English Vowel Production for Japanese Adults: Comparison of Two Training Methods

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Abstract. American English vowels are challenging for non-native speakers of English, because the vowels' articulation is generally difficult to observe and describe. Although a computer has been applied for language learning, human instructors are still preferred because of pedagogical flexibility and personal interaction. This preliminary study compared two short-term methods: computer feedback only (Group I) and computer feedback with instructor's assistance (Group II), on American English vowel production for Japanese adults. Recordings of Japanese vowel productions of pre- and post-trainings in two groups were evaluated by three native speakers of English. Overall the results demonstrated a slight improvement of the vowel productions for Group II, however, no change was found for Group I.

1. Introduction

Among several hallmarks of developing multilingualism, it is common knowledge that an individual's first language (L1) largely influences learning the phonology of the target languages (Kohnert, 2008). Strange (1995) claims that adults have most difficulty perceiving and producing phonetic contrasts not functional in their L1. The Japanese vowel inventory, in fact, contains only five phonemes, /a, e, i, o, u/, which may cause problems with producing the rest of the English vowels. Also, vowels are challenging, because articulation is difficult to observe and describe without special instrumentation (Wang & Munro, 2004). Moreover, Rochet (1995) argues that the mechanisms tuned to L1 highly influence both articulation and perception of English as a second language (L2).

Numerous studies have investigated the production and perception of both American English vowels and consonants for non-native speakers of English. With an advancement of technology, a computer-assisted language learning system has been adopted in addition to the traditional approach. Although computer provides visual feedback (Ferrier, Reid, &Chenausky, 1999) and is flexible in terms of time, space, and self-pacing (Hoppe, Sadakata, &Desain, 2006), a "personal approach" (p.37) that a traditional approach provides is still supported strongly (Ferrier, Reid, &Chenausky, 1999). Although some investigations on computer-assisted training of English consonants have shown some positive effects (Bradlow, Yamada, Pisoni, &Tohkura, 1999; Yamada &Tohkura, 1992), studies on specific computer assisted training of articulatory placement for vowel production are rather scare (Nishi &Kewley-Port, 2007).

Given the emergence of technological alternatives to a traditional method, conclusive findings on vowel training are not available from current studies. Consequently, the purpose of this study was to investigate the effects of two short-term treatments on American vowel articulation for Japanese adults, utilizing computer feedback with and without instructor's assistance.

2. Experiment, Results, Discussion, and Significance

The five participants (F=3, M=2) recruited for the study were students from Japan studying at Wichita State University. Their mean age was 31, and mean length of the US residence was three years and seven months. All of them started to learn English at the age of 12 or 13; none of them had received previous specific instruction on vowel perception or production. They were divided into two groups: computer feedback only (group I) and computer feedback with instructor's assistance (Group II). Group I (2 students) practiced only with a feedback of vowel plotting program of Visi-Pitch II Model 3300 and Group II (3 students) practiced with the same computer feedback and instructor assistance. Assistance included specific instruction and feedback on articulation of vowels.

The individual 30-minute training session was given twice a week for three weeks for the both groups. The training consisted of intensive production practice of 10 American English vowels including front and back vowels only, used between consonant and voiceless consonant. The consonants chosen were also found in the Japanese

consonant inventory so that any major pronunciation problems should not occur. They practiced two sets of 10 vowels in real words at each session. Some examples included *back*, *pet*, and *tape*.

