks of EN /r/ than EN /l/. In the present study, L2 KO /s/ and L1 EN /s/ are acoustically and perceptually different from each other, but their overall mean correct identification scores were 0.67. Instead, they did a slightly better job in perceiving the L2 KO /s\*/ (which is more similar to L1 EN /s/ than L2 KO /s/) with the mean identification scores of 0.7, which is comparable with the results of [5, 6, 7].

Human languages differ in their phonological systems and phonetic descriptions. Different L2 contrasts or sounds behave in different ways. Some L2 contrasts are more difficult for L2 learners to perceive. In the present study, KO /s\*/ is more similar to EN /s/ than KO /s/ is to EN /s/. Korean ESL learners tend to judge EN /s/ perceptually as KO /s\*/ (not as KO /s/). English loan words with /s/ syllable-initially have been lexically borrowed into KO /s/ in Korean but were pronounced as KO [s\*]. For instance, English /seil/ or /세일/ 'sale' is romanized as 'se.il' but produced as [s\*eil] or [세일]. Thus, unlike AE learners of Korean who show perceptual difficulties in the acquisition of KO L2 contrast /s-s\*/, Korean ESL learners do not have difficulty in identifying the EN /s-f/ contrast. It is better to consider the differences between the L1 and L2 sound systems as a whole.

Another possible reason that AE speakers acquire KO /s-s\*/ with such difficulty is length of exposure. It is theoretically possible that lack of L2 experience may result in a decline in perceptual sensitivity. In contrast to AE KSL learners who have usually been exposed to Korean sounds in their twenties or thirties, Korean ESL learners have generally been exposed to formal instruction in English before the age of twelve, and they have had a longer duration of L2 study than have AE KSL learners. Learners' perception of L2 sounds may differ depending on when in life L2 learning began [1] or on how long and how much L2 learners have been exposed to L2 [8].

In sum, adult L2 learners would have had difficulty perceiving L2 contrasts that do not carry phonemic significance in their L1 because perceptually they tend to identify the L2 contrasts from the viewpoint of their L1 phonology.

However, it seems that this difficulty depends on the nature of an L2 contrast, on the degree of phonetic similarity between L1 and L2 sounds or between each sound of an L2 contrast, and on L2 experience. Obviously, the degree of phonetic similarity between native and non-native sounds influences the perception of non-native sounds. The EN contrast /s-f/ is acoustically and articulatorily distinct, compared to the KO contrast /s-s\*/, which shows a higher degree of phonetic similarity. As predicted, AE KSL learners have difficulty perceiving KO /s-s\*/ and Korean ESL learners have little difficulty perceiving EN /s-f/. Also, L2 experience made a difference in native-like achievement of perception in the perception of EN /s-f/ by Korean ESL learners. In the perception of KO /s-s\*/, although L2 experience made a difference in improvement of perceptual ability, it did not make L2 learners achieve a native speaker's level of perception.

## 5. REFERENCES

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<sup>i</sup> The perception scores as a dependable variable yielded a value where 0 represented incorrect responses and 1 correct responses.

\* An asterisk (\*) denotes 'significant difference at the  $p < 0.001$  level.'