Perception of Transplanted English Prosody by American and Korean Listeners

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ABSTRACT

This study explored the perception of transplanted English prosody by thirty American and Korean, male and female listeners. The English utterances of various sentence types produced by Korean and American male speakers were employed to transplant the American prosody contours to Korean English utterances. Then, the thirty subjects were instructed to rate the transplanted prosodic components. Results showed that the interactions between the three factors (e.g., rater groups & transplantation types; transplantation types & sentence types; rater groups & transplantation types & sentence types) turned out to be meaningful. Both Americans and Koreans perceived the effectiveness of the combined effect of transplanted duration and pitch or duration and pitch and intensity. However, when perceiving individual prosodic components, Americans and Koreans showed different perceptual ratings. As for the overall prosody change, Americans perceived the change of intensity in a significant way but Koreans did not because intensity is not a crucial semantic factor in Korean. Americans rated the transplantation of duration alone as ineffective while Koreans rated otherwise. This was explained by the difference between English and Korean. The difference of perspective was also significant with different sentence types, especially with the three sentence types that had speech rates slower than other sentence types. A slower speech rate intensified the mismatch between the transplanted duration and the original pitch causing a negative impression on American listeners whereas this did not affect Korean listeners. Pedagogical implications of the findings are discussed.

Keywords: English prosody, prosody transplantation, prosody perception

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I. Introduction

Listeners perceive an utterance by referring to their own articulations (Ladefoged, 2001; Lass, 1996). Therefore, it is reasonable to expect that a listener's linguistic background affects his/her perception of suprasegmentals or prosody. Perceptions of foreign language prosody are influenced by the linguistic characteristics of the listener's native language (Depouw et al., 1997, 2001; Lim, 2001; Kim, 2003; Guion et al., 2004; Guion, 2005).

The problems which Korean learners of English face, in part, originate from the linguistic influence of Korean language on the perception of English. The influence of a mother tongue on the perception of foreign language prosody is important because the educational process of teaching intonation includes enhancing the learners' auditory perception and teaching the usage of intonation (Hewings, 1993). Effective acquisition of foreign language prosody, therefore, is not possible without enhancing auditory perception of foreign language prosody.

It is expected that the negative influence of native language on the perception of foreign language prosody leads to undesirable influence on the production of foreign language (Guion, 2005; Kim, 2003; Oh et al., 2005; Trofimovich et al., 2006; Lee et al., 2006). Kim (2003) and Guion (2005) showed that Korean language prosody patterns affects the perception and the production of English in a negative way. Kim (2003) also reported that in all 33 different Korean high school English textbooks, the portion related to the education of prosody was only 17.7% of the portion related to the education of segmental sounds (Kim, 2003).

The study on the perception of prosody is important because prosody education can benefit from the knowledge provided by the perception study. Therefore an effective way of learning and teaching prosody should be explored by studying perception of prosody by listeners from different language backgrounds.

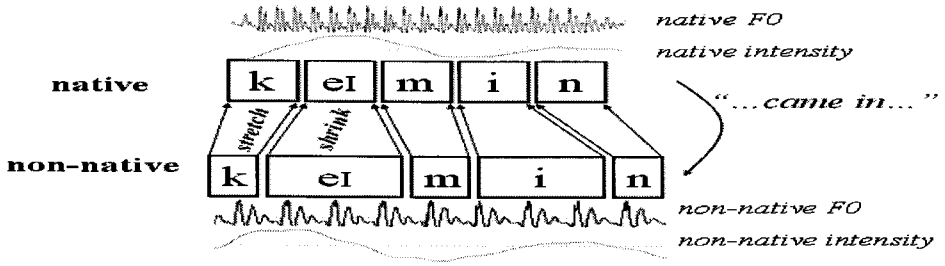

Figure 1. Transplantation of the native durations, F0 contour and intensity contour. Yoon (Personal Communications)

Study on the perception of individual aspects of prosody (e.g., pitch, duration, intensity) has not been easy because the separation of the prosodic components was difficult. However, this study employed the technique proposed by Yoon (2006), which used the PSOLA (Pitch Synchronous Overlap and Add, Moulines et al., 1990) algorithm to transplant each of the individual prosodic components from a native English utterance to the same utterance produced by a Korean speaker. Then the perception of the sentence-level prosody by Americans and Koreans was examined. <Figure 1> shows how this transplantation proceeded. Each of the segments was first manually labeled by a phonetician. Then the English native speaker's durations and F0 contour were transplanted, followed by the transplantation of the native intensity contour (Yoon,

2006).

2. Method

2.1 Stimuli

Out of the sentence examples from other studies (Yang, 2006) 14 English sentences (12 for rating & 2 for training) were chosen and recorded by 4 speakers (two Koreans & two Americans). A Senheiser PC150 headset microphone and a notebook PC were used to record speech at the sampling rate of 16 bit 22,050 Hz. The Koreans were in their early twenties. They were students from the Electronic Engineering department at Pusan National University. Korean A and B had South Kyungsang Accent (one of the Korean dialects). American C came from Michigan and American D from Texas. They were in their early to late fifties and both were teachers teaching American students at an American School.

