Title: Biobehavioral Measures of Audiovisual Speech Processing are Associated with Language in Children with and without Autism Spectrum Disorder

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Introduction: Explaining individual differences in language understanding and use of young children with autism spectrum disorder (ASD) is a top priority of research because language has been repeatedly linked with long-term outcomes in this population. Theory and findings from past research suggest that efficiency of audiovisual speech processing may account for variability in language understanding and use in children with ASD. The high demands of experimental tasks used in prior work, however, have limited many investigations of audiovisual speech processing and perception in ASD to older and high functioning children. This study explores the association between audiovisual speech processing and language in children with ASD who represent a broader range of ages, cognitive abilities, and language levels by using low demand biobehavioral measures.

Methods: Data collection is ongoing; at Gatlinburg, data from 18 children with ASD and 18 typically developing (TD) peers matched on chronological age, sex, and nonverbal IQ will be presented. Participants completed a passive EEG task that is a direct neural measure of audiovisual speech processing. During our task, we collected event-related potentials (ERPs) in response to audiovisual (AV) and auditory only (AO) syllables (e.g., “ba”). An Eyelink 1000 plus was used to control stimulus presentation and to monitor eye gaze to areas of interest (AOIs) during AV speech. A battery of norm-referenced and standardized language assessments, including the Receptive- and Expressive- One Word Picture Vocabulary Tests (ROWPVT and EOWPVT; the measures for which results are presented below) was collected concurrently.

Results: Preliminary analyses were conducted based upon a sample of 14 children with ASD and 10 TD children collected to date. P2 amplitudes (a positive deflection that peaks approximately 200ms after the onset of a speech stimulus in infants and children) were significantly reduced for AV versus AO speech across groups (p = .004; this finding is consistent with increased efficiency on average for AV versus AO speech according to prior literature), but mean P2 amplitude suppression did not significantly differ between groups (p > .05). Children were, however, highly heterogeneous in P2 amplitude suppression, and the degree of suppression experienced for AV versus AO speech was related to degree of both receptive and expressive language impairment across groups (e.g., r = .48 and .37 for associations between P2 amplitude suppression and ROWPVT and EOWPVT scores, respectively). These relations do not vary according to group (p values for product terms in regression models testing moderated effects > .05). Participants also looked significantly more to the mouth versus eyes during AV speech across groups (p < .005). Mean looking to the mouth did not significantly differ between groups (p > .05). The relation between looking to mouth and language level, however, varied by group (p values for product terms in moderation models for receptive and expressive language = .01 and .008, respectively). Data collection is expected to be complete prior to the conference.

Discussion: Implications for theory, research, and practice will be discussed. Preliminary results suggest that biobehavioral measures of audiovisual speech processing, particularly ERPs, hold some potential for predicting language in children with ASD. If our hypotheses are born out in the larger sample, this work will have identified a possible impediment to language development in children with ASD that independent evidence suggests is malleable and therefore potentially remediable.

References/Citations: