

Title:

A Speech Perception Loss but an Acoustic Gain - a Cross-age Study of Tone and Non-tone Language Listeners' Perception of Lexical Tones

Abstract:

Infants are born with an initial sensitivity to speech prosody [1]. At 6-9 months of age, they undergo a perceptual reorganization (PR) of tones, after which non-tone-language-learning infants' sensitivity for tonal contrasts sharply decreases [2;3]. Still, adult non-tone-language listeners can perceive tones in a psycho-acoustical fashion [4]. A gap in our knowledge occurs regarding the transition between non-tone-language-learning infants' loss of sensitivity to tones and adults' restored sensitivity, calling for an inspection of the crucial periods in this perceptual change, and the factors that influence it.

60 Dutch adult, 30 Chinese adult listeners and 140 Dutch infants of five age groups from 5 to 18 months participated in the study. Listeners were tested on their perception of an acoustically salient tonal contrast (/ta/, Tone1 high level vs. Tone4 high falling) in Mandarin Chinese and a manipulated non-salient contrast which shrunk the pitch distance between the two tones above, using a habituation-dishabituation paradigm.

Results confirmed previous findings, showing that native Chinese adults perceived tones categorically, whereas Dutch adults discriminated contrasts in a psycho-acoustical manner, displaying no trace of tonal category formation. Dutch infants when tested in a habituation-dishabituation paradigm were initially sensitive to both contrasts at 5-6 months before their sensitivity dropped at 8-9 months, and then bounced back quickly for the salient contrast. For the non-salient contrast their sensitivity kept low to 11-12 months, then partially returned at 14-15 months, and almost fully recovered at 17-18 months, forming a U-shaped pattern. The performance of the 17-18 month old infants is consistent with Dutch adults. Acoustic salience of the contrast strongly influenced Dutch adults' and infants' discrimination across all age groups.

We interpret this U-shaped perceptual pattern as caused by an interaction of developments in language-specific speech perception and acoustic perception, respectively. Infants' sensitivity to non-native tonal contrasts is reduced by PR when infants are tuning to their native non-tone language, causing a loss of linguistic tonal sensitivity. Their general acoustic sensitivity then quickly recovers after PR is completed, suggesting that the process of PR temporarily inhibits acoustic sensitivity by focusing perceptual resources to the detection of tonal contrast.

References:

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