

Korean L2 Learners' Perception of English Front Vowels, /ɛ/ and /æ/

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1. Introduction

Numerous studies have attempted to explore how Korean L2 learners of English perceive English vowel contrast. A number of Korean L2 learners have difficulties discriminating English front vowels – /i/ and /ɪ/, /ɛ/ and /æ/ and back vowels – /ʊ/ and /u/ due to the discrepancies between Korean and English phoneme inventories (Flege, Bohn & Jang, 1997). Korean only has three front vowels, /i, e, ɛ/, while English has five front vowels, /i, ɪ, e, ɛ, æ/. Korean has vowels similar to, but not exactly the same as English front vowels, particularly, /ɛ/ and /æ/, so L2 Korean learners of English tend to perceive L2 sounds based on their phonetic and phonological information of L1 (Bohn & Flege, 1990; Flege, 1988). However, only few L2 learners can perceptually tell the difference between the English front vowels accurately. Thus, the present study now aims to find out what exactly enabled some Korean L2 learners to distinguish the vowels. A great deal of research suggests various factors mainly influencing the vowel perception, such as age, gender, dialectal characteristic, English experience, etc. No research, nevertheless, has taken into a consideration of various specific reasons altogether. Hence, the current study examines three factors – gender, dialectal characteristics, and English proficiency to account for Korean L2 learners' vowel perception.

1.1. Previous Research

A considerable amount of research has investigated how L2 learners perceive and produce the English front vowels. Kim (2010) has focused on how

the characteristics of perception and production of English front vowels, /i, ɪ/ and /ɛ, æ/ are explained by two hypotheses – ‘under-differentiation’ and ‘reinterpretation of distinction,’ comparing 61 Korean native speakers to five English native speakers. Under-differentiation refers to the situation when the L1 phoneme inventory is larger than the L2 phoneme inventory; reinterpretation of distinction refers to the situation when L2 speakers distinguish two distinct L2 sounds, based on the already established phoneme system of L1. As a result, Koreans could perceive the contrast between the /i/ and /ɪ/ pair, but not the /ɛ/ and /æ/ pair, indicating that under-differentiation of the phonemes occurred due to L1’s interference and reinterpretation of distinction also occurred because Koreans used the duration of the vowels to identify each contrastive vowel. Similarly, in Hong (2012)’s study, 73 Korean native speakers could distinguish /i/ and /ɪ/, but, not /ɛ/ and /æ/. However, the measurement of vowel perception can be problematic, because Koreans may not be trained well to be accustomed to identifying IPA (International Phonetic Alphabet) symbols, which do not represent the vowels’ sounds exactly. Furthermore, these studies did not suggest any internal or external factors that have an effect on the participants’ vowel discrimination.

Unlike the previous studies above, several studies have paid attention, specifically, to what factors influence on L2 vowel discrimination. Baker et al. (2001) considered the starting age of learning English in Korean L2 learners’ perception of vowels. Korean children ranging from 7 to 9 years old and Korean adults ranging from 20 to 23 years old were required to choose Hangul characters that correspond to the stimuli in a forced-choice task, and also to choose the degree between Korean-like vowel and English-like vowel on a seven-point Likert scale. The result showed that children’s score was higher than adults’, which indicates that children can perceive the contrast between vowels more accurately than adults. Children tend to treat L2 sounds as members of L1 sound categories, because they might learn the English vowels before a critical period when their vowel system is not fixed as much as adults’ (Patkowski, 1990).

