

## **An acoustic analysis of Korean EFL learners' English prosody: A longitudinal study\***

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**Yoo, Hyebae. 2016. An acoustic analysis of Korean EFL learners' English prosody: A longitudinal study.** *Studies in Phonetics, Phonology and Morphology* 22.1. 55-75. This study compares prosodic features of English pronunciation in a Korean student cohort from 2000 with one from 2012 in order to investigate accent improvement in the latter that may be attributable to receiving English education from an earlier age, following its formal introduction in elementary schools. The data were collected from recordings of 94 speakers: 40 students who entered university in 2000, 40 students who did so in 2012, and 14 native English speakers serving as a control group. The data revealed that the student group of 2012 has better English prosody than that of 2000, although the degree by which it was better varied by gender. In terms of the acoustic features of stress, the ratios of stressed to unstressed vowels were significantly higher in duration and intensity but not in F0. The female group of 2012 showed better pronunciation in duration, while the male group pronounced better in intensity. With regard to syllable modification, vowel insertion decreased remarkably. In addition, speech rate and pitch range significantly improved for the female group but did so to a lesser extent for the male group. This study suggests that elementary school English education has had a positive effect on Korean EFL students' English pronunciation, and also that this effect may differ by gender, a finding that may have implications for the potential usefulness of gender-specific teaching methods. (Incheon National University)

Keywords: acquisition of English rhythm, acquisition of English stress, effect of early English education, F0 difference, speech rate, acquisition of English prosody, gender difference, Korean EFL learners

### **1. Introduction**

The introduction of the English language early at the elementary school level has become more common worldwide over the last 20 years. Asian countries, including South Korea, China, and Japan, have been revising their national education curricula

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to begin the teaching of English in elementary rather than junior high school (Nunan 2003, Igawa 2008). In South Korea, English has been taught from the third grade since 1997, with one of the overriding goals designated as the development of “accent-free” English. As discussed in a comprehensive review (Piske 2001) of factors affecting degree of L2 foreign accent, age of L2 learning appears to be the most important predictor of degree of foreign accent. According to the critical period hypothesis (Lenneberg 1967), complete mastery of an L2 is not possible if learning begins after the end of critical period; therefore students exposed to English (or any language) after puberty are expected to have a higher degree of foreign accent than early learners.

The first cohorts of Korean students who started learning English in elementary school have now become university students, and some of them have already graduated. (A third-grader in 1997 is around 27 years old in 2016.) It is generally agreed that the English pronunciation of Korean students has improved in comparison with previous generations, which may indicate the effect of this earlier English education. However, few studies have examined accent improvement in this regard, even though there have been a number of studies dealing with the present level of Korean students’ pronunciation (Park 2006, J. Kim et al. 2007, Choi 2011, Yoo 2012, among others). It is therefore worthwhile to investigate how early learning has affected Korean students’ English pronunciation in their later life.

In the present study, English prosodic features—suprasegmentals, including stress and rhythm—were compared between university students with elementary school English education and those without. The hypothesis is that all things being equal, Korean students who entered university in 2012 will have better English pronunciation than those who entered in 2000, since the latter did not undergo elementary English education. To test the hypothesis, this paper measured and analyzed the acoustic correlates of suprasegmentals including fundamental frequency (F0), duration, and intensity, F1, F2, speech rate, vowel insertion, and pitch range.

## 2. Literature review

In communication, prosodic features such as pitch, syllable length, and stress are as important as segmental features (phonemes) for intelligibility. As is well-known, English and Korean exhibit important differences in prosodic structure; for example, English is a stress-timed language (Gimson 1980, Chun 2002) in which the length of

the intervals between stressed syllables tends to be almost the same, regardless of the number of unstressed syllables. Therefore, unstressed syllable reduction is quite an important part of English rhythm (Crystal and House 1988, Fear et al. 1995). In contrast, Korean is a syllable-timed language (J. Kim et al. 2007), meaning that it does not feature meaningful stress and the length of syllables is almost uniform.

Recently, there have been a number of studies on the acquisition of English stress by Korean learners of English. Many of these have focused on stress at the individual word level (Yang 2002, O. Lee and J. Kim 2005, J. Kim et al. 2007, Kwon 2007, S. Lee and Cho 2011). Their findings unanimously suggest that Korean speakers are significantly different from English speakers in terms of acoustic features when pronouncing English words: For example, the duration of unstressed vowels was significantly longer than that of native speakers of English.

Acquisition of English stress at the sentence level has only recently received more attention (O. Kim 2007, Yom 2007, Choi 2011, Yoo 2012, Chung 2013, Yoo 2014, Seo 2015). O. Kim (2007), for example, considered how Korean speakers realize English sentence stress in terms of acoustic characteristics. The reduction of function words that are normally unstressed in a sentence was investigated in detail. Similar to the findings from the research on words, the acoustic measurements of stressed and unstressed vowels produced by Korean speakers turned out to be different from those of native English speakers.

Various methods have been used to measure rhythm, of which vowel and syllable duration have been the main focus—Ling et al. (2000), Grabe and Low (2002), O. Lee and J. Kim (2005), J. Kim et al. (2007), and Chung (2013) all used a type of “variability index,” which measures vowel duration according to stress. In addition to duration, other acoustic correlates of stress such as F0, intensity, F1, and F2 have been examined in studies of English (Hillenbrand et al. 1995, van Bergem 1993, Flemming and Johnson 2007) to find out the stress effect. The correlates were investigated in the Korean EFL environment (O. Kim 2007, Kwon 2007, Yoo 2012, Seo 2015). For example, Yoo (2012) investigated the acquisition of English sentence stress by 63 adult Korean EFL learners in terms of acoustic features, F0, duration, and intensity. The study reports that stressed vowels have longer duration and higher intensity than unstressed vowels but do not have higher F0 for both Korean and American speakers. This finding supports Kochanski et al. (2005) and Beckman and Edwards (1994), who argue that the role of F0 is the least prominent among these factors, with evidence from EFL data.

Other studies, such as Kang and Rhee (2011) and J. E. Kim (2014), have proposed that suprasegmental features be used in the measurement and evaluation of pronunciation. One of these is pitch range variation, represented by the difference between the highest and the lowest F0 reached in a word or phrase. Kang and Rhee (2011) demonstrated in an experiment that speech rate, pitch range difference over a paragraph and the duration of pause affected the native raters' evaluation of natelikeness of speech. In this study the two features, speech rate and pitch range were adopted to measure the pronunciation of suprasegmentals.

Another parameter that affects rhythm is vowel insertion, by which a difficult syllable structure in a target language is simplified (No 1997, Broselow et al. 1998). The syllable structure of English is more complex than that of Korean: English maximally allows three consonants in syllable onset and four consonants in coda, while Korean maximally allows only a relatively simple consonant-vowel-consonant syllable. As these differences imply, Korean learners have difficulty with English syllable structure and often modify the syllable structure by inserting vowels or deleting consonants to conform to the pattern of the learner's native language (No 1997). The choice of modification strategy was examined in many studies but findings are inconsistent: No (1997) reported epenthesis is more prevalent, while S. Lee et al. (2002) reported that the most prominent error type is replacement. Vowel insertion deteriorates speech rhythm and lowers the comprehensibility of the speech because it increases the number of vowels, resulting in longer timing of the utterance.

Age is regarded as an important factor in the acquisition field, since it affects degree of L2 foreign accent (reflecting the critical period hypothesis): the younger the learner, the more native-like the pronunciation (Flege et al. 1995, Piske 2001, B. Lee et al. 2006, Munro and Bohn 2007). However, studies on L2 English pronunciation conducted in Korea very often do not give information on the age at which participants started learning English. Thus, it is valuable to compare the pronunciation of speakers who started learning English in junior high school (usually at the age of 13) and those who started in the third grade (around age 8) (also with a different English curriculum geared toward elementary students). The results should have implications for the broader evaluation of English education as it has been conducted in Korea in recent decades.

Another important predictor of degree of foreign accent is gender (Major 2004). Nevertheless, there are controversial findings concerning the effect of gender on the degree of L2 foreign accent (Flege and Fletcher 1992). The studies that identified

gender as an important predictor of degree of foreign accent supported the common belief that female speakers have better pronunciation. However, other studies (Flege et al. 1995, Elliott 1995) did not find the independent gender effect, suggesting that gender may have interactions with other factors like age of learning. In this study, data will be separated in terms of gender to examine the influence of gender on the prosodic proficiency.

### 3. Methodology

#### 3.1 Participants

The participants of this study were divided into 3 groups: 40 Korean students who entered university in 2000 (hereafter Group 2000), 40 Korean students who entered university in 2012 (hereafter Group 2012), and 14 native English speakers, used as a control group (NE)<sup>1</sup>. There were equal numbers of male and female speakers. The Korean groups were further divided by gender, such as 2000M (male) and 2000F (female).

All Korean speakers were aged 21–25 and sophomores taking a required course, Phonetics in the English department at a University in Incheon. None of them had been to an English-speaking country for more than 3 months (as students with extensive experience in a foreign country had been excluded). Evaluation of their English proficiency taken from the class placement test showed intermediate to high intermediate. TOEIC scores for Group 2012 ranged from 750 to 850 but TOEIC scores were not available for Group 2000.

The native English speakers were English instructors teaching in the city of Incheon and Gyeong-gi Province. All of them had been resident in Korea for less than 3 years, had been raised in the US, and consequently had American English accents. Their ages ranged from 28 to 42. All of them were university educated, with 11 holding a bachelor's degree and 3 a master's degree.

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<sup>1</sup> The data for 2012 students and native speakers were used in Yoo (2014) but analyzed for different purposes.

### 3.2 Materials

The tested vowels were the same ones used in previous studies (Yoo 2012, Yoo 2014), extracted from recordings of a diagnostic passage used in Prator and Robinett (1985: x) (see appendix). The passage includes a number of sentence types, words, and morphemes and is suitable to test learners above intermediate level. It contains 231 vowels: 87 stressed and 144 unstressed, of which 110 were from disyllabic words and 121 from monosyllabic words; among the latter, 40 vowels were from content words (stressed) and 81 from function words (unstressed).

### 3.3 Procedure

The recordings for Group 2000 were done in 2001 in the author's office, using a Sony handheld audio-recorder. Before recording, the participants were given the chance to practice the target words several times. Group 2012 and NE were recorded in a quiet room in the fall semester of 2013, also after practicing. These participants read the passage aloud three times in their normal manner of speaking in English. Only the third and final recording was used for analysis. The recordings were made using a Sony PCM-D50 recorder, transferred onto a computer, and analyzed using Praat 5.1.31 for segmentation and extraction of acoustic features and SPSS 23.

### 3.4 Acoustic measurements

The acoustic characteristics measured included F0, F0 range, duration, intensity, F1, and F2. The duration measurement (in msec) was taken from the entire vowel. F0, F1, F2 (in Hz), and intensity (in dB) were measured at the mid-point of the vowel portion. The vocalic portion (the vowel target) was hand-labeled referring to the waveform and formant transitions.

Prosodic features were analyzed for a total of 21,714 tokens (94 speakers × 231 vowels). In addition, reading speed was measured and epenthetic vowels with formants were counted.

## 4. Results and discussion

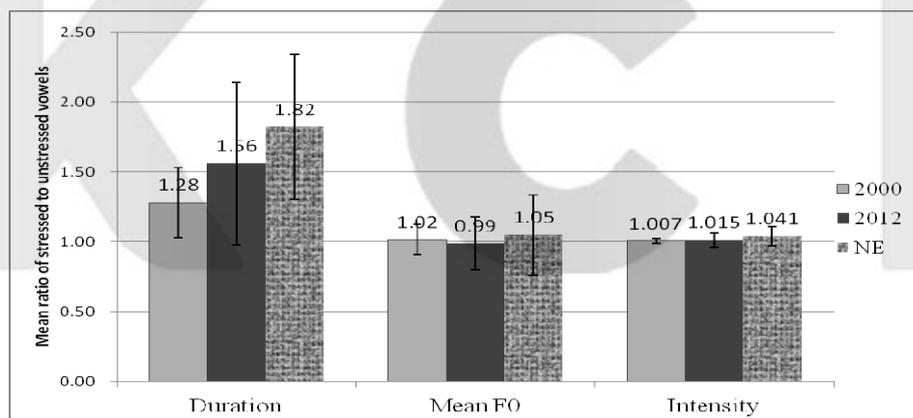
This section will be divided into four parts, respectively covering 1) acoustic

correlates of stress, including duration, F0, intensity, F1 and F2; 2) speech rate; 3) vowel insertion; and 4) pitch range.

#### 4.1 Acoustic correlates of stress

##### 4.1.1 General overview

To determine how much Korean EFL students' English prosody improved in general from 2000 to 2012, the mean ratios of stressed to unstressed vowels for the three correlates of stress were calculated in the following way<sup>2</sup>. The means of the vowels in the stressed syllables in each sentence were divided by the means of vowels in the unstressed syllables in the same sentence, and the results were averaged across the 11 sentences. The results are provided in Figure 1.



**Figure 1. Mean ratios of stressed to unstressed vowels for the correlates of stress (SDs in error bars)**

With respect to duration, the results indicate that Korean participants showed a great difference from 2000 to 2012. Figure 1 indicates that whereas Group 2000 pronounced stressed vowels 1.28 times longer than unstressed vowels, Group 2012 pronounced them 1.56 times longer and NE 1.82 times longer. These ratios were

<sup>2</sup> There are five correlates of stress (duration, F0, intensity, F1, and F2) but the ratio of stressed to unstressed for F1 and F2 are meaningless, so they have been excluded.

statistically different among the three groups:  $F(2,1281) = 75.086$ ,  $p = 0.000$ ; Bonferroni post-hoc tests revealed that Group 2012 pronounced stressed vowels significantly longer than Group 2000, but also that their duration ratio was significantly lower than that of NE ( $p = 0.000$ ). This suggests that Korean students appear to have improved the nativelikeness of their production of the durational difference between stressed and unstressed vowels; put another way, the students of 2012 showed a more stress-timed pattern than those of 2000.

As for F0, the mean ratios of stressed to unstressed vowel pitch were not as high as generally expected: even native speakers displayed a mean ratio of only 1.07. The two Korean groups showed almost the same results as each other: mean F0 ratios were 1.018 for Group 2000 and 1.017 for Group 2012. ANOVA results showed a significant difference in F0 among the three groups:  $F(2,1258) = 4.50$ ,  $p = 0.011$ . The Bonferroni post-hoc tests revealed that the difference between native speakers and Korean groups was significant ( $p < 0.01$ ), whereas there was no significant difference between the two Korean groups. This implies that there is no stress effect on F0 for Korean EFL learners.

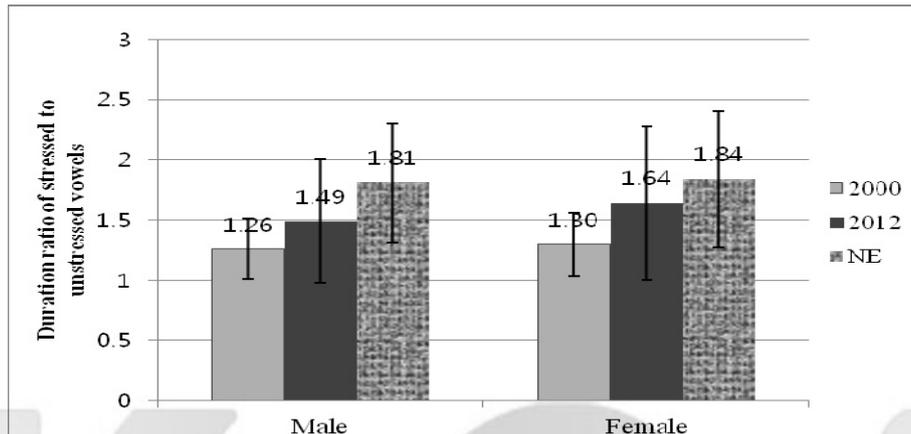
Even though the difference between stressed and unstressed vowels was only 1-3 dBs, intensity displayed a significant improvement: the intensity ratio of Group 2000 was 1.007 while that of Group 2012 was 1.014, in contrast to that of NE, which was 1.04. The ANOVA test revealed that there was a significant difference in intensity among the groups ( $F(2,1284) = 43.94$ ,  $p = 0.000$ ); according to the Bonferroni post-hoc tests, the difference between Korean groups was also significant ( $p = 0.002$ ), which indicates that Group 2012 pronounced stressed syllables with meaningfully greater intensity than Group 2000.

Having provided a general overview, the data will be discussed in more detail in the next section, where the results will be broken down by gender to identify its effect on pronunciation.

#### 4.1.2 Duration

As shown in Figure 2, with regard to duration, both male and female speakers of Group 2012 showed significantly greater scores than Group 2000:  $t = 5.233$ ,  $df = 531$ ,  $p = 0.000$  for male,  $t = 6.447$ ,  $df = 557$ ,  $p = 0.000$  for female. The results indicate that male and female students of Group 2000 respectively pronounced stressed vowels 1.26 and 1.30 times longer than unstressed vowels, whereas the pronunciations of

Group 2012 had lengthened to 1.49 and 1.64 for males and females, respectively.

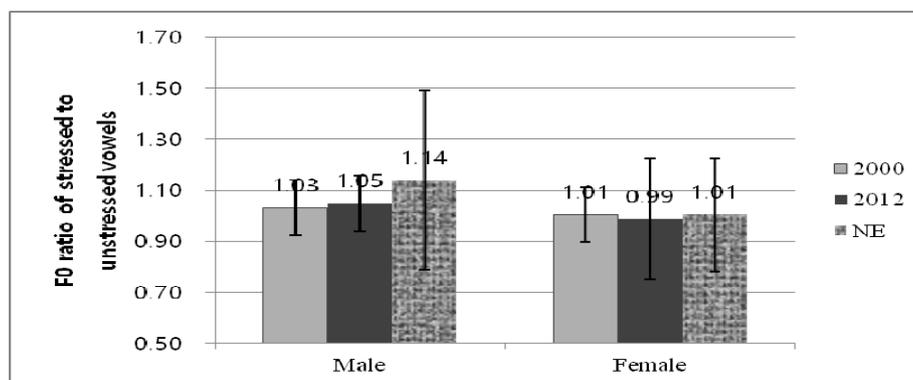


**Figure 2. Duration ratios of stressed to unstressed vowels by gender**

The 2012 results showed a significant difference between the female and male group, which implies that female Korean students improved more than their male counterparts in the nativelikeness of the duration ratios of their stressed to unstressed vowels.

#### 4.1.3 Fundamental frequency (F0) ratio

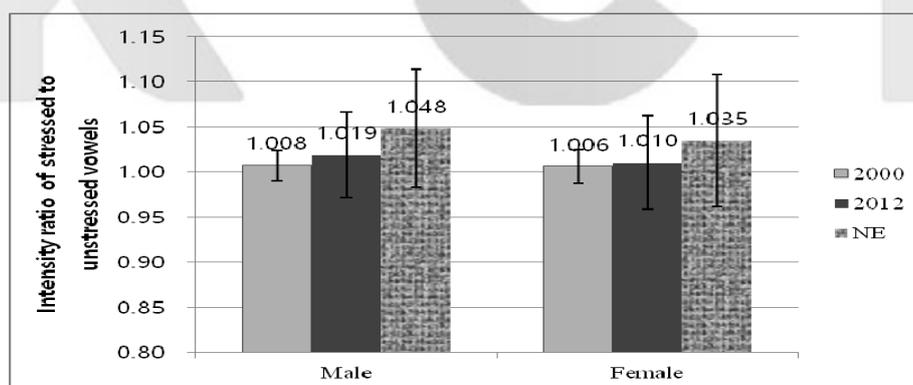
The female groups showed a different F0 pattern from the male groups, as seen in Figure 3. The ratios between stressed and unstressed vowels were over 1.0 for the male groups, both in 2000 (1.03) and 2012 (1.05), while for NE, the ratio was 1.1. The female speakers showed a rather unexpected pattern, wherein Group 2000 had a ratio of 1.01, meaning that stressed vowels had a higher pitch than unstressed ones but that the ratio was lower than for the male speakers. On the other hand, Group 2012 and, importantly, also NE had ratios lower than 1.0, indicating no stress effect on F0.



**Figure 3. F0 ratios of stressed to unstressed vowels by gender**

#### 4.1.4 Intensity

In the general review above, intensity appeared to be an important correlate of stress, with a significant difference found between Korean Groups 2000 and 2012. Splitting the data by gender showed different patterns, however, as seen in Figure 4.



**Figure 4. Intensity ratios of stressed to unstressed vowels by gender**

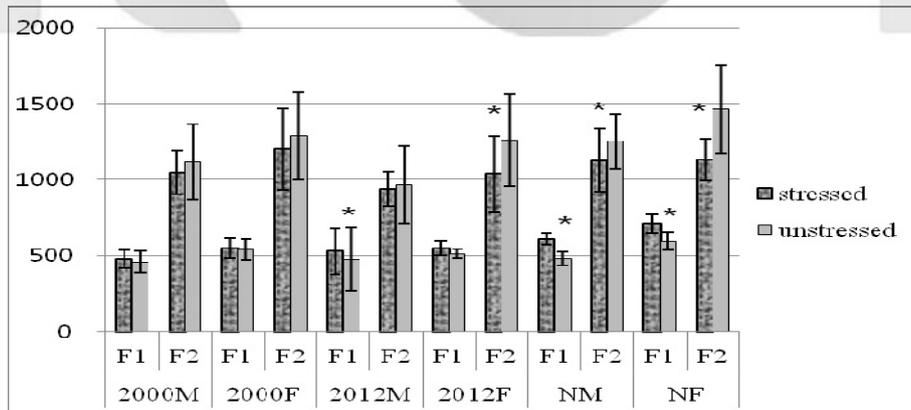
Specifically, the Korean male groups showed a significant difference, 1.007 for Group 2000 and 1.02 for Group 2012 ( $t = 3.785$ ,  $df = 531$ ,  $p = 0.000$ ), while the mean of NE was 1.05. In contrast, female groups showed no significant difference: the mean intensity was 1.006 for 2000F and 1.010 for 2012F. The data thus indicate

that 2012M pronounced stressed syllables with greater intensity than 2000M, while there was no such improvement for Korean female students.

#### 4.1.5 Vowel quality

In this section, the stress effect on F1 and F2 will be discussed. Even though most vowels are expected to undergo some centralization in an unstressed position, there were only a few vowels that occurred both in stressed and unstressed positions in the diagnostic passage: /ɔ/ and /ʊ/.

For “for” (that is, for /ɔ/), four words were examined: two prepositions and two content words (“informal” where “for” is located in a stressed position). We expect that an unstressed vowel will have lower F1 and higher F2 than its stressed counterpart due to its centralization. As expected, both male and female native speakers showed this pattern: unstressed vowels have lower F1 (male:  $t = 3.087$ ,  $df = 26$ ,  $p < 0.01$ , female:  $t = 2.818$ ,  $df = 26$ ,  $p < 0.01$ ) and higher F2 (male:  $t = -3.532$ ,  $df = 26$ ,  $p < 0.01$ , female:  $t = -3.917$ ,  $df = 26$ ,  $p < 0.01$ ). On the other hand, the Korean students had some variability: 2012M showed significance for F1 only ( $t = 2.799$ ,  $df = 78$ ,  $p < 0.01$ ) and 2012F for F2 only ( $t = -3.997$ ,  $df = 76$ ,  $p = 0.000$ ), while Group 2000 showed significant difference in neither F1 nor F2, as shown in Figure 5.

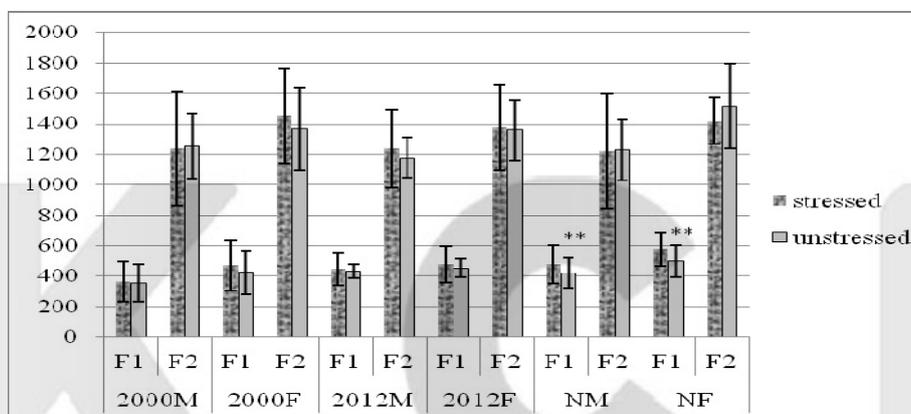


**Figure 5. F1 and F2 of stressed and unstressed /ɔ/**

\* indicates a significance level below 0.01.

M and F indicates male and female respectively.

Next, /ʊ/ in “would” and “look” was compared in terms of F1 and F2. The /ʊ/ in “would” is expected to change in quality, since it is a function word, whereas in “look,” a content word, it is not. In the data, the native English speakers showed a significant difference in F1 (male:  $t = 2.745$ ,  $df = 26$ ,  $p = 0.011$ , female:  $t = 2.417$ ,  $df = 26$ ,  $p = 0.000$ ), with lower F1 for “would,” but no significant difference in F2; together, these results indicate that /ʊ/ in /would/ was raised noticeably but not fronted to any considerable extent.



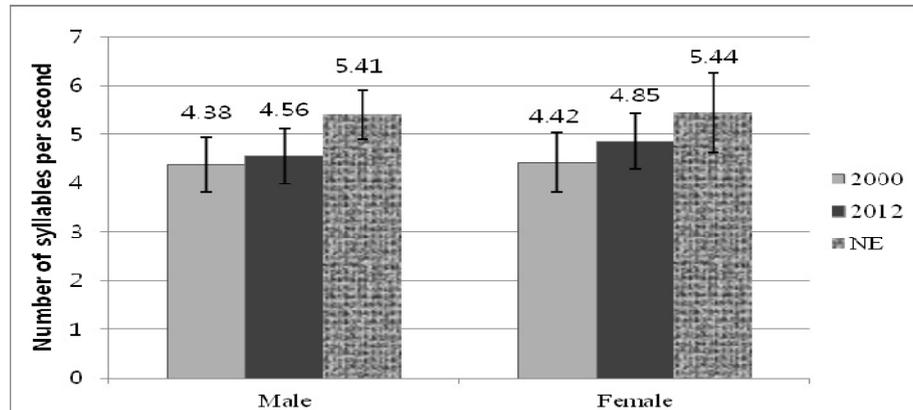
**Figure 6. F1 and F2 of stressed and unstressed /ʊ/**

\*\* indicates a significance level below 0.05. M and F indicates male and female respectively.

In contrast, the Korean groups did not display any effect of stress on either F1 or F2 for /ʊ/, indicating that they did not change the quality of this vowel according to stress assignment.

#### 4.2 Speech rate

The first of the three additional measures taken besides the acoustic measures was speech rate, measured by the average number of syllables per second. Results are shown in Figure 7.



**Figure 7. Number of syllables per second**

As Figure 7 shows, Group 2012 read significantly faster than Group 2000 (4.71 and 4.40 syllables per second, respectively;  $p = 0.026$ )<sup>3</sup>. This result indicates that speech rate improved under the new English education model. With respect to gender, a significant difference was found between the female student groups ( $p = 0.023$ ), but not between the male groups ( $p = 0.340$ ). This indicates that the improvement in speech rate was greater for the female group.

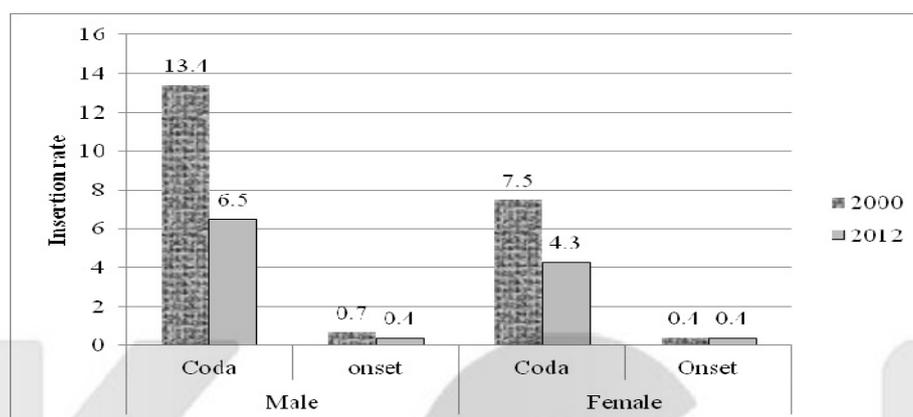
#### 4.3 Vowel insertion

Vowel insertion is a commonly occurring type of error in foreign language speakers' pronunciation. One of the prominent characteristics of Group 2012 in the present study in relation to Group 2000 is a decrease in vowel insertion. In the reading list, 14 words had onset consonant clusters and 50 words had coda clusters, neither of which are permissible in Korean; hence, insertion was expected. For each group, total onset tokens with clusters were 280 ( $20 \times 14$ ) and total coda cluster tokens were 1000 ( $20 \times 50$ ).

As seen in Figure 8, Group 2000 showed a relatively high level of insertion, and Group 2012 significantly less. There were more insertions in coda than in onset across both groups. The insertion rate of the male speakers declined from 13.4% to

<sup>3</sup> The speech rate shown is higher than that reported in Kang and Rhee (2011) (=3.28) and J.E. Kim (2014) (=3.55).

6.5%, and that of female students decreased from 7.5% to 4.3%. For each gender, the difference between 2000 and 2012 was significant ( $p = 0.000$  for male,  $p = 0.001$  for female).



**Figure 8. Insertion rate**

#### 4.4 Pitch range (F0 difference)

The difference between the highest and the lowest F0 in a sentence was measured and averaged to investigate the pitch range. As mentioned above, English speakers have quite a large pitch range (Aoyama and Guion 2007, Pepiot 2014) and F0 difference can be used as a diagnostic measurement for English proficiency (Kang and Rhee 2011). In this experiment, native speakers showed a significantly larger pitch range than the Korean students, as expected ( $p = 0.000$ ). This implies that Koreans did not raise their pitch at peak level as much as native speakers did.

Male speakers showed a lower pitch range than their female counterparts, regardless of their native language background. There was no significant difference among Korean male groups in pitch range ( $p = 1.000$ ): F0 difference was 52.65 for 2000M and 59.94 for 2012M. Even for 2012, the pitch range was significantly lower than that of NE ( $p = 0.000$ ).

Female speakers showed more improvement than males, as seen in Figure 9, where the pitch range was 113.30 for 2000F and 129.36 for 2012F; this difference was significant ( $p = 0.001$ ). However, Group 2012F still had a significantly lower pitch

range than NE (129.36 vs. 161.66).

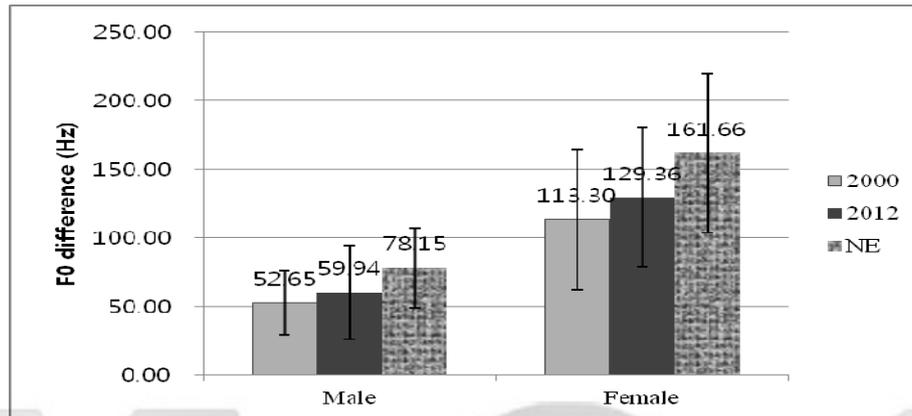


Figure 9. F0 difference by gender

## 5. Conclusion

In this study, two Korean EFL student groups, 2000 and 2012, were compared in terms of their English prosodic features in order to find the different patterns/improvement in their pronunciation of suprasegmentals. Specifically, the author measured 1) acoustic correlates of stress including duration, fundamental frequency, intensity, and vowel quality; 2) speech rate; 3) vowel insertion; and 4) F0 difference.

Group 2000 had not received elementary English education and did not gain exposure to English until junior high school, while Group 2012 had been exposed to English from elementary school. Therefore, Group 2012 was expected to have acquired English prosody to a greater degree, since they had been exposed to English before the critical period.<sup>4</sup>

In this study, age and gender appear to have an effect on the acquisition of English

<sup>4</sup> One might question whether the improvement in pronunciation is only due to the age at which learners start to be exposed to English or whether other factors such as greater government investment, media development, etc., may have played a part. However, the introduction of elementary English education was a turning point for education in Korea and must in some way be evident in students' patterns.

prosody. As for the acoustic correlates of stress, the students from 2012 appeared to have better English prosody in many areas, with significant differences in duration and intensity. As far as duration difference is concerned, similar to findings in a number of previous studies, Korean speakers have difficulties producing the stress-timed rhythm of English due to the interference of Korean syllable-timed rhythm. In the present study, the students from 2012 appeared to be more stress-timed than those of 2000, as seen in the comparison of stressed–unstressed vowel duration ratios: 1.56 for 2012 and 1.28 for 2000. Female students improved far more than their male counterparts (+0.34 vs. +0.23).

Intensity also plays an important role in marking stress in the interlanguage of EFL learners as it does for native speakers. (Kochanski et al. 2005). The ratios between stressed to unstressed vowels were over 1.0, which means that stressed vowels were pronounced louder than unstressed ones. However, the improvement rate varies according to gender. The male group of 2012 showed a higher ratio (1.02) than the corresponding female group (1.01).

On the other hand, Group 2012 seemed to have acquired vowel quality changes resulting in the centralization of the unstressed vowels to a small degree. While native speakers showed a significant change in F1 and F2 for unstressed (and reduced) vowels as distinct from the stressed vowels while pronouncing “for,” Korean females of 2012 showed only F1 change and males of 2012 only F2 change. Nevertheless, considering that students from Group 2000 showed almost no quality change at all, the 2012 results should be seen as a big improvement in the acquisition of English pronunciation in Korea.

Speech rate also improved over the decade under study, from 4.40 to 4.71: female students improved significantly ( $p = 0.023$ ), whereas male speakers did not ( $p = 0.34$ ).

One interesting feature of the 2012 results was the decrease in vowel insertion. This is one of the strategies a second/foreign language learner uses frequently to approximate the pronunciation of a complex syllable structure. In general, Korean speakers have traditionally inserted a lot of vowels in their English speech, which has been a characteristic feature of the Korean accent (No 1997). However, in this study, male students reduced insertion from 11.7% to 5.5% between 2000 and 2012, and female students from 6.5% to 3.4%, representing significant rates of reduction.

The final point of interest is pitch range, which is generally argued to be in correlation with English proficiency. A significant difference was found between

Korean and native speaker groups, implying that Korean speakers tend to have a flatter tone (i.e., less variation in pitch) when speaking in English than native speakers. In this study, Korean speakers improved F0 difference between the peak and the negative peak between 2000 and 2012. However, the improvement was not significant in male speakers, and since it was not nativelike in females either, Korean EFL learners in general still need to work on making their F0 difference bigger.

Gender appears to be an important predictor of the degree of foreign accent proving the common belief that females have better pronunciation as most studies reported (Flege and Fletcher 1992, Elliott 1995): the female group of 2012 showed better pronunciation than the male group of 2012 in most components of prosody including duration, speech rate, insertion and pitch range. On the other hand, the male group pronounced better only in intensity.

To sum up, this study investigated the acquisition of English prosody by Korean EFL students at the university level, comparing groups from 2000 and 2012. The results suggest that students in 2012 showed significant improvements in almost all the measures as compared to those of 2000. Thus, the effect of elementary school English education can be tentatively assessed as positive, at least in the area of pronunciation. Moreover, the significant gender differences found have the further implication that different teaching methods may need to be implemented on the basis of gender.

#### APPENDIX

(1) When a student from another country comes to study in the United States, he has to find out for himself the answers to many questions, and he has many problems to think about. (2) Where should he live? (3) Would it be better if he looked for a private room off campus or if he stayed in a dormitory? (4) Should he spend all of his time just studying? (5) Shouldn't he try to take advantage of the many social and cultural activities that are offered? (6) At first, it is not easy for him to be casual in dress, informal in manner, and confident in speech. (7) Gradually, he learns what kind of clothing is usually worn here to be casually dressed for classes. (8) He also learns to choose the language and customs that are appropriate for informal situations. (9) Finally, he begins to feel sure of himself. (10) But let me tell you, my friend, this long-awaited feeling does not develop suddenly, does it. (11) All of this takes will power.

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