Visual Language Discrimination in Infancy

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Talking faces are among the most dynamic and salient stimuli available to infants, and the facial movements accompanying speech influence adult (1) and infant (2) speech perception. Recently it was reported that facial speech information alone is sufficient for language discrimination in adults (3). Although it is well established that young infants can discriminate languages auditorily (4, 5), it is unknown whether infants can discriminate languages visually. We examined whether 4-month-old infants can visually distinguish their native language (English) from an unfamiliar language (French). Because exposure to specific auditory and visual information in infancy is essential for maintaining many early-appearing native language, musical, and face perception sensitivities (6–10), we compared monolingual English infants to French-English bilingual infants at 6 and 8 months.

Discrimination was tested by using silent video clips of three bilingual French-English speakers reciting sentences in each language. Every trial contained a video clip of a different sentence by one speaker in one language (for example, movies S1 and S2). The infants (n = 36) were presented with video clips from one of the languages until their looking time declined to a 60% habituation criterion. Test trials using the other language were shown to examine whether the infants noticed the language change. The test trials where the language was switched (4, 6, or 8 months), condition (language switch versus control), and trial (habituation versus test) revealed only a significant three-way interaction [F(2, 66) = 3.71, P < 0.05]. Simple main effects analyses showed that the infants looked significantly longer at the language switch test trials (Fig. 1A), compared with the control trials, at 4 months [F(1, 22) = 4.70, P < 0.05] and 6 months [F(1, 22) = 4.19, P = 0.05] but not at 8 months [F(1, 22) = 1.18, P = 0.29].

The finding that infants can visually discriminate their native language from an unfamiliar language at 4 and 6 months but not at 8 months parallels declines in performance seen in other perceptual domains. Indeed, across the first year of life, infants’ performance declines on the discrimination of nonnative consonant and vowel contrasts (6, 7), nonnative musical rhythms (8), cross-species individual faces (9), and cross-species face and voice matching (10). Thus, it appears that specific experience is necessary for maintaining sensitivity to some initial perceptual discriminations necessary in their language learning environment. Notably, bilingual infants advantageously maintain the discrimination abilities needed for separating and learning multiple languages.

Fig. 1. Mean looking time in seconds to silent talking faces. The y axis represents infant looking time; the x axis represents the trials that the infant was shown (final habituation trials and test trials). Error bars represent the standard error of the mean. (A) Experimental (language switch and control [same language]) conditions for monolingual infants at 4, 6, and 8 months. (B) Experimental conditions for monolingual (replotted from A) and bilingual infants at 6 and 8 months.

Supporting Online Material
www.sciencemag.org/cgi/content/full/316/5828/1159/DC1
Materials and Methods
Movies 51 and 52

References and Notes
11. Materials and methods are available on Science Online.
12. Supported by grant funding through Social Sciences and Humanities Research Council of Canada (SSHRC) and Natural Sciences and Engineering Research Council of Canada (NSERC) to J.F.W., Human Frontier Science Program and James S. McDonnell Foundation to J.F.W. and N.S.-G., and Human Early Learning Partnership to S.S.-F. and by fellowships from Killiam Trusts to S.S.-F. and A.V., NSERC to A.V. and W.M.W., and Michael Smith Foundation for Health Research and SSHRC to W.M.W.

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www.sciencemag.org SCIENCE VOL 316 25 MAY 2007 1159