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Perceptual Identification and Perception of Sibilants of English Language by Turkish English Majors

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Abstract

Sibilants of English, /s, z, ʃ, ʒ, tʃ, dʒ/, are a combination of fricative and affricate consonants, produced with an audible hissing /s, z /and hushing / ʃ, ʒ, tʃ, dʒ/ overtones via perceptual intensity in pitches in their articulations. They are louder and their acoustic energy occurs at higher frequencies, which create some perceptual problems to Turkish students in English majors. The aim of this research is to explore whether Turkish English majors are able to perceive the articulatory distinction among English sibilant sounds. The 11 questions of the pre-test included one of the 6 English sibilants as the correct choice. In a soundproof language lab, the pronunciation coach articulated the correct choice three times. The correct answer was placed among the other four alternatives which were all fricatives and affricatives like [f, v, ɸ, β, θ, ð s, z, ʃ, ʒ, tʃ, dʒ, ç, j, ɣ] in the same question. The English majors chose one of the alternatives as the correct answer. After the pre-test, the English fricatives and affricative were intensively studied three hours by means of exercises. Fifteen days later, the same pre-test was administrated to the participants as a post test. The students' success rate is 73.83 % for the pre-test and for the post-test is 91.60%, this showed that the participants improved their perception of the sibilant sounds of English

Keywords: affricatives; fricatives; perceptive intensity; sibilants; pitches; stridents.

1. Introduction

The present study looks at how English sibilant consonants, namely /s, z, ʃ, ʒ, tʃ, dʒ/, cause pronunciation perception problems in oral utterances for Turkish-speaking students of English. Turkish holds the same sibilants of

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English with very approximate places of articulation. By nature sibilants signal the intersections of articulatory, acoustic and auditory/perceptual criteria in phonetics studies. Speech perception is a crucial stage in the communicative connection that requires that an adequate audition of acoustic signals to be reconciled with symbols that the sounds represents. The term sibilant is derived from Latin *sībilāre* which means to hiss (American Heritage Dictionary of the English Language: 2016). Sibilants are also known as the whistling fricatives with friction and with a noise source in forms of the sibilant curls. They are "acoustically louder and have higher pitched noise than non-sibilants" (Johnson, 2007). In Praat (Boersma & Weenink, 2013), acoustic analysis on sibilants reveals that the amplitude is almost twice as long compared to non-sibilant fricatives.

Actually, the term sibilant is a collective term for a group of fricatives. There are six sibilants in English: /s, z, ʃ, ʒ, tʃ, dʒ/, which occur phonemically by being articulatorily and perceptually distinct from each other. They are very distinctive in English, but it's important to make distinction between hissing /s, z / and hushing / ʃ, ʒ, tʃ, dʒ/ overlay of acoustic information of sibilants with frication noise. So, English language phonemically distinguishes six sibilants. The pre-palatal sibilant / ʒ / takes place in coarticulatory effects which can create auditory mis-parsings via the acoustic characterization of the sibilants in aural hearing of words. As a phonetic categorization, the term sibilant is most often isomorphic with [strident] (Keating, 1991: 45), and mainly refers to a relatively large amount of high-frequency noise. In production, strident sounds are characterised by turbulence at the point of articulation due to a supplementary barrier at the constriction (Stevens, 1971).

1.1. Articulatory situation of sibilants

In the production of sibilants there is a degree of stricture for fricatives which creates acoustic consequence in forms of the noise generated by turbulent airflow through that degree of constriction in the oral cavity, and the perceptual timber of them lies in the already created noise in the speech sound produced. "The term sibilance refers to the hissing sound that accompanies certain English consonants (Gilbert, 2012: 57). In phonetics, sibilants are fricative consonant sounds, in which the tip, or blade, of the tongue is brought near the roof of the mouth through a narrow channel in the oral cavity while air stream is pushed past the tongue to make a characteristic high-pitch hissing or hushing sound. "Sometimes, the alveolar and pre-palatal fricatives are further distinguished as sibilants and shibalants" (Pennington, 2013:50).They are characterized by high acoustic energy and rounding of the lips. Then, they are a group of consonants where a stream of air is first forced through a narrow gap (=formed by the tongue) and then over a sharp obstacle (=teeth) (Ladefoged 2005:166). In the nature of sibilant sounds sibilance timbre is in form of hissing or hushing intrusion, which "is the result of high-velocity turbulence in the air flowing of the speaker's mouth" (Gilbert, 2012: 57). The alveolar and pre-palatal sibilants of English expose an articulation of difference in terms of lip shape. The alveolar sibilants tend to have a slightly spread lip shape, whereas the pre-palatal sibilants tend to have a slightly protruded or rounded lip shape" (Pennington, 2013:50-51).

1.2. The phonemic status of sibilants

Sibilants are normally described according to their place of articulation; however, acoustically different sibilant fricatives are produced both through various tongue positions and different tongue shapes. Non-sibilant sounds of English are bilabial: [ɸ, β], labio-dental /f, v/, inter-dental /θ, ð/, and palatal [ç, j]. In acoustic and laboratory phonetics, electro-palatographic study (EPG) compares the realization of the sibilant fricatives as distinct phonemes. In the following minimal pairs, the contrast in question is phonemic, which yield to /s, z, ʃ, ʒ, tʃ, dʒ/ as concrete sibilant phonemes and can be reliably distinguished from each other as distinct phonemes.

sue /suː/ →/s/ "to institute legal proceedings" :

zoo /zuː/→ /z/ "a place where live animals are exhibited to the public"

Further examples: buzz/bus, base/bays, fuss/fuzz, loose/lose lacy/lazy, race/raze, racer/razor, sip/zip, sink/zinc, sap/zap, sue/zoo.

mission /mɪʃɪn/ → /ʃ/ " an important job that someone has been given to do"

vision /vɪʒɪn/ → /ʒ/ " the ability to see"

Further examples: assure/azure, azure/Asher, confusion/Confucian, fusion/version, mesher/measure, glacier/glazier, pressure/pleasure

chew /tʃu:/→ /tʃ/ "to bite repeatedly"

Jew /dʒu:/ → /dʒ/ "a person whose religion is Judaism"

Further examples: batch/badge, chain/Jane, cherry/Jerry, chest /jest, choice/Joice, choke/joke, choose /Jews, cheap/jeep, cheer/jeer, chug/jug, etch/edge, letcher/ledger, march/Marge, match/badge, rich/ridge, search/surge,

With the help of these minimal pairs, the identification of the sibilants one by one can be stated as follows:

/s/ → a voiceless alveolar fricative

/z/ → a voiced alveolar fricative

/ʃ/ → a voiceless pre-palatal (palato-alveolar) fricative

/ʒ/ → a voiced pre-palatal (palato-alveolar) fricative

/tʃ/→ a voiceless pre-palatal affricative

/dʒ/→ a voiced pre-palatal affricative

2. Review of literature

Phonological typology involves comparing languages according to the number or type of sounds they contain. Much research on perception of L2 contrasts has focused on vowels, but not on specifically sibilants in Turkey.

In Tossavainen and Turunen's study (1988:79), Finnish teachers of English identified English sibilants /s, z, ʃ, ʒ/ as the most challenging phonemes of pronunciation that they had faced with their pupils. Furthermore, according to Morris-Wilson (1992: 54-152), the most obviously problematic distinct phonemes for Finnish users are: fricative /v/ is, which is often confused with /w/.

When (Lintunen 2004:149) it dealt with sibilant sounds, namely /z, ʒ , ʃ /, he demonstrated the pronunciation of individual segments with the help of transcription. The first two were found to be among the most problematic sounds for Finnish learners of English, and the last one among those that often cause problems. It is an intuitively straightforward prediction that English sibilants will cause difficulties for L1 Finnish-speaking learners since the Finnish phoneme inventory includes only one sibilant, /s/, and lacks /z, ʃ, ʒ, dʒ, tʃ/, which sound foreign to Finnish learners of English and thus cause difficulty in production for many of them.

Mandarin Chinese also has four sibilants: /z�, ʂ, ɕ, s/, which sibilants are voiced retroflex, voiceless retroflex, voiceless alveolo-palatal, and voiceless dental respectively. Li and Beckman (2007) looked at the production of English, Mandarin and discovered that Mandarin learners of English sometimes confuse certain English sibilant fricatives. They found that English /ʃ/ was often produced as /ʂ/ by the Chinese participants.

McGuire (2007) investigated the perception of Polish alveopalatal and retroflex voiceless sibilants by native speakers of English through a number of brief experiments. Native Polish speakers used friction noise to discriminate the two fricatives whereas English native speakers did not do it by paying less attention to frication noise or even stopped using it. In addition, a study depicting the general characteristics of the English spoken by speakers from China, Deterding (2006) looked at the most salient deviations in the production of 13 college Chinese students. Among the English sibilant fricatives, he investigated the errors the participants made when producing English /ʒ/ and /z/. This study stressed that among the four English sibilant fricatives /ʒ/ and then /z/ caused the most difficulty for speakers from China.

Jing and Yanyan (2011) looked at the production and perception of English fricatives by two groups of college students from China. The first group consisted of 32 non-English major and the second of 26 English major students. They employed a listening discrimination test and a reading exercise. The contrasting pairs: /f/-/v/, /w/-/v/, /s/-/z/, /θ/-/s/, /ð/-/z/, /ʃ/-/ʒ/, and /θ/-/ð/ were placed in minimal pairs in the listening discrimination test. The participants' task was to listen to the recording of only one of the two words in each minimal pair and then decide which sibilants they heard. The listeners were presented with the phonetic symbols of these fricatives and then listened to a word and were asked to pick the symbol of the sound they heard. In the listening test for the English

major and non-English major students stood at 84.33% and 72.55% respectively. In the listening test specifically, both groups had difficulty discriminating /ð/ from /z/ and /w/ from /v/. Also, Chinese participants had considerable difficulty producing English /z/, because /z/ is an alveolar sibilant fricative in English while it is a dental one in Mandarin, which stresses the fact that place of articulation for sibilants, is the hard part of the matter. Moreover, it can be said that if the perception is not correct, it can be assumed that articulation will also be incorrect: as Jing and Yanyan (2011) reported that some participants confused /ʃ/ and /ʒ/ in their productions. As they said, /ʒ/ and /z/ are the most problematic English sibilant fricatives for L1 speakers of Mandarin.

Almost all of the research cited up to now indicates that the similarities and differences between L1 and L2 certainly affect the way L1 speakers of L2 produce and perceive English sibilants as specific cases of mother tongue interference. The differences between the places of articulation for sibilants have always been a decisive factor for the aural perception.

2.1. The importance of sibilants in foreign language teaching

In English, sibilant sounds are common and the ability to distinguish between them is of great significance. For most Finnish learners, as it has been aforementioned, English sibilants are the most difficult sounds to learn (Peacock 2005:16; Tergujeff, 2012: 559-607). Peacock (2005: 16-17) maintains that learning to pronounce palato-alveolar sibilants /ʃ/, /ʒ/, /tʃ/ and /dʒ/ is considerably more important for Finnish speakers than, for instance, intonation. Apparently, Finnish learner of English struggle with the sibilants in the English language that do not exist in Finnish. Finnish has only one sibilant /s/, English has four: /s/, /z/, /ʃ/ and /ʒ/, as well as the affricate counterparts /tʃ/ and /dʒ/ of the last two (Peacock 2005: 14). It is predictable that English sibilants cause difficulties for L1 Finnish-speaking learners, as the Finnish phoneme inventory only includes one sibilant, /s/, and no affricates.

Turkish and English hold the same type and number of sibilants, namely /s, z, ʃ, ʒ, tʃ, dʒ/, but L1 Turkish-speaking students and teachers of English on-the-job are prone to   encounter pronunciation problems in the plural, third person singular and possessive forms posed by sibilants of English.

According to Gilbert (2012:50; Sheldon & Strange, 1982: 243-261), "Japanese students add a sibilance to a word like 'he', and English listeners will often mistake the 'he' for 'she'. Similarly, Korean students "tend to add a final vowel sound after sibilants" (Cheon, 2008). In addition, Spanish speakers "tend to leave off the final /s/ and /z/ from plural nouns" (Hill & Bradford, (2000). In addition, /dʒ/ does not exist as a separate phoneme; therefore, it is a problematic sibilant for Spanish speakers.

In addition, the alveolar sibilants have a special status in English as compared to the other fricatives because they occur in the grammatical forms of the third person singular, present tense of verbs, and of the possessives and plural of nouns (Pennington, 2013 :51). Sibilants are important for Turkish students of English because they tell you how to pronounce the final {-S } morpheme as plural, possessive, and third person singular forms in English, If the noun ends in a sibilant, then add the /-əz/ sound for the plural, which denotes a schwa-insertion.

Plurality Forms:

class /klæs/→ /classes /klæsəz/	dish/dɪʃ/→dish/dɪʃəz/
dance /dæns/→ dances /dænsəz/	wish /wɪʃ/→ wishes /wɪʃəz/
race /ɹeɪs/ → races /ɹeɪsəz/	bush /bʊʃ/→ bushes /bʊʃəz/
kiss /kɪs/ → kisses /kɪsəz/	crash /kræʃ/→crashes/kræʃəz/
buzz /bʌz/ → buzz /bʌzəz/	garage /gəˈɹɑʒ/→ garages /gəˈɹɑʒəz/
quiz /ˈkwɪz/→ quizes /ˈkwɪzəz/	rouge /ɹu:ʒ/ → rouges /ɹu:ʒəz/
prize /pɹaɪz/→ prizes /pɹaɪzəz/	massage /məˈsɑʒ/ → massages /məˈsɑʒəz/
pause /pɔ:z/ → pauses /pɔ:zəz/	collage /kəˈlɑʒ/ → collage /kəˈlɑʒəz/
clause /klɔz/→clauses /klɔzəz/	mirage /mɪˈɹɑʒ/ →mirages /mɪˈɹɑ:ʒəz/
squeeze /skwi:z/→squeezes/skwi:zəz/	camouflage /ˈkæməˌflɑʒ/→camouflages/ˈkæməˌflɑʒəz/
gaze /geɪz/→gazes/geɪzəz/	cortege /kɔɹˈtɛʒ/ →corteges /kɔɹˈtɛʒəz/
breeze /bɹi:z/→breezes/bɹi:zəz/	montage /mɑnˈtɑʒ/ →montages/mɑnˈtɑʒəz
itch /ɪtʃ/ → itches /ɪtʃəz/	age/eɪdʒ/→ages/eɪdʒəz/
watch /wɑtʃ/→ watch /wɑtʃəz/	bridge /bɹɹɪdʒ/→ bridges /bɹɹɪdʒəz/

witch /wɪtʃ/→ witches /wɪtʃəz/	page/peɪdʒ/→pages/peɪdʒəz/
beach /biːtʃ/ → beaches /biːtʃəz/	change /tʃeɪndʒ/→ changes /tʃeɪndʒəz/
peach /piːtʃ/ → peaches /piːtʃəz/	judge /dʒʌdʒ/ → judges /dʒʌdʒəz/

All in all, the plurality of nouns comes up as /-əz/ in pronunciation in English, exhibiting the most difficult aspect of the English pluralization system in its oral rendering.

