

Perception and Production of Korean Obstruents through Prosody*

Mee-Jeong Park**

< contents >

- I. Introduction
- II. The Three-way Contrast in Korean Obstruents
- III. Korean Prosodic Structure
- IV. Experiment 1: Perception Test
- V. Experiment 2: Production Test
- VI. Conclusion

I. Introduction

Ever since the Communicative Approach took hold in the 1980s, communication has become the main purpose of language instruction and, as a consequence, communication has become the central focus in all language classrooms(Celce-Murcia et al., 1996). As a consequence, intonation, along with pronunciation, has become an unavoidable aspect all language students

* This paper is a revised version of a paper presented at the 2009 International Conference on Korean Language Education at Korean Language Education Research Institute, Seoul National University, on October 31, 2009.

** Assistant Professor, East Asian Languages & Literatures, Univertisy of Hawaii at Manoa.

have to deal with in their classroom, as well as in their real world face-to-face interaction. According to Celce-Murcia et al., to most of the L2 students, pronunciation is the physical, most obvious aspect of one's speech, and, thus, represents an inseparable component of their second language identities, reflecting the significance of socio-psychological factors related to the acquisition of pronunciation. Nowadays, more and more learners of a second/foreign language are very concerned with the native-likeness of their utterances, which greatly depends on pronunciation and intonation. However, the primary goal of teaching pronunciation and intonation in the classroom is not to make one sound like a native speaker. The most important goal in teaching intonation and pronunciation is to help students overcome any aspect of their phonetics and phonology that may hinder their communication in spite of their excellent grammar and vocabulary.

According to Jun & Oh(2000) there are some aspects of Korean that require the highest level of proficiency in order to achieve a native-like production by English speakers. The main two aspects are: (a) production of plain versus tense and/or aspirated obstruents; and (b) the phrasing strategy, which affects the semantics of the utterance. In fact, several studies concerning the teaching and learning of Korean pronunciation state that the three-way contrast in Korean obstruents is one of the most challenging aspects for novice learners whose native language is English, Japanese, or Chinese(Han, J.-Y. et al., 2003; Kim & Kim, 2005; Kim, K. et al, 2006; Park, S.W. et al., 2008). In particular, the distinction between the plain and the aspirated obstruent pairs is even more challenging for novice learners whose first language is English (Kim, K. et al., 2006). The most challenging Korean consonants for English speakers to perceive and to

produce are the plain versus aspirated obstruent consonants: [p] vs [ph], [t] vs [th], [c], vs [ch], [k] vs [kh].¹⁾

Not being able to perceive and produce these consonants may hinder the learner's communication, since there are several commonly used words that are identical except for the consonants mentioned. For instance, the word *pal* 'foot' and *phal* 'arm', *tal* 'moon' and *thal* 'mask', *cang* 'market' and *chang* 'window', *kong* 'ball' and *khong* 'bean', and numerous others. Teaching these consonants is a big challenge for both instructors and students. Even with tedious repetition, some students cannot grasp the difference even after the completion of the Elementary level of instruction. However, most of the studies dealing with the topic focus on the three-way contrast of Korean stop consonants, focusing on the factors that hinder the perception and production in an acoustic approach without providing pedagogical strategies on how to teach and correct the pronunciation in a classroom setting.

Some studies suggest the typical minimal pairs for a contrastive exercise of the three types of consonants, such as 'listen and choose' exercises, dictation practices, or even a 'custom-made' teaching strategy based on the acoustic characteristics of the learners' native languages (Lee & Jung, 1999; Han, J.-Y. et al., 2003). Others suggest the use of technology for a visually enhanced input system by generating images of vocal organs in motion (Kim et al, 1993). However, none of these guarantee effectiveness and some of them are not feasible to be carried out in the classroom settings.

