Distributional Learning in Vowel Distinctions by 8-month-old English Infants

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Introduction

By the end of the first year of life, infants show decreased sensitivity to phonetic differences not used in their native language (Werker & Tees, 1984) and increased sensitivity to native distinctions (Kuhl et al., 2006). With an artificial language learning manipulation, Maye, Werker, and Gerken (2002) demonstrated that infants' speech sound categories change as a function of the distributional properties of the input. Recently, Bosch and Sebastián-Gallés (2003) reported a different pattern of perceptual reorganization for Catalan-Spanish bilingual infants: At 4 and 12 months, but not at 8 months of age, infants were able to discriminate the Catalan vowel contrast /ε-e/. This finding challenges the idea that linguistic exposure promotes increased sensitivity within the language environment. It was suggested that distributional learning may be the mechanism responsible for such a pattern. Finally, Sabourin and Werker (in prep.) found that 8-month-old English infants had difficulties discriminating two vowels (/ɪ/-/e/) that are close in vowel space.

The present study investigates the role of distributional learning in these similar vowels (/ɪ/-/e/).

Method

32 eight-month-old Canadian-English infants (15 females) were familiarized in a unimodal or bimodal manner to an 8-step continuum from /ɪ/ to /e/ vowels embedded in a nonsense word ([tɪb]-[teb]). Tokens were a subset of the stimuli used by Sabourin and Werker (in prep.). Familiarization was followed by a test phase where two types of test trials were presented: Non-alternating, where either stimulus 3 or stimulus 6 was repeated, and alternating, where infants heard the alternation of the two endpoint stimuli of the continuum (tokens 1 and 8).

Results

Infants in both conditions (unimodal and bimodal) were able to discriminate between the endpoint tokens of the continuum. They listened longer to the alternating than to the non-alternating trials ($p < .001$). There was no interaction between conditions, demonstrating that the type of distribution did not affect performance.

Discussion

These results suggest that there may be limitations to distributional learning, and support the idea that vowel perception may develop in a different manner than consonants. The type of familiarization used (as in Maye et al., 2002) may not be powerful enough to impact vowel perception. The critical phonetic cues distinguishing vowel contrasts may be more salient than those distinguishing consonant contrasts. Simple exposure to the reduced set of stimuli used in this study in comparison to those used in Sabourin and Werker, may have been enough to highlight that salient distinction, irrespective of the distributional manipulation. Our results are in accordance with PRIMIR (Werker & Curtin, 2005) which predicts that salient contrasts will be resistant to distributional learning.

Future experiments are needed to further explore the present results and to investigate other possible explanations, such as prototypically preferences.

References

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