English sentences (12 sentences) used as stimuli

Wh-Question
1. Mike, where is she?
2. John, where did she say the place is?

Yes-No Question
1. Does she want that?
2. Did you watch channel 3 or channel 5?

Tag Question
1. They are busy, aren't they?
2. Jack and Jill went up the hill in the morning, didn't they?

Imperative
1. Tell me your last name.
2. Don't forget to buy the soda 10 bottles more unless it is expensive.

Exclamatory
1. How beautiful you are!
2. What a noble thing it is to sacrifice your life for the safety of all!

Declarative
1. I have five books here. One, two, three, four and five.
2. They think that the man in the jacket is carrying a walking stick.

The 12 sentences can be grouped into 6 types according to the sentence types (Exclamatory, Imperative, Wh-Question, Yes-No Question, Tag Question, Declarative- Simple & Complex). Each type has two sentences: one short and the other long.

The 24 utterances were produced by Korean A and American C (12 by Korean A and 12 by American C) and used for prosody transplantation. Out of the 24 utterances, the prosody features of the 12 utterances spoken by American C were transplanted to the 12 utterances spoken by Korean A yielding 60 utterances (12 x 5) including the original Korean English utterances.

In <Table 1>, Ex, Im, Wh, Yn, Ta, De mean the 6 sentence types: Exclamatory, Imperative, Wh-question, Yes-No Question, Tag question, Declarative, respectively. The numbers mean the length of the sentences (1-short & 2-long, only the declarative type had two long sentences). The transplantation of duration is denoted by -D, pitch by -P, duration & pitch by -DP, duration & pitch & intensity by -DPI.

Table 1. Transplanted utterances of 60 prosody transplantation combinations

	Transplantation Types				
Sentence Types	Ex1	Ex1-D	Ex1-P	Ex1-DP	Ex1-DP1
	Ex2	Ex2-D	Ex2-P	Ex2-DP	Ex2-DP1
	Im2	Im2-D	Im2-P	Im2-DP	Im2-DP1
	Im1	Im1-D	Im1-P	Im1-DP	Im1-DP1
	Wh1	Wh1-D	Wh1-P	Wh1-DP	Wh1-DP1
	Wh2	Wh2-D	Wh2-P	Wh2-DP	Wh2-DP1
	Yn1	Yn1-D	Yn1-P	Yn1-DP	Yn1-DP1
	Yn2	Yn2-D	Yn2-P	Yn2-DP	Yn2-DP1
	Ta1	Ta1-D	Ta1-P	Ta1-DP	Ta1-DP1
	Ta2	Ta2-D	Ta2-P	Ta2-DP	Ta2-DP1
	De1	De1-D	De1-P	De1-DP	De1-DP1
	De2	De2-D	De2-P	De2-DP	De2-DP1

Utterances of American D were 'Koreanized' by the prosody transplantation. In contrast to the prosody transplantation procedure mentioned above, the prosodic features of the Korean English utterances of Korean A were transplanted to the utterances of American D producing 12 utterances with Korean English prosody. Thus, the utterances produced by Korean A and American D shared the same prosodic patterns of Korean A. Significant discrepancy between the perception scores of the utterances of Korean A and the transplanted utterances of American D rated by a person indicates that the rater is biased by the undesired influence of Korean English pronunciation on the perception of prosody. Therefore, the data from the biased rater should not be counted in the measurement of prosody perception. The 12 utterances were added to 60 utterances to determine the rater bias (the perception data of these were not included in the analysis) and the resulting 72 stimuli (60 + 12) were randomly sorted.

The 6 dummy utterances were added to the randomized 72 stimuli used for the rating session. The dummy utterances were presented at the beginning of the rating because the perceptual data of initial portion of each rating session (1 session per 1 rater) is not reliable in a psychological perspective. Therefore, the perceptual data from the dummy utterances were excluded from the analysis. All in all, a total number of 78 stimuli were presented to 13 Americans and 23 Koreans during the rating session.

2.2 Prosody Rating

The 36 people (13 Americans & 23 Koreans) participated in the prosody rating experiment. All of the 23 Koreans were Korean students from the Electronic Engineering department at Pusan National University. All of the 13 raters were Americans. Out of the 13 Americans, 3 of them were teachers experienced in teaching English.

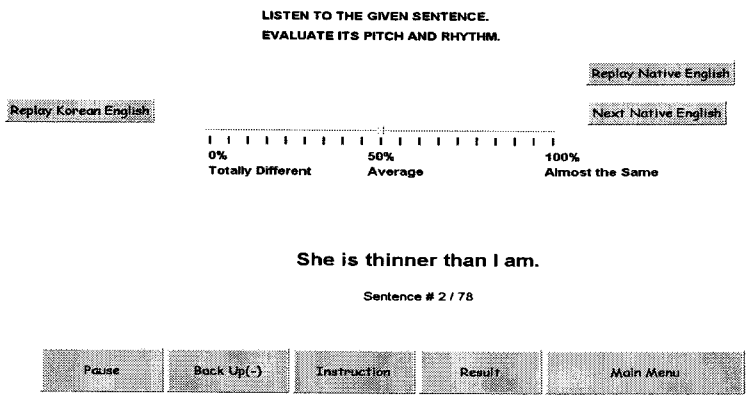

Figure 2. Computer interface for the prosody rating

The participants practiced with a training set before the actual rating session. The following two sentences were recorded for the purpose of rater training. These sentences were recorded by Korean B. Then, prosodic features of American C were transplanted to the utterances of Korean B, producing 10 utterances to be used for the training session.

English sentences (2 sentences) for training

1. She is thinner than I am.
2. She thought that the man with the glasses has his coat on his arm.

A total number of 78 stimuli were rated by 36 people using a computer based interface called Alvin (Hillenbrand, 2006). In <Figure 2>, raters clicked the 'Replay Korean English' button to listen to the 78 stimuli and the 'Replay Native English' button to listen to the counterpart utterances spoken by American C. Then raters compared the two utterances and determined the similarity of the two on the slider.

If a rater moved the bar on the slider toward the right end of the slide (100%), this indicated that the degree of similarity increased. If a rater moved the bar on the slider toward the left end of the slide (0%), this indicated that the degree of similarity decreased. Raters were instructed to pay attention to the intonation and rhythm only, not the pronunciation of each segment.

3. Results and Discussion

Out of 36 raters' data, 6 raters' data (3 Koreans & 3 Americans) were excluded because of the undesired influence of the negative impression of Korean English pronunciation. Thus, only the perceptual data from 30 raters (20 Koreans and 10 Americans) were pooled and analyzed. As for the consistency among raters, the intra-class correlation coefficients (McGraw et al., 1996) of

each group were evaluated. The American group and the Korean group showed 0.842 and 0.959, respectively, indicating that the raters coded prosody with good reliability.

According to the mixed-design analysis of variance (ANOVA) with four factors; rater groups (2), prosody transplantation (5), sentence types (7), sentence length (2), the difference of sentence length did not influence the perception of prosody in a significant way. It can be said that both of Korean group and American group did not rate long sentences differently from short sentences when perceiving prosody. Therefore, length of sentence was excluded among the independent factors from the statistical analysis.

The two levels for the factor or rater groups included an American group and a Korean group. The five levels for the factor or prosody transplantation were K (Korean English), D (Transplantation of Duration), P (Transplantation of Pitch), DP (Transplantation of Duration & Pitch) and DPI (Transplantation of Duration & Pitch & Intensity). The seven levels for the factor or sentence types were exclamatory, imperative, wh-question, yes-no question, tag question, declarative simple sentence and declarative complex sentence. The two levels for the factor or sentence length were short and long sentences.

The scores from the perception task were submitted to a mixed-design analysis of variance (ANOVA), with three factors: rater groups (2), prosody transplantation (5), sentence types (7). The main effects of prosody transplantation [$F(4,112) = 77.496$, $*p<0.05$], and sentence types [$F(6,168) = 13.758$ $*p<0.05$] were significant, as well as the two-way interactions of prosody transplantation and rater groups [$F(4,112) = 3.372$, $*p<0.05$], prosody transplantation and sentence types [$F(24, 672) = 5.834$, $*p<0.05$] and the three-way interaction of prosody transplantation and sentence types and rater groups [$F(24,672) = 1.648$, $*p<0.05$].

3.1 Analysis of Two Groups & Transplantation Types

In this paper, the words, 'transplantation effect' and 'rater effect', were used to describe two perceptual aspects. Transplantation effect means the significance of a transplantation of prosodic components. When a prosodic change was perceived in a significant way, it can be said to have a transplantation effect. Rater effect means the significant difference of perception between rater groups. When the probability of difference of perception between rater groups is significant, it can be said that the rater effect is significant.

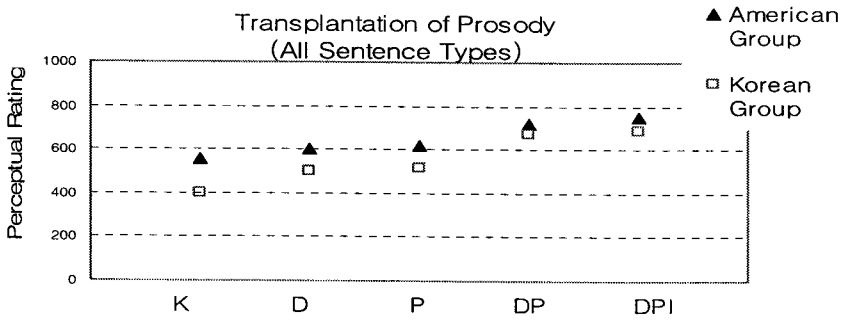

Figure 3. Two rater groups with prosody transplantation types

<Figure 3> shows the perceptual difference between the groups and the transplantation types. In the figure, the vertical axis is for the rating scale and the horizontal axis for the different prosody transplantation types with average rating scores.

