TRAINING OF THE ENGLISH /r/ AND /l/ SPEECH CONTRASTS IN KOREAN LISTENERS

Karen Yu and Donald G. Jamieson
Hearing Health Care Research Unit
The University of Western Ontario
London, ON N6G 1H1

Native speakers of Korean have particular difficulty with the distinction between English /r/ and /l/ contrasts (e.g., Borden, Gerber & Milsark, 1983). While English has two separate labels for the sounds we call /r/ and /l/, the Korean language groups both such sounds into a single category. The Korean /r/ tends only to occur intervocalically and it occurs in the form of a rhotic flap which is articulated with the tip of the tongue making a quick flipping contact against the alveolar ridge (Pyun, 1987). The Korean /l/ sound occurs only postvocalically, and only in a "light" form (Borden, et al., 1983). Korean orthography does not distinguish these sounds (i.e., these sounds do not constitute a phonemic contrast; Borden, et al., 1983). The Korean listener may therefore be unable to hear the difference between the English /r/ and /l/ sounds.

In the present study we sought (1) to measure the abilities of young, adult, native Korean speakers to discriminate between the English /r/ and /l/ speech contrasts; and (2) to evaluate the possibilities that these listeners could be taught this perceptual skill using procedures similar to those used by Logan, Lively and Pisoni (1991).

METHOD

Subjects

Five native speakers of Korean (3 male and 2 female) between the ages of 21 and 31, participated in this experiment. All were native to Korea, had resided in Canada between 5 weeks and 1.5 years ($\underline{M}$ = 0.8 years), and were enroled in an English-as-a-second-language (ESL) program.

Procedure

Our stimuli were a superset of the words used by Logan, et al. (1991). There were nine minimal pairs (e.g., rock-lock) within each of five phonetic environments: initial singleton (IS), initial consonant cluster (IC), medial (M), final consonant cluster (FC) and final singleton (FS). Nine native English speakers (4 males,5 females) produced each of the eighteen words, contrasting /r/ and /l/ in the phonetic environments mentioned. Speakers six to nine had incomplete stimulus sets, so that there were approximately 162 individual words in each phonetic position, with 775 stimulus words used in total.

All aspects of stimulus sequencing and presentation, response recording, and experimental control were carried out using the experiment generator and controller utility ***ECoS*** contained in the CSRE 4.0 software package (Jamieson, Ramji, Kheirallah & Nearey, 1992). Stimuli were presented to listeners over Etymotic Research ER-2 insert phones. All phases of testing and training took place in an IAC, double-walled, acoustically-shielded room.

Design

Two matched-groups were formed when assigning subjects to a control or training group. All subjects were tested individually.

Pretest and Postest. The pretest preceded any training and the posttest followed it; otherwise both tests were identical. Each of the five phonetic environments was tested separately. Following each stimulus presentation, subjects indicated whether an /l/ or /r/ sound was heard, by pressing the "L" or "R" key on a computer keyboard. No feedback was provided. Each test required < 75 minutes.

Training. Subjects were trained with the two phonetic environments we predicted would be the most difficult: the initial singleton and initial consonant cluster positions. Subjects in the training group received 15 minute training sessions for 15 days. Subjects in the control group only received the pre- and posttests. All subjects continued to attend their ESL program throughout the experimental procedures.

Training used a two-alternative forced-choice identification procedure, with feedback. Only words produced by five of the nine talkers (4 male,1 female) were used during training.

RESULTS AND DISCUSSION

Our analysis addressed three questions: (1) what effect did phonetic environment have on intelligibility? (2) to what extent were different talkers differentially intelligible? and (3) to what extent did training improve intelligibility performance? These questions are discussed in turn.

Phonetic Environment

Overall, the final consonant cluster (FC) position was the most difficult (M=66%) and the final singleton (FS) position was the least difficult (M=83%). The initial singleton (IS; M=73%), initial consonant cluster (IC; M=71%) and medial (M; M=73%) positions were of equal difficulty (cf., Figure 1).

Sounds in final position tend to be longer in duration which may assist perception (Logan, et al, 1991; Sheldon and Strange, 1982). We were therefore surprised that Korean listeners tended to find the final consonant clusters to be the most difficult to identify. This may reflect differences in native-language transfer, but future research is required on this topic. The high accuracy of Korean listeners with sounds in the initial singleton position is similar to performance found with Japanese listeners.

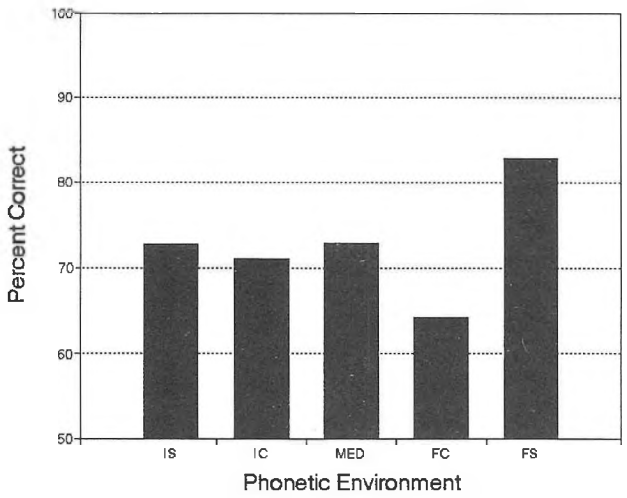

Figure 1. Performance in each of the five phonetic environments. Data are based on pretest performance, and are collapsed across all five listeners.

Speaker Differences

Talkers were differentially understandable, with talkers 6 and 4 being the most intelligible (cf., Figure 2). Studying only Talkers 1-5, Logan, et al., (1991) had found Talker 4 to be the most intelligible; to our knowledge, Talkers 6-9 have not been studied previously.

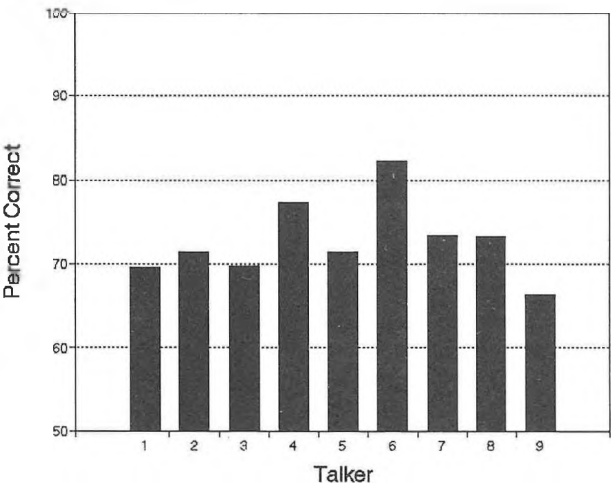

Figure 2. Mean intelligibility of tokens spoken by each of the nine Talkers. Data are based on pretest performance, and are collapsed across all five listeners.

Effects of Training

Mean accuracy increased for each of the subjects who received training (from 61% at pretest to 83% at posttest, for one trained listener and from 86% to 94% for the other; cf., Figure 3). Smaller, but statistically insignificant improvements were also found in identification performance of the control group subjects. AH showed the greatest increases in accuracy for the initial consonant cluster, medial, and final consonant cluster positions. CP improved most with the final consonant clusters and showed equivalent increases in accuracy for all other phonetic environments.

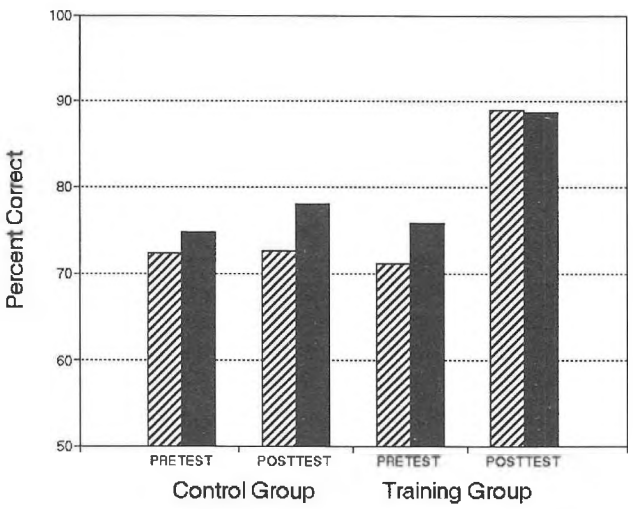

Figure 3. Mean intelligibility performance during pretesting and posttesting for listeners in the trained and control groups. Cross-hatched bars indicate performance with those tokens spoken by the talkers used in training trials; solid bars indicate performance with those tokens spoken by talkers used only in the pretest and posttest.

DISCUSSION

Although increases in performance may be obtained through regular attendance in ESL programs, the present identification training procedure significantly increased subjects' abilities to identify English /r/ and /l/ tokens. Training generalized to tokens spoken by unfamiliar talkers, and to phonetic environments not used in training.

REFERENCES

Borden, G, Gerber, A, & Milsark, G (1983) Production and perception of the /r/-/l/ contrast in Korean adults learning English. *Language Learning, 33*(4), 499-526.

Jamieson, DG, Ramji, K, Kheirallah, I, & Nearey, TM (1992) CSRE: The Canadian speech research environment. In JJ Ohala, TM Nearey, BL Derwing, MM Hodge, and GE Wiebe (Eds.) *Proceedings of the Second International Conference on Spoken Language Processing*, Edmonton: University of Alberta, 1127-30.

Koo, JH (1975) On the phonemic principles and romanization of Korean. In H Sohn (Ed.), *The Korean Language: Its Structure and Social Projection* (121-26).

Logan, JS, Lively, SE, & Pisoni, DB (1991) Training Japanese listeners to identify English /r/ and /l/: A first report. *Journal of the Acoustical Society of America, 89*(2), 884-86.

Pyun, K (1987) *Korean-Swedish Interlanguage Phonology.* Stockholm: Institute of Oriental Languages, University of Stockholm.

Sheldon, A, & Strange, W (1982) The acquisition of /r/ and /l/ by Japanese learners of English: Evidence that speech production can precede speech perception. *Applied Psycholinguistics, 3*, 243-61.

ACKNOWLEDGEMENTS

Work supported by NSERC and taken from an Honor's BA thesis by KY, supervised by DGJ.