

Nonnative listeners rely less on phonetic information for phonetic categorization than native listeners

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Résumé:

Trois expériences 2AFC montrent que des sujets non natifs utilisent plus d'information lexicale et moins d'information phonétique pour prendre des décisions 2AFC que des sujets natifs.

Ganong [1] first showed that lexical information can influence phonetic categorization decisions. The present study suggests that nonnative listeners rely more on lexical information and less on phonetic information for making phonetic categorization decisions than native listeners do. A series of Two-Alternative Forced Choice experiments showed that nonnative listeners were, more than native listeners, inclined to categorize items such that they were consistent with a word. This difference was found not only for a contrast that the nonnative listeners found difficult to distinguish, but also for easy to distinguish contrasts.

Three experiments tested Dutch and English listeners' perception of British English contrasts. The Dutch listeners had a high level of proficiency in English as a second language. Contrasts used were /æ/ and /e/, that are difficult to distinguish for Dutch listeners [2], and /z/-/s/, /v/-/f/, /b/-/p/, and /d/-/t/, that are similar to Dutch contrasts and that are easy to distinguish for Dutch listeners, even in word-final position, where they are not contrastive in Dutch [2]. In all experiments, natural speech was used. No continua with ambiguous tokens were created.

EXPERIMENT 1 tested perception of the /æ/-/e/ contrast, which is perceptually ambiguous for Dutch listeners [2]. Twelve monosyllabic words were selected, 6 containing an /æ/ and 6 an /e/. For each word, a nonword was formed by replacing /æ/ with /e/ or vice versa. The items included word and nonword pairs like *deaf* - *daf* and *cat* - *ket*. For each item, a carrier word was found in which the item occurred as a word-initial embedding. All carriers were recorded by a male native speaker of British English and words and nonwords were excised from the carriers. For example, *deaf* was excised from *definite*, and *daf* from *daffodil*. Participants were presented with four repetitions of all items in a semi-random order and indicated with a button press for each item which vowel it contained. The Dutch listeners gave more correct responses to words than to nonwords. For the English listeners, there was no lexical effect. Thus, the nonnative listeners' phonetic categorization decisions were more often congruent with lexical information than the native listeners' decisions. Lexical effects may be more likely to occur when speech input is perceptually ambiguous [1, 3]. The English phonemes were perceptually ambiguous for the nonnative listeners.

Therefore, EXPERIMENT 2 investigated whether an increased lexical effect for the nonnative listeners also occurred for contrasts that they found easy to distinguish [2], namely /z/-/s/, /v/-/f/, /b/-/p/, and /d/-/t/. Thirty-two monosyllabic words were selected, with each of the eight target consonants appearing in word-final position in four of the words. For each word, a nonword was formed by replacing the word-final voiced consonant with its voiceless counterpart or vice versa. The items included word and nonword pairs like *globe* - *glope*, and *cheap* - *cheab*. Each item was recorded in and excised from a two-word fragment that contained the item across the word boundary. For example, *globe* was excised from *big lobe*, and *glope* from *big lope*. The four voicing contrasts were presented in separate blocks and the procedure was as for Experiment 1. Both English and Dutch listeners gave more correct responses to words than to nonwords, but this lexical effect was significantly stronger for Dutch listeners than for English listeners. Lexical effects on phonetic categorization may depend on the naturalness of the stimuli [3]. The items in Experiment 2 were excised from a two-word context. To preclude the possibility that the cuts and the word boundary within the items influenced the native and nonnative listeners differentially, the experiment was replicated with unaltered single-word tokens.

In EXPERIMENT 3, the same words and nonwords from Experiment 2 were recorded in isolation. The results were similar to those of Experiment 2: whereas both English and Dutch listeners gave more correct responses to words than to nonwords, this lexical effect was

significantly stronger for Dutch listeners than for English listeners. Thus, the effect in Experiment 2 cannot be ascribed to a differential effect of the way in which the stimuli were created.

Nonnative and native listeners' lexical effects may have differed because the nonnative listeners attributed less weight to phonetic detail than native listeners did, or because lexical activation was not reduced after a mismatch as efficiently for nonnative listeners as for native listeners. In summary, the three experiments presented here showed that lexical effects played a more important role in phonetic categorization for nonnative listeners than for native listeners, even when phoneme perception was uncompromised.

1. GANONG, W. F. (1980). Phonetic categorization in auditory word perception. *JEP:HPP*, 6, 110-125.
2. BROERSMA, M. (2005). Perception of familiar contrasts in unfamiliar positions. *JASA*, 117, 3890-3901.
3. BURTON, M. W., BAUM, S. R., & BLUMSTEIN, S. E. (1989). Lexical effects on the phonetic categorization of speech: The role of acoustic structure. *JEP:HPP*, 15, 567-575.