

The English Intonation of Native Speakers and Korean Learners: A Comparative Study*

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ABSTRACT

This paper investigates the English intonation of Korean speakers of English as a second language and compares it to that of English native speakers. The speech data of ten Korean speakers and three native speaker controls were tape recorded in an oral reading task in which the subjects were asked to read aloud the given text which was used in the study of Wennerstrom (1994). Following Pierrehumbert and Hirschberg (1990) who distinguishes the discrete units of meaning in intonation, pitch accents, phrase accents and boundary tones were measured. It was found that Korean speakers' use of phrase accents and boundary tones were relatively good compared to their use of pitch accents. That is, Korean speakers conform to native speakers' use of phrase or boundary tones for the purpose of marking the relationship between intermediate or intonational phrases. In contrast, the main difference of Korean speakers' use of intonation from that of native speakers was the use of pitch accents. That is, Korean speakers tend to have difficulty in assigning an appropriate pitch accent to signal relationships between new or contrastive information and that which is assumed to be understood or contributes little to the meaning of the utterance.

Keywords: intonation, pitch accent, phrase accent, boundary tones, second language

1. Introduction

There has been an increase of attention on intonation in the fields of Teaching English as a Second Language and applied linguistics, recognizing the importance of intonation in discourse function. Intonation is not just a nice flourish to enhance a non-native accent, but a complex system for the signaling of relationships in discourse. Chun (1988) claims that in addition to competence in expressing oneself on certain topics and in particular situations, speakers must also learn discourse management strategies. That is, negotiating a turn, indicating awareness of shared information between the speaker and the hearer, topic management and boundary marking are all examples of intonational cues in English

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and these would not necessarily be syntactically or lexically distinguishable. In fact, there are actual reported cases in which incorrect intonation is said to result in miscommunication. Therefore, the ability to use proper intonation is important as one of the tools to engage in and manage discourse when learning English as a second or foreign language.

The development of various sound analysis programs and the theory of intonational phonology which proposes the phonemic/morphemic status of intonational cues have brought additional attention to intonation and its application on English teaching. There are many studies that report discrepancies between the English intonation of second language learners and native speakers. Among others, Wennerstrom (1994) systematically compared the English intonation of native speakers and that of Japanese, Thai and Spanish speakers. Following the model of intonational meaning developed by Pierrehumbert and Hirschberg (1990) that distinguishes meaningful components of intonation, she measured pitch accents, phrase accents and boundary tones. She found that while the native speakers of English made significant use of pitch contrasts to signal meaning on the items measured, the non-native speakers did not consistently use pitch to signal meaningful contrasts in many of the same environments.

In this paper, I conducted the same experiments for Korean learners of English using Wennerstrom's (1994) method and examined the read speech of 10 Korean speakers and 3 native speaker controls. I present findings from a comparative study of the English intonation of native speakers of English and Korean English learners. The main aim of the work is descriptive - to identify similarities and differences in the intonation of the two groups of subjects, and thus to provide insights into where teaching about intonation should be focused.

2. Experiment

2.1 Subjects

In this experiment, the intonational pattern of 13 subjects' read speech (10 Koreans and 3 native speakers) was investigated. The 10 Korean subjects, 5 male and 5 female were graduate students at K University and all had TOEIC scores ranged from 750 to 900. The native speakers were female, all educated and experienced teachers of English as a second language. Although I conducted the experiment with 3 native speakers, I will mainly utilize the data gathered from native English speakers which was reported in Wennerstrom (1994) for convenience and supplement it with data gathered from my experiment where necessary.

2.2 Materials and procedures

The subjects did a speaking task which was recorded on a Sony DAT recorder with a SHURE SM 58 microphone. The taped material was analyzed on Pitchworks, which displays intonational contours on a screen, and gives measurements for pitch.

The task was an English oral reading task. Although an oral reading task might not provide as natural speaking data as a structured free-speech task would, the extended texts would provide a discourse context for the subjects. In addition, it is easier to systematically compare the intonation pattern of the native speakers and that of the English learners when the text is unvarying.

The subjects were asked to read the given text aloud twice, as naturally as possible, as if they were speaking in an actual situation. The two paragraph long text which was used in the study of Wennerstrom (1994) was used. It contained simple vocabulary and unambiguous phrasing, with complex structures avoided. Subjects were given the opportunity to pre-read the text and ask questions on meaning. The following (1) is the text for reading. The pitch of the items subscripted with an alphabetical letter is to be measured and compared. Explanations for each item follow the oral reading text. The basic breaking down of intonation into sequences of tones and their explanations were adopted from Pierrehumbert and Hirschberg (1990).

(1) Oral reading text

If you like the sun, then you may not like Seattle. In Spring, Seattle is usually wet. Meanwhile_a, other cities are having sun_b. If you move to Seattle, you should probably buy an umbrella_c - you will need one. You will see clouds_c, rain, or fog almost every day_d.

In a light rain, you may not get very wet, but in a hard_b rain_d, you will! In Spring, Seattle is usually green. That is why many Seattle people like the rain. Besides, they say the sun hurts their eyes. In fact, a sunny day may cause a traffic jam because people can't see very well. Do you think we should move to Hawaii_e?

(2) Components to be measured

- a. High boundary tone L-H%: Choice of boundary tone conveys whether the current intonational phrase is "forward-looking" or not - that is, whether it is to be interpreted with respect to some succeeding phrase or not (Pierrehumbert and Hirschberg 1990:305). A H boundary tone indicates that the speaker wishes the hearer to interpret an utterance with particular attention to subsequent utterances. A L boundary tone does not convey such directionality. A native speaker would use a L-H% tone (a Low phrase accent and a H boundary tone)

at the end of the word 'meanwhile', which is produced as continuation rise.¹⁾ A H% boundary tone here can be interpreted as 'this utterance will be completed by a subsequent utterance' and indicates that both phrases are to be interpreted together as a larger unit. The pitch at the end of the word 'meanwhile' was compared with the pitch at the end of the word 'day' (subscripted with ɡ). The latter would end in a low boundary tone L% to convey that the current utterance may be interpreted without respect to subsequent utterances.

- b. High pitch accent H*: A content word has the potential to be pitch-accented. A high pitch accent is associated with individual words to indicate that these are new or contrastive in the discourse. In the phrase 'having sun', both words have the potential to get a pitch accent as a content word. However, in the study of Korean speakers' realization of focus and information structures on English intonation, Um et al. (2001) found that for VP broad focus, native speakers of English assigned a pitch accent either to both the verb and its complement or to the complement only. In addition, Ladd (1996) claims that in English, accentuation can be influenced by the relative informativeness of words or constituents in a sentence. According to him, the speaker assesses the relative semantic weight or informativeness of potentially accentable words and puts the accent on the most informative point of the sentence. In fact, Jeon et al. (2003) found that the lexical semantic information of words influences the pitch accent location even in a focused phrase. That is, relative semantic weight is a key factor in the location of pitch accent. And deaccenting of the item, which is in the position where it can get a pitch accent, occurs when it does not have much semantic weight. In this text, the 'sun' in other cities is contrasted to the wet weather of Seattle and it is the complement position that attracts a pitch accent. Therefore, the word 'sun' would get a high pitch accent. The pitch of the word 'sun' was compared to that of the previous word 'having' which would get no pitch accent or at least much lower pitch, since this word contributes

1) Wennerstrom (1994) assumes that the word 'meanwhile' ends in a high phrase accent H-. In fact, it is difficult to separate the meaning of the phrase accent from the meaning of the boundary tone and it is sometimes ambiguous to distinguish an intermediate phrase boundary from an intonational phrase boundary. I analyzed the word 'meanwhile' as constituting an intonational phrase by itself and used a L-H% boundary. This would express the fact that there is a drop in pitch in the syllable 'while' and a subsequent rise. However, this difference in analyses does not affect the method or result of the comparison, both analyses assuming a high pitch at the end of the word 'meanwhile'.

nothing new to the discourse and contributes little to the meaning compared to its complement 'sun'.