Current study shows how English learners of Korean could accelerate the acquisition process of the most difficult Korean obstruent pairs (i.e., plain

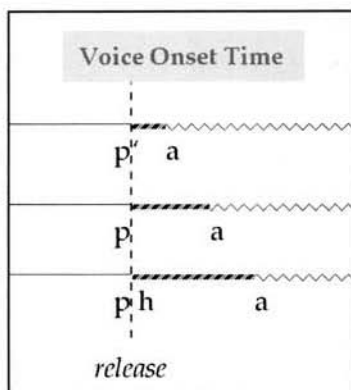
1) Yale Romanization is used to denote Korean consonants and words (in *italics*) in this study.

versus aspirated) by incorporating some Korean prosodic features to the instruction to achieve successful communicative practices. This study suggests instructing the two-way contrast between the plain and aspirated independently from the tense obstruents. The rationale for this suggestion is elaborated in the next section.

II. The Three-way Contrast in Korean Obstruents

Many languages such as English, Spanish, French among others are known to have two-way contrast stop consonants as in /b-p/, /d-t/, /g-k/, with contrast in voicing(i.e., voiced and voiceless). Korean, however, has three-way contrast stop consonants known as plain, aspirated, and tense, as in /p-ph-p'/, /t-th-t'/, and /k-kh-k'/, all being voiceless in utterance initial positions(Kim, 1965; Abramson & Lisker, 1973). Several studies claim that segmental(e.g., voice onset time (VOT)) property is the major factor in differentiating the three-way contrast in Korean stop consonants(Lisker & Abramson, 1964; Kim, 1965; Han & Weitzman, 1970).

Voice onset time(VOT) is the interval between the release of a closure (i.e., the opening of the airway) and the start of the voicing(i.e., vocal cord vibration)(Ladefoged, 2006). Several studies claim that the VOT values are shortest in Korean tense stops, medium in plain, and longest in aspirated. Several studies claim that the VOT of the Korean consonants vary across the three-way contrast in such a way that the average of the tense stops have the shortest (11/13ms), plain stops medium (30/35ms), and the aspirated



〈Figure 1〉 Illustration of the VOT in Korean Stops.

the longest (93/106ms) at utterance initial position (Lisker and Abramson, 1964; Kim, 1965; Cho et al., 2002). This difference in the VOT values across the three types of consonants can be illustrated in the figure below, where the dark and bold lines between the point of release and the vowel onset are the voice onset time of each stop consonant /pʰ/, /p/, and /pʰ/.

However, it was detected in several studies that in some speakers, the range of VOT in the three consonants may overlap (Kim, 1965; Han & Weitzman, 1970). With the belief that VOT was not the only factor distinguishing the three-way contrast in the stop consonants, recent studies found that the f_0 (the frequency of repetition of the complex waveform, and it corresponds to the rate of vocal cord vibration), known as a pitch plot, at vowel onset is 20/80Hz lower after plain consonants compared to that of tense and aspirated (Jun, 1996; Cho et al., 2002; Kim et al., 2002). Moreover, more recent studies found that the difference of VOT between plain and aspirated stops are decreasing significantly over time (Silva, 2006; Kang & Guion, 2006). As a result, younger generation Korean speakers rely more on the f_0 of the vowels following the plain and aspirated stop consonants than their VOT.

The increased f_0 after aspirated or tense consonants is common in other languages, which is a phonetic perturbation. In Korean, however, the increased f_0 after aspirated and tense consonants is not a mere phonetic

perturbation of the preceding consonants as in many languages but phonologically encoded in its prosodic system(Jun, 1996, 1998). Therefore, this study proposes to incorporate intonation in the instruction of these three types of Korean consonants. Moreover, due to the recent increase of VOT in plain consonants, the discrimination of these from the aspirated consonants must have become even more challenging for the novice learners. Thus, the instruction of the plain-aspirated pairs must be given more attention in the teaching of Korean consonants. Once students gain confidence in distinguishing between the two, they should be given the third type, the tense consonants.

