

A Comparative Analysis on Native and Non-Native Korean Speakers' Vowel Productions

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Abstract

This paper investigates Korean vowel spaces of native Korean speakers (NS) and non-native Korean speakers (NNS, L1: English). The vowel production of NS and NNS were compared. All the speakers recorded eight Korean cardinal vowels, which are [i], [e], [æ], [W], [A], [o], [u], and [a] three times. A preceding consonant was lenis fricative [s] sound of Korean. The participants' production was normalized by using Lobanov normalization function in the R program. Results show that NNS cannot differentiate the Korean mid-vowels and back vowels such as [A], [o], and [u]. This research can be helpful to investigate that L1 English can affect the L2 Korean learners' vowel pronunciation.

Keywords: Korean Vowels, L1 Phonetics

Word count: 5000

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1. Introduction

In this paper, our group investigated Korean vowel productions of Korean native speakers (NS) and non-native Korean speakers (NNS) by analyzing acoustic features. We aimed to examine native speaker pattern of vowel formants in Korean, and to explore second language learners' patterns in comparison to those of NNSs. Our results were analyzed by using normalization and statistic functions in the R program. The results indicate that L1 (English) of the NNSs might affect their L2 Korean vowel production. It is important to know what sounds students may have trouble with and what causes the difficulty in L2 Korean acquisition Seongmoon (2003) Heoung (1965). Thus, this study is useful in terms of as well as suggesting crucial research in the second language education field.

2. Methodology

To compare the convergence and divergence of L1 Korean and L2 Korean Vowel Production, we used a one-way between-subjects design, and analyzed the collected data using two Hz-basd measurements and a phonetic measurement tool, Praat.

2.1 *Participants*

Using convenince sampling, we sampled six adult residents living in Eugene, Oregon; three of them were Native Koreans, and the rest were non-Native sperking Koreans. Two Native Koreans were doctoral students majoring in East Asian Lanuages and Literatures, and the other one was a Korean instructor at the University of Oregon. Non-native speakers were recruited from one of the Korean classes at the Univeresity of Oregon. Korean participants were an average of 28 in age, while the average age of the non-Korean subjects were 19.

2.2 *Speech Materials*

We prepared seven sentences consisting of eight Korean vowels; i,e,ae,w,^,a,u. The sentences to be tested will be added at the end of the original paper as one of the appendice.

2.3 *Procedure*

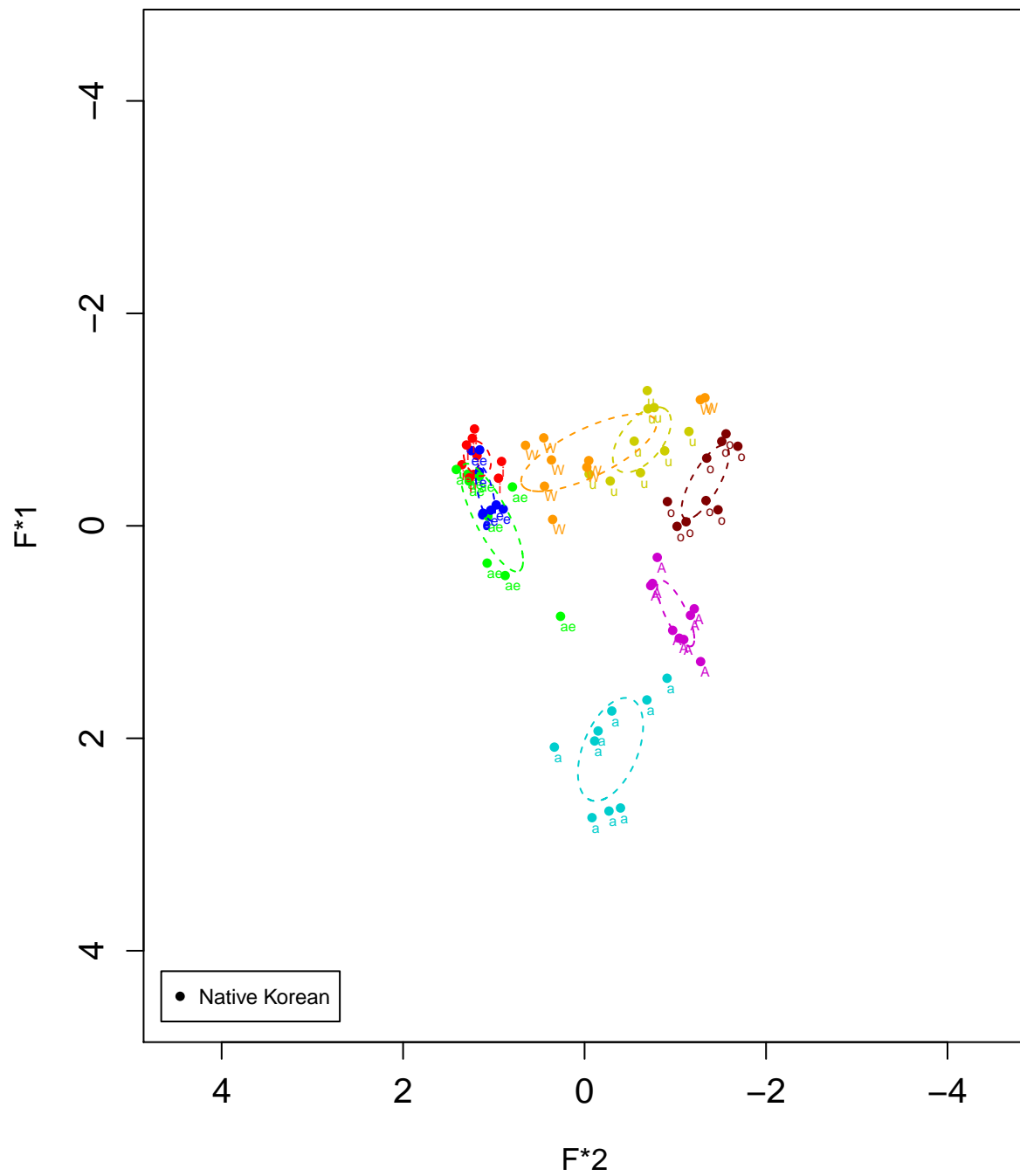
The Korean vowels of the participants were audio-recorded. We met in the quiet room individually and we had them repeat the eight sentences three times using a Praat program, which is widely used in phonetic measurements. By measuring F1 and F2 in the vowel mid-point, we intended to find vowel formant patterns.

3. Results and Discussion

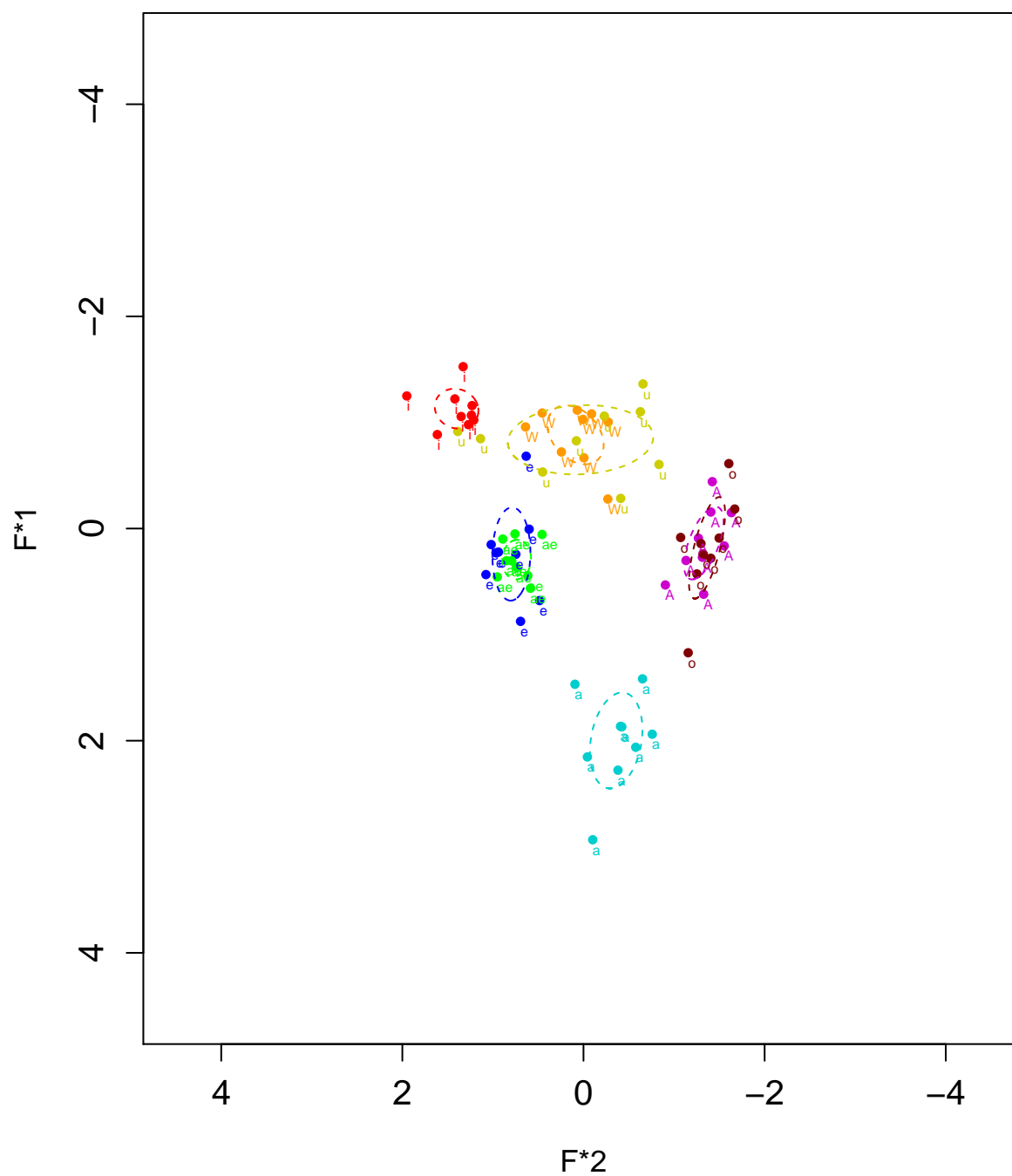
In this section, vowel formant patterns of NSs and NNSs will be contrasted based on the obtained speech samples. First, we will report the mean formants across three repetitions. Namely, the vowel charts of all participants based on mean values will be presented and compared below. The NS vowel charts reveal several convergences and divergences among the native speakers. For instance, NS1 tends to pronounce high-back vowel [u] as a front vowel. Meanwhile, her high-mid vowel [W] also approximates a high back vowel. Another surprising native speaker is NS3, who is the only native subject who did not demonstrate a merge of [i], [e], and [æ], marked by her clear differentiation of [e] and [æ]. In general, NS 3 produced a similar pattern with the vowel chart of Shin, Kiaer, and Cha (2012) regardless of some subtle variations. For instance, the mid-back vowel [o] in Shin et al. (2012) is realized as a high-back vowel by NS3. NS3's distinction in vowel articulation might be triggered by multiple reasons. Her standard Korean training experience for a teaching certificate in the Seoul Education office, as well as her relative shorter residence in English speaking countries, might be the causes. In the next section, we will present the vowel charts of NNS. Several shared typical L2 errors from the NNS data can be observed. First, compared to the NSs, none of the NNS participants

