

REINVESTIGATING THE MERGER OF MID-FRONT VOWELS IN SEOUL KOREAN

Woo Jin Choi

Johns Hopkins University
wchoi20@jh.edu

ABSTRACT

In Seoul Korean, it is claimed that the merger of mid-front vowels ㅐ (IPA: /ɛ/) and ㅑ (IPA: /e/) has happened, mainly for younger generations [1]. To revalidate the claim, we conducted an experiment on Korean speakers to pronounce minimal pairs of the mid-front vowels. After analyzing formants and intensity to identify distinctions between two vowels, we claim to support that the merger is present in modern speakers.

Keywords: merger, mid-front vowels, Korean

1. INTRODUCTION

A phonemic merger is a linguistic phenomenon in which a phonological distinction is lost or absent between two or more phonemes. A known example of this phenomenon could be found in some dialects of English between cot and caught where the difference is hard to be found in speech production.

In Seoul Korean, also known as Gyeonggi dialect, there exists eight vowel phonemes: ㅣ, ㅡ, ㅏ, ㅑ, ㅓ, ㅕ, ㅗ, and ㅛ. From this vowel system, it is often claimed that the distinction between ㅐ (IPA: /ɛ/) and ㅑ (IPA: /e/) is no longer present in modern speakers [1, 2]. That is, younger generations are not possible to present a clear distinction between two vowels in speech production while the older generation can.

In this paper, I aim to reinvestigate the merger of mid-front vowels ㅐ and ㅑ in Seoul Korean. By presenting ten minimal pairs to college students who speak Korean, I collect phonological data from the recordings including formants and intensity. Then the data is analyzed to determine whether two vowels are differentiable from one another.

2. EXPERIMENT

To accurately capture the merger of mid-front vowels in Seoul Korean speakers, a total of 10 subjects (6 males and 4 females) were recruited for recording. I selected native speakers of the language to minimize the confounding variables including

ㅐ /ɛ/	ㅑ /e/
내 /nɛ/	네 /ne/
모래 /more/	모레 /mo:re/
개 /gɛ/	계 /ge/
새 집 /sɛ tɕip/	세 집 /se tɕip/
아내 /anɛ/	아 네 /a: ne/
새로 /sɛro/	세로 /sero/
매 /mɛ/	메 /me/
한 때 /han tɛ/	한 떼 /han te/
태 /tɛ/	테 /te/
팽이 /pɛŋ:i/	펑귄 /peŋ:yn/

Table 1: Minimal Pairs of Seoul Korean Mid-Front Vowels

but not limited to the unforeseen impacts of language learning environments and the difference between first and second language acquisition. In addition, all subjects are in their twenties, which was intentionally done, as this paper tests the hypothesis that the merger has happened in younger generations of contemporary Korean speakers.

As minimal pairs are the strongest source of evidence for distinctions or contrast among phonemes within a language, ten minimal pairs are constructed and presented to the subjects for speech production. The list of minimal pairs are in Table 1.

Each participant was asked to pronounce the presented minimal pairs in order while leaving a short break in between each word. The participants spoke each word in a continuous manner, creating a single wav file for each participant. The lengths of the recordings varied by participants, from 30 seconds to 45 seconds. The recording was conducted in a quiet room with the same hardware.

This resulted in a total of 10 recordings that contain 20 words from 10 different participants. Then each recording was analyzed using Praat to manually extract formants (F1, F2, F3), pitch (F0), and intensity from the midpoint of the vowel. Then the extracted data were recorded on a Microsoft Excel file, which was converted to a CSV file to be analyzed using RStudio.

Vowel	F1		F2	
	μ	σ	μ	σ
ɪ /e/	547.46	80.95	1933.46	445.85
ɪ /e/	523.30	70.97	1978.74	378.01

Table 2: Mean and Standard Deviation for F1 and F2

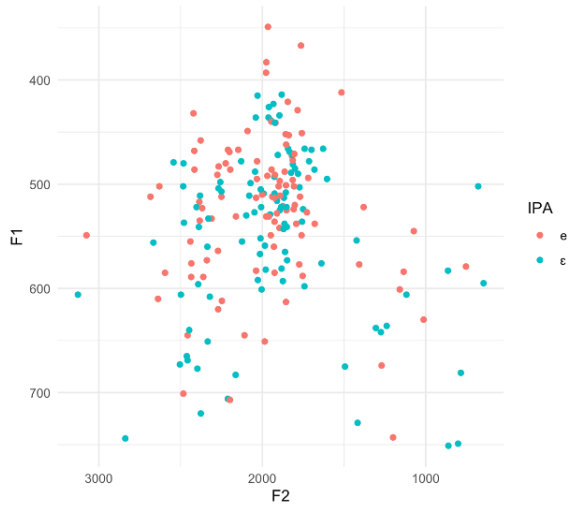


Figure 1: Overall Distribution of F1 and F2

3. ANALYSIS

Among the values collected from the subjects, three values were mainly used: F1, F2, and intensity.