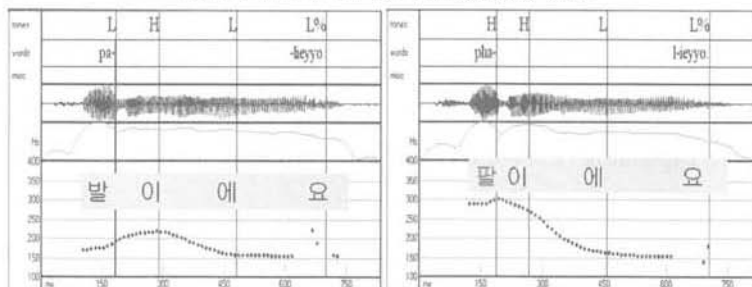
III. Korean Prosodic Structure

According to Jun(1996; 1998), the standard Korean dialect(Seoul) has two intonationally defined prosodic units: the Intonation Phrase(IP) and the Accentual Phrase(AP). An IP can have one or more APs and is marked by a boundary tone(%) and final lengthening. An AP can contain one or more words and is marked by phrase initial LH (or HH of the phrase initial segment is aspirated or tense) tones and phrase final LH tones, but the AP final syllable is not lengthened.

The tonal sequence of an AP, either LHLH or HHLH, is fully realized when the AP has more than three syllables, yet when the AP has fewer than four syllables, the medial H or L may not be realized, resulting in LLH, LHH, or LH patterns. Therefore, in standard Korean, the sentence initial plain consonants [p], [t], [c], [k] trigger a low initial tone for the intonation

at the sentence level. The phrase initial aspirated consonants [ph], [th], [ch], [kh], on the other hand, trigger a high initial tone for the intonation at the sentence level. That is, the prosodic shapes of Korean phrases are based on the initial segmental quality. Therefore, if students were trained to recognize the initial tone (either Low or High) in addition to the traditional instruction of distinguishing a [p] from [ph], they will have additional factors that could help them distinguish the minimal pairs such as pal 'foot' from phal 'arm'. Below are the pitch tracks of the two sentences palieyyo 'It's a foot' and phal-ieyyo 'It's an arm'.

<Figure 2> Pitch tracks of two sentences
with the minimal pair pal 'foot' and phal 'arm'.



Although most of studies dealing with the three-way contrast in Korean include stop consonants only, from pedagogical perspective, the affricate [c-ch-c'] which also have the three-way contrast in pronunciation as well as orthography. Therefore, the scope of this study falls onto the plain and aspirated consonants of the three-way contrast obstruent category. Thus, students should be instructed that all plain stops and affricate take phrase initial low tone, whereas all aspirated stops and affricate take phrase initial

high tone as in the following chart.

〈Figure 3〉 Summary of phrase initial low (L) and high (H) tones on the three-way contrast Korean obstruents.

| Plain Tense Aspirated | | | | |
|-----------------------|---|----------|---------|-------------|
| ㅂ | ㅃ | ㅍ | 바-리-세-인 | 'pharisees' |
| ㄷ | ㄸ | ㅌ | | |
| ㄱ | ㄲ | ㅋ | 파-노-라-마 | 'panorama' |
| ㅈ | ㅉ | ㅊ | | |
| | | | | |
| L | H | <u>H</u> | | |

IV. Experiment 1: Perception Test

The first experiment is based on perception of the two types of Korean consonants, plain versus aspirated, by the beginning level students. The test was taken by three different groups of students: the first group with 37 Korean heritage students, the second group with 27 non-heritage students whose native language is English, and finally the third group with 27 trained non-heritage students whose native language is English. The three groups took the perception test after 4 days of classroom instruction (200 minutes) in Korean at the Elementary level Korean classes offered at the University of Hawaii. The heritage speaker (HS) group and the non-heritage

speaker (NHS) group were given the test right after the regular Hankul instruction of 200 minutes of instruction. The other non-heritage speaker group, which will be referred to as a trained non-heritage group (TNHS), was also given the same sound recognition test, but after a special lesson on the prosodic features clueing the segmental types (see appendix 1) instead of the traditional instruction on these consonants. The amount of time spent on this special lesson was same as the regular Hankul instruction dealing with the target consonants which is approximately 10-15 minutes.

The sound recognition test includes 30 stimuli each of which includes a pair of words with the two types of contrastive consonants at the beginning of the word. For each pair, students were asked to circle what they heard from the instructor. The 30 stimuli include 3 pairs of each of the four types (i.e., stop bilabial, alveo-dental, velar, and affricate palatal) of plain consonants, 3 pairs of each of the four types of aspirated consonants, and 6 pairs of foil items for distraction (see appendix 2). Each of the words with the target consonant was used in a short sentence form as in pal-ieyo 'It's a foot' instead of just the noun form pal 'foot'.

