The Development of Face-Sensitive Cortical Processing in Early Infancy

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Introduction
Human faces have unique biological structures that convey a variety of complex social messages. Multiple lines of research suggest that, in adults, faces are a class of stimuli that receives high priority from attention. Information concerning the time course of neural mechanisms for face processing has been provided by electrophysiological studies through the analyses of Event Related Potentials (ERPs).

The N290 has been identified as a face-sensitive ERP component in infancy. Its activity is systematically modulated by faces and not by non-face objects (De Haan, Johnson, & Halit, 2002). Greater N290 amplitudes have been reported in response to faces than to toys in 4.5-, 6-, 7.5- and 12-month-old infants (Guy, Richards, Tonnesen, & Roberts, 2018; Guy, Zieber, & Richards, 2016). The face inversion effect occurs when faces are presented vertically inverted. It has been considered a marker for expert perceptual processing, since results in an impairment in perceptual recognition of the inverted face stimuli. A selective inversion effect for human faces has been reported to modulate the amplitude of the N290 in 12-month-old infants (Halit, de Haan, & Johnson, 2003).

Another ERP component – the P400 – has been reported in response to faces during infancy. However, the role of P400 in infants’ face processing is still not fully understood. Some studies found earlier P400 peaks for faces than toys (De Haan & Nelson, 1999), while others reported larger amplitude for toys than for faces (Guy, Zieber, & Richards, 2016).

We hypothesized that faces would elicit larger N290 and P400 responses compared to houses and that a possible developmental change would occur in the scalp distribution of the N290 and P400 responses to faces. Moreover, an inversion effect on N290 amplitude would be elicited by faces but not houses.

Methods
Participants
4.5 (N = 7), 6 (N = 6), 12 (N = 11) months

ERP Procedure
Infant passively viewed brief stimulus presentations (500 ms) while seated on parent’s lap in darkened room. EEG activity was recorded from high-density EGI HGSN/GSN nets

References