- c. High phrase accent: A H phrase accent indicates that the current phrase is to be taken as forming part of a larger composite unit with the following phrase, whereas a L phrasal tone emphasizes the separation of the current phrase from a subsequent phrase. A H phrase accent can be used in listings to indicate that the item in the list together with the following item is to be interpreted as a larger unit. A native speaker would use a high phrase accent at the end of the word 'clouds'. The pitch at the end of the word 'clouds' was compared to that of the word 'day' (subscripted with g).²⁾
- d. Deaccentuation: Deaccentuation is the phenomenon that the accent on a particular element which deserves to be accented, disappears and loses the property of intonational prominence. For example, it is well known that accents tend not to be placed on elements that are repeated or 'given' in the discourse, or on elements that are vague or generic (Ladd 1996:175). The word 'rain' in this text would not get a pitch accent, i.e., it would be deaccented since it has just been used in the previous phrase 'light rain'. This would be in sharp contrast to 'hard' which would have a high pitch accent, being new. The pitch was compared on the words 'rain' and 'hard'.
- e. High boundary tone for Yes-No question: This is also the case that a high pitch is associated with the end of a sentence whose meaning is to be interpreted with respect to subsequent discourse. The sentence ending with 'Hawaii' anticipates the hearer's response to complete its interpretation. The final pitch of this sentence was compared to the final pitch of the sentence ending in 'umbrella' (subscripted with h), which should be lower since it ends a thought group.
- f. Low pitch accent: Wennerstrom (1994) assumes that the pitch on the word 'rain' (d) is a low pitch accent, interpreting the low pitch accent as deaccentuation of redundant material. In this paper, for the measurement of a low pitch accent, I added one sentence with a vocative. According to Pierrehumbert and Hirschberg (1990), the low pitch accent marks items that the speaker intends to be salient but not to form

2) The word 'day' ends in a L-L% boundary tone. The purpose of this comparison is not to compare H- phrase accent with L- phrase accent. It is difficult to separate L- from L-L%. This part simply compares the pitch of H- phrase boundary tone with the low tone occurring at the boundary.

part of what the speaker is predicated in the utterance. Vocatives can be frequently used with a low pitch accent. In particular, a postposed vocative should be used with a low pitch accent (Pierrehumbert and Hirschberg 1990:294). For the measurement of the low pitch accent, I added the following sentence to the oral reading task.

(3) An additional sentence for the oral reading task

Your lunch is ready, Anna.

The pitch on the first syllable of 'Anna' was compared to that of the word 'lunch' which would get a high pitch accent.

3. Results

In this section, I will provide the results of the experiment for Korean speakers, dividing them into two categories; pitch accent data and phrase accent or boundary tone data. The data of English native speakers (5 male and 5 female speakers of American English) in Wennerstrom (1994) will be used for comparison. The data of native speakers of English (3 female speakers) from my own experiment will also be provided. However, since the number of native speaker subjects in the study of Wennerstrom (1994) is 10, with the same number from both gender, as in my experiment for Korean speakers, it is more effective to compare my Korean subjects' data with those of Wennerstrom (1994).

3.1 Pitch accent

3.1.1 High pitch accent

English speakers did as predicted, associating a significantly higher pitch (41 Hz difference, $p < .05$ by the paired t-test) with the new information 'sun' than with 'having' which contributes little to the information structure of the discourse. Native speaker subjects in my experiment also showed a higher pitch on 'sun' than on 'having' (66.3 Hz difference, $p < .05$). On the contrary, the Korean speakers actually showed a significant decrease of pitch on 'sun' with an average 39.5 Hz drop ($t = 4.306$, $p = .002 < .05$)³⁾. In other words, Korean speakers tended to assign higher pitch on 'having' instead of 'sun'. Some speakers gave each word almost equal status with a slight decrease in pitch on 'sun'. Table 1 shows each subject's data of pitch on the words 'having' and 'sun'. Notice that none of the Korean speakers assigned a higher pitch on the word 'sun'.

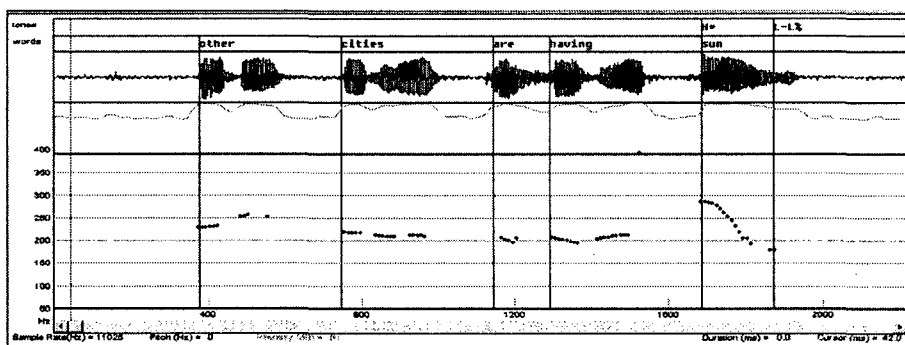
3) Paired t-tests were used to test for significant differences among the measurements.

Table 1: Comparison of pitch of the words 'having' and 'sun' (Korean speakers)

	having (Hz)	sun (Hz)	difference (Hz)
S1	180	160	-20
S2	230	170	-60
S3	200	170	-30
S4	280	220	-60
S5	280	180	-100
S6	130	100	-30
S7	85	80	-5
S8	125	120	-5
S9	150	100	-50
S10	135	100	-35
mean	179.5 (SD:67)	140 (SD:46)	-39.5

Figure 1 shows the pitch of the sentence including 'having sun' of a native speaker and that of a Korean speaker. Notice the contrast between the speakers: while the native speaker assigns a high pitch accent on 'sun', the Korean speaker assigns a high pitch accent on 'having'.

a. Native speaker



b. Korean speaker

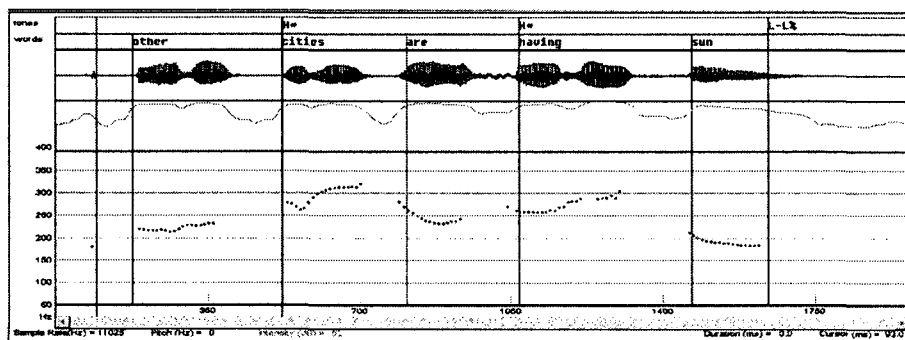


Figure 1: A comparison of the pitch of a native speaker and a Korean speaker on 'having sun'

3.1.2 Deaccentuation

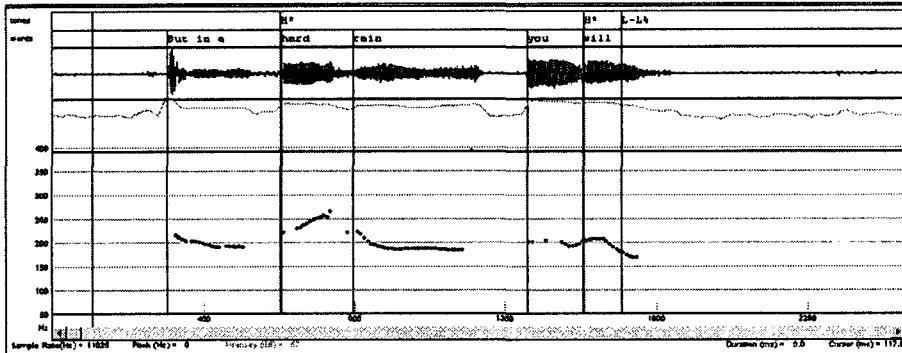
Among native English speakers, the average low pitch on the word 'rain' was in sharp contrast (43 Hz difference, $p < .05$) with the high pitch accent on the word 'hard' as expected. Native speakers from my own experiment showed 66.7 Hz difference. On the contrary, some Korean speakers gave each word an equal status while other speakers showed a decrease in pitch on 'rain'. The average difference in pitch was 21 Hz. Table 2 shows each subject's data of pitch on 'hard' and 'rain'.