The results from the test taken by the three groups show that the NHS group scored an average of 67% while the HS group scored an average of 84%, and finally the TNHS at 87%. These numbers suggest that the TNHS surpassed not only the NHS group but the HS group as well. The table below shows the distribution of the scores by students in each of the three groups.

〈Table 1〉 Test scores of the three groups arranged by [±aspiration] and place of articulation. Values are given at %.

| | | Heritage | Non-Herit | Trained NH |
|--------------------------|-------------------------------|----------|-----------|------------|
| ±aspiration | Plain C | 80 | 58 | 86 |
| | Aspirated C ^h | 89 | 77 | 88 |
| by place of articulation | Bilabial C/C ^h | 87 | 68 | 87 |
| | Alveo-dental C/C ^h | 86 | 72 | 87 |
| | Palatal C/C ^h | 75 | 51 | 85 |
| | Velar C/C ^h | 89 | 76 | 89 |
| | Total correct items | 84 | 67 | 87 |

As the table indicates, when the correct items were organized by [±aspiration] and place of articulation, HS group scored 80% and 89% on the plain consonants and aspirated consonants, respectively. In terms of the place of articulation, the HS group scored highest on the velar consonants at 89%, and lowest on the palatal consonants at 75%. In case of the NHS group, they scored an average of 67% at total, but there was a large discrepancy between the plain and aspirated consonants, at 58% and 77%, respectively. Discrepancy throughout the four categories based on the place of articulation was also quite noticeable. The NHS group also scored highest on the velar consonants at 76% and lowest on the palatal consonants at 51%. In case of the TNHS group, the total average score was 87%, which is slightly higher than that of the HS group, but their test score was equally distributed among all categories. The scores on the plain versus aspirated consonants were well balanced at 86% and 88%, and their scores by place of articulation were also equally balanced with the highest at 89% and lowest at 85%.

One noticeable aspect about the results is that across all three groups, the average score was lower in plain consonants than that of the aspirated consonants.²⁾ In the same way, all three groups scored highest on the velar consonants and lowest on the palatal consonants. Therefore, the group of students who were given a special instruction on the prosodic features cueing the quality of the relevant consonants outperformed the traditionally instructed groups of heritage and non-heritage students.

V. Experiment 2: Production Test

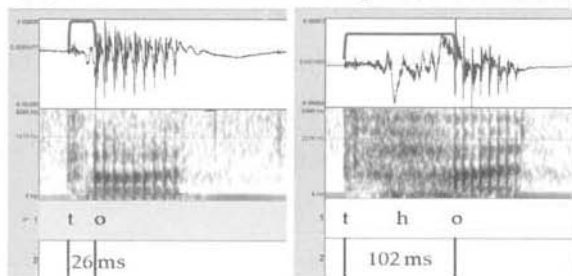
The above perception test proved the efficiency in teaching the two types of consonants that are most difficult to distinguish (i.e., plain versus aspirated obstruents) by incorporating the prosodic cues. In this experiment, 10 additional non-heritage students (5 male and 5 female students) whose native language is English participated in the production test to record the 30 sentences used in the perception test. In the same way the students who participated in the perception tests, these 10 students also had just finished their first week (200 minutes) of the Beginning level Korean instruction. This time, students were asked to read the 30 sentences (not the pairs used in the answer sheets from the perception tests but only the sentences students were asked to circle as the correct answers) right after the same special instruction on the prosodic cues was given for 10–15 minutes.

2) This result matches that of Kim et al. (2006), although their study did not include the affricates.

The analysis of the production test shows that 9 out of 10 students were able to read all 30 items with the relevant tonal cues, high tones for the aspirated consonants and low tones for the plain consonants. Some students read the same item twice or even three times when they felt they did not produce the initial high or low tone correctly although not all of them were able to produce native-like prosodic contour. One of the 10 students had some difficulties in producing the instructed tonal contour based on the consonant types. As a result, one student out of 10 read only around 70% of the sentences with the correct initial tones (e.g., aspirated /ph/ with a high initial tone, plain /p/ with a low initial tone).

