

ON THE PERCEPTUAL EQUIVALENCE BETWEEN JAPANESE AND SPANISH SOUNDS

SATORU AIBA

Dept. of Behavioral Science
Hokkaido University
Sapporo, Japan

MIGUELINA GUIRAO

Laboratorio de
Investigaciones Sensoriales
CONICET
Universidad de Buenos Aires
Buenos Aires, Argentina

JUN-ICHI ABE

Dept. of Behavioral Science
Hokkaido University
Sapporo, Japan

ABSTRACT

Identification tests were performed with Japanese listeners using Spanish sounds consisting of V, CV, CVC, CCV syllables and CVCV words. All five vowels were correctly identified. Nine of the seventeen consonantal phonemes /m,n,ɲ,b,g,s,f,ʒ,tʃ/ reached over 80% accuracy. One /x/ scored 75% (taken for /f/ 23%). Liquids /l/ and /r/ were mutually confused with /l/, being twice more recognized as /r/ than vice versa. Unvoiced stops (average correct 40%) were changed for their voiced counterparts, and voiced /d/ (correct 50%) was displaced toward /r/ and /θ/. In 20% of the responses syllables CCV were transcribed as CVCV. When unvoiced stop-vowel syllables were in the second position in CVCV words, all responses rated nearly 100%. For another group of listeners /d/ resulted in 100% accuracy and unvoiced stops rated between 80 and 90%. Both Japanese and Spanish listeners seem equally good in identifying sounds of the other language, while misidentified phonemes are different for the two languages.

INTRODUCTION

Working with Spanish speaking listeners, we have previously presented some evidence on the perceptual similarity between Japanese and Spanish sounds (Guirao, M., 1978; Guirao, M. and Luis, C. R., 1982). In the experiments described here the Spanish speech material was presented to Japanese listeners.

PROCEDURE

Two speakers, both native of Argentina, recorded isolated syllables and words. Speech sounds consisted of the following syllabic types: a) five vowels /i,e,a,o,u/, b) eighty five CV combining seventeen consonants with each one of the five vowels, c) seven CVC, starting with /p,k,m,s,f/ and ending with /m,n,s,l,r/, d) twelve CCV pairing the six stops and /f/ with /l,r/ as in /pla/, /pra/, /fla/ and /fra/. Eleven words, formed by stop V - stop V combinations, as in /dote/, /dike/, /codo/, were also included.

The material was presented individually to ten students of Hokkaido University, Sapporo, Japan, who were instructed to listen and to write down the sounds in kana characters and in romanized letters.

RESULT

Vowels /i,e,a,o/ were 100% identified. Vowel /u/ resulted less familiar, being 60% correctly reproduced and written out by the rest of the cases. For the CV syllabic types, nasals /m,n,ɲ/, voiced stops /b,g/ and fricatives /s,f,ʒ,tʃ/ were identified over 80% of the cases. Sound /x/ rated 75%, was perceived as /f/ 23%. Unvoiced stops /p,t,k/ scored 40% being shifted toward their voiced counterparts /b,d,g/. In turn, voiced /d/ was misidentified for /r/ 17%, /b/ 9% and /l/ 6%.

Liquid /l/ and /r/ rated 42% and 62% respectively. Sound /l/ was taken for /r/ 42% and /r/ for /l/ 29% of the cases. We tested these two sounds in CVC and CCV syllables. At the end of CVC the identification of /l/ improved to about 80% but /r/ remained close to 50%. When in the second position of syllables CCV, /l/ was confused with /r/ twice as much as /r/ for /l/.

Unvoiced stops were also tested at the onset of CV and CCV syllables and were misidentified for voiced stops. Moreover some of the subjects transcribed CCV type as CVCV, e.g. gara instead of gra.

Unvoiced stops and /d/ were presented again in CVCV words. In this case /t/ and /d/ reached 100%. Recognition of /p/ and /k/ improved to 83 and 90% respectively in the initial word position and to 93 and 100% when located in the second syllable.

An extra experiment was run presenting unvoiced stops and /d/ in CV and CVCV combinations to listeners trained in phonetics. This time /d/ scored 100% and the other stops gave about 80% for /p/, 86% for /t/ and 90% for /k/.

FINAL REMARKS

It is observed that in general Japanese listeners gave equally good performance as the Spanish listeners in recognizing each others speech sounds. It is also noted that when sounds are confused, tendencies are different for the two language groups.

As it was anticipated (Guirao, M. and Luis, C.R., 1982) vowel /u/ does not seem to have as close correspondence in both vocalic systems as the other four.

Among the periodic non vocalic sounds, the Spanish speaking group converted most of the Japanese sound /r/ into /l/ and Japanese listeners showed the opposite tendency making more bias in Spanish /l/ toward /r/.

With respect to fricative sounds (bands of noise) consonant /f/ was somewhat changed for /x/ by Spanish listeners and /x/ for /f/ by Japanese listeners. While the Spanish participants found it more difficult to label some fricative sounds such as /ʒ/ /f/ /z/ /ts/ and /ʃ/, the last three non-existent in Spanish, Japanese speakers could not easily recognize the unvoiced sounds (bursts) /p,t,k/. In both listeners confusions were between sounds of the same acoustic group.

REFERENCES

- (1) Guirao, M. "Similarity between Japanese and Spanish sounds", The Study of Sounds 18 (Proceedings of the 3rd World Congress of Phoneticians, Tokyo, Japan, 1976), 211-216, 1978.
- (2) Guirao, M. and Luis, C.R. "Identification of Japanese syllables by Spanish speaking listeners", Journal of Acoustic Society of Japan. (E), 3, No.1, 21-26, 1982.