84 successfully distinguished [A] and [o]. Although English vowels contrast [A] and [o], due to
85 their shorter duration of learning Korean (five months), they may not have fully acquired
86 the accurate L2 pronunciation. Moreover, except for NNS 2, the other two NNSs were both
87 confused between [W] and [u]. Since NS 1 and NS 3 are their teachers in the Korean 102
88 class, they might have assimilated teachers' inputs when producing the two sounds. In
89 addition, given the apparent difference between [e] of "met" and [æ] of "mat" in English,
90 they articulated [e] and [æ] as a merged vowel [e]. In other words, the merger consistently
91 appeared in the NNS pronunciation because the teachers might not have fully explained
92 the differences between [e] and [æ], or the students might not have perceived any
93 dissimilarities between the teachers' pronunciations. Fortunately, there are noticeable
94 native-like vowel patterns in the NNSs' data as well. Especially their accurate production
95 of [i] and [a]. They pronounce [i] as a high front vowel and [a] as a low mid vowel. Since
96 there are similarities between Korean vowels and English vowels— English [i] is also
97 articulated in a high front position of the vocal tract— they managed to produce Korean
98 vowel [i] correctly. However, [a] has different acoustic features cross-language. For instance,
99 English does not have [a] but an [a]. While the English [a] is a low back vowel, the Korean
100 [a] is a low mid vowel. Thus, even though Korean [a] is different from English [a], L2
101 learners of Korean still can articulate Korean [a] accurately. It is interesting that they
102 pronounce [a] more native-like than other vowels, despite dissimilarities, which is a
103 dimension worth thorough investigation in the future analysis.