3. Methodology

In this research, perceptual adaptation of the prospective students to English speech sound categories of sibilants was handled. Especially, incorrect perception of orally articulated sibilants sounds of English by prospective Turkish students of English was explored.

4. Participants

Participants were 40 freshmen of Turkish English majors who were getting their training in the Department of English Language Education at the Faculty of Education in Hacettepe University in the year of 2015. 30 of them were females, and 10 of them were males, and their age range varied from 18 to 19. The respondents formed a homogenous group who were the graduates of Anatolian High School and Anatolian Teachers' High School. They studied broad and narrow transcription in the course titled İDÖ 175 Listening and Production I (İDÖ 175 Dinleme ve Sesletim I) in the first term of 2015 academic year.

5. Procedure

In this study, perceptions and identification of English sibilants were examined via aural stimulus design method to check the comprehensibility of the sibilant sounds. The stimuli consisted of the oral production of the researcher, who pronounced the sibilants orally in a soundproof language lab. As a preliminary step, an oral pre-test was administered to participants, who listened to 11 test items which had five multiple choice distracters that were chosen from the other fricative sounds like [f, v, ɸ, β, θ, ð, x, ç, j, ɣ] in terms of aural stimulus design method. The exhortations of pronunciation coach were used as **oral stimuli**. Each test item entry was uttered by the pronunciation coach one by one within 5 seconds limits three times. The respondents saw the signs of the distracters in form of a multiple choice test on paper while the pronunciation coach uttered the test sounds one by one.

After the pre-test, participants were given a three-hour course on the perception of sibilants by listening. The participants underwent comprehensive and intensive sound training. Minimal pair tests, points and places of articulations were used as graphic organizers in relation to visual aids, true and false exercises and **mimic method** developed by Idahosa Ness (http://www.mimicmethod.com/2015) were utilized.

One of the main steps in teaching the sibilants and their related signs explicitly in this research was the **representation technique** (Celce-Murica, Brinton, & Goodwin, 2010). In such a representation technique, the pronunciation coach did the exhortations, repeated the sibilants, put their signs on the board, and the respondents repeated back the sounds, and took notes pertaining to their articulation and signs.

Controlled practice was another technique in which especially the correct options of the sibilant sounds repeated by the coach and their correct signs were taken down. In addition, the articulations of the respondents were taped and analyzed all together in the class.

Phonological transcription with audio forms from the voice of the native speakers was another technique to show the sound-graphic symbol relationship. The respondents listened to the sibilant sounds and wrote down their IPA symbols and checked them whether they matched or not.

Two weeks after completion of the related exercises, the participants received the pre-test as a post-test in the same manner via oral stimuli.

6. Results and discussion

The results of the pre-test and post-test were submitted to SPSS20 whose deductions can be given as follows in relation to research questions:

RQ 1: What is the overall success rate of the students when the pre-test and post-test scores are considered separately?

In order to find out the overall success for both tests, namely pre- and post-tests, descriptive statistics is used identifying the mean score for valid cases. It is to be noted beforehand that for the variables regarding pre- and post-test scores, the labels of Pretot and Posttot are named after respectively to be used for further cases. Accordingly, as given in the table below, the mean score for pre-test is 6.82 out of 11 (SD= 2.17). In this vein, it can be stipulated that the students' success rate is 62% for the pre-test. To add more, the case for post-test results is 9.82 out of 11 (SD= 1.17). Herein, it can be ascertained that the students' success rate for the post-test is 89.27%. As indicated, when the students' scores for both test are considered, it is seen that the scores for post-test is higher than those of pre-test.

Table 1: Descriptive statistics for pre-test and post-test results

		N	Min	Max	Mean	Std. Deviation
Valid N	Pretot	40	1.00	10.00	**6.8250**	2.17076
(listwise)	Posttot	40	7.00	11.00	**9.8250**	1.17424

RQ 2: Is there a statistically significant difference between pre-test and post-test scores of the students?

In order to find out whether there is a statistically significant difference between pre- and post-test scores of the students, the Paired Samples T-Test is conducted assuming that the case for this sample group requires parametric tests in use. Accordingly, the Paired Samples T-Test indicates that the post-test scores (M= 9.82) are statistically significantly higher than pre-test scores (M= 6.82); t= -11.619, p< .05 as given in the table below:

Table 2: Paired Samples T-Test Results

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 pretot - posttot	-3.00000	1.63299	.25820	-3.52226	-2.47774	-11.619	39	**.000**

RQ 3: Is there a statistically significant difference between students' scores on pre-test and post-test when the test items when 'sibilants' are considered?

In order to find out whether there is a statistically significant difference between pre- and post-test scores of the students when the test items regarding sibilants, Paired Samples T-Test is conducted. Accordingly, the Paired Samples T-Test indicates that the post-test scores for the sibilants (M= 5.40) are statistically significantly higher than pre-test scores for the sibilants (M= 3.80); t= -8.973, p < .05 as given in the table below:

Table 3: Paired Samples T-Test Results

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1　Sibi1 – Sibi2	-1.600	1.12774	.17831	-1.96067	-1.23933	-8.973	39	**.000**

RQ 4: Which of the test items are the most deceptive ones for learners regarding sibilants after the pre-test?

The test items which are the most deceptive ones with the lowest mean scores even after the post-test regarding sibilants are explored by means of descriptive statistics. The results are given in the table below. Accordingly, the test items entailing the sibilants **[tʃ]** (Q5) and **[ʃ]** (Q7) with the equal mean scores of .92. They are followed by the sibilants **[s]** (Q10) and **[z]** (Q9) with the mean score of .90 and .84 respectively. The highest rate of failure regarding sibilants are for **[dʒ]** (Q2) and **[ʒ]** (Q8) with the mean scores of .69 and .58 respectively.

Table 4: Descriptive statistics for sibilants after post-test

		N	Min	Max	Mean	Std. Deviation
	Q2[dʒ])	40	.00	1.00	**.6923**	.49831
	Q5([tʃ])	40	.00	1.00	**.9231**	.26995
Valid N (listwise)	Q7([ʃ])	40	.00	1.00	**.9231**	.26995
	Q8([ʒ])	40	.00	1.00	**.5897**	.49831
	Q9([z])	40	.00	1.00	**.8462**	.36552
	Q10([s])	40	.00	1.00	**.9000**	.30382

RQ 5: Which of the test items are the most deceptive ones for learners regarding sibilants after even after the post-test?

The test items which are the most deceptive ones with the lowest mean scores even after the post-test regarding sibilants are explored by means of descriptive statistics. The results are given in the table below. Accordingly, the test items entailing the sibilants **[s]** (Q10), **[ʒ]** (Q8), **[ʃ]** (Q7) are answered without fail (M= 1.00). They are followed by the sibilants with the mean scores of both.92, which belongs to **[ʒ]** (Q8) and **[z]** (Q9). The highest rate of fail for the post-test is estimated at the mean score of .90, which belongs to the sibilant **[dʒ]** (Q2).

Table 5: Descriptive statistics for sibilants after post-test

		N	Min	Max	Mean	Std. Deviation
	Q2[dʒ])	40	.00	1.00	**.9000**	.30382
	Q5([tʃ])	40	1.00	1.00	**1.0000**	.00000
Valid N (listwise)	Q7([ʃ])	40	1.00	1.00	**1.0000**	.00000
	Q8([ʒ])	40	.00	1.00	**.9231**	.26995
	Q9([z])	40	.00	1.00	**.9231**	.26995
	Q10([s])	40	1.00	1.00	**1.0000**	.00000

Additionally, the table below shows the percentages for every test item entailing sibilants. The success rate is also given for each test with regard to every test item regarding sibilants:

Table 6: Sibilants		Pre-test		Post-test	
ITEM		Count	Table N %	Count	Table N %
Q2[dʒ])	wrong	4	37.1%	2	18.2%
	correct	7	62.9%	9	81.8%
Q5([tʃ])	wrong	3	16.1%	0	0.00%
	correct	8	83.9%	11	**100.0%**
Q7([ʃ])	wrong	3	16.1%	0	0.00%
	correct	8	83.9%	11	**100.0%**
Q8([ʒ])	wrong	5	46.4%	3	16.1%
	correct	6	53.6%	8	83.9%
Q9([z])	wrong	5	23.1%	3	16.1%
	correct	6	76.9%	8	83.9%
Q10([s])	wrong	2	18.2%	0	0.00%
	correct	9	81.8%	11	**100.0%**
SUCCESS RATE		**73.83%**		**91.60%**	

7. Conclusion

In this paper, the suitability of an aural stimulus design method to perceive the phonetic contrasts pertaining to English sibilants for Turkish freshmen studying English were examined. So, the objective of the present research was to examine the Turkish-speaking prospective students' aural perception of English sibilants. Pre-and post-tests were administrated in a multiple choice hearing test. Right It must be noted that there is a high degree of phonetic similarity between English and Turkish sibilants, which obviously affects the perception of non-native sounds by Turkish prospective students.

After the pre-test, the subjects participated three hours in solving of exercises with sibilant contrasts by means of minimal pairs, to promote sibilant contrast interaction effect. For the auditory training on sibilants, participants underwent comprehensive and intensive sound training perception studies for three hours via various types of exercises on minimal pair contrasts, points and places of articulations used as graphic organizers in relation to visual aids, true and false exercises, aural stimulus design method and mimic method. In the pre-test and post-test, the participants' perception were tested by a multiple choice audition test with five distracters. In the pre-and post-tests, the order of perception was / dʒ, tʃ, ʃ, ʒ, s, z /. The pre-test results yielded 73.83% of success while the post-test results ended up in 91.60%. Difficult English sibilants for Turkish prospective students were /dʒ/ (18.2%), /ʒ/ (16.1%), and /z/ (16.1%). The respondents perceptually and aurally identified the English sibilant contrasts with native-like accuracy. The conclusion is that L2 experience in sibilant sounds made a difference in perceptual and oral improvement in L2 phonology acquisition. Obviously, the degree of phonetic similarity between native and non-native phonetic inventories remarkably influences the perception of non-native sounds in the target language.

Appendix A. Corpus (pre-test and post-test)

What is the **correct** sign of the following sounds articulated by the pronunciation coach:

1. ……......
a) [x]   b) **[f]**   c) [v]   d) [ʃ]   e) [x]

2. ……......
a) [j]   b) [dʒ]   c) [ç]   **d) [tʃ]**   e) [ʃ]

3. ……......
a) [θ]   b) [ɸ]   **c) [v]**   d) [ɣ]   e) [β]

4. ……......
a) **[ð]**   b) [ɸ]   c) [z]   d) [v]   e) [θ]

5. ……......
a) [tʃ]   b) [s]   c) [z]   **d) [dʒ]**   e) [ʒ]

6. ……......
a) [ʃ]   b) **[h]**   c) [j]   d) [x]   e) [ɣ]

7. ……......
a) **[s]**   b) [t]   c) [ʒ]   d) [θ]   e) [β]

8.............
a) [s]   b) [z]   c) **[ʒ]**   d) [θ]   e) [j]

9....................
a) [s]   b) **[z]**   c) [ʒ]   d) [tʃ]   e) [dʒ]

10…………..
a) [s]   b) [dʒ]   c) [ʒ]   d) [tʃ]   e) **[ʃ]**

11……..............
a) [j]   b) [dʒ]   c) [ʒ]   **d) [θ]**   e) [ʒ]

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