

Audiovisual Interactions in Infant Categorization of Gender Neutral Faces

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Introduction

Infants categorize faces (Newell & Strauss, 2002; Newell, Castellanos, Grossman, & Bahrick, 2009; Ramsey, Langlois, & Marti, 2005) and voices (Miller, 1983) on the basis of gender. They also show intersensory processing of faces and voices (Bahrick, Hernandez-Reif, & Flom, 2005). However, few studies have investigated the role of intersensory processing in categorization. We recently addressed this issue and demonstrated that infant categorization of gender neutral faces could be biased by presenting synchronized male versus female voices (Bahrick, Grossman, Castellanos, Argumosa, & Newell, 2010). After hearing female voices synchronized with gender neutral faces, 6-month-old infants showed increased looking to novel male faces but not to novel female faces (and vice versa for infants who heard male voices). These results suggest that infants detected intersensory redundancy (synchrony, common rhythm and/or intensity covariation) across the face and voice and this biased their perception and categorization of the gender neutral faces. If so, then by eliminating audiovisual synchrony (by presenting asynchronous voices of one gender along with the gender neutral faces), infants should no longer show gender categorization (greater looking to novel gender faces). Alternatively, if gender categorization was based on other factors including attention to the voice alone, infants could show gender categorization even in the absence of face-voice synchrony.

Methods

Stimuli and procedures identical to those of our prior study were used, only the face-voice synchrony differed. The stimuli (selected from among forty male and forty female faces and voices rated for gender typicality) depicted males and females reciting a nursery rhyme, with hair and clothing cues occluded. The four faces rated closest to neutral comprised the group of gender neutral face events. (see Figure 1). These faces were then paired with both typical male and typical female voices.

Six-month-old infants (n=32) were assigned to the female or male voice habituation condition. They were habituated to three different gender neutral faces, each paired with a different typical female or typical male voice. Following habituation, infants received three pairs of silent face test trials (within subjects): 1) novel faces, novel gender category, 2) novel faces, familiar gender category, and 3) familiar (habituated), gender neutral faces (control).

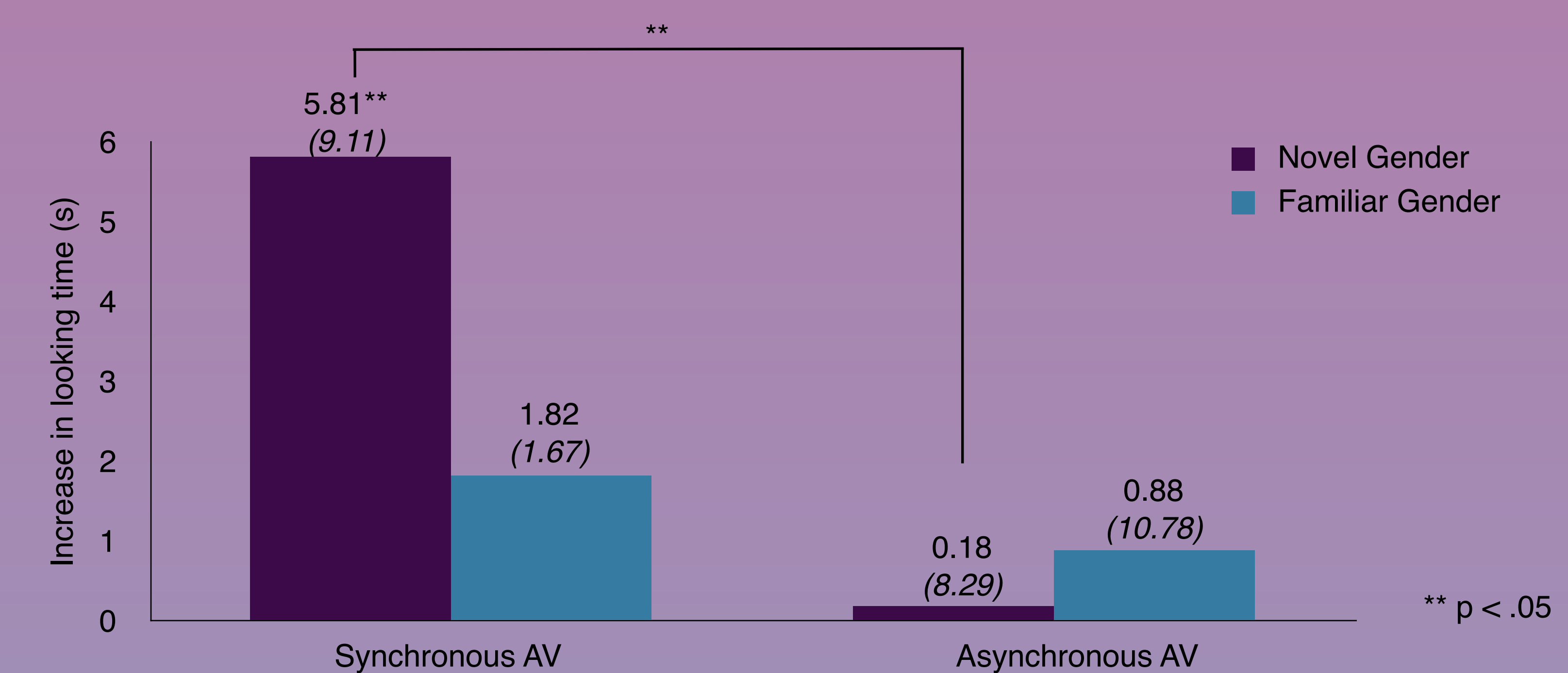
Figure 1: Faces rated closest to gender neutral



Results

Results indicated no evidence of gender categorization. Infants showed no difference in looking to the novel gender face test trials ($M = 8.89$, $SD = 9.53$) as compared to the familiar gender and gender neutral (control) face test trials ($M = 9.59$, $SD = 9.26$; $M = 8.71$, $SD = 10.68$, respectively). Further, visual recovery to the novel gender category faces was significantly greater in the synchronous voice condition (prior study) than in the asynchronous voice condition (present study, $F(1, 62) = 6.69$, $p = 0.01$).

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



Conclusions

Six-month-old infants categorize gender neutral faces of adults in a manner consistent with the gender of the voice heard speaking when the voice is synchronous, but not when it is asynchronous, with the movements of speech. These findings demonstrate that infant categorization of gender neutral faces is biased by the gender of synchronously, but not asynchronously presented voices. Face-voice synchrony provides intersensory redundancy which is highly salient to young perceivers and serves to unitize audiovisual stimulation. These findings are among the first to demonstrate audiovisual interactions in categorization in early development and indicate the important role of intersensory redundancy in categorization.

References

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