3.1. F1 and F2

The mean and standard deviation of F1 and F2 for mid-front vowels are recorded in table 2.

As the table presents, there exists a minor difference in the mean values of F1 and F2 of mid-front vowels. The difference is 24.16 and 45.28 for F1 and F2 respectively. Considering the spectrum of the F1 and F2 values for the vowel system, the difference is not significant. This can be further highlighted when looking at the overall distribution of F1 and F2.

As Figure 1 depicts, there does not exist a significant difference in the region for two mid-front vowels. It appears that there is a big overlapping region in the middle of the scatterplot where the F1 value is 500 and the F2 value is 2000. Considering that two distinct regions would support that two phonemes are different from each other, the scatter plot supports the current claim on the merger of mid-front vowels.

To further investigate the distribution of F1 and F2 values, additional scatterplots were made to analyze whether the gender of the speaker has an influence



Figure 2: Distribution of F1 and F2 for Male

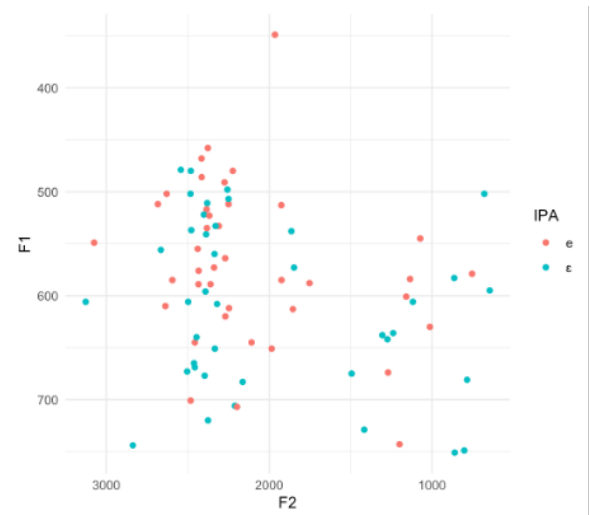


Figure 3: Distribution of F1 and F2 for Male on the merger.

A gender-specific scatter plot (in Figure 2 and Figure 3) demonstrates a similar pattern to that of the overall scatter plot. That is, there do not exist two distinct regions for two mid-front vowels. Although the location of the mixed region is different for the two scatter plots above, these additional scatter plots further support the claim that the distinction between two mid-front vowels is lost.

As two vowels are located at the mid-front region of the vowel system, it is expected that some overlapping regions exist. From the scatter plots presented previously, the majority of the regions were overlapping. Then, to investigate whether some individuals may still retain the distinction between two mid-front vowels, 10 additional scatter plots were constructed. Among newly plotted graphs, two subjects have shown an interesting pattern – a

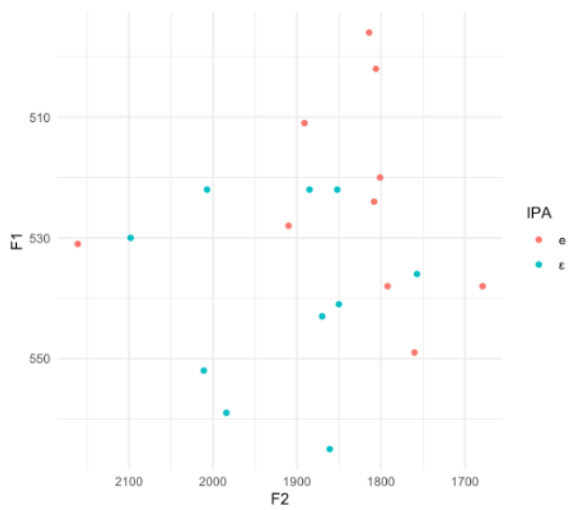


Figure 4: Distribution of F1 and F2 for Male 5

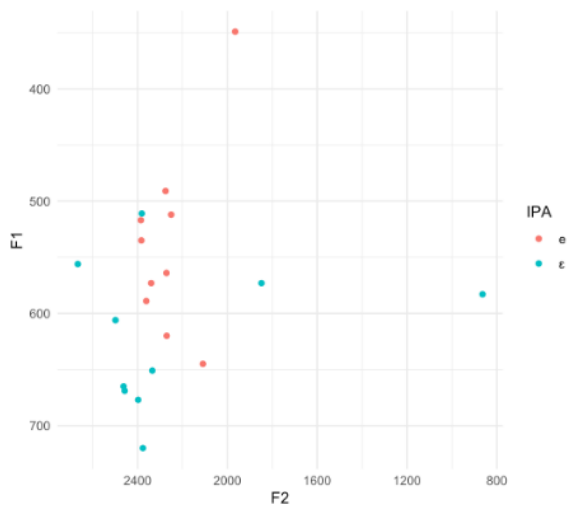


Figure 5: Distribution of F1 and F2 for Female 2
noticeable distinction is present.

