Infants’ native and nonnative tone perception

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Abstract

Infants’ native and nonnative tone perception was investigated in three studies. In Study 1, 6- and 9-month-old English (non-tone) and Chinese (tone) infants were tested for discrimination of Thai tones in a training procedure. Study 2 examined English and French infants’ Thai tone perception in a more natural looking/listening task. Study 3 investigated English infants’ discrimination of Mandarin tones. The findings provide robust evidence for the reorganization of tone perception as a function of language experience. Age-related decline in nonnative discrimination was found for English and French infants. Chinese infants showed stable tone perception across age.

Index terms: lexical tone, speech perception, infants

1. Introduction

Infants initially discriminate native and nonnative speech contrasts, but from 4 months for vowels and 6 months for consonants, a process of perceptual reorganization takes place such that discrimination of nonnative speech sounds deteriorates, but discrimination of native contrasts is maintained or improved [1]. Relative to consonants and vowels, little is known about infants’ tone perception. Tone is used to contrast words in tone languages [2] such as Thai and Mandarin but not in non-tone languages such as English and French. Here, three studies are presented that investigate how age and language experience influence tone perception. In line with a perceptual reorganization account, 4- and 6-month-old English- and French- learning infants were predicted to show significant discrimination of lexical tone contrasts but this ability was predicted to decline by 9 months due to lack of experience with tone in the ambient language environment. No decline in discrimination over age was hypothesized for Chinese infants because tone is phonologically relevant for these infants.

2. Method

2.1. Study 1

6- and 9-month-old Chinese- (tone) and English- (non-tone) infants were tested for discrimination of the Thai rising vs. falling and rising vs. low tone contrasts carried on the syllable /ba/. One tone of a pair played repeatedly and infants were trained to head-turn to a visual reinforcer when the tone changed. Percent correct head-turns were measured (see Fig. 1 where data are collapsed across tone contrast).

2.2. Study 2 and Study 3

Infants fixated a visual display and were presented with a tone for 30 seconds. At test, infants were given trials of the familiar tone (F), and trials containing the familiar tone and a new tone (N). Discrimination was indexed by longer looking to the latter trials. In study 2, 4-, 6-, and 9-month-old English and French learning infants were tested for discrimination of the Thai rising vs low contrast (data for English and French collapsed). In study 3, 6- and 9-month-old English infants were tested for discrimination of Mandarin high vs falling and rising vs low-dipping tone contrasts carried on the syllable /yi/ (data collapsed across contrast here). The dependent variable is mean looking time to N trials minus looking time to F trials (see Fig. 2).

2.3. Results

Figure 1: Chinese and English infants’ discrimination of Thai tone. English infants’ discrimination declined over age (p<.001). Chinese infants’ discrimination did not change over age (p>.83).

Figure 2: Non-tone infants’ discrimination of Thai (dark columns), and Mandarin (light columns) tones significantly declined between 6 and 9 months (p<.001), but not between 4 and 6 months (p>.05)

3. Conclusions

There is perceptual reorganization for tone in the first year of life as there is for consonants and vowels. Reorganization is evidenced by an age-related decline in nonnative tone discrimination. For infants learning a tone language, tone discrimination is maintained with age.

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5. References