Data were collected from the scores of vowel production performance, which consisted of 10 monosyllable consonant-vowel-consonant combination words. Audio recordings of words in a carrier phrase, "The word is ____" were made pre- and post-instruction. A few examples included "The word is neck," and "The word is cash." Performances of the speakers were assessed by three female listeners whose first language was American English and were recruited from an undergraduate course of Phonetic Theory at the same university. They listened to all audio recordings of the five speakers randomly presented to determine the vowel sound produced in the words by circling the vowel symbols they heard on the evaluation form. When all of the three listeners heard the correct vowels, three points were awarded. When two heard the correct vowel, two points; when only one heard the correct vowel, one point was awarded. Pearson *r* of intrarater reliability based on remeasurement of 8% of the words was significant at p< .01 (ranged from .96 to .99). Interrater reliability was high (intraclass correlation coefficient= .99). After six treatment sessions, Group II improved slightly above the pre-test score in their ability to produce the vowels in the post-test (M of pre-test=2.20, M of post-test=2.27). Group I did not differ in performance (M of pre-test=2.35, M of post-test=2.35). As literature indicates, vowel articulation is difficult to observe and describe. Instructor's help might have been a contributor to improve the performance even though slightly. The easiest vowel for both groups to produce was /i/ as in *eat,* whereas the most difficult vowel was the back vowel /ɔ/ as in *caught*. This vowel /ɔ/ is not found in the Japanese vowel inventory and is also one of the hardest vowels to describe how to produce. Moreover, this /ɔ/ was the most difficult vowel for the listeners to perceive. The vowel is dialectally dependent among native speakers of American English. Kansas is the region where people may not produce the vowel (Edwards, 2003). This can be a possible reason that /ɔ/ was difficult for the listeners to perceive. Another vowel /æ/ as in *apple* is not in the Japanese inventory, but it was easy to produce correctly for the Japanese from the beginning. It was observed that the articulation of this vowel was easy to describe and to follow.

3. Conclusions

The goal of this preliminary study was to investigate the effects of the two treatments of the American English vowel articulation for the Japanese adults. The findings demonstrated the effectiveness of the explicit training of the sound mechanism with computer assistance to improve the production of segmental phonemes. The results, however, suggested the positive influence of instructor's involvement by providing encouragement and constructive feedback. Following the study, participants reported they now pay more attention to vowel production/perception than before. Given the small number of the participants and the short length of the research time, more research is warranted.

4. Acknowledgements

[1] K. Kohnert, Language Disorders in Bilingual Children and Adults, Plural, San Diego, CA. 2008.
[2] W. Strange, in Speech Perception and Linguistic Experience: Issues in Cross-Language Research (Ed. W. Strange), York Press, Cross-Language Studies of Speech Perception: A Historical Review, p. 3-45, 1995.
[3] X. Wang and M. J. Munro, Computer-Based Training for Learning English Vowel Contrasts, SYSTEMS, Vol. 32, p. 539-552, 2004.
[4] B. L. Rochet, Perception and Production of Second-Language Speech Sounds by Adults, Speech Perception and Linguistic Experience: Issues in Cross-Language Research, p. 379-410, 1995.
[5] L. J. Ferrier, L. N. Reid, and K. Chenausky, Computer-Assisted Accent Modification: A Report on Practice Effects, Topics in Language Disorders, Vol. 19, 4, p. 35-48, 1999.
[6] D. Hoppe, M. Sadakata, and P. Desain, Development of Real-Time Visual Feedback Assistance in Singing Training: A Review, Journal of Computer Assisted Learning, Vol. 22, p. 308-316, 2006.
[7] A. R. Bradlow, R. A. Yamada, D. B. Pisoni, and Y. Tohkura, Training Japanese Listeners to Identify English /r/ and /l/: Long-Term Retention of Learning in Perception and Production. Perceptions and Psychophysics, Vol. 61, 5, p. 977-985, 1999.
[8] R. A. Yamada and Y. Tohkura, The Effects of Experimental Variables on the Perception of American English /r/ and /l/ by Japanese Listeners, Perception and Psychophysics, Vol. 52, p. 376-392, 1992.
[9] K. Nishi and D. Kewley-Port, Training Japanese Listeners to Perceive American English Vowels: Influence of Training Sets. Journal of Speech, Language, and Hearing Research, Vol. 50, p. 1496-1509, 2007.
[10] H. T. Edwards, Applied Phonetics: The Sounds of American English, Delmar Learning, NY. 2003.