It is arguable that the distinction may be lost in the two individual plots: Figure 4 and Figure 5. However, considering the definition of merger and previous plots, two subjects certainly demonstrate, or have an internal distinction of two mid-front vowels, in terms of speech production. Despite some overlapping regions still exist, there exists a clear distinction when producing those vowels. Considering that a minor distinction was present to two out of ten subjects, it may be possible to state that some young generations of Korean speakers did not undergo the merger of mid-front vowels.

3.2. Intensity

As Figure 3 presents, there only exist a minor different in the mean and standard deviation of intensity for two mid-front vowels. This is expected

	μ	σ
ㅈ /ɛ/	66.33	2.15
ㅊ /e/	68.46	2.60

Table 3: Mean and Standard Deviation for Intensity

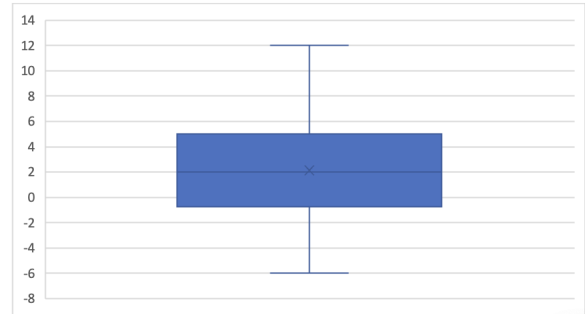


Figure 6: A box plot of Intensity Difference between Minimal Pairs

as intensity is a measure of physical phenomenon in which it is a measure of the amount of energy used in the production of a vowel. However, a notable observation is made in Figure 6 when measuring the intensity difference between minimal pairs.

The difference between minimal pairs was calculated by subtracting the intensity value of ㅈ /ɛ/ to ㅊ /e/. Thus, a positive value would represent that the higher intensity value was measured for ㅈ /ɛ/ compared to ㅊ /e/. The mean value of intensity difference between minimal pairs is greater than 0 and the box is formed from 5 to -1. The plot suggests that the speakers impose some difference in pronouncing two mid-front vowels by altering the intensity as one vowel ㅈ had a greater intensity than the other vowel ㅊ. As the previous section of the analysis suggested that no significant difference was found when comparing F1 and F2 values, intensity, on the other hand, could be a possible source of difference that the young generation of Korean speakers maintain as a distinguishing factor between the two mid-front vowels.

4. CONCLUSION

This paper aimed to reinvestigate the current claim that the merger of mid-front vowels in Seoul Korean has happened so that the distinction is lost, especially in the younger generations. To reaffirm that the phenomenon is ongoing, ten subjects currently enrolled in university were recruited for data collection. Ten minimal pairs were presented to be spoken and values such as formants and intensity were collected.

In the first section of the analysis, the scatter

plots of F1 and F2 values were constructed. While overall and gender-specific scatter plots displayed no significant distinction between the two vowels, some individual-specific plots demonstrated a possible distinguishing region between the two vowels. This suggests that the merger may not be present in some speakers while the majority has definitely lost the distinction.

In the second section of the analysis, the box and whisker plot of intensity difference between minimal pairs was constructed. The plot suggested that the speakers could be demonstrating the difference between the two vowels by imposing higher intensity for ㅓ /ɛ/ while lower intensity for ㅕ /e/. However, because such difference is not consistent in the overall data, as in some cases higher intensity was used for ㅕ /e/, this analysis remains uncertain.

There are some possible improvements for future relevant studies. In the process of data collection, subjects are from the same university, which could be improved by recruiting Korean-speaking young participants from other regions as well. In addition, the recordings were simply pronouncing an entire collection of minimal pairs by word, which could be improved when presenting words in a random order or in a sentence to better capture the usual speaking environment.

In addition to the improvement relating to the data collection, this paper only focuses on the speech production of the two mid-front vowels. As was done in the early relevant study [1], the paper could have been more interesting if it also focused on the perception of the two vowels. For instance, each participant could be provided a recording from the news to determine which vowel it was. This additional listening task could have provided a deeper understanding of the current perception and understanding of the two mid-front vowels in young Korean speakers.

Overall, this paper was able to confirm that the merger of mid-front vowels in Seoul Korean is still present and the ongoing claim on the merger should be continued. However, as presented in the analysis section of this paper, there may exist other factors that could be used by the speakers to distinguish the two vowels.

5. REFERENCES

- [1] J. Eychenne and T.-Y. Jang, "On the merger of korean mid front vowels: Phonetic and phonological evidence," *Journal of the Korean society of speech sciences*, vol. 7, pp. 119–129, 06 2015.

- [2] J. Lee, C. Vaughn, and K. Idemaru, "Production and perception of north and south korean vowels: A pilot study," 2019. [Online]. Available: <https://api.semanticscholar.org/CorpusID:202754661>
-