Table 2: Comparison of F0 on the word 'hard' and 'rain' (Korean speakers)

	hard (Hz)	rain (Hz)	difference (Hz)
S1 (female)	220	175	-45
S2 (female)	230	200	-30
S3 (female)	250	250	0
S4 (female)	280	240	-40
S5 (female)	250	200	-50
S6 (male)	140	110	-30
S7 (male)	100	100	0
S8 (male)	150	150	0
S9 (male)	150	140	-10
S10 (male)	145	140	-5
mean	191.5 (SD:61)	170.5 (SD:51)	-21

Figure 2 shows the pitch of the sentence including 'hard rain' of an English native speaker and that of a Korean speaker who did not realize deaccenting on the second mentioned 'rain'. Notice the contrast between the speakers: while the native speaker does not assign a high pitch accent on 'rain', the Korean speaker gives both 'hard' and 'rain' an equal status.

a. Native speaker



b. Korean speaker

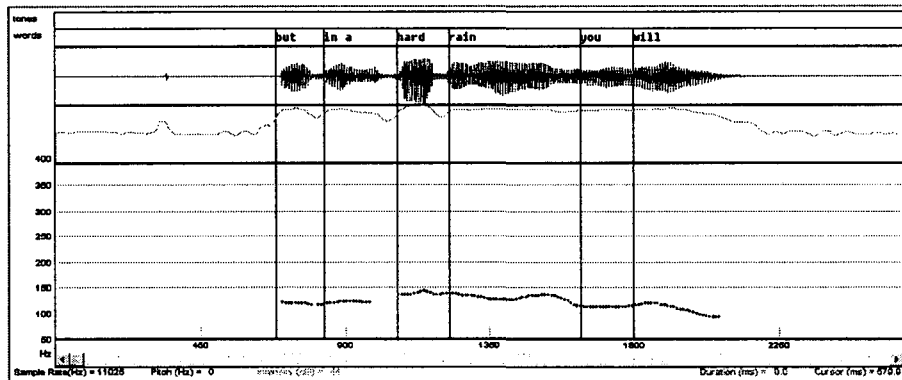


Figure 2. A comparison of the pitch of a native speaker and a Korean speaker on 'hard rain'

However, about half of the Korean subjects showed a relatively considerable decrease in pitch on 'rain' as expected of native speakers. In particular, all the female speakers except one showed an expected decrease in pitch on 'rain'. Pired *t*-tests used to test for significant differences showed that the pitch difference between 'hard' and 'rain' is significant in the case of female speakers ($t=3.713$, $p=.021<.05$) and that the difference is not significant in male speakers ($t=1.616$, $p=.181$). This reflects the tendency that Korean male speakers pronounce each word with similar pitch. However, with the number of subjects in this experiment ($N=10$), it is not clear that the factor which affects the difference in the realization of deaccenting is gender or the level of English ability. Further experiment is needed in subsequent research.

3.1.3 Low pitch accent

According to Pierrehumbert and Hirschberg (1990:294), postposed vocatives are frequently produced with a L^* and it is virtually impossible to use a high pitch accent on

the postposed vocatives because it makes little sense for the speaker to try to attract the hearer's attention after making a point rather than before. In the sentence "Your lunch is ready, Anna.", the pitch on the word 'lunch' which would get a high pitch accent, being new information, was compared to the pitch on the first syllable of 'Anna'. As expected, native speakers assigned a low pitch accent on the first syllable of 'Anna'. The difference in the pitch of the word 'lunch' and the first syllable of 'Anna' was 143.3 Hz in the case of native speakers (3 female subjects). Five Korean female speakers averaged 47 Hz lower on the first syllable of 'Anna'. The difference was not as great as in the case of native speakers. It is not possible to state the level of a low pitch accent with a certain number. However, Korean speakers did not seem to assign a low pitch accent on the word 'Anna'. Some speakers gave it a high pitch accent and others pronounced it with a slightly lower pitch, which cannot be interpreted as a low pitch accent. The following figure shows the pitch of the sentence 'Your lunch is ready, Anna.' of a native speaker and that of a Korean speaker.

