A relationship between Korean L2 learners' stress placement of noun-verb homographs and English proficiency

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Joo, Hyunjung. 2016. A relationship between Korean L2 learners' stress placement of noun-verb homographs and English proficiency. *SNU Working Papers in English Linguistics and Language 14, 82-102.* For Korean L2 learners, stress plays a decisive role in learning English – a stress-timed language, compared to their L1, Korean – a syllable-timed language. The accurate stress placement is important, particularly, in noun-verb homographs, which are related to the grammatical functions. This paper aims to explore whether English proficiency has a significant effect on Korean L2 learners' stress placement of noun-verb homographs. A total of ten female participants conducted the stress production experiment where they were required to read sentences including the noun-verb homographs in the sentence-middle and sentence-final. Two prosodic features of stress – pitch and duration were measured in Praat. The result shows that English proficiency is not a crucial factor to the stress placement in noun-verb pairs, but reveals that the location of a word in a sentence influences the stress patterns of English. **(Seoul National University)**

1. Introduction

Suprasegmentals – stress, intonation – as well as segmental features play a pivotal role in learning second languages, particularly, English. Stress usually refers to three prosodic features – duration, pitch, intensity. Numerous studies have explored the distinctive phonological features of stress, but no consensus has yet been reached. Fry (1958) has found that the stressed syllable has longer duration and stronger intensity than the unstressed syllable; however, Sluijter & van Heuven (1996) have revealed that duration and pitch are influential factors to the stressed syllable. Despite the conflicting measurement of the stressed syllable,

still, stress plays a pivotal role in learning English, a stress-timed language.

However, Korean learners of English have trouble realizing the accurate stress patterns, because in a syllable-timed language such as Korean, stress is not an important prosodic feature. There has been many controversies about the existence of stress in Korean (Kim & Nam, 2011), but some researchers point out that the stress is basically placed in the first syllable of a monosyllabic and a disyllabic word (Lee, 1997). Moreover, in case of Korean learners' realization of the stress, the phonetic feature of stress is not the same as English native speakers. Yi (2005) has compared the stress pattern of Korean native speakers and English native speakers and has tried to figure out the phonetic difference of English stress between Korean and English native speakers. He found that duration and pitch were related to Korean native speakers' stress realization, but intensity did not show any correlates. In addition, Hong (2012) researched about the phonetic aspects of Korean native speakers and found that duration and pitch showed the relationship with the stressed syllable, but intensity did not show significant correlation with the stress. Likewise, Korean is different from English, even though there is stress in Korean. The stress patterns of English also do have many irregularities. Korean learners, nevertheless, should pay more attention to stress in order to close the gap between the two different languages.

The correct realization of stress facilitates colloquial communication between English users, as it contributes to the difference of meaning and grammatical functions. The importance of the stress is exemplified in several homographs, which have the same orthography, but assign different stress placement depending on the grammatical category: '*contest*', '*rebel*', and '*record*' (Kelly, 2004). In these words, noun has a stress on the first syllable – trochaic pattern; verb has a stress on the second syllable – iambic pattern. The stress patterns of these noun-verb homographs systematically depend on the grammatical functions (Chomsky & Halle, 1968).

Several studies have paid a considerable attention in a noun-verb homograph in the interest of its characteristic. Hong (2015) has investigated the acoustic feature of lexical stress difference in noun-verb homographs between Korean native speakers and English native speakers. The four target words, *conduct, increase, permit, and produce* were required to read in the carrying sentences, 'He said [TARGET] today.' She found out that English native speakers tend to produce the stressed syllable longer than the unstressed syllable and they produce the stressed syllable longer than Korean native speakers. The location of the target words on the sentence, however, did not have taken into account. Kim (1973) pointed out that the location and grammatical function of the target word in the sentence can influence on the stress patterns. Cassidy & Kelly (1991) have explored how accurate 48 participants from different countries realize the stress patterns of noun-verb homographs depending on various factors. The result showed that even though they acquired the knowledge of the stress patterns, the influence of English experience, mother language, and sensitive period did not have an effect on the realization of the stress.

A considerable body of research has attempted to investigate influential factors to L2 learners' stress acquisition, and revealed that English experience influences the correct realization of stress patterns. Trofimovich and Baker (2007) have examined whether L2 experience influences on child second language acquisition. Twenty Korean L2 learners of English conducted sentence repetition task to see how they represent phonological features depending on their length of residence. In comparison with Cassidy & Kelly's study, the result showed that the length of residence in English speaking countries has a positive impact on L2 learners' prosody. These line studies showed the conflicting results that the amount of English experience merely focused on the experience in English countries.

On the other hand, several studies have addressed some questions about whether the amount of English experience is equal to English proficiency.

Taguchi (2013) has explored the effects of proficiency and study-abroad experience in L2 English. Intermediate-level of 64 Japanese learners of English were divided into three groups: low proficiency with no English experience, high proficiency with no English experience, and high proficiency with English experience. They conducted oral fluency test measuring appropriateness, planning time, and speech rate. The result revealed that only high proficient group with English experience outperformed the low and high group without English exposure to English speaking countries. Saegert et al. (1974) also found the same result of Arabic-speaking Egyptian and Lebanese EFL learners. The amount of residence in English speaking countries and the proficiency in English did not have considerable correlation. These considerable body of studies shows the necessity to differentiate English proficiency from English experience.

In drawing conclusions about the discussion above, a number of studies have explored about the relationship between the stress and English experience; however, some studies found out that English proficiency is not the same as the amount of residence year in English speaking countries. In addition, English proficiency can influence L2 Korean learners' stress realization (Kim & Kim, 2006; Park, 2004). Thus, the present study aims to investigate whether proficiency in English relates to Korean L2 learners' accurate placement of English stress patterns. Moreover, among the stress patterns, noun-verb homograph stress placements are to be examined, because a noun-verb homograph is related to the grammatical category, which is needed to learn accurately in order to communicate with English speakers without having trouble. Also, duration and pitch of stress syllable and unstressed syllable would be measured, drawing on the previous studies of the phonetic feature of Korean learners' stress. The research question then to ask is: Is there a relationship between Korean EFL learners' stress placement of noun-verb homographs and English proficiency?'

2.   Method
2.1 Participants

A total of ten Korean native speakers participated in the production test. All of them were females, who were chosen in order to minimize the gender influence, because male and female varies in their acoustic properties due to the measurements. Their ages ranged from 20 to 30 (mean = 25.2, SD = 3.7). The participants were divided into two groups, depending on their English proficiency levels, based on the score of TEPS (Test of English Proficiency developed by Seoul National University): the high proficient group was over 800 and the low proficient group was below 600. In the low proficient group, none of the participants had any experience in English speaking countries, while in the high proficient group, three participants had English experience, four weeks, five months, and one year respectively. All subjects were paid for their participation.

2.2 Stimuli

A total of 133 noun-verb homographs were examined to measure the frequency in Corpus of Contemporary American English (COCA). Among the topmost frequent homographs, the noun-verb homographs, which had the ratio of noun and verb frequency as 1: 1 to 1: 3 were finally selected as the target words; *increase, address, transfer, desert, conduct, combat, combine, protest,* and *permit*. When the noun and verb form of a homograph were exposed to learners competitively, it is possible that the differing stress pattern of the homograph would be exposed in a similar way. Table 1 shows the frequency of noun-verb pairs in COCA:

Table 1. Noun-verb pair frequency in Corpus Of Contemporary American English (COCA)

	Word	Noun	Verb	N / V	Total
1	process	104862	4403	23.81603	129622
2	project	63822	1959	32.57887	75405
3	record	65611	7525	8.71907	73623
4	increase	24066	31714	0.758845	66130
6	impact	54136	926	58.4622	56629
7	address	19970	22144	0.901824	48902
			⋮		
16	transfer	9827	7825	1.255847	22221
17	desert	15255	5100	2.991176	20453

Stimuli sentences containing ten target words consisted of eight syllables (see Table 2). The nouns and verbs of target words were placed respectively in the sentence depending on the location – sentence-middle and sentence-final. The placement of the target words in the sentence can influence the stress patterns (Kim, 1973; Jun, 1993).