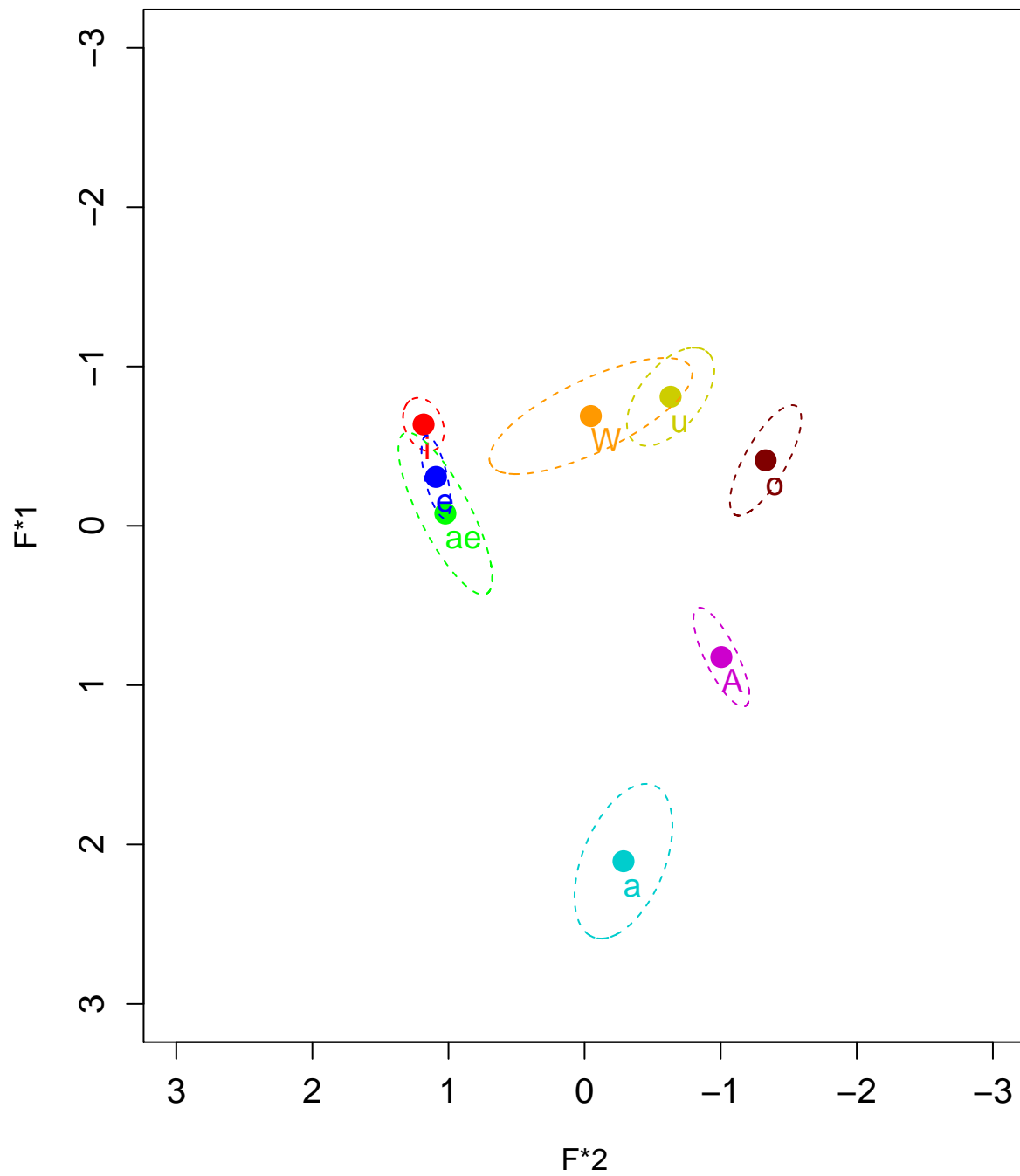
Native Korean Speakers



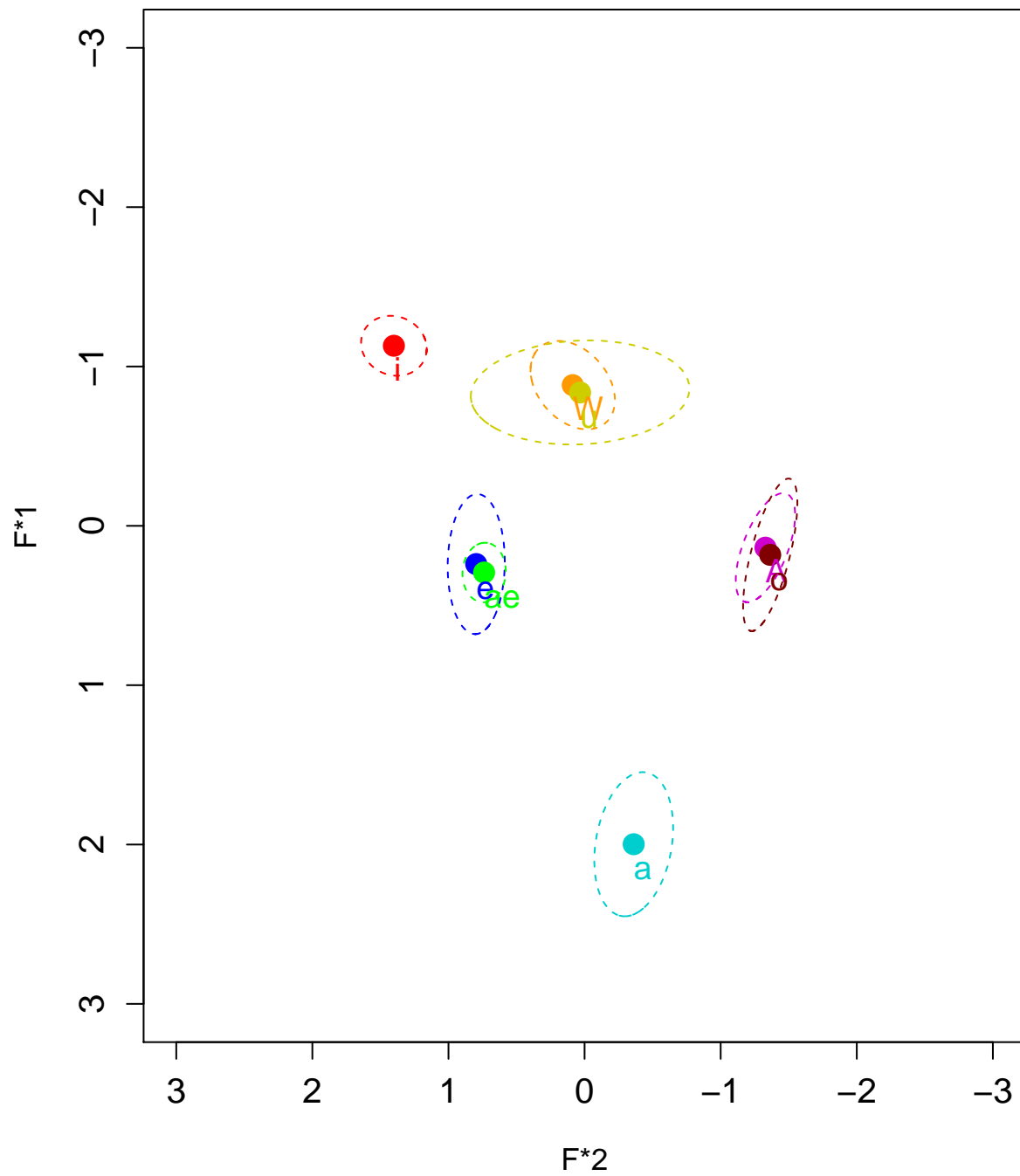
Non-Native Korean Speakers



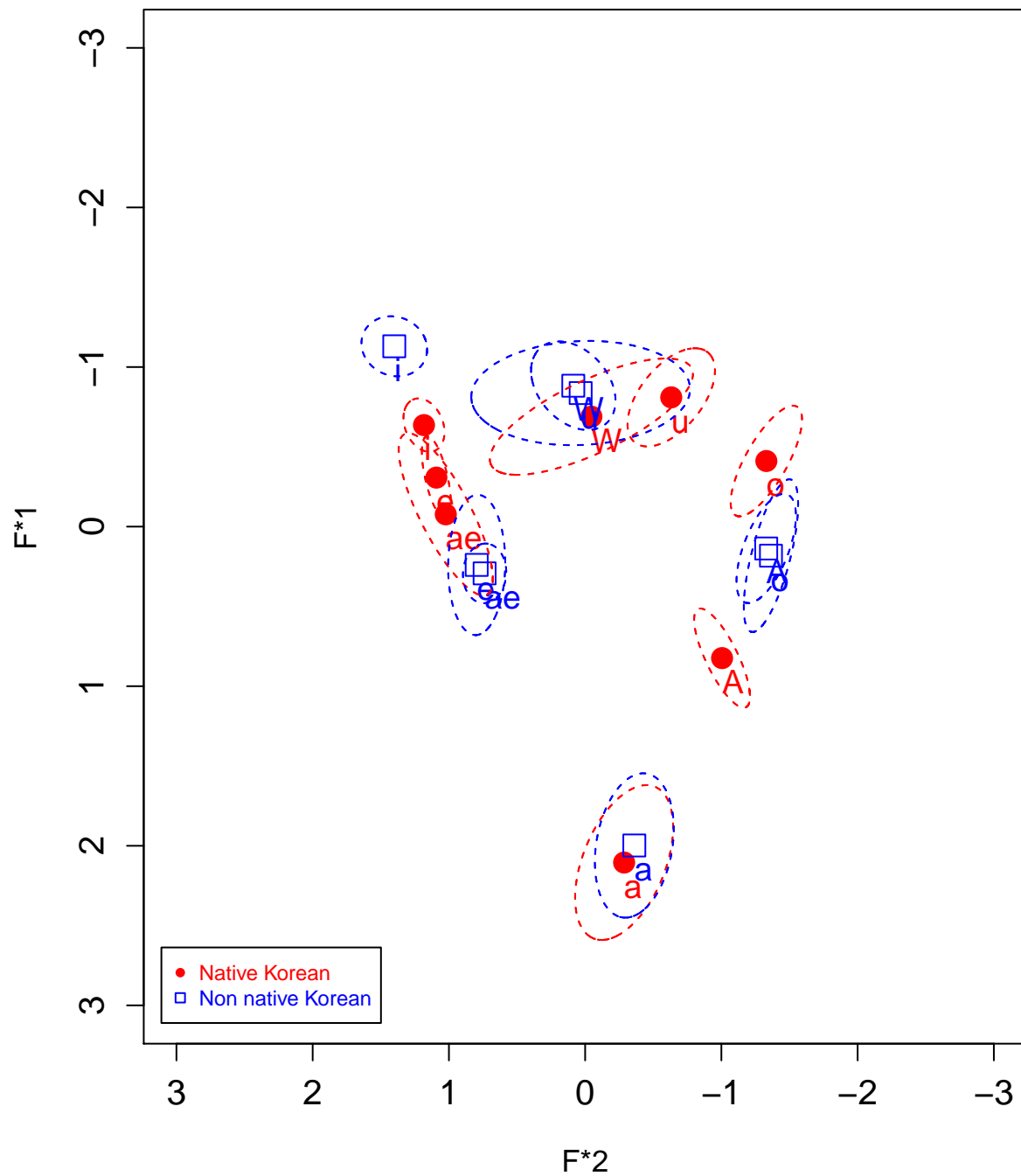
Native Korean speakers



Non-Native Korean Speakers



Comparison of Two Speaker Groups



4. Conclusion

In summary, our analysis indicates that even native Korean speakers may have different vowel formant patterns due to their various duration of living in foreign countries and native language phonetic training. Additionally, teachers' classroom input may play an essential role in L2 sound acquisition. For instance, the NNS in this study demonstrated a confusion between vowel [W] and [u]. Furthermore, despite the dissimilarities between the participants' L1 and L2, the learners still can have relatively more native-like articulations of [a]. We speculate that the teacher's demo pronunciation and explicit instruction are critical for this achievement. In the meantime, the vowels [e] and [æ] extracted from the current