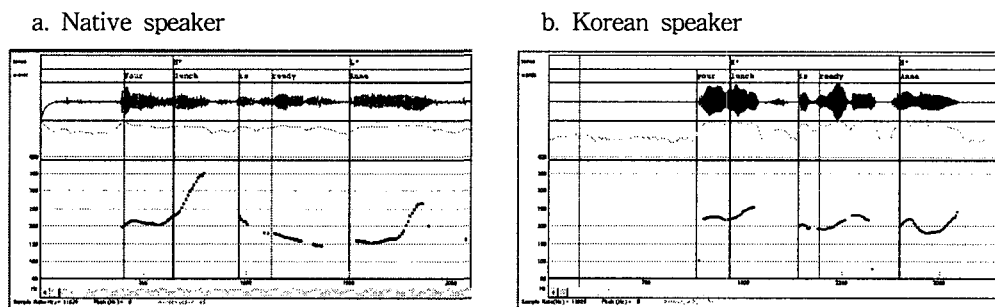


Figure 3: A comparison of the pitch of a native speaker and a Korean speaker producing "Your lunch is ready, Anna."

3.2 Phrase accent and boundary tone

3.2.1 High phrase accent

As expected, 3 native speakers of English from my own experiment averaged 111.6 Hz higher at the end of the word 'clouds' than at the end of the word 'day'.⁴⁾ The Korean subjects (5 female, 5 male) showed 61.5 Hz difference. Since all the native speaker subjects are female, I provide the results of Korean speakers, dividing them into two groups; male and female. Table 3 shows the mean value of the F0 at the end of the words 'clouds' and 'day'. Both male and female subjects showed a significant difference in pitch. That is, Korean speakers also used a higher pitch at the end of the word 'clouds' to

4) Since Wennerstrom (1994) assumes a high phrase accent at the end of the word 'meanwhile', this part was not measured in her study.

mark its relationship to the subsequent phrase.

Table 3: Comparison of F0 at the end of the words 'clouds' and 'everyday'

subjects	clouds (Hz)	day (Hz)	difference (Hz)	p
Native (N=3, female)	253.3	141.7	111.6	.006 (<.05)
Korean (N=10, 5 male, 5 female)	196.5	135	61.5	.002 (<.05)
Korean (female, N=5)	263	180	83	.023 (<.05)
Korean (male, N=5)	130	90	40	.011 (<.05)

3.2.2 High boundary tone L-H%

As expected, native speakers averaged 27 Hz higher on 'meanwhile' than 'day' ($p < .05$). Three native speaker subjects (female) in my experiment showed a difference of 95 Hz. Korean speakers averaged 43.5 Hz higher in the pitch at the end of the word 'meanwhile' ($t = 5.157$, $p = .001 < .05$). This indicates that both English and Korean speakers used a significantly higher pitch to mark the boundary after 'meanwhile'.

However, in the case of Korean speakers, it was found that there were some cases in which the word 'meanwhile' was realized as a plateau contour that consists of a high pitch accent followed by a high phrase accent and a low boundary tone (H* H-L%). It was produced as a flat continuation of the peak of the pitch accented syllable 'mean' with no drop in pitch on the syllable 'while' and consequently there is no final rise. All the native speakers used H* plus L-H% boundary which is realized as a continuation rise. Figure 4 shows the typical pitch pattern of 'meanwhile' of a native speaker and that of a Korean speaker produced with a tune of H* H-L%.