Table 2. Example of stimuli sentences - *conduct*

Target word	Position	POS	Stimuli
Conduct	Sentence Middle	Noun	His **conduct** agrees with his words.
		Verb	He will **conduct** a survey now.
	Sentence Final	Noun	He always acts with good **conduct**.
		Verb	The band had no one to **conduct**.

To distract the subjects' attention from noticing the purpose of this experiment, filler sentences starting with '*st-*' consonant cluster were placed in a randomized order with stimuli sentences. The ratio of stimuli and filler was 1: 1.

3. Procedure

All recordings were made in a sound-attenuated laboratory. Participants were instructed to carry out the experiment and signed on the sheet of agreement on recording their voice. Then, they were seated in front of the laptop, displayed with the recording in Praat (Boersma & Weenink, 2015). They read the stimuli sentences five times respectively for a total of 100 sentences (100 sentences x 5 times) in order to find the tendency of their stress assignment. Their speech production was recorded in mono sound with sampling frequency 44100 Hz.
The stressed syllables were judged by the measure of duration and pitch using Praat. The duration and pitch of the two vowels in a target word were obtained from the stimuli. For example, in the target word '*conduct*', the duration and pitch of the vowel in the first syllable (V1) and the vowel in the second syllable (V2) were measured. Each duration and pitch value from five-time production data was averaged. Then, the average of the first syllable were divided by the average of the second syllable. In the following analysis, if the value of the duration and intensity is larger than 1, it will be indicated as the stress on the first syllable, and if it is smaller than 1, it will be indicated as the stress on the second syllable. The formulae of duration ratio and pitch ratio are below:

Duration ratio
(Stressed → the ratio > 1, Unstressed → the ratio < 1):

$$\frac{\text{(duration of the vowel in stressed syllable)}}{\text{(duration of the vowel in unstressed syllable)}}$$

Pitch ratio
(Stressed → the ratio > 1, Unstressed → the ratio < 1):

$$\frac{\text{(pitch of the vowel in stressed syllable)}}{\text{(pitch of the vowel in unstressed syllable)}}.$$

4. Result

Statistical analysis was conducted in R (R Development Core Team, 2015). This study used non-parametric inferential statistical method, because the sample population of this experiment was not sufficient to perform parametric statistical analysis that can be conducted on the sample data with a probability distribution. In order to measure the correlation between variables, a nonparametric model of Kendall rank correlation coefficient was performed by using Kendall package (McLeod, 2011). In addition, another nonparametric statistical method of Spearman rank correlation coefficient was computed to measure the statistical dependency by using pspearman package (Savicky, 2014). Moreover, to investigate the difference between two high and low proficient groups, Wilcoxon rank sum test, which is similar to t-test in parametric statistical analysis was carried out by using clusrank package (Jiang, & Ting Lee & Yan, 2016). The R code used in the analysis is as the following:

Correlation between Duration & Pitch and English Score
> cor.test(data1$pitch_ratio,data1$score,method="spearman")
> cor.test(data1$dur_ratio,data1$score,method="kendall")

Difference between the groups of high and low
> wilcox.test(x,y).