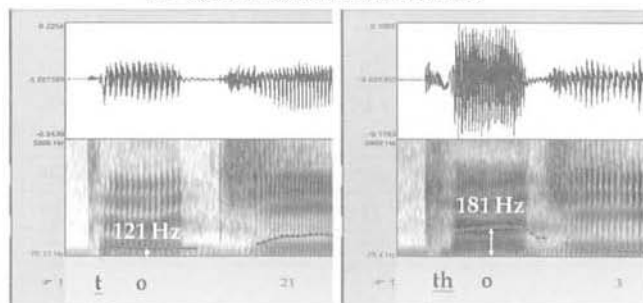
The plain and aspirated consonants of all sentences were measured and analyzed in their VOT values; and the f_0 at the vowel onset, after the two types of consonants of the same sentences were measured and analyzed using Praat 5.1.02. VOT, was measured by examining wide band spectrogram and waveform of each production. The VOT was measured from the beginning of the release closure to the onset of periodic vibrations in the first formant as shown in the figure 4 below.

〈Figure 4〉 Sample measurement of the VOT for the plain and aspirated consonants [t] and [th], and the f_0 of the vowels following these two consonants.



The f_0 value was measured by examining wide band spectrogram and the pitch plot marked on the first formant as shown in the figure 5 below.

<Figure 5> Sample measurement of the f_0 of the vowels following the plain and aspirated consonants [t] and [th].



The VOT measurements of the 24 tokens (6 foil items were not included here) were averaged for each subject. The averages of the VOT for the two consonant types and their place of articulation are provided in Table 2 below. Speakers 1-5 are male and speakers 6-10 are female. Speaker 10 was not included in the table below because she did not successfully read all tokens with the appropriate phrase initial tones. In addition, the speaker had difficulties in reading hankul at the time of the experiment, and therefore, had too many pauses and self-corrections within a single sentence.

〈Table 2〉 Averaged VOT for each speaker by place of articulation and [\pm aspiration]. Values given in milliseconds.

| | bilabial | | alveo-dental | | velar | | palatal | |
|-----------|----------|----------------|--------------|----------------|-------|----------------|---------|----------------|
| | C | C ^h | C | C ^h | C | C ^h | C | C ^h |
| Speaker 1 | 48 | 118 | 81 | 95 | 78 | 95 | 103 | 109 |
| Speaker 2 | 48 | 71 | 34 | 67 | 60 | 82 | 123* | 91* |
| Speaker 3 | 71* | 49* | 74* | 73* | 108 | 110 | 70 | 82 |
| Speaker 4 | 22 | 125 | 20 | 37 | 80 | 102 | 105* | 91* |
| Speaker 5 | 48 | 105 | 143 | 171 | 122* | 116* | 158 | 197 |
| Speaker 6 | 34* | 21* | 24 | 30 | 48 | 65 | 71* | 68* |
| Speaker 7 | 117* | 84* | 94* | 23* | 98 | 107 | 133* | 88* |
| Speaker 8 | 79 | 88 | 71 | 94 | 50 | 99 | 139 | 181 |
| Speaker 9 | 23 | 68 | 69 | 77 | 88 | 96 | 92 | 95 |

In general, Korean plain consonants have shorter VOT compared to that of aspirated, and bilabial consonants have shorter VOT than velar consonants. However, as the numbers in the table 2 indicate, the VOT within each speaker is not well balanced and there is no pattern observed in this table. Some of them have quite well balanced VOT while others show no meaningful patterns. For instance, the cells marked with the (*) indicate that the average VOT of the plain consonants is larger than that of its aspirated counterpart which go against the general patterns of the native speakers. In addition, the range between the VOT of each consonant varied dramatically among speakers at an average of 126 milliseconds. For instance, the highest VOT was detected from a /k/ at 225 ms, while the lowest in /p/ at 7 ms.

Although the values of the VOT on some speakers' consonants had a total discrepancy, the averaged f0 values of the vowels following these consonants of all subjects (except for the speaker 10 which is not included

in this study) shows some patterns observed in that of native speakers of Korean, as shown in Table 3 below.

<Table 3> Averaged f0 for each speaker by place of articulation and [\pm aspiration]. The numbers in the last column indicate the averaged difference between the f0 of the vowel onset of the C and Ch for each speaker.