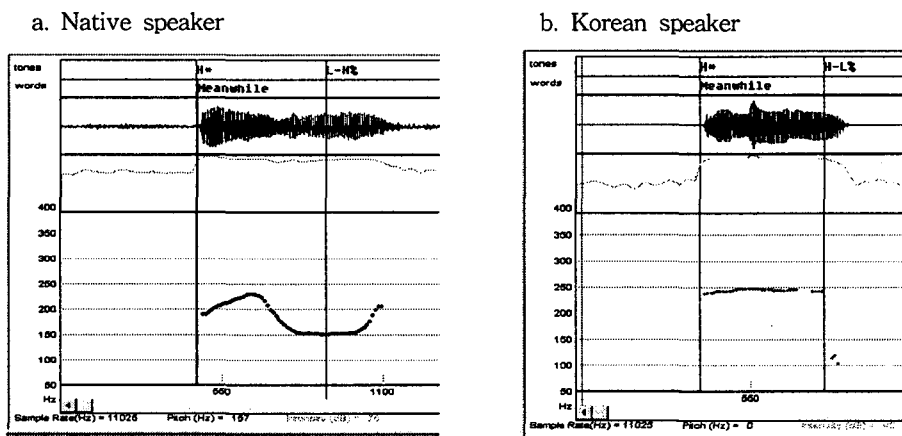


Figure 4: A comparison of a native speaker's H* L-H% tone and a Korean speaker's H* H-L% tone

3.2.3 High boundary tone for Yes-No question

Both Korean and English speakers averaged significantly higher in pitch at the end of the word 'Hawaii' than the word 'umbrella'. The difference in pitch of English native speakers was 59 Hz ($p < .05$) and that of Korean subjects was 84 Hz ($p < .05$).

4. Summary and discussion

The experiment in this paper showed that, in their use of intonational contrasts in English oral reading, Korean speakers of English as a second language showed less consistency compared to overwhelming consistency among native speakers of English. However, among Koreans, some aspects of intonational pattern were consistently used. For example, the experimental result in the use of a high boundary tone for yes-no questions showed that all Korean subjects used a high pitch at the end of a yes-no question. In addition, the high phrase accent in listing and the high boundary tone combined with a low phrase accent used for continuation rise approached the degree of pitch increase found in the native speakers' speech. That is, Korean speakers used the correct high boundary tone for yes-no questions 100% of the time, high phrase accent in listing 90% of the time, and the correct boundary tone after the word 'meanwhile' about 70-80% of the time. It was found that the boundary tone after the word 'meanwhile' was pronounced with an unusual H-L% boundary in a few cases. However, in most of the cases all the Korean subjects tried to realize high pitch at the end of 'meanwhile' in order to express the fact that the phrase is related to the following phrase. Therefore, it can be said that Korean L2 speakers of English did relatively well in their production of the phrase or boundary tones. In other words, the experiment showed that the Korean speakers conform to native speakers' use of phrase or boundary tones for the purpose of marking the relationship between intermediate or intonational phrases.

In contrast, in the case of assigning pitch accents to individual words, the distribution of pitch accents to signal relationships between new or contrastive information and that which is already assumed to be mutually understood was not similar to that of the native speakers. Native speakers assigned a high pitch accent on the word 'sun' which is new and contrastive information in the phrase 'having sun', while Korean speakers tended to assign a high pitch accent on 'having'. One of the reasons for assigning an inappropriate pitch accent might be that the semantic weight the speaker feels can differ depending on his or her native language. For example, Koreans might feel the word 'have' has quite important semantic information, since Koreans do not use this kind of expression and therefore, the verb 'have' in the phrase 'having sun' might be semantically very salient in

their mind. Apart from the information structure, Um et al. (2001) found that native speakers of English assigned a pitch accent either to both the verb and its complement or to the complement only, while Korean speakers assigned a pitch accent only on the verb about 45% of the time. This study confirms the fact that Korean speakers' pattern of pitch accent assignment differs from that of native speakers.

As for deaccenting of given information, only about 50% of the Korean subjects did as expected of native speakers. In fact, some studies reported that Korean speakers tend to assign a pitch accent on every content word. But my study revealed that some speakers tend not to assign any distinct pitch accent on any items, giving each word an equal status not approaching the level of pitch accents, which makes their utterance sound monotonous.

Differences in the intonational pattern of Korean speakers and native speakers present potential barriers to communication and native-non-native interaction. However, it is encouraging that even speakers who use monotonous intonation use their phrase/boundary tone correctly, which means that certain aspects of intonation can be acquired.

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