Audiovisual Interactions in Infant Categorization: Voice Gender Biases Face Categorization

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Background

Infants categorize faces (Newell & Strauss, 2002; Newell, Castellanos, Grossman, & Bahrick, 2009; Ramsey, Langlois, & Marti, 2005) and voices (Miller, 1983) on the basis of gender by the age of 4-6 months. They also show intersensory processing of synchronous faces and voices (Bahrick, Hernandez-Reif, & Flom, 2005) and detect invariant audiovisual information specifying gender such as the relation between pitch of the voice and size of the facial features by 4-6 months of age (Walker-Andrews, Bahrick, Raglioni, & Diaz, 1991). However, few studies have investigated the role of intersensory processing in categorization. The present study assessed whether categorization of gender neutral faces could be biased by the gender of synchronously presented voices during audiovisual speech.

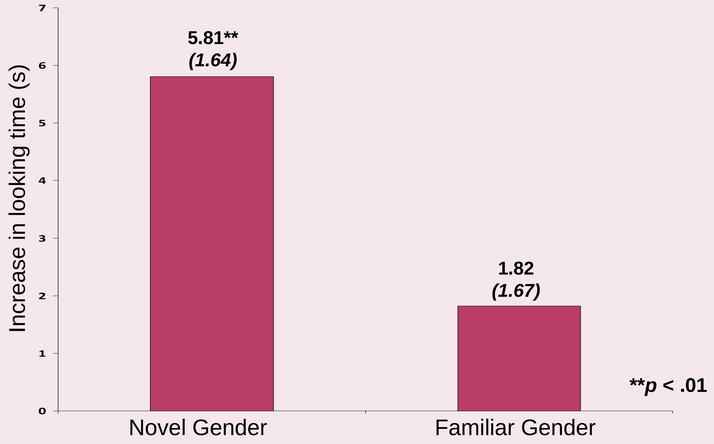
Method

Thirty-two six-month-old infants were tested in an infant-controlled habituation procedure. Stimuli were selected from forty male and forty female faces and voices reciting a nursery rhyme (with hair and clothing cues occluded). The faces (speaking silently) and voices (presented separately) were rated for gender typicality (i.e., ranging from extremely masculine to extremely feminine) by adult judges (N=34). The four faces rated closest to neutral were selected to comprise the group of gender neutral face events for the present study (see Figure 1). These faces were then synchronized with both typical male and typical female voices.

All infants were habituated to three different gender neutral faces, each synchronized with a different typical female or typical male voice. Half of the infants were assigned to the female voice condition, while the other half were assigned to the male voice condition. Following habituation and three post-habituation trials (silent, but otherwise identical to the habituation trials), infants received three pairs of face test trials (within subjects): novel gender category, familiar gender category, and gender neutral control (habituated faces). Test trials depicted two faces from each category, speaking silently.

Figure 1: Faces rated as gender neutral

Figure 2: Mean increase in looking time during test trials to the novel gender and familiar gender face events with respect to gender neutral (control) faces



Results

Categorization of gender neutral faces on the basis of the voice gender (audiovisual categorization) was inferred if infants generalized habituation to the gender neutral (control) and familiar gender category faces but showed visual recovery to the novel gender category faces. Results indicated a significant main effect of test type (F (1, 29) = 6.11, p<.01). Infants looked longer during the novel gender (but not the familiar gender) face test trials (M=16.17, SD=14.99) than to the gender neutral (control) face test trials (M=10.37, SD=11.84; p < .01; see Figure 2).

Conclusions

These findings demonstrate that categorization of gender neutral faces is biased by the gender of synchronously presented voices. After hearing female voices synchronized with gender neutral faces, infants showed increased looking to novel male faces but not to novel female faces (and vice versa for infants who heard male voices). These findings reveal audiovisual interactions in infant categorization of faces and voices. They extend findings of intersensory processing to the domain of categorization. Future studies will assess the role of audiovisual synchrony in face-voice categorization.

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