Values given in Hz.

| | bilabial | | alveo-dental | | velar | | palatal | | H-L f0 |
|-----------|----------|----------------|--------------|----------------|-------|----------------|---------|----------------|---------|
| | C | C ^h | C | C ^h | C | C ^h | C | C ^h | average |
| Speaker 1 | 116 | 138 | 111 | 132 | 114 | 142 | 121 | 145 | 24 |
| Speaker 2 | 107 | 213 | 108 | 207 | 120 | 220 | 125 | 225 | 101 |
| Speaker 3 | 126 | 191 | 121 | 205 | 126 | 191 | 127 | 208 | 74 |
| Speaker 4 | 103 | 152 | 135 | 180 | 102 | 181 | 106 | 187 | 64 |
| Speaker 5 | 123 | 195 | 131 | 179 | 136 | 191 | 129 | 192 | 60 |
| Speaker 6 | 210 | 337 | 215 | 360 | 217 | 309 | 240 | 354 | 120 |
| Speaker 7 | 195 | 258 | 179 | 291 | 202 | 330 | 205 | 327 | 106 |
| Speaker 8 | 186 | 298 | 181 | 294 | 184 | 316 | 189 | 300 | 117 |
| Speaker 9 | 193 | 266 | 186 | 281 | 198 | 268 | 189 | 273 | 81 |

In this table, the averaged f0 at the vowel onset after the aspirated consonants is higher than that of the vowel onset after the plain consonants as suggested in several studies based on production of the native speakers (Jun, 1996; Cho et al., 2002; Kim et al., 2002). In addition, the f0 at vowel onsets after plain consonants range between 24Hz and 120Hz. Considering the fact that the average f0 value difference between the two consonant cases of the native speakers is 20-80Hz, the prosodic cues were very well incorporated in the production of the stimuli given to the nine non-heritage speakers.

In sum, the nine non-heritage students did not successfully produce the

plain and aspirated consonants in terms of their VOT values after 200 minutes of traditional hankul instruction. However, they were successful in producing the test tokens with the appropriate levels f_0 values after only 10-15 minutes of special instruction on the prosodic cues. Given that both VOT and f_0 proportionally influence in the distinction of the three-way contrast in the Korean obstruents, and that teaching of the f_0 factor is relatively easier for students, the prosodic factor must be incorporated in the teaching of the Korean obstruents.

VI. Conclusion

This study included perception and production tests to demonstrate the usefulness of the suggested instructional model in dealing with the plain and aspirated Korean obstruents. Once students feel comfortable about the two pairs (i.e., plain vs. aspirated) the tense groups could be added to the instructional agenda. In the meantime, students can just rely upon the traditional teaching and learning. As shown from the two tests on the plain and aspirated consonants, it is very important to teach these two types of consonants in an integrated way so that students could perceive and produce these consonants in terms of their VOT values and the initial tonal cue. In order to streamline the lesson, these consonants should be taught in forms of a short sentences such as *pal-ieyyo* 'It's an arm' or *phal-ieyyo* 'It's a foot' so that both VOT difference and initial tonal cue could be included in the instructor's input as well as students' output.

This study tried to consolidate the accountability in adopting research results into the classroom setting. Without practicality, suggestions made in researches may not be useful in everyday classroom settings, but will remain as mere theories.*

