

Japanese Listeners' Perception of the French Versus American English /r/-/l/ Contrasts

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MOTIVATION

Is the classic difficulty for Japanese listeners to perceive /r/-/l/ entirely attributable to the lack of a liquid contrast in the Japanese phonological system, or is it also due to phonetic factors?

On the “phonology-only” view, the level of difficulty that Japanese listeners experience in perceiving /r/-/l/ should not depend on the language in which /r/-/l/ is produced. For instance, Japanese listeners should encounter comparable difficulties in perceiving the English and French /r/-/l/ contrasts. If phonetic factors play a role, however, the phonetic proximity between /r/s and /l/s, as perceived by Japanese listeners, may contribute to determine their discrimination and identification performance on the /r/-/l/ contrast. The treatment of the /r/-/l/ contrast according to stimulus-language has more general implications. The issue at hand indeed bears on the relative importance of the two main factors that can conceivably shape nonnative speech perception: the structural properties of the native versus nonnative phonological systems, and the phonetic properties of the nonnative speech sounds.

EXPERIMENTAL DESIGN

In Experiment 1, Japanese subjects were first tested against French subjects on their discrimination performance of French /r/-/l/, using an AXB discrimination procedure with natural stimuli. We used natural tokens of LV, VL, and VLV utterances, where V stands for vowel (/a, i, u/) and L for liquid (/l, r/), making up 18 items in 9 /r/-/l/ contrasts (3 positions x 3 vowels). One male and one female French speakers produced eight tokens of each item, out of which four tokens were selected so that the prosodic parameters were balanced at best for each /r/-/l/ contrast and each speaker. For each contrast and each speaker, 32 AXB triads were constructed so that each token appeared equiprobably in each position for the four AAB, ABB, BBA, and BAA orderings. Half of the subjects received the female-speaker stimuli and the other half the malespeaker stimuli. Thus, each subject received a total of 288 AXB trials, presented in randomized order. The discrimination test was preceded by a 9-trial training. Japanese subjects were then run on an open-response identification test for the stimuli they received in the discrimination test. They were asked to provide a transcription of each stimulus in kana spelling. Two groups of Japanese subjects were tested. One group comprised 12 Japanese listeners who had been staying in Paris for 40 months in average, and had received variable amounts of formal training in French (17 months in average). They all had received a longer formal training in English (72 months in average), although in Japan. A second group comprised 15 students from Chiba University, with no exposure at all to French. The latter group was tested on identification only.

In Experiment 2, the same 12 Japanese subjects as those participating in Experiment 1 were tested, two months later, against American subjects on their discrimination performance of AE /r/-/l/, using the same procedure as in Experiment 1. The stimuli were again tokens of LV, VL, and VLV now produced by one male and one female American English speakers. The Japanese subjects were then run on an open-response identification test for the stimuli they received in the discrimination test. In addition, 12 French subjects received the same tests as the Japanese subjects. Little or no difficulty with the AE /r/s and /l/s was expected for these subjects.

RESULTS

For French /r/-/l/, Japanese subjects performed quite well overall compared to the control French subjects: 95% vs. 98% correct discrimination. They performed less well, however, for the VLV context, and especially so for the /lrl/-/lil/ contrast (82% vs. 99% for Japanese vs. French subjects, a significant difference). RT correlated negatively with correct discrimination rate for Japanese subjects ($r = -0.90$), with, for instance the longest RTs for /lri/-/lil/. In the identification data, French /l/ was almost always (above 99% of the time) transcribed with an R-series kana (ラ、リ、ル) by the Japanese subjects tested

in Paris; French /r/ was transcribed in this way only 66% of the time in average. This pattern explains the good overall discrimination performance of Japanese subjects. In more detail, Japanese did use an R-series kana for /r/ in the /i/ context, consistent with their relatively poor discrimination of /iri/-/ili/; they used the vowel-lengthening (kata)kana for /r/ in /ar/ or /ur/. They otherwise tended to use H-series kanas (ゝ、フ) for /r/ in the /a, u/ contexts. All these patterns were found for the Japanese subjects tested in Chiba, but even more clearly: whereas French /l/ was virtually always transcribed with an R-series kana, French /r/ was transcribed in this way only 28% of the time, and mainly for /iri/.

For AE /r/-/l/, Japanese discrimination performance was quite poor for the initial and medial positions (77% and 71% correct, respectively); it was better for the final position (92% correct), but still relatively poor in the /u/ context (82%). It was near ceiling for the American control subjects (99% correct). As in Experiment 1, RT correlated negatively with correct discrimination rate for Japanese subjects ($r = -0.69$). AE /l/ was transcribed exclusively with R-series kanas, as well as AE /r/ most of the time (90%) when in initial or medial position. AE /r/ was transcribed with R-series kanas much less often (30% of the time) when in final position. To sum up, the Japanese discrimination and identification data were quite congruent.

French subjects performed as well as American subjects in terms of correct discrimination rate (98.5%) but responded much more slowly. Some difficulty with AE /r/-/l/ also appeared in their identification performance, with 96% correct categorization for AE /l/s but “only” 92% for /r/s, due to some confusions with /l/ (1.6%) and, mainly, with /w/ (6.4%).

CONCLUSIONS

Our data is consistent with the view that Japanese listeners' perception of the /r/-/l/ contrast is determined at least in part by the stimulus language. Most previous studies have used English to test Japanese listeners perception “deficit” with /r/-/l/. We have presented preliminary data with French /r/-/l/ but without the critical comparison with AE /r/-/l/ (Yamasaki & Hallé, 1999). Apart from this early work, we are only aware of a Japanese BA dissertation bearing on this issue: Japanese listeners in Tokyo showed much better discrimination performance with French than AE /r/-/l/ (99% vs. 61% correct), for CV stimuli in a variety of vowel contexts. This is quite in line with our own findings. The lesser difficulty experienced by Japanese listeners with French than English /r/-/l/ must be due to their greater sensitivity to the phonetic cues that distinguish French /r/ and /l/ than to those that distinguish AE /r/ and /l/. This differential sensitivity is conceivably due at least in part to objective differences in terms of acoustic or auditory distances. Yet, it might also be due to differences in phonetic perception which are specific to Japanese listeners in that they reflect Japanese-specific routines for interpreting phonetically acoustic or articulatory patterns.

REFERENCES

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