Table 3. The summary of *p*-values (<.05) in Spearman, Kendall, Wilcoxon test

Sentence Middle	Correlation	Spearman	Kendall	Wilcoxon
Noun	Score & Duration	0.785	0.7275	0.5476

	Correlation	Spearman	Kendall	Wilcoxon
	Score & Pitch	0.4916	0.4843	0.8413
Verb	Score & Duration	0.1434	0.1083	0.4206
	Score & Pitch	0.1328	0.1557	0.09524
Sentence Final	**Correlation**	**Spearman**	**Kendall**	**Wilcoxon**
Noun	Score & Duration	0.3128	0.6007	0.2222
	Score & Pitch	0.2956	0.3807	0.2222
Verb	Score & Duration	0.3871	0.4843	1
	Score & Pitch	0.7329	0.7275	0.4206

First, in the noun of the sentence-middle, the correlation between English score and duration has Kendall score (T) = 25, p-value = 0.7275 (<.05), and Kendall's tau statistic value (*tau*) = 0.1111111, which indicate no statistical dependence between English proficiency and duration. In Spearman's rank correlation test, Spearman score (S) = 148, p-value = 0.785 (<.05), and Spearman's rho statistic value (*rho*) = 0.1030303 show no statistical relationship between the two variables. Moreover, the correlation between English score and pitch has no significant statistical dependency, which has T = 27, p-value = 0.4843, and *tau* = 0.2. In Spearman's rank correlation test, the two variables do not have statistical correlation, S = 124, p-value = 0.4916, and *rho* = 0.2484848. The correlation between English proficiency and duration & pitch ratio does not have any statistical significance. The result reveals that there is no pattern of the stress pattern between the high and low English proficient groups. In Wilcoxon rank sum test, which shows the difference between the two groups of high proficiency and low proficiency, noun has W = 16, p-value = 0.5476, and W=14, p-value = 0.8413, in duration and pitch, respectively. The correlation between English proficiency and duration & pitch ratio does not have any statistical dependency, shown in Figure

1 and 2.

Figure 1. Plot of score and noun duration in sentence-middle
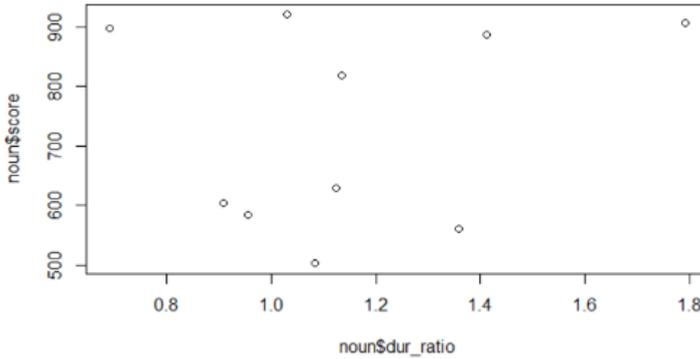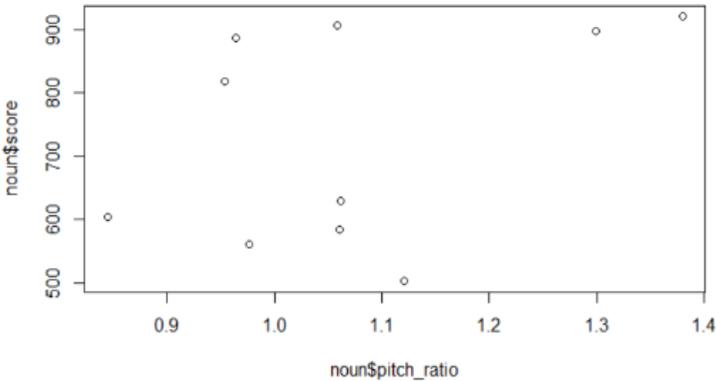

Figure 2. Plot of score and noun pitch in the sentence-middle

Next, in the verb of the sentence-middle, the correlation between English score and duration has T = 32, *p*-value = 0.1083, and *tau* = 0.4222222 in Kendall's rank correlation test, which indicate no statistical dependence between English proficiency and duration. Spearman's rank correlation was S = 82, *p*-value = 0.1434, and *rho* = 0.5030303, showing no statistical relationship between the two variables. Moreover, Kendall's

correlation between English score and pitch has no significant statistical dependency, which has T = 31, p-value = 0.1557, and *tau* = 0.3777778. In Spearman's rank correlation test, S = 80, p-value = 0.1328, and *rho* = 0.5151515 indicate no statistical relationship between the English score and pitch in the verb of the sentence middle. The correlation between English proficiency and duration & pitch ratio does not have any statistical significance, which is also indicated in Figure 3 and 4. In Wilcoxon rank sum test, verb has W = 17, p-value = 0.4206, and W=21, p-value = 0.09524, in duration and pitch, respectively, showing that there is no group difference between high and low.

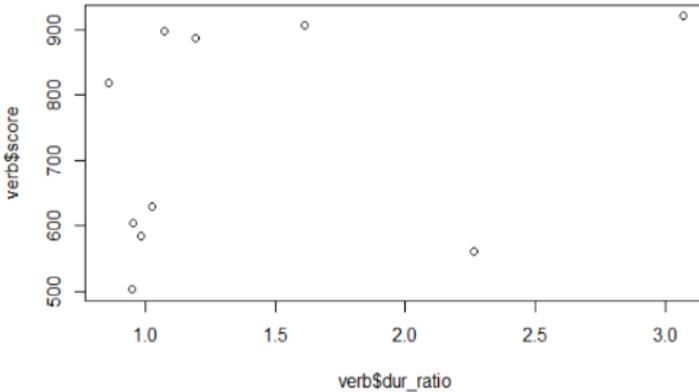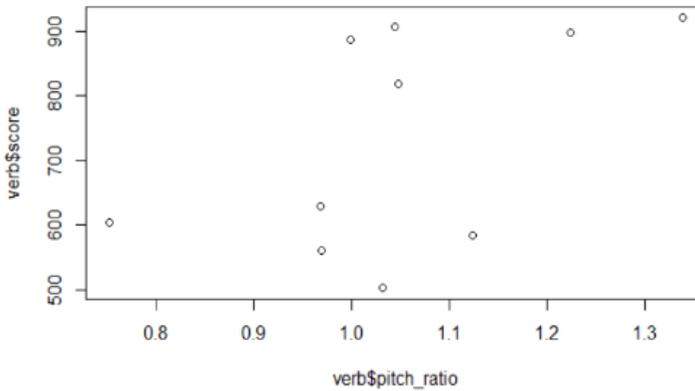Figure 3. Plot of score and verb duration in sentence-middle

Figure 4. Plot of score and pitch in the sentence-middle

In the noun of the sentence-final, the correlation between English score and duration has T = 19, *p*-value = 0.6007, and *tau* = -0.1555556, which indicate no statistical dependence between English proficiency and duration. Spearman's rank correlation test has Spearman score, S = 224, *p*-value = 0.3128, and *rho* = -0.3575758. In addition, the correlation between English score and pitch has no significant statistical dependency, which has T = 28, *p*-value = 0.3807, and *tau* = 0.2444444. No statistical relationship between the two variables is in Spearman's rank correlation test, S = 104, *p*-value = 0.2956, and *rho* = 0.2369697. The correlation between English proficiency and duration & pitch ratio does not have any statistical significance. The result reveals that there was no pattern of the stress pattern between the high and low English proficient groups. In Wilcoxon rank sum test, noun has W = 6, *p*-value = 0.2222, and W=19, p-value = 0.2222, in duration and pitch, respectively. The result reveals that there is no group difference between high and low. The plots of score and duration & pitch of noun and verb in the sentence-final is indicated in Figure 5 and 6.