Statistical analysis showed that the transplantation effect of D was statistically significant for the Korean group but not for the American group, and the rater effect was significant between the two groups. This indicates that Americans did not perceive D as an effective change whereas Koreans judged otherwise. This can be explained by the durational effect of English prosody (more in 3.2).

The transplantation effect of P was significant for the two rater groups. Furthermore, there was a significant rater effect between the two rater groups indicating that Koreans were more sensitive to P than Americans. However, neither D nor P was able to narrow the perceptual difference between Americans and Koreans caused by the difference of prosodic system between the two languages (more in 3.2).

The transplantation effect of DP and DPI was statistically significant for Americans and Koreans. There was no rater effect between the two groups perceiving DP or DPI (see <Table 2>). It can be said that the Koreans were as sensitive as Americans when perceiving DP or DPI.

Table 2. Two rater groups with transplantation types and probability (*P< 0.05)

Total	American Group	Korean Group	Difference (Americans-Koreans)
K (Korean English)	553.5	399.8	153.7
Probability			0.00*
D	599.1	496.2	102.9
Difference (D-K)	45.6	96.4	
Probability	0.19	0.00*	0.05*
P	620.2	517.3	102.9
Difference (P-K)	66.7	117.5	
Probability	0.02*	0.00*	0.04*
DP	714.9	670.4	44.5
Difference (DP-K)	161.4	270.6	
Probability	0.00*	0.00*	
DPI	749	684	65
Difference (DPI-K)	195.5	284.2	
Probability	0.00*	0.00*	0.22
Difference (DPI-DP)	34.1	13.6	
Probability	0.03*	0.24	0.22

Statistical Analysis of transplantation effect of intensity pattern (DP vs. DPI) showed that the effect was statistically significant for the American group but not for the Korean group (see 'DPI-DP' at the bottom of <Table 2>). The American group perceived the transplantation of intensity as a significant change whereas the Korean group did not.

Korean speakers' insensitivity to the intensity might be because of Korean usage of intensity in actual utterance. According to Huh (1985), in Korean, intensity does not contribute to the semantic difference. It is just used for the effective representation of a speaker's emotion and attitude in an utterance. Recent study on the production of English by Korean speakers showed that Korean speakers made less of an intensity difference than native speakers of English (Lee et al., 2006). Therefore, it is reasonable to say that Korean speakers did not perceive the change of intensity pattern in the emotionally neutral utterances.

On the whole, as shown in <Figure 3>, the American group shows a less steep slope when perceiving D, P, DP and DPI. In other words, the American group perceived the prosody transplanted from native English utterances to Korean English utterances as a significant change but the size of the effect was smaller than the Korean group.

This can be explained by the fact that Americans were more affected by the negative impression of Korean English pronunciation (i.e., non-nativelikeness). According to the survey after the rating experiment, all American raters said that it was hard for them to ignore the Korean English pronunciation whereas most Koreans said they had little problem ignoring the pronunciation, probably because Koreans were familiar with the linguistic characteristics of their own mother language.

3.2 Analysis of Three Groups & Transplantation Types

The Korean group was divided into two groups according to their language proficiency level for additional analysis - one group of 6 Koreans with high English proficiency level and the other group of 14 Koreans with low level. The criterion for the proficiency level is their TOEIC (Test Of English for International Communication) scores (e.g., people above 800 belonged to the high proficiency group and the rest to the low proficiency group).

The two-way interaction of prosody transplantation (5) and rater groups (3) was significant [$F(8,108) = 2.495$, $^{*}p<0.05$] but another two-way interaction of prosody transplantation (5) and sentence types (7) and the three-way interaction of prosody transplantation (5), sentence types (7) and rater groups (3) were not.

Therefore, the analysis was done with the two-way interaction of prosody transplantation (5) and rater groups (3) only. Intra-class correlation coefficient for each group was 0.862 for the Korean group with high proficiency and 0.945 for the Korean group with low proficiency indicating comparatively good reliability.

It can be said from the results that the scores of the raters with higher proficiency were almost always consistently higher than those of the raters with lower proficiency at all transplantation types and all sentence categories (see Figure 5). This might be explained by the difference of prosodic systems between English and Korean. The basic building block of English prosody is stress accent whereas in Korean, it is the tone pattern. In English, stress accents (most notably pitch) are associated with the lexical word and in Korean, tone (or pitch) patterns are associated with an accentual phrase. Jun (1998) has demonstrated empirically that Korean has the tone pattern Low-High-Low-High (LHLH) or High-High-Low-High (HHLH) associated with accentual phrases. One might expect that Korean speakers

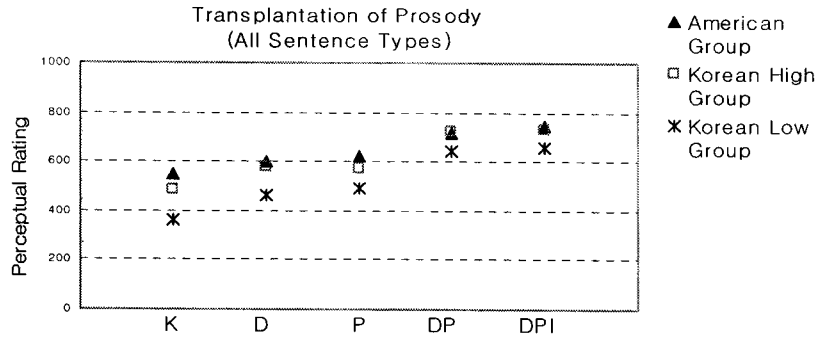

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Figure 4. Three rater groups with prosody transplantation types

