

NAME: Kacie Dunham, kacie.a.dunham@vanderbilt.edu

PI: Woynaroski, Tiffany

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Neural Responses to Audiovisual Speech in Infants at Increased Likelihood for Autism: An ERP Pilot Study

Authors: Kacie Dunham, Bahar Keceli-Kaysili, Alexandra J. Golden, Pooja Santapuram, Jennifer Markfeld, Jacob I. Feldman, Tiffany Woynaroski

Introduction: Speech is inherently a multisensory process, wherein synchronized visual cues from the moving mouth complement the dynamic acoustic stream. Past research has shown that typically developing (TD) infants tune in to multisensory speech, looking to the mouth of their communication partners during the first year of life, presumably to access audiovisual cues that facilitate speech processing and language learning. This study aims to determine: (a) if visual cues increase efficiency of speech processing as indexed by event-related potentials (ERPs) in infants at general population-level likelihood for autism (infant siblings of TD children; Sibs-TD) and (b) if infants at increased familial likelihood for autism (infant siblings of children with autism; Sibs-AUT) display a lesser boost in speech processing efficiency with access to multisensory versus unisensory cues compared to Sibs-TD.

Methods: Forty 12-18 month old infants (20 Sibs-AUT; 20 Sibs-TD matched on sex and chronological age) are being recruited. Participants view videos of a female speaking syllables in audiovisual (auditory speech + synchronous visual mouth movements) and auditory only (auditory speech + still image of the face) conditions. Data are collected using NetStation and a 128-channel Geodesic sensor net (Net Amps 400 amplifier, Hydrocel GSN 128 EEG cap, EGI Systems Inc.). The raw EEG signal is sampled at 1000 Hz and referenced to vertex (Cz). The amplitude of the P2 component (defined a priori as occurring between 160 ms and 340 ms) as measured at Cz is extracted from the average ERP of each participant.

Results: Preliminary results for data processed to date (5 Sibs-TD; 5 Sibs-AUT) suggest that, on average, Sibs-TD display a decreased P2 amplitude in response to audiovisual versus auditory only speech, while Sibs-AUT display reduced differentiation of audiovisual versus auditory only speech as indexed by the P2 amplitude compared to Sibs-TD.

Discussion: These findings suggest that differential processing of audiovisual speech may emerge early in life and that infants at increased likelihood for autism appear to show reduced differentiation of multisensory versus unisensory speech that may be clinically useful for predicting autism and related symptomatology.

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