

The pitch patterns of infants acquiring tonal languages: the perspective from Chinese

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Abstract

A large amount of empirical evidence has demonstrated continuity of development from babbling to first words based on the speech production of infants, disconfirming the claim of Jakobson (1941/1968) that a sharp division exists between the babbling stage and the subsequent one-word stage when vocalizations acquire conventional meaning. Various studies have shown biases of the target language in the phonetic production of infants, with respect to vowel and consonant production (de Boysson-Bardies 1999; de Boysson-Bardies et al 1984, 1989; de Boysson-Bardies and Vihman 1991, Levitt and Utman 1992). Other studies have identified aspects of phonetic structure and distributional properties of early words in infants' early vocalizations (Oller et al 1976, Oller and Eilers 1982; de Boysson-Bardies et al 1992, Vihman 1996, Chen 1997). Some evidence in support of continuity is also found in pitch production (Whalen, Levitt and Wang 1991). The present study evaluates the continuity issue by examining the pitch patterns of infants acquiring tonal languages, with an aim to ascertaining (a) whether common pitch patterns exist in the early stages of pitch production; (b) whether the pitch patterns in infant babbling resemble those in the one-word utterances; (c) whether the target language environment exerts an influence on pitch in infant babbling.

The subjects included two infants growing up in Changsha, exposed to Mandarin and Hunanese dialects, and two infants growing up in Hong Kong, exposed to Cantonese. The two groups of subjects were audio- and video-recorded at approximately weekly and semi-monthly intervals respectively. The data for analysis consisted of 25 hours of recording for the Changsha infants, covering the period 0; 8 to 1; 3, and 19 hours of recording for the Hong Kong infants, covering the period 0; 8 to 1; 4. A total of 5500 and 5200 syllables were analyzed acoustically for the two groups of infants. The pitch contours of each syllable were analyzed by PRAAT and 11 F0 values were taken from each contour, divided into 10 equal segments. The 11 F0 points representing the F0 contour of each syllable, quantified by lz scores, were converted to a relative pitch level description on a five-point scale, borrowing from the method of You and Yang (2001) and Zhu (2005).

Our findings show that infants preferred to produce level pitch rather than contour pitches. With respect to simple pitch contours, falling or rising contours typically involved falls or rises of one step to two steps. The distribution of pitch contours in the babbling stage resembles that in the babbling-and-words stage, and the profile of pitch contours in babbling at the babbling-and-words stage parallels that in words in the same stage, with level pitch contours being predominant, exceeding the falling contours, which in turn outnumbered the rising contours. These patterns suggest a close connection between babbling and early lexical development. Further, the Changsha infants and the Hong Kong infants reveal significant differences in mean F0 and mean relative level pitch, reflecting an early influence of the ambient language on pitch production.