Temporal Coupling of the Left and Right M100: Speech Sound Processing in Children with Autism Disorder, their Siblings and Typically Developing Controls

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Sound Processing in Autism

Neural synchrony coupled with the exquisite timing of the auditory system play a critical role in the development of language. However, little work has been done to characterize hemispheric asymmetries in the auditory evoked response in typically developing (TD) children. Our previous studies of auditory function in TD children show adult-like patterns of modulation by place of articulation and voice onset time. Here we investigate maturational changes in the direction and magnitude of TD hemisphere latency offsets to mature adult responses.

Autism disorder is marked by sound reactivity and language impairment motivating an investigation of the temporal coupling of cortical responses across the hemispheres. In previous studies using MEG, we provided evidence for abnormalities in auditory cortical processes underlying feature extraction in children with autism disorder for both speech and non-speech sounds.

In adults, the auditory evoked M100 component detected by MEG peaks within a narrow (~20ms) time window across left (LH) and right (RH) hemispheres, with the LH typically peaking later across a wide variety of stimulus categories. Although the neural basis of the hemispheric asymmetries (LH-RH) seen in adults are not fully understood, they are highly replicable and generally stable across stimulus conditions.

In this ongoing investigation we use MEG to evaluate synchrony in cortical responses as measured by the M100 peak latency offset between hemispheres in processing complex (speech) sounds in age matched typically developing controls, AD and their siblings. Adult data reported here include in part modified presentation of the data reported in Poeppel et al. 2004.

In adults the M100 component peaks similarly in time across the hemispheres, with the left hemisphere typically peaking later. Here we report differences in magnitude and direction in the peak latency difference between hemispheres for TD, AD and their Siblings. Magnitude findings similar to adults are seen in TD. The direction of the hemisphere offset varies by group, differentiating unaffected siblings responses from both the TD and AD groups.

Additional work is needed to explore the maturational implications and neuronal basis of the hemisphere differences seen in the peak latency of the M100.

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