According to the research conducted by Kim (2013), ten Kyungsang dialect speakers were compared to ten Kangwon dialect speakers in a vowel produc-

tion test. This study found out that the Kyungsang dialect speakers were able to produce English /ɛ/ and /æ/ distinctively, while the Kangwon dialect speakers pronounced the two different vowels as the same sound. Additionally, Eychenne and Jang (2015) have examined a corpus data spoken by a variety of Korean dialect speakers from Seoul, Daegu, and Gwangju. The result showed that the dialectal characteristics did not have any impact on Korean dialect speakers' vowel production; however, gender difference, interestingly, turned out to be another influential factor, because male speakers had lower F1 and F2 frequency than female speakers. This study also focused on the participants' vowel perception and attempted to figure out F1 and F2 ranges that they recognized as the vowels, /ɛ/ and /æ/, by using synthesized vowels. The result revealed that Gwangju male speakers tended to perceive the vowels in lower F1 frequency than Gwangju female speakers. These two tests above verify that gender influences considerably on the vowel discrimination.

English experience, the last factor, has been given a considerable attention in recent L2 phonetics. Fledge, Bohn and Jang (1997) have investigated the role of English experience on L2 learners' English vowel acquisition. They defined English experience as the sum of educational year in English speaking countries, arrival year, residential year, chronological age, and the amount of use in English. Eighty L2 learners of English from Korea, German, China, and Spain participated in a vowel discrimination test, compared with a control group of ten English native speakers from the U.S. All subjects heard several vowels, which were synthesized in a continuum from /i/ to /ɪ/ and from /ɛ/ to /æ/. The result revealed that English-experienced speakers perceived the vowels in a more native-like way than inexperienced participants. Furthermore, English experience is closely related to English proficiency, because the more they use the language, the more proficient they become (Lee, 2006). Hence, English proficiency is to be taken into an account as the last factor influencing the ability to distinguish English front vowels.

To sum up, a number of studies focused on how Korean L2 learners of English differentiate the English front vowels and how the specific factors

affects them individually. So far, no research has been conducted to verify the reasons taken altogether. Drawing on the previous studies, the most influential factors turned out to be as gender, difference between dialects, and English proficiency. First, male and female speakers had relatively different accuracy in perceiving vowels (Eychenne & Jang, 2015). Second, in case of the two different dialects, there was no research that compared Kyungsang dialect speakers to Jeolla dialect speakers in a perception test. The studies above have discussed the difference between the dialects by comparing Kyungsang dialect to Kangwon dialect in perception, or Kyungsang dialect to Jeolla dialect and Standard Korean in production. Third, English proficiency is closely related to the vowel acquisition, because the more the learners experienced English, the higher proficiency they would have. On top of the three factors, age also played an important role in vowel discrimination; however, the present study excluded the age factor. Thus, the primary purpose of the current study is to explore Korean L2 learners' perception of the English front vowels, / ϵ / and / æ / by examining the three factors – gender, difference between Kyungsang and Jeolla dialects, and English proficiency. The research question to ask now is: How Korean L2 learners of English perceive English front vowels, / ϵ / and / æ /, and what factors affect their vowel discrimination?

2. Method

2.1. Participants

A total of sixteen Korean native speakers participated in the vowel discrimination test. Their age ranged from 22 to 29 (mean = 24.62, SD = 1.89). They were divided into three groups - gender, dialects, and English proficiency. The first group of gender was subdivided into male and female; the second group was subdivided into Kyungsang dialect and Jeolla dialect speakers; the last group of English proficiency was subdivided into high and low English proficient speakers based on the score of TEPS (Test of English Proficiency developed by Seoul National University): the score of the high proficient group was over 800 and the score of the low proficient group was

below 600. Those who do not have a TEPS score shared their TOEIC scores, and the TOEIC scores were converted into TEPS score according to 'TEPS vs. TOEFL vs. TOEIC Conversion Table' provided by TEPS committee. All subjects had normal hearing and were paid for their participation. The specific information about the subjects is provided in Appendix A.

2.2. Stimuli

A target word was composed of a target vowel and two consonants – voiced stop; /b, d/ and voiceless stop /p, t/ – preceding or preceded by the vowel as CVC. Voiced and voiceless stops were placed before and after the vowel, because voicing can affect vowel duration and vowel quality (Hillenbrand et al., 2000; Port & Dalby, 1982; Summers, 1987). Each pair of the stimuli had either the two same target words or the two different target words, such as /pɛp-pɛp/ or /pɛp-pæp/ respectively. In order to distract the subject's attention from the purpose of the study, 128 fillers, similar to the stimuli, but with different vowels, such as /bid, bɪd, bʊd, and bud/, were added. The stimuli consisted of 128 target words and 128 fillers in a ratio of 1:1 (32 words x 4 pairs x 2 repetitions). They were presented on a Praat script in a randomized order and the interval between the pairs was 700-ms.

A female English native speaker recorded stimuli in a sound-attenuated room. She was born and had lived in Saint Louise in Missouri of the U.S. for 27 years. The native speaker majored in psychology and graduated from a university. She had no listening or speaking impairments. Before the recording of the stimuli, she was trained on pronouncing the accurate English front vowels, /ɛ/ and /æ/ by listening the noncoined words containing the vowels, such as *pet* and *pat*, *red* and *nap*. She was also given the IPA symbol that helps the exact pronunciation of vowels. Then, the stimuli were recorded in a carrier sentence, 'Please say CVC clearly' at a normal speaking rate, using a microphone in a laptop with a sampling frequency 44100 Hz. Appendix B shows the frequency of the first formant and duration from the native speaker. The native speaker was paid for her participation.

Table 1. Stimuli

	/pVp/	/pVb/	/pVt/	/pVd/	Judgement
Pair	pɛp - pɛp pæp - pæp pæp - pæp pæp - pɛp	pɛb - pɛb pæb- pæb pæb- pæb pæb - pɛb	pɛt - pɛt pæt - pæt pæt - pæt pæt - pɛt	pɛd - pɛd pæd- pæd pæd- pæd pæd - pɛd	Same or different?
	/bVp/	/bVb/	/bVt/	/bVd/	Judgement
Pair	bɛp - bɛp bæp - bæp bæp - bæp bæp - bɛp	bɛb - bɛb bæb- bæb bæb- bæb bæb - bɛb	bɛt - bɛt bæt - bæt bæt - bæt bæt - bɛt	bɛd - bɛd bæd- bæd bæd- bæd bæd - bɛd	Same or different?
	/tVp/	/tVb/	/tVt/	/tVd/	Judgement
Pair	tɛp - tɛp tæp - tæp tæp - tæp tæp - tɛp	tɛb - tɛb tæb- tæb tæb- tæb tæb - tɛb	tɛt - tɛt tæt - tæt tæt - tæt tæt - tɛt	tɛd - tɛd tæd- tæd tæd- tæd tæd - tɛd	Same or different?
	/dVp/	/dVb/	/dVt/	/dVd/	Judgement
Pair	dɛp - dɛp dæp - dæp dæp - dæp dæp - dɛp	dɛb - dɛb dæb- dæb dæb- dæb dæb - dɛb	dɛt - dɛt dæt - dæt dæt - dæt dæt - dɛt	dɛd - dɛd dæd- dæd dæd- dæd dæd - dɛd	Same or different?

2.3. Procedure

All participants took a vowel discrimination test in a sound-attenuated room. First, they were given basic instructions about the ongoing experiment and were required to be seated in front of a laptop displayed with Praat (Boersma & Weenink, 2015). In addition, the researcher checked their normal listening. Before the main experiment, the subjects were trained on the pretest and were made to be accustomed to operating the program selecting the ‘same’ or ‘different.’ Then, they began the vowel discrimination test of 256 words set with a randomized order. The L2 learners were required to click the button nearly at the same time as they heard the stimuli sounds. In order to minimize their tiredness, they could take a rest for 3 minutes and then started off the rest of the tests.

Each pair had a value of either the ‘same’ or ‘different.’ When the subjects heard the two pairs as the same, i.e. /bɛt-bɛt/, /bæɛt-bæɛt/, they clicked the button ‘same’; when they heard two different pairs, i.e. /bɛt-bæɛt/, /bæɛt-bɛt/, they

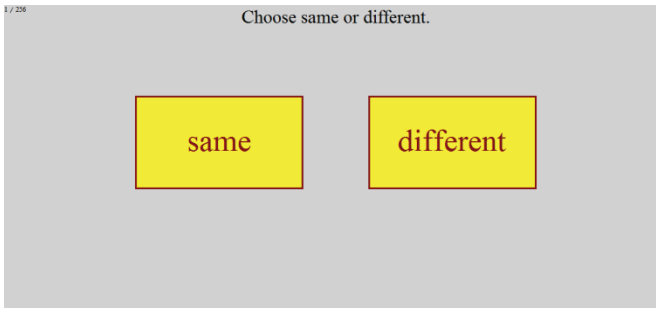


Figure 1. The Image of the Praat Script

clicked the button ‘different.’ In order to measure the accuracy rate of each pair, the correct answers were coded as 1 and the wrong answers were coded as 0. Then, the value of the four pairs was averaged out. Accordingly, when the average was near 1, the answers were correct; when the average was near 0, the answers were wrong. The example of the coded results is in Appendix C.

3. Results

3.1. Difference Between Dialects

The Figure 2 shows that both Kyungsang dialect and Jeolla dialect speakers differentiated the vowel, /ɛ/ from /æ/. All of the Kyungsang dialect speak-

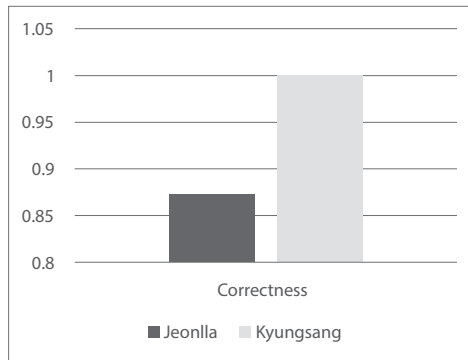


Figure 2. Difference between dialects

ers clearly figured out the difference between the two distinctive sounds, while Jeolla dialect speakers did not discriminate the two vowels as much as Kyungsang dialect speakers. The average scores of vowel perception were 1 for Kyungsang dialect speakers and 0.87 for Jeolla dialect speakers. The result indicates that both groups could perceive the difference between the vowels, / ϵ / and / \ae /, but Kyungsang dialect speakers perceived the difference better than Jeolla dialect speakers.

3.2. English Proficiency

The Figure 3 below shows an interesting result about the relationship between English proficiency and the L2 learners' discrimination of the vowels. Previous studies pointed out that the more English experience people have, the more accurately they perform in vowel discrimination tests. In the experiment of the current study, however, the low proficient group had higher correctness than the high proficient group. Both groups had high scores that are nearly 1, but the low group had more accuracy, which is the opposite result from what was expected. To conclude, pertaining to the second factor, i.e. English proficiency, the low proficiency group discriminated slightly better than the high proficiency group, but the overall difference between them was small.

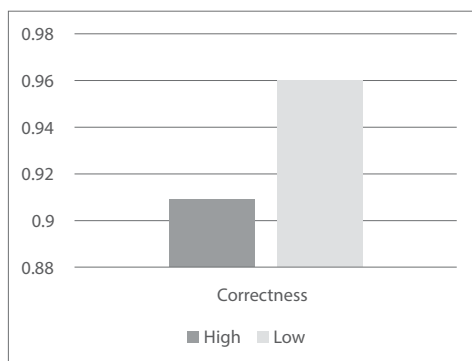


Figure 3. English Proficiency

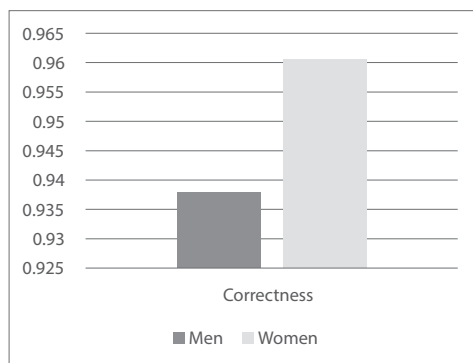


Figure 4. Gender

3.3. Gender

Figure 4 above shows that female group had higher accuracy than male group. As the previous study from Eychenne and Jang (2015) has mentioned, gender difference played an important role in distinguishing the front vowels, /ɛ/ with /æ/. Both group had a high score, 0.97, in discriminating the vowels, but there was a slight difference, 0.025, between men and women.

3.4. Other Factors

Additionally, the duration of the vowels, voicing of the consonants and the consonants' place of articulation were examined to find out what the other contextual factors influenced on the perceptual difference. In Figure 5, the voiced consonants greatly affected the duration of the vowels. The duration of voiceless vowels was much shorter than the voiced vowel, which shows that the voicing of the consonants can affect the vowel duration between them. In Figure 6, there was no big difference between the correctness of the voicing of the final consonants. The words ending with the voiceless consonants, such as /pvp, pvt, bvp, bvt, tvp, tvt, dvp, and dtv/ had the slightly higher correctness than the words with the voiced consonants, such as /pvb, pvd, bvb, bvd, tvb, tvd, dvb, and dtv/. The front vowels, /ɛ/ and /æ/ were distinguished to the participants in both voiceless and voiced consonants contexts.

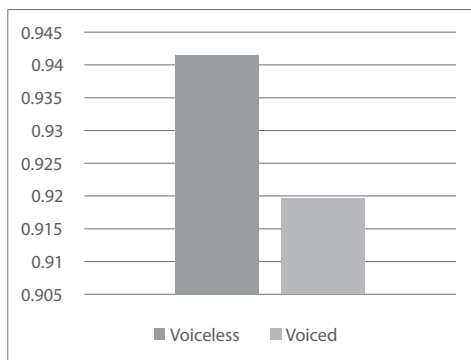


Figure 5. Duration of the vowels

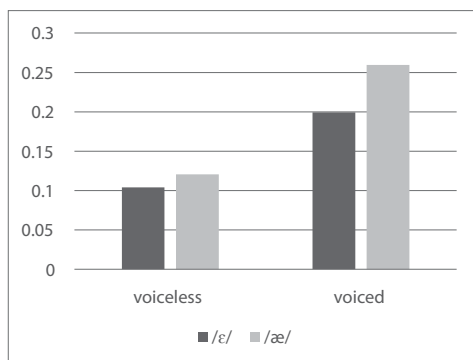


Figure 6. Voicing of the consonants

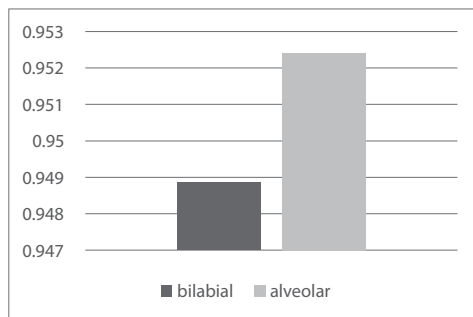


Figure 7. Place of articulation of the consonants

The two consonants preceding or preceded by the vowel were different in terms of place articulation. Bilabial stops, /p, b/ and alveolar stops, /t, d/ were placed before and after the vowels, /ɛ/ and /æ/. The quality of consonants in the stimuli did not show any meaningful difference in the accuracy rate of vowel perception, as the difference of the value was only 0.003551 as indicated in Figure 10. Likewise, a variety of factors were analyzed to find out what factor influences on the L2 learners' discrimination of the vowels; however, the overall results show that most of the factors did not show big difference in the correctness of the discrimination. Most of the subjects discriminated the English front vowels, /ɛ/ and /æ/, relatively accurately, regardless of many factors.

4. Discussion

The aim of the study was to explore whether Korean L2 learners of English perceive the English front vowels, /ɛ/ and /æ/ differently. A great deal of research has pointed out that many L2 learners struggle to distinguish these two English front vowels. The reason is that the phonetic and phonological system of L1 is different from that of L2, so L2 speakers tend to perceive the L2 vowels based on their L1 phonemic inventory. In order to reveal the reasons why they have hard time differentiating the vowels, this study mainly focused on examining various factors, such as gender, difference between the dialects, and English experience. Sixteen Korean native speakers from Kyungsang-do and Jeolla-do participated in the perception experiment. The stimuli were made from the female English native speaker from the United States and were made in the context of the bilabial and alveolar stop consonants. The participants chose the 'same' or 'different' button to the corresponding pairs. The overall result showed that most of the participants discriminated the vowels correctly with the accuracy rate being over 0.9. This indicates that both two dialect speakers can discriminate the distinctiveness of the two vowels. In a gender factor, females had higher correctness than males. Interestingly, the low proficiency group had higher correctness than the high proficiency group, which was the opposite from the

previous studies. Moreover, voicing of the consonants after the vowel could affect the accuracy rate. The stimuli ending with the voiceless consonants had slightly higher correctness than voiced consonants. Furthermore, the place of articulation of the consonants preceding and preceded by the vowels showed no big difference in discriminating the vowels.

This study focused on the perception and elaborated a variety of factors affecting the discrimination of the vowels. No previous studies have included many factors in vowel perception. This research provided a different approach on understanding Korean L2 learners' vowel acquisition. Moreover, the findings from the current research would provide Korean L2 learners with a helpful guidance to perceive the nonexistent English vowels in Korean phoneme inventory. The result of the current study, however, needs to be investigated in further studies. A larger number of participants would be needed to generalize the findings. On top of that, the voice from only one female native speaker was used in this study to make the stimuli. More native speakers are required to record their vowel production in order to examine a variety of vowel pronunciations. Lastly, only perception test was conducted in this research, so production test needs to be included in the future studies.

5. Conclusion

The present study focused on the Korean L2 learners' perception of the English front vowels, /*ɛ*/ and /*æ*/, which cause L2 learners' confusion due to the discrepancies between Korean and English phoneme inventory. Koreans, in many cases, tend to perceive the English vowels based on the Korean phoneme. In order to find out what factors influence on the perception of the two contrastive vowels, the three factors – gender, dialectal characteristics, and English proficiency were examined.

The current study compared a variety of factors that affect the vowel discrimination of /*ɛ*/ and /*æ*/. The result showed that most of the subjects could discriminate the vowels exactly and the accuracy rate of the perception was over 0.9. Only slight differences were found between the two groups, Kyung-

sang and Jeolla dialectic group, high proficiency and low proficiency groups, and female and male groups. Moreover, the contexts of the vowels, such as voicing and place of articulation of consonants preceding and preceded by the vowel, were taken into consideration. However, these contexts also did not show meaningful difference in distinguishing the vowels. To make up for the limitations of this study, further studies are needed to explore the perception of Korean L2 learners' in vowel discrimination.

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Appendix A. Subject Information

	Subject A	Subject B	Subject C	Subject D
Age	25	23	25	25
Gender	Male	Male	Male	Male
Dialect	Gwangju	Gwangju	Gwangju	Gwangju
English score	800	805	500	550
	Subject E	Subject F	Subject G	Subject H
Age	23	23	23	27
Gender	Female	Female	Female	Female
Dialect	Gwangju	Gwangju	Gwangju	Gwangju
English score	920	790	645	570
	Subject I	Subject J	Subject K	Subject L
Age	25	29	26	26
Gender	Male	Male	Male	Male
Dialect	Daegu	Masan	Ulsan	Changwon
English score	950	860	500	550
	Subject M	Subject N	Subject O	Subject P
Age	22	22	25	25
Gender	Female	Female	Female	Female
Dialect	Ulsan	Jinju	Ulsan	Ulsan
English score	810	900	496	530

Appendix B. The frequency of the first formant and duration from the English native speaker

		bvb	bvd	dvb	dvd
/ɛ/	F1 duration	843.6439 0.197131	742.7061 0.280934	778.4093 0.221063	723.1862 0.241178
/æ/	F1 duration	928.5278 0.156	911.852 0.232	857.6981 0.354536	846.8346 0.374630
		bvp	bvt	dvp	dvt
/ɛ/	F1 duration	822.4027 0.165996	815.1156 0.153	765.5809 0.101712	756.4297 0.128654
/æ/	F1 duration	962.8443 0.212315	900.2062 0.146	739.0344 0.099	797.2084 0.130574
		pvb	pvd	tvb	tvd
/ɛ/	F1 duration	861.2333 0.143035	786.6998 0.188732	868.7948 0.124148	804.9926 0.198511
/æ/	F1 duration	1048.519 0.098	896.8859 0.283098	848.7737 0.280173	919.4888 0.297767
		pvp	pvt	tvp	tvv
/ɛ/	F1 duration	pvb 861.2333	pvd 786.6998	tvb 868.7948	tvd 804.9926
/æ/	F1 duration	0.143035 1048.519	0.188732 896.8859	0.124148 848.7737	0.198511 919.4888

Appendix C. An example of the results and coding

Dialect	Jeolla	Jeolla	Jeolla	Jeolla
Gender	Men	Men	Women	Women
Proficiency	High	High	High	High
Dialect	Jeolla	Jeolla	Jeolla	Jeolla
Gender	Men	Men	Women	Women
Proficiency	High	High	High	High
bvb-aa	same	same	different	same
bvb-aa	same	same	same	same
bvb-ab	different	different	different	different
bvb-ab	different	different	different	different
Dialect	Jeolla	Jeolla	Jeolla	Jeolla
Gender	Men	Men	Women	Women
Proficiency	High	High	High	High
bvb-aa	1	1	0	1
bvb-aa	1	1	1	1
bvb-ab	1	1	1	1
bvb-ab	1	1	1	1
bvb mean	1	1	0.75	1
Dialect	Jeolla	Jeolla	Jeolla	Jeolla
Gender	Men	Men	Women	Women
Proficiency	Low	Low	Low	Low
bvb-aa	same	same	same	same
bvb-aa	same	same	same	same
bvb-ab	different	different	different	same
bvb-ab	different	different	different	different
Dialect	Jeolla	Jeolla	Jeolla	Jeolla
Gender	Men	Men	Women	Women
Proficiency	Low	Low	Low	Low
bvb-aa	1	1	1	1
bvb-aa	1	1	1	1
bvb-ab	1	1	1	0
bvb-ab	1	1	1	1
bvb mean	1	1	1	0.75

ABSTRACT

Korean EFL learners' perception of English vowel, /ɛ/ and /æ/

Hyunjung Joo

Previous studies have explored how L2 Korean learners of English acquire English vowels, which is not the same as the vowels in their L1 phoneme inventory and what factor affects the discrimination of the vowels. The present study aims to investigate whether Korean L2 learners of English perceive the distinctiveness between two English front vowels, /ɛ/ and /æ/ and whether three factors – gender, difference between dialects, and English proficiency – influence on the perception of the vowels. Sixteen participants were divided into three groups of male or female, Kyungsang dialect or Jeolla dialect speaker, and high proficient or low proficient speaker. They heard the stimuli consisting of the words with the four front vowel pairs, /ɛ - ɛ/, /ɛ - æ/, /æ - ɛ/, and /æ - æ/ recorded by a female English native speaker from the U.S. Then, they were required to click the 'same' or 'different' button when they heard the same or different pairs of the stimuli. Taken together, the overall result shows that both Kyungsang and Jeolla dialect speakers discriminated /ɛ/ and /æ/, while the factors of gender, dialect, and English proficiency had no meaningful significance.

Key Words vowel perception, /ɛ/ and /æ/, Kyungsang dialect, Jeolla dialect, English proficiency, gender