References

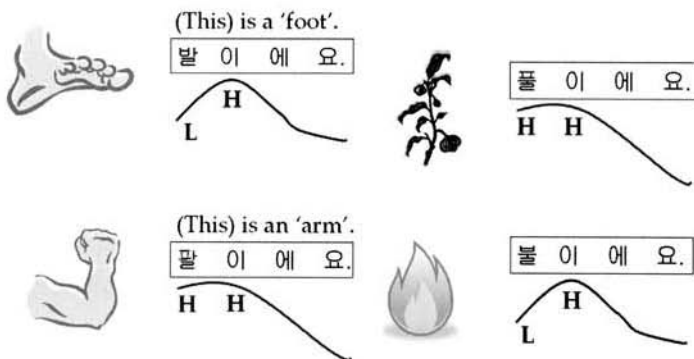
- Abramson, A. S. & Lisker, L.(1972). "Voice timing in Korean stops". Proceedings of the seventh international congress of phonetic sciences, The Hague, Mouton, pp.439-446.
- Celce-Murcia, M., Brinton, D. & Goodwin, J.(1996). *Teaching pronunciation*. Cambridge University Press.
- Cho, T., Jun, S.A., Ladefoged, P.(2002). "Acoustic and aerodynamic correlates of Korean stops and fricatives". *Journal of Phonetics* 30(2), pp.193-228.
- Han, J. Y. et al.(2003). *Teaching Korean Pronunciation*. Hollym, Elizabeth, NJ.
- Han, M. S. & R. S. Weitzman(1970). "Acoustic features of Korean /P,T,K/, /p,t,k/ and /ph,th,kh/", *Phonetica* 22, pp.112-128.
- Jun, S.-A. & Oh, M.(2000). "Acquisition of 2nd Language Intonation", Proceedings of International Conference on Spoken Language Processing 4, pp.76-79.
- Jun, S.-A.(1996). *The Phonetics and Phonology of Korean Prosody: intonational phonology and prosodic structure*, Garland Publishing Inc., New York: NY.
- _____.(1998). "The Accentual Phrase in the Korean Prosodic Hierarchy", *Phonology* 15(2), pp.189-226.
- Kang, K. H. & Guion(2006). "Phonological systems in bilinguals: Age of learning

* 이 논문은 2009. 11. 30. 투고되었으며, 2009. 12. 14. 편집위원회의 심사를 거쳐 게재가 확정되었음.

- effects on the stop consonant systems of Korean-English bilinguals", *Journal of the Acoustical Society of America* 119, pp.1672-1683.
- Kim, Chin-Wu(1965). "On the Autonomy of the Tensity Feature in Stop Classification (with Special Reference to Korean Stops)", *Word* 21, pp. 339-359.
- Kim, H. S.; Byun, Y. T.; Lee, K. C.(1993). "A Korean Pronunciation Education System in a Multimedia Environment". *한국정보과학회 논문집* 제20-12호, pp.1807-1824.
- Kim, K., Park, Y. J., & Chun, Y. S.(2006). "The production and Perception of the Korean Stops by English Speakers", *음성과학* 제13-4호, pp.51-67.
- Kim, M. R., Beddor, P., & Horrocks, J.,(2002). "The contribution of consonantal and vocalic information to the perception of Korean initial stops". *Journal of Phonetics*, 30(1), pp.77-100.
- Kim, Y. H. & Kim, J. O.(2005). "The Effect of the Japanese' Perceptual Learning of Korean Alveolar Stop Consonants on Discrimination of Korean Bilabial Stop Consonants", *The Korean Journal of Experimental Psychology*, 2005, pp.499-507.
- Ladefoged, P.(2006). *A Course in Phonetics*. Fifth Edition. Thompson Wadsworth.
- Lee, K. H. & Jung, M. S.(1999). "A method of teaching Korean stop sound for Japanese students", *한국어교육* 10(2), pp.233-255.
- _____ (2000). "Acoustic characteristics and Perceptual Cues for Korean Stops", *Korean Journal of Speech Sciences* 7-2, pp.139-155.
- Lisker, L. & A. S. Abramson,(1964). "Cross-language study of voicing in initial stops: Acoustical measurements", *Word* 20, pp.384-422.
- Park, S.-G. & Kwon, P.-R.(2008). *A Study on the difficult Korean consonants to English speakers learning Korean and solutions for their improvements*.
- Silva, D.(2006). "Variation in Voice Onset Time for Korean Stops: A Case for Recent Sound Change", *Korean Linguistics* 13, pp.1-16.

Appendix 1.

Sample instructional figures used in the lesson on the prosodic cues.



Appendix 2.

Sample instructional figures used in the lesson on the prosodic cues.

- | | |
|-----------|------------|
| 1. 불이에요 | 16. 내 굴이에요 |
| 2. 주웠어요 | 17. 근데요 |
| 3. 토지예요 | 18. 팔이에요 |
| 4. 자예요 | 19. 아점이에요 |
| 5. 근데요 | 20. 발발이에요 |
| 6. 중심이에요 | 21. 도지예요 |
| 7. 산품이에요 | 22. 중심이에요 |
| 8. 덜덜이에요 | 23. 쿨이에요 |
| 9. 새자예요 | 24. 거지예요 |
| 10. 커지예요 | 25. 발이에요 |
| 11. 팔팔이에요 | 26. 덜덜이에요 |
| 12. 달이에요 | 27. 자는 거예요 |
| 13. 차는거예요 | 28. 크니까예요 |
| 14. 발렛이에요 | 29. 팔렛이에요 |
| 15. 근이에요 | 30. 이달이에요 |

■ 국문초록

운율을 통한 한국어 폐쇄음의 인지와 발음

박미정

영어권 한국어 학습자에게 가장 어려운 발음 습득 중 한 가지는 [p-ph], [t-th], [k-kh]과 같은 폐쇄음의 평음과 경음의 구분이다. 경우에 따라서는 의사소통에 지장을 줄 수도 있으며 교사나 학습자 모두가 학습적 한계를 느끼는 계기가 되기도 한다.

한국어에서는 문장 첫 부분에 오는 폐쇄음의 경우, 경음일 때는 높은 억양을 유도하며 평음일 경우 낮은 억양을 유도한다. 다시 말해서 문장의 첫 자음에 따라 억양의 패턴이 결정된다는 것이다. 따라서 본 연구에서는 폐쇄음의 평음과 경음의 인지와 발음 실험을 통해 운율을 통한 학습의 효과성을 보여 준다.

인지 실험은 세 그룹의 초급반 학습자를 대상으로, 발음 실험은 10명의 초급반 학습자를 대상으로 이루어졌다. 37명으로 구성된 한국계 학습자 그룹과 각각 27명으로 구성된 비한국계 두 그룹에게 인지 실험을 한 결과 전형적인 한글 수업을 들은 한국계와 비한국계 학습자 그룹의 정답률 68%와 84%에 비해, 운율적 특성의 수업을 들은 비한국계 학습자 그룹의 정답률이 91%로 가장 높았다. 두 번째 실험에서는 10명의 비한국계 학습자에게 운율적 특성의 수업 후에 발음 실험을 한 결과 해당 자음의 VOT에서는 한국어 모국어 화자들에게서 나타나는 결과가 나오지 않았지만 f0의 경우 모국어 화자와 비슷한 수치가 나왔다. 이 또한 운율을 통한 한국어 폐쇄음 학습의 효율성을 증명해 준다.

[주제어] 한국어 폐쇄음, 운율, 인지, 발음, 발음교육

■ Abstract

Perception and Production of Korean Obstruents through Prosody

Mee-Jeong Park

The most challenging Korean consonants for English speakers to perceive and produce are the plain versus aspirated stop consonants: [p] vs [ph], [t] vs [th], [k] vs [kh]. Not being able to perceive and produce these consonants may hinder the learner's communication, and teaching and learning these consonants is a big challenge for both instructors and students.

In Korean, the sentence initial plain consonants [p], [t], [k] trigger a low initial tone for the intonation at the sentence level. The sentence initial aspirated consonants [ph], [th], [kh], on the other hand, trigger a high initial tone. That is, the prosodic shapes of Korean sentences are based on the initial segmental quality.

This study shows how prosody enhances the perception and production of the two types of Korean consonants by the beginning level students learning Korean. Three groups (27 students each) of non-heritage students and heritage students (2 and 1, respectively) of Korean classes were given a sound recognition test. The heritage speaker (HS) group and one of the non-heritage speaker (NHS) groups were given the test after the regular consonants instruction. The other non-heritage speaker group (TNHS) was also given the same sound recognition test, but after a special lesson on the prosodic features clueing the segmental types (15 min). The results from the three groups show that the NHS group scored an average of 68%, while the HS scored 84%, and finally the TNHS 91%, respectively. The production test also shows that students are not able to produce the appropriate level of the VOT of the consonants but are able to produce the appropriate type of initial tone based on the initial segmental quality.

[Key words] Korean obstruents, prosody, perception, production, teaching pronunciation