data are controversial. Since the merger of [e] and [æ] is progressing in Standard Seoul Korean, how to teach the articulations of these two sounds needs to be discussed in the future.

5. Appendix

| speaker | vowel/frame | context | F1 | F2 | F3 | gl F1 | gl F2 | gl F3 |
|---------|-------------|---------|-----------|-----------|----|-------|-------|-------|
| NS1 | i | s | 493.2375 | 2751.1464 | NA | NA | NA | NA |
| NS1 | i | s | 507.5334 | 2865.6353 | NA | NA | NA | NA |
| NS1 | i | s | 522.4271 | 2776.4157 | NA | NA | NA | NA |
| NS1 | e | s | 585.4128 | 2708.4025 | NA | NA | NA | NA |
| NS1 | e | s | 584.2901 | 2706.7544 | NA | NA | NA | NA |
| NS1 | e | s | 576.3157 | 2553.8634 | NA | NA | NA | NA |
| NS1 | ae | s | 521.9904 | 2820.2192 | NA | NA | NA | NA |
| NS1 | ae | s | 532.9491 | 2809.9055 | NA | NA | NA | NA |
| NS1 | ae | s | 587.5074 | 2668.7089 | NA | NA | NA | NA |
| NS1 | W | s | 406.3744 | 1063.7681 | NA | NA | NA | NA |
| NS1 | W | s | 403.2908 | 1029.0942 | NA | NA | NA | NA |
| NS1 | W | s | 500.0833 | 2189.0697 | NA | NA | NA | NA |
| NS1 | A | s | 651.3945 | 1389.8223 | NA | NA | NA | NA |
| NS1 | A | s | 695.3000 | 1439.2194 | NA | NA | NA | NA |
| NS1 | A | s | 691.9308 | 1425.3407 | NA | NA | NA | NA |
| NS1 | a | s | 1040.9052 | 1666.9375 | NA | NA | NA | NA |
| NS1 | a | s | 872.9430 | 1467.5644 | NA | NA | NA | NA |
| NS1 | a | s | 1045.7113 | 1754.2864 | NA | NA | NA | NA |
| NS1 | u | s | 532.7743 | 1744.8213 | NA | NA | NA | NA |
| NS1 | u | s | 521.8414 | 1904.3388 | NA | NA | NA | NA |
| NS1 | u | s | 519.8707 | 1516.3195 | NA | NA | NA | NA |
| NS1 | o | s | 497.1905 | 1015.9893 | NA | NA | NA | NA |
| NS1 | o | s | 603.1489 | 1240.2403 | NA | NA | NA | NA |
| NS1 | o | s | 563.1774 | 1021.5937 | NA | NA | NA | NA |
| NS2 | i | s | 484.5754 | 2530.1916 | NA | NA | NA | NA |
| NS2 | i | s | 506.4917 | 2749.4107 | NA | NA | NA | NA |
| NS2 | i | s | 507.1835 | 2551.5501 | NA | NA | NA | NA |
| NS2 | e | s | 460.0207 | 2680.1408 | NA | NA | NA | NA |

| speaker | vowel/frame | context | F1 | F2 | F3 | gl F1 | gl F2 | gl F3 |
|---------|-------------|---------|----------|----------|----|-------|-------|-------|
| NNS1 | i | s | 347.0051 | 2656.345 | NA | NA | NA | NA |
| NNS1 | i | s | 399.5299 | 2514.290 | NA | NA | NA | NA |
| NNS1 | i | s | 307.0789 | 2393.816 | NA | NA | NA | NA |
| NNS1 | e | s | 560.6831 | 2240.837 | NA | NA | NA | NA |
| NNS1 | e | s | 528.4257 | 2086.393 | NA | NA | NA | NA |
| NNS1 | e | s | 429.0911 | 2100.116 | NA | NA | NA | NA |
| NNS1 | ae | s | 534.9859 | 2152.606 | NA | NA | NA | NA |
| NNS1 | ae | s | 609.0134 | 2080.387 | NA | NA | NA | NA |
| NNS1 | ae | s | 535.6872 | 2026.094 | NA | NA | NA | NA |
| NNS1 | W | s | 487.4876 | 1719.508 | NA | NA | NA | NA |
| NNS1 | W | s | 423.2244 | 1936.019 | NA | NA | NA | NA |
| NNS1 | W | s | 431.3064 | 1830.811 | NA | NA | NA | NA |
| NNS1 | A | s | 604.5336 | 1451.755 | NA | NA | NA | NA |
| NNS1 | A | s | 505.9047 | 1144.177 | NA | NA | NA | NA |
| NNS1 | A | s | 571.0737 | 1355.492 | NA | NA | NA | NA |
| NNS1 | a | s | 951.4490 | 1789.920 | NA | NA | NA | NA |
| NNS1 | a | s | 838.7338 | 1815.066 | NA | NA | NA | NA |
| NNS1 | a | s | 739.6891 | 1872.772 | NA | NA | NA | NA |
| NNS1 | u | s | 440.4063 | 1481.121 | NA | NA | NA | NA |
| NNS1 | u | s | 486.5747 | 1659.796 | NA | NA | NA | NA |
| NNS1 | u | s | 450.5802 | 2023.228 | NA | NA | NA | NA |
| NNS1 | o | s | 539.7927 | 1380.349 | NA | NA | NA | NA |
| NNS1 | o | s | 501.0599 | 1128.311 | NA | NA | NA | NA |
| NNS1 | o | s | 439.2177 | 1155.855 | NA | NA | NA | NA |
| NNS2 | i | s | 361.5158 | 2606.105 | NA | NA | NA | NA |
| NNS2 | i | s | 345.7214 | 2602.082 | NA | NA | NA | NA |
| NNS2 | i | s | 334.6823 | 2699.489 | NA | NA | NA | NA |
| NNS2 | e | s | 623.4945 | 2523.746 | NA | NA | NA | NA |
| NNS2 | e | s | 586.4931 | 2453.199 | NA | NA | NA | NA |

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