

Auditory Electrophysiological Responses in Young Autistic and Non-Autistic Children: Information lost in ERP Group Averages

Atypical sensory processing and sensory experiences are increasingly recognized to be a central part of autism, but autistic sensory experiences are complex and vary from person to person. A substantial literature has investigated sensory processing in autism by recording ERPs to auditory stimuli and comparing ERP averages between autism and typical development; however, there are limits to the information such studies can provide. We recorded usable auditory ERPs to tones of varying intensities (50 – 80 dB SPL) from ~130 autistic and ~80 typically developing children aged 2-4, presenting many trials (~200-300 per each of 4 conditions) to obtain stable individual averages. We used exploratory clustering analyses to describe patterns of inter-individual variability in the relative strengths of responses to tones of different intensity, as well as in ERP topographies. We also compared ERPs in autistic individuals with and without disproportionate megalencephaly (i.e., big brains), a phenotype associated with loss of skills early in development (“regression”) and intellectual disability. Furthermore, we examined variability within individuals by measuring inter-trial variability in auditory responses (“neural noise”), as well as habituation of responses over the recording session. Our findings emphasize the existence of considerable inter-individual heterogeneity of neural responses not only in autism but also in neurotypical children, as well as the importance of intra-individual, inter-trial differences.