Figure 5. Plot of score and noun duration in sentence-final
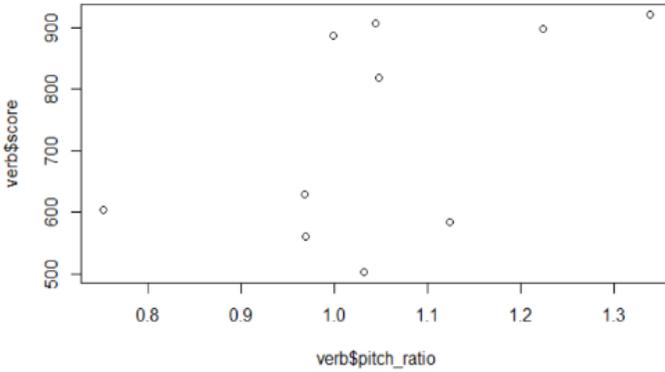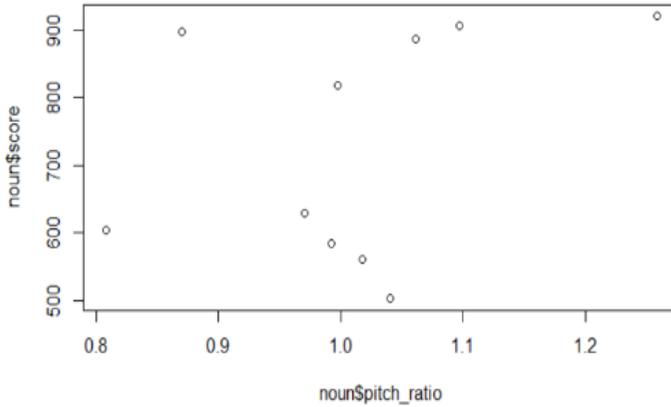
Figure 6. Plot of score and noun pitch in the sentence-final

In the verb of the sentence-final, the correlation between English score and duration had T = 18, *p*-value = 0.4843, and *tau* = -0.2 in Kendall's rank correlation test, which indicate no statistical dependence between English proficiency and duration. In Spearman's rank correlation test, S = 216, *p*-value = 0.3871, and *rho* = -0.3090909 show no statistical relationship between the two variables. Kendall's correlation between English score and pitch has no significant statistical dependency, which has T = 25, *p*-value = 0.7275, and *tau* = 0.1111111. In Spearman's rank

correlation test, the values are S = 144, *p*-value = 0.7329, and *rho* = 0.1272727, showing no statistical relationship between the English score and pitch in the verb of the sentence middle. The correlation between English proficiency and duration & pitch ratio does not have any statistical significance. In Wilcoxon rank sum test, noun has W = 12, *p*-value = 1, and W=17, *p*-value = 0.4206, in duration and pitch, respectively. The result also shows no group difference between high and low.

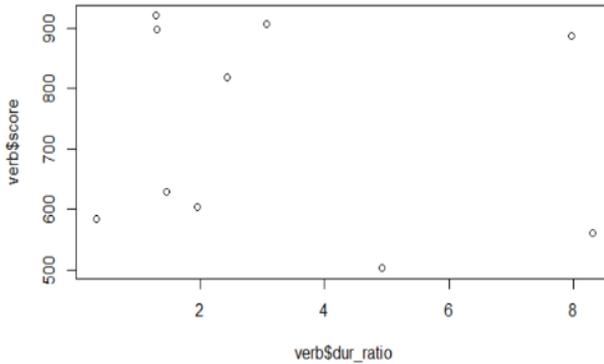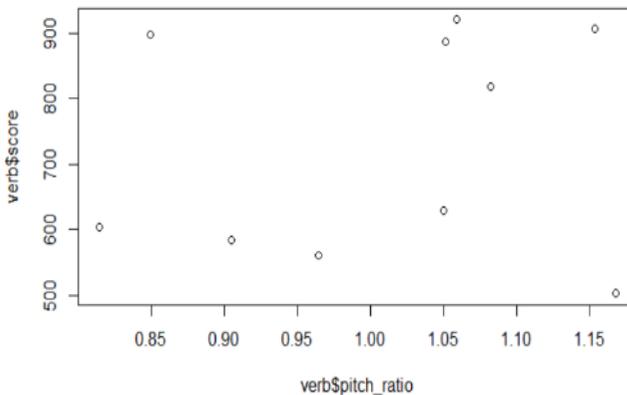Figure 7. Plot of score and verb duration in sentence-final

Figure 8. Plot of score and pitch in the sentence-final

5. Discussion

The overall result shows that both high and low proficient group do not have any statistical difference in placing stresses in noun-verb homographs in the sentence. Although there is no statistical significance between English score and duration & pitch in the previous section above, the verb *p*-values of English score & duration and English score & pitch are smaller than the noun *p*-values in the middle of the sentence. In Figure 9, both high and low group tend to put the stress on the first syllable in both cases, noun and verb of duration and pitch. The result implies that the stress placement of both groups might have been interrupted by their L1, Korean, considering the previous studies that showed Korean stress tend to be placed in the first syllable, even though there exist many controversies about the Korean stress.

Figure 9. Noun and verb stress in sentence-middle
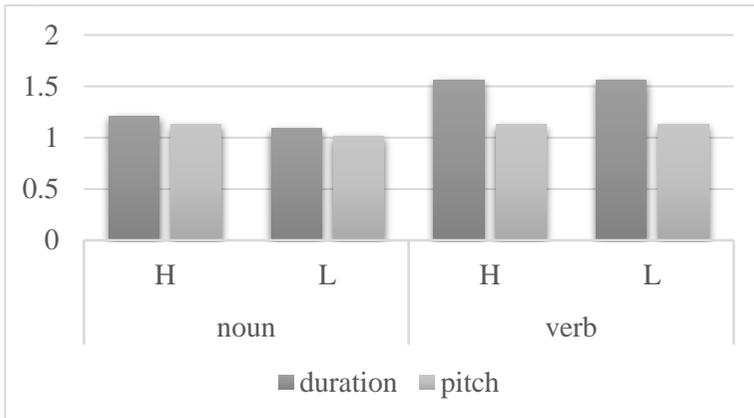
In the final of the sentence, however, both group tend to put the stress on the second syllable in case of pitch, as shown in Figure 10. This result indicates that the location of words in sentences can have an impact on

the pitch, which corresponds to the previous studies (Jun, 1993; Kim, 1973). Also, the three participants, who had experience in English-speaking countries do not show any difference in the stress placement. In sum, in the sentence-middle, both groups of proficiency tend to put stress on the first syllable, whereas in the sentence-final, both group tend to put stress on the second syllable in pitch. Both groups have difficulties in discriminating the stress placement of nouns and verbs. The research question of this study is: In there any relationship between English proficiency and Korean L2 learners' stress production of noun-verb homographs. The conclusion to be drawn here is that there is no such relationship between them, and English proficiency might be not an influential factor to learning English stress. In addition, the location of the word in the sentence has a great impact on the stress placement.

Figure 10. Noun and verb stress in sentence-final
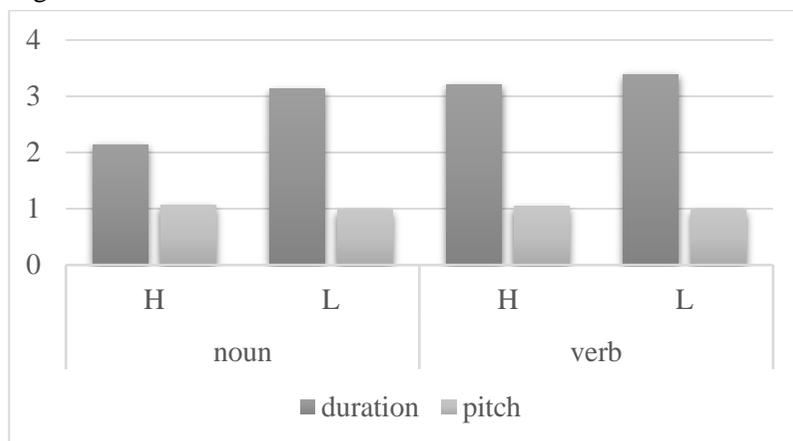
6.   Conclusion

This paper has attempted to sketch out the relationship between English proficiency and Korean L2 learners' stress placement of noun-verb

homographs. The result shows that English proficiency is not a crucial factor to the stress placement in noun-verb pairs, but reveals that the location of a word in a sentence influences English stress placement. Further studies need to investigate more about Korean L2 learners' stress placement and the effect of Korean dialectic difference in English, because some Korean dialects are intonation languages. In addition, intonation of sentence level should be regarded. Only a small number of participants conducted the experiment, which requires future studies to increase the number of participants. Moreover, other stress patterns of English should be taken into account in the future studies.

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Appendix

Noun-verb homographs production material

	STIMULI
1	The heavy storm is coming tonight.
2	He started to play the piano.
3	This statue stands on an island.
4	I do not want to start the work.
5	They transferred the shipment last week.
6	He started to play the piano.
7	They combated crime with smart phones.
8	He stopped to smoke two years ago.
9	They transported her to new world.
10	The permit runs for seven months.
11	This statue stands on an island.
12	I do not want to start the work.
13	The state was nice and beautiful.
14	The state was beautiful and nice.
15	They will desert their cat and dog.
16	They decreased the price of coke.
17	The size of the lake will decrease.
18	There are many stars in the dark sky.
19	Earth Day began as a protest.
20	Too much stress is not good for health.
21	I do not want to start the work.
22	They conducted a survey last week.
23	He stopped to smoke two years ago.
24	There is no data to transfer.
25	The transport will send you your child.
26	The strong wind came to the states.
27	They addressed the issue last week.
28	He started to play the flute.
29	The desert extends to the south.
30	The protest was held on March 3.

31	His bike is his means of transport.
32	He started to play the piano.
33	The address remains unchanged.
34	He started to play the flute.
35	Soon they will finish the transfer.
36	The transfer will take place now.
37	Police say they need a permit.
38	Too much stress is not good for health.
39	They will increase the price of coke.
40	They protested without violence.
41	They found novel ways to combat.
42	I do not want to start the work.
43	The heavy storm is coming tonight.
44	The state was nice and beautiful.
45	They increased the price of coke.
46	The price for water will increase.
47	He stopped to smoke two years ago.
48	Too much stress is not good for health.
49	There are many stars in the dark sky.
50	It was the end of the combat.
51	The state was nice and beautiful.
52	I do not want to start the work.
53	They deserted their cat and dog.
54	There are many stars in the dark sky.
55	They wanted a ship to transport.
56	This is the card they would permit.
57	This year crime is on the increase.
58	They will address the issue now.
59	The state was nice and beautiful.
60	The heavy storm is coming tonight.
61	She nerved herself to protest.
62	The band had no one to conduct.
63	They will transfer the shipment now.
64	Marriage has been on the decrease.
65	This statue stands on an island.
66	He started to play the flute.
67	He started to play the piano.

68	The increase shows big difference.
69	Too much stress is not good for health.
70	The strong wind came to the states.
71	They rode camels in the desert.
72	This statue stands on an island.
73	Too much stress is not good for health.
74	The strong wind came to the states.
75	The heavy storm is coming tonight.
76	The strong wind came to the states.
77	There are many stars in the dark sky.
78	They will conduct a survey now.
79	They told me who I should address.
80	The strong wind came to the states.
81	His conduct agrees with his words.
82	The heavy storm is coming tonight.
83	They will decrease the price of coke.
84	There is no one left to desert.
85	He started to play the piano.
86	They will combat crime with smart phones.
87	They will protest without violence.
88	They permitted him to use the car.
89	There are many stars in the dark sky.
90	He started to play the flute.
91	The combat entered a new phase.
92	He always acts with good conduct.
93	This statue stands on an island.
94	He started to play the flute.
95	He stopped to smoke two years ago.
96	They will permit to use the car.
97	He stopped to smoke two years ago.
98	They will transport her to new world.
99	The decrease has not been proven.
100	They forgot to write the address.

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