Title: The Impact of Singing on Multisensory Integration in Children with Autism Spectrum Disorder: A Pilot Study

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Introduction: Children with autism spectrum disorder (ASD) show reduced or atypical multisensory integration of audiovisual speech stimuli when presented with a spoken “McGurk” task (Stevenson et al., 2014), in which the presentation of incongruent audiovisual speech tokens (i.e., a visual “ga” and an auditory “ba”) result in the illusory percept that reflects a fusion of the two stimuli (i.e., “da” or “tha”; MacDonald & McGurk, 1978). It has been proposed that such differences in multisensory integration may underlie language impairments in children with ASD. We hypothesize that children with ASD show enhanced multisensory integration for sung tokens, which offer more salient visual and auditory cues, in comparison to the spoken tokens, such as those presented in prior research (Quinto, Thompson, Russo, & Trehub, 2010).

Method: For the present pilot study, we are recruiting 20, 5-7 year old children with ASD and 20 TD children matched on chronological age, sex, and IQ. Diagnostic status of participants with ASD will be confirmed via ADOS and a clinical interview with a research-reliable examiner who is experienced in evaluating school-age children with ASD. TD status will be confirmed using the Social Communication Questionnaire. A comprehensive battery of cognitive and language measures will be administered to characterize the sample. Participants will be presented with auditory only, visual only, congruent “ba”, “da”, and “ga” syllables, and incongruent auditory “ba” dubbed onto visual “ga” stimuli in two conditions (spoken syllables, sung in-tune syllables) presented in random order. After each presentation, the participant will be asked to report what syllable they perceived by pushing a button on a serial response box. We will assess between-group differences in auditory only, visual only, and congruent audiovisual accuracy, as well as magnitude of multisensory integration for incongruent stimuli in the spoken and sung in-tune conditions and explore associations between measures of multisensory integration and language ability according to group.

Anticipated Results: Data collection for this pilot study is ongoing, but will be complete prior to the Gatlinburg conference. Preliminary results indicate that TD children do not exhibit significant difference in the perception of the fused illusory percept in response to sung versus spoken stimuli (t = 0.16, p = 0.92). This is consistent with Quinto et al.’s (2010) findings in TD adults. Based on the extant literature, we expect that children with ASD will show reduced accuracy in identifying visual only and congruent audiovisual syllables, as well as reduced integration for incongruent audiovisual syllables presented in the spoken condition relative to TD controls. However, we anticipate that children with ASD will show increased identification accuracy and integration for the analogous “sung” syllables, such that they will not differ from TD peers in “sung” conditions. It is anticipated that a 2x2 (condition x group) ANOVA will show a significant interaction effect, whereby the sung McGurk condition will increase multisensory integration in the ASD group.

Discussion: If our hypotheses are born out, these findings would provide preliminary support that music is a modality that increases multisensory integration, and perhaps even support language learning in children with ASD. Such a result would lay the groundwork for a larger scale study that would test whether a music-based intervention boosts language outcomes via increased multisensory integration in this population.

References/Citations: