

論文の英文要旨

論文題目 : Perception of English Syllable-Initial Consonants by Japanese Listeners
(日本語聴者による英語音節頭子音の知覚)

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The present dissertation studied the perception of 22 syllable-initial English consonants (/p b t d k g f v θ ð s z ʃ h tʃ dʒ r l w j m n/) by 10 Japanese subjects, examining the relationship between the identification of the consonants as English phonemes and their assimilation patterns to Japanese phonemes.

Background

The experimental studies on the discrimination/identification accuracy of problematic English consonant pairs such as /l/-/ɾ/ and /s/-/ʃ/ (Uchida 1998) by Japanese listeners have shown the existence of large individual differences. This variability in performance cannot be attributed to the status of phonemic contrast between English and Japanese. One approach to this problem is the consideration of perceptual similarity between the L2 categories and the corresponding L1 categories.

Two current language learning models, Perceptual Assimilation Model by Best et al. (1992, 1996) and Speech Learning Model by Flege (1988, 1997), have proposed that the perceptual similarity between L1 and L2 phoneme categories is an important predictor concerning which L2 consonant pairs would be more difficult to discriminate for L1 speakers. Yet neither model has incorporated how to deal with the individual differences into their theory.

According to Laver (1994), the similarity of any two phones can be compared and rated on a scale of relative similarity. Takagi (1995) investigated the /l/-/ɾ/ perception

by Japanese listeners in terms of similarity to Japanese /r/. He showed that the subjects overall judged /l/ tokens to be more similar to Japanese /r/ than /r/ tokens, and that the more different the /l/ and /r/ tokens are in terms of their similarity to Japanese /r/, the higher the discrimination accuracy of the /l/-/r/ tokens. The study also revealed that the same tokens were perceived or processed differently by different subjects. His observation is limited to one pair, and needs to be extended to other problematic consonant pairs.

Experiments & Results

The stimuli contained the 22 consonants followed by 3 vowels /a: i: u:/ and each vowel pronounced without a consonant (22 consonants X 3 vowel contexts + 3 vowels = 69). There were 3 tokens pronounced by 3 different talkers per syllable type.

Experiment 1.

10 native Japanese subjects first listened to these tokens (twice each) and chose one katakana that best fitted each token, and rated the initial consonant's similarity to the Japanese category on a five-point scale. Consonant pairs /b/-/v/ and /l/-/r/ were mostly assimilated to single Japanese categories (i.e. Japanese /b/ and Japanese /r/) in all vowel contexts, whereas /s/-/ʃ/ and /--/(no consonant)-/j/ showed this single assimilation pattern only when followed by /i:/, and /f/-/h/ and /--/w/ only when followed by /u:/. These tokens, however, differed in terms of their similarities to Japanese consonants.

Experiment 2.

These six pairs were then put into an open-class identification task. Each token was presented six times together with other consonants as one of the all possible 23 English response alternatives (22 consonants + no consonant). It was shown that the above-mentioned differences in similarities to the Japanese categories seem to have affected the way the subjects identified these tokens.

While the majority of the responses were "b" or "v" for /b/-/v/ and "l" or "r" for

/l/-r/, /s:/-/ʃi:/ obtained a third alternative response, "θ". Overall, /s/ was often associated with "θ" as well as "s," and /ʃ/ with "s" as well as "ʃ." Some subjects seem to have had a labeling problem rather than a discrimination one.

Experiment 3.

In order to closely investigate the relationship between the identification and similarity judgment, four problematic consonant pairs, /b/-/v/ (before /i:/, /u:/), /l/-/r/ (before /a:/ and /i:/), /s/-/ʃ/ (before /i:/), and /f/-/h/ (before /u:/) were selected and each consonant pair was first presented in a one-interval identification task with confidence ratings: for each pair the subject had 2 response alternatives concerning category identity and 2-level confidence ratings. Then each pair was rated in terms of similarity to a predetermined Japanese category (Japanese /b/ for /b/-/v/; Japanese /r/ for /l/-/r/; Japanese /s/ for /s/-/ʃ/; and Japanese /h/ for /f/-/h/). For both tasks, 20 responses were collected for each token from each listener. This made it possible to evaluate each subject's responses to each token accurately.

It was observed that the similarity difference between the two members of each pair played an important role. In general, larger differences in similarity led to better identification performance. Yet, there was strong stimulus-listener interaction in the way each token was assimilated to Japanese categories, not to mention the large individual differences in the identification task. For example, for a particular /l/ token, some heard a Japanese /r/ and gave a high similarity rating, while others gave a low rating, and still others heard a Japanese /d/. In terms of identifiability, one listener identified a certain pair of tokens better than other tokens, but for other listeners the pattern was quite opposite.

To evaluate statistically the relationship between identification performance and similarity difference, two independent measures of sensitivity were obtained for each stimulus pair for each subject from the identification task and the rating task in the form of the statistic known as A' in the signal detection literature. The correlation between

these two was relatively high for /b/-/v/, /l/-/r/, and /f/-/h/, indicating the general trend mentioned above can be empirically supported: the more different two consonants are in terms of their similarity to a single sound to which they are assimilated, the easier their discrimination.

Finally, the sensitivity measures obtained from the nine subjects were compared between /b/-/v/ and /l/-/r/, /b/-/v/ and /f/-/h/, and /l/-/r/ and /f/-/h/. The correlation was observed for all three pairs, suggesting the tendency that the higher an individual's sensitivity to one of three consonant pairs, the higher the listener's sensitivity to another pair is.

Conclusion

The present thesis demonstrated that the difficulty the Japanese listeners encounter in the identification of English consonant phonemes can be explained fairly well in terms of the perceptual similarity/dissimilarity relationship between the English consonants and the assimilated Japanese phonemes. Large individual differences observed in perceptual similarity judgment as well as sensitivity to a given English consonant pair, pointed to the importance of adopting an appropriate method to measure the listeners' performance and give feedback to them in phonetics classrooms.