The data from the wh-question in this experiment illustrate this point. According to the grammatically acceptable pitch pattern in English, wh-questions should end with a falling pitch pattern (as all of the native utterances in this research ended). However, the Korean English utterances of wh-questions used in the experiment ended with rising pitch pattern instead of a falling pitch. Interestingly, in spite of this discrepancy, Americans rated the Korean English prosody with higher scores than Koreans and the rater effect was significant ($p=0.01$*). In other words, Americans rated the discrepancy rather generously whereas Koreans rated it in a stricter way probably because Koreans paid more attention to the tonal difference at the end of the sentence than native speakers.

This result supports Guion's research (2005) showing that the native speakers of English and Koreans with different proficiency levels of English demonstrated difference in production and perception experiments of English prosody. She mentioned that this difference may be due to Korean speakers' low sensitivity to word level statistical distributions because of early exposure to a phrase level prosodic system.

Like the American group, the Korean group with high proficiency exhibited significance for the perception of P, DP and DPI but not for D whereas Korean group with low proficiency showed significant probability for the all prosody transplantation types (see <Figure 4>). Like the Korean group with low proficiency, the Korean group with high proficiency did not perceive the effectiveness of transplantation of intensity pattern (see the bottom of <Table 3>). It can be said that the two Korean groups with different proficiency levels were insensitive to intensity change confirming what Huh (1985) mentioned.

Table 3. Three rater groups (A: American group, Khigh: Korean high group, Klow: Korean low group) with transplantation types and probability *P< 0.05

Total	American Group	Korean High Group	Difference (A-Khigh)	Korean Low Group	Difference (A-Klow)	Difference (Khigh-Klow)
K	553.5	483.4	70.1	363.9	189.6	119.5

Probability			0.20		0.00*	0.04*
D	599.1	579.1	20.0	460.6	138.5	118.4
D-K	45.6	95.6		96.8		
Probability	0.19	0.08	0.74	0.00*	0.02*	0.05*
P	620.2	575.3	44.9	492.4	127.8	82.9
P-K	66.7	91.8		128.5		
Probability	0.02*	0.02*	0.39	0.00*	0.02*	0.24
DP	714.9	723.3	-8.4	647.7	67.2	75.5
DP-K	161.4	239.8		283.9		
Probability	0.00*	0.00*	0.84	0.00*	0.19	0.19
DPI	749	733.4	15.6	662.8	86.2	70.6
DPI-K	195.5	250.0		298.9		
Probability	0.00*	0.00*	0.87	0.00*	0.13	0.25
DPI-DP	34.1	10.1		15.1		
Probability	0.03*	0.59	0.87	0.00*	0.13	0.29

The American group and the Korean group with high proficiency did not perceive D as an effective improvement whereas the Korean group with lower proficiency perceived it as a meaningful improvement. This can be explained by the durational effect of English prosody. According to Guion et al. (2003), vowel length affects the perception of stress placement by native speakers of English. Guion, Clark, Harada, & Wayland (2003) reported an investigation of the CELEX lexical database (Baayen, Piepenbrock, & Gulikers, 1995) whose results indicated that long vowels were roughly twice as likely to be stressed as short vowels. Therefore, it can be expected that the change of the duration pattern, including the change of vowel length combined with the awkward pitch pattern of Korean English, results in a negative impression of prosodic change for the listeners with higher proficiency of English.

In Guion's study (2005), Korean speakers demonstrated low sensitivity to statistical distributions of English word stress patterns conditioned by syllabic structure (most notably, vowel length) and late Korean English bilinguals showed lower sensitivity than early bilinguals. Therefore, it might be reasonable to say that the Americans and the Koreans with higher proficiency in this experiment were more sensitive to the negative impression of awkward combination of native duration and Korean English pitch than the Koreans with lower proficiency. In other words, it can be said that the Korean group with low proficiency rated D as an improvement because they were less sensitive to the negative impression and tend to selectively listen to the native duration pattern (apart from Korean English pitch) transplanted from native utterances to Korean English utterances.

3.3 Analysis of Two Groups & Transplantation Types & Sentence Types

The three-way interaction of rater groups (2), transplantation types (5) and sentence types (7) was significant [$F(24,672) = 1.648$, $*p<0.05$]. In all sentence types, as expected, the effect of combined prosodic components was more significant than that of individual components for the both groups. Koreans, however, were more sensitive to the effectiveness of individual prosodic

components than Americans.

As <Figure 5> shows, the scores of Americans were consistently higher than those of Koreans. This phenomenon might be explained by the different characteristics of the two prosodic systems. Because of the different linguistic perspectives, Americans seemed to have paid more attention to prosody at the lexical level whereas Koreans' attention was given to phrasal level.

A good illustration of this point was found in the case of wh-question (explained in 3.2). Another example is the transplantation of duration pattern in the tag questions, as shown in <Figure 5>, in contrast to the positive rating of Korean listeners ($p=0.01^*$), Americans perceived D as a significant deterioration (became worse) of prosodic quality ($p=0.04^*$). <Figure 6> shows the native English pitch & duration pattern and Korean English pitch & duration pattern used in this experiment. As <Table 4> shows, the vowel to consonant ratios of stressed vowels in native utterances are greater than those of the counterpart Korean English vowels and the Korean English vowels are not stressed in the utterances (see <Figure 6>).

In English prosodic system, long vowels are expected to have stress (most notably pitch). Thus, it can be said that if the long vowels of native duration pattern transplanted in Korean English utterances do not have the proper stress (as shown at the bottom of <Figure 6>), the resulting sound might not sound like real English to native speakers. Therefore, the native duration contours transplanted onto Korean English utterances were considered as an improvement by Koreans but not by Americans. A similar example can be found in the declarative simple sentence. Even though the transplantation effect of D was significant for Koreans, it was not for Americans because of the prosodic difference at lexical level (e.g., vowel duration and stress).

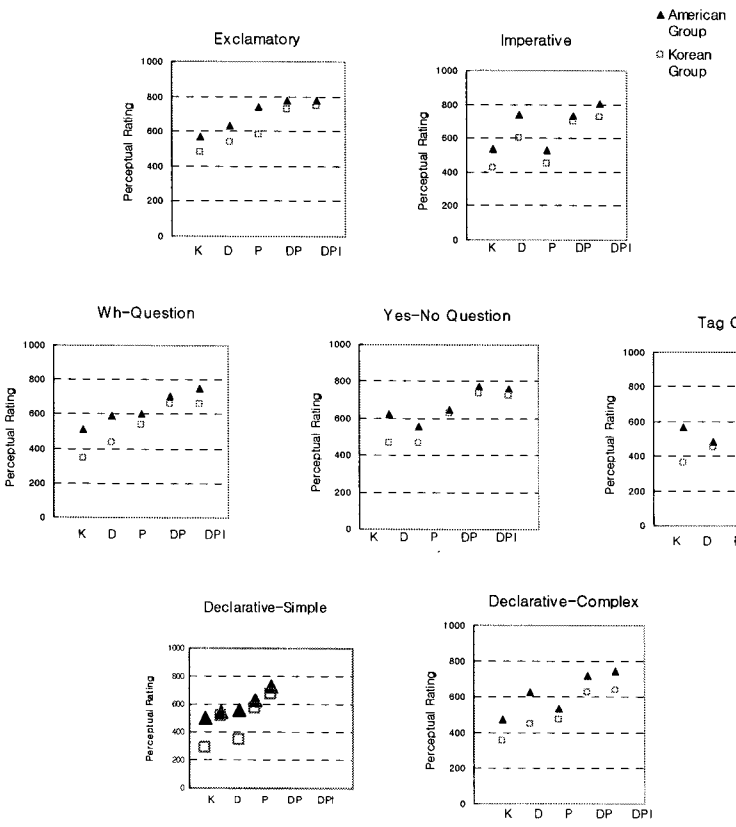

Figure 5. Overall trend in 7 sentence types

These phenomena that the transplantation effect of pitch in tag, yes-no questions and declarative simple sentences was significant for Koreans (p=0.00*, 0.00*, 0.02* respectively) but not for Americans can be explained in the same vein. After the transplantation of pitch, the awkward combination of native pitch and non-native duration caused a negative impression on native speakers' perception because the native speakers' expectation of vowel durations (e.g., stress for lengthened vowels) was not properly met.

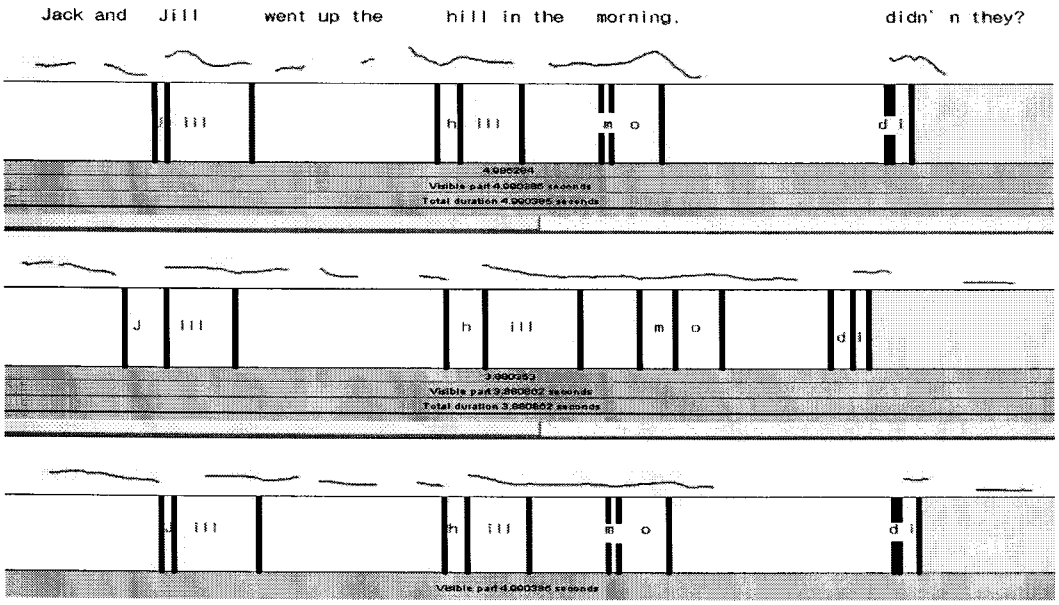

Figure 6. Native pitch & duration (top), Korean English pitch & duration (middle), Korean English pitch combined with native duration (bottom)

Table 4. Duration ratio of Native English & Korean English utterances

	Native English	Korean English		Native English	Korean English
J	0.050	0.127	m	0.040	0.108
ill	0.332	0.207	o	0.194	0.141
V/C	6.616	1.628	V/C	4.872	1.307
H	0.089	0.116	D	0.022	0.065
ill	0.262	0.289	i	0.075	0.048
V/C	2.961	2.490	V/C	3.400	0.737

In the three types (i.e., tag question, yes-no question and declarative simple sentence), compared to the Korean English

utterances, the native speech rate was slow (e.g., tag-question 4.99 vs 3.88, yes-no question 2.77 vs 2.47, declarative simple sentence 7.75 vs 4.81: duration of utterance in seconds - native vs. Korean English, respectively) which increased the difference of vowel length between native and Korean English utterances. In slow speech rate, the vowels in native utterances tend to be lengthened which consequently increases the expectation of high pitch on the lengthened vowels. Therefore, the transplantation of durational pattern of these did not improve the rating by Americans. Even though duration pattern is corrected, the disharmonious combination of duration and pitch at the lexical level (mainly in terms of vowel length and stress) caused a negative impression on American listeners. The same is true of the transplantation of pitch pattern of these three sentence types which supports this phenomenon.

When the difference between the two groups changed from non-significance to significance, it can be said to have a certain degree of sensitivity as found in P in exclamatory, D in imperative and D in declarative complex sentence. Both Americans and Koreans perceived the effect of P in exclamatory (p=0.00*, 0.00*)[2] and D in imperative (p=0.00*, 0.00*) utterances significant whereas D in exclamatory and P in imperative insignificant. In both cases, Americans' sensitivity to prosody was greater than Koreans' (p=0.03* for 'American P □ Korean P' in exclamatory, p=0.01* for 'American D-Korean D' in imperative).

These phenomena can be explained by the functional aspects of the two modalities. Many studies point to pitch as the main prosodic cue for emotion recognition (Carlson et al., 1992; Razak et al., 2003). In exclamatory modality, conveying the emotion of a speaker to an audience tends to be more important than the information or the content of the sentence. Therefore, it is reasonable to say that more emphasis on the perception of P facilitates better understanding of exclamatory type of utterances. When perceiving exclamatory sentences, Americans seem to put more emphasis on the change of pitch pattern than Koreans.

In imperative modality, the insensitivity to P can be explained by some research reporting that the role of pitch in imperative type does not seem to be crucial (Di Cristo, 1998; Willis, 2002). As for the sensitivity to D, it can be said that with imperative sentences, the content of a sentence or the intention of a speaker is more important than emotion. It is well known that different pauses and durations cause semantic change. For example, the imperative sentence used in this experiment can be interpreted in two ways depending on the location of the pause: First, "Don't forget to buy the soda / 10 bottles more unless it is expensive" (= Buy another 10 bottles if it is not expensive). Second, "Don't forget to buy the soda 10 bottles / more unless it is expensive" (= Buy 10 bottles and if it is not expensive buy more bottles). Therefore, with imperative type of utterances, an effective communication can be achieved by paying more attention to durational pattern rather than pitch pattern and Americans seem to put more emphasis on the change of durational pattern than Koreans.

The D in declarative complex sentence was also found effective (p=0.02*, 0.02*) by the both groups. Americans' sensitivity of D in declarative complex sentence was greater than Koreans' (p=0.03* for 'American D-Korean D') because of the difference between native English and Korean English utterances in terms of duration pattern or pause pattern. According to Yang (2006), when reading declarative complex sentences, most Koreans pause between conjunctive 'that' and the rest of the 'that clause'

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2) Henceforth, all of the P values are for the ratings by American and Korean groups respectively unless noted otherwise.

(e.g., They think that / the man in the jacket is carrying a walking stick.) while native speakers of English pause between the 'main verb' and the conjunctive 'that' (e.g., They think / that the man in the jacket is carrying a walking stick). This was the case with the utterances used in this experiment.

For example, the complex sentences used in this experiment can be interpreted in two ways, depending on the location of the pause: First, "They think / that the man in the jacket is carrying a walking stick." (= It is their opinion that the man in the jacket is carrying a walking stick.) Here, the clause starting with 'that' is an opinion and they think so. The word 'that' is functioning as a conjunction. Second, "They think that / the man in the jacket is carrying a walking stick." (= The man in the jacket is carrying a walking stick and they think that.) Here, 'the man in the jacket is carrying a walking stick' is a fact and they think 'that' as an object. Therefore, the different location of the pause caused semantic change in English which was ignored by Koreans and noticed by Americans. Thus the correction of duration pattern appealed to Americans more than Koreans.

In the two cases, there was a consensus judgment by the two groups on the effectiveness (i.e., P in exclamatory, D in imperative) and ineffectiveness (i.e., D in exclamatory, P in imperative) of each individual transplantation. The consensus on the ineffectiveness indicates that there was no significant difference between the native English and the Korean English utterances at both lexical and phrasal level of the individual prosodic aspect (e.g., duration aspect or pitch aspect). In other words, the Korean English utterances, in this case, have well produced prosody in the perspective of American and Korean prosody systems. In the same vein, the consensus on the effectiveness indicates that there was a significant difference between the native English and the Korean English utterances, at both lexical and phrasal level, signifying that the Korean English utterances have poorly produced prosody. Therefore, it can be said that the Korean participant spoke the exclamatory with a worse pitch pattern than his own durational pattern and the imperative with a worse duration than pitch pattern in the perspective of American and Korean prosody systems.

3.4 Pedagogical Implications

In the prosody educational point of view, the problem found in this research is that Koreans, especially people with low proficiency level, tend to be sensitive to individual prosodic components, whereas Americans perceive prosody as an organic combination of prosodic features rather than individual components. One can say that since the Korean perception of English prosody is different from native speakers', Koreans produce English prosody in a different way, especially in native speakers' perspective of prosody.

This point can be supported by the fact that Koreans, especially people with low proficiency level, tend to speak English with a certain degree of imbalance between duration pattern and pitch pattern (worse pitch than duration or vice versa) as is the case with the Korean English utterances used in this experiment. If Koreans can use both duration pattern and pitch pattern with good precision, the desired prosodic improvement, especially in the perspective of native speakers of English, can be expected. When teaching prosody, teachers can exhibit the weak aspect of a learner's prosody by extracting the specific prosodic component (even a portion of a sentence). By comparing the weak prosodic component with the counterpart component of the target

prosody, teachers can help the student understand his/her own weakness. This might be especially effective if the feedback utterances are made out of the learner's own voice (e.g., listening to the target prosody transplanted in the learner's utterances).

The utterances of a learner can be processed by prosody transplantation to produce individual or combined prosodic components. Teachers can easily illustrate which component of the learner's prosody (duration or pitch or intensity or the combinations of the two of three) is different from the target prosody. In so doing, each prosodic component can be better compared with the target prosody and evaluated by the learner better than the conventional way. In addition to that, the reproduced utterances, after the feedback, can be reprocessed to produce another outcome for the next prosody training feedback and this feedback cycle can go on and on until the desired prosody is acquired.

When using the prosody transplantation technology for prosody education, the rater effect or sensitivity difference between Americans and Koreans should be taken into consideration. Teachers might want to put more emphasis on one aspect of prosody in a particular sentence type (e.g., pitch in exclamatory, duration in imperative) for more effective communication with native speakers.

4. Summary and Conclusion

In this paper, it is shown that different linguistic backgrounds of listeners affects the perception of prosody. The difference in English proficiency also contributes to the different perception.

In the overall perception of prosody at sentence level, both Americans and Koreans showed consensus preference for the combined effect of change of pitch and duration pattern but showed significant difference with each individual prosodic component. The transplantation of pitch pattern and that of duration pattern were significant for Koreans whereas for Americans only that of pitch, not duration, was significant. The effectiveness of intensity change was significant for Americans but not for Koreans. Koreans with high proficiency showed trends similar to Americans but different from Koreans with low proficiency. Length of sentences was not a significant factor. Both the Korean group and the American group did not rate long sentences differently from short sentences when perceiving prosody.

In the perception of prosody in different sentence types, Americans and Koreans showed significant difference with different sentence types especially with the change of individual prosodic components. Both Americans and Koreans favored the combined effect of prosodic components. With the sentences of slow speech rate (e.g., tag question, yes-no question, declarative simple sentence) perceptually effective change of individual components was perceived by Koreans but not by Americans. Americans showed higher sensitivity than Koreans to the change of pitch in exclamatory, duration in imperative and declarative complex sentences.

Using the prosody transplantation technology with which individual prosodic components of a sentence were able to be

extracted, this study demonstrated a systematic perception experiment of prosody. Furthermore, the consistency among raters estimated by intra-class coefficients showed the possibility of using the prosody transplantation technology for perception experiments of prosody.

The perception of English prosody by Americans and Koreans was investigated and the possibility of using the prosody transplantation technology for perception experiment and education was explored. This study takes steps towards the development of new methods and approaches in prosody research and foreign language education.

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