**Title**: Neurophysiology of perceptual closure abilities in autistic and neurotypical control children

**Authors:** Erin K. Bojanek1, Edward G. Freedman1, John. J. Foxe1

**Introduction**: Visual perceptual differences are well documented in autism spectrum disorder (ASD); however, gaps remain in our understanding of the neurobiological mechanisms underlying these observable sensory behaviors. In this study, we examined how the visual system fills in missing information during incomplete viewing conditions. Autistic individuals tend to focus on local object features at the expense of the global picture, which may result in visual perception difficulties during incomplete viewing conditions (1,2). We examined this process using a perceptual closure paradigm during electroencephalography (EEG) recording. Using this paradigm, a specific event-related potential (ERP) component, the closure negativity (Ncl), has previously been identified which reflects the process by which fragmented elements of complex objects are gradually filled-in, thus indexing the perceptual closure process (3-5). This study aims to define the neurophysiological underpinnings of the perceptual closure process in neurotypical development and examine whether there are global visual perception disruptions in autistic children.

**Methods**: Fourteen autistic children and 15 neurotypical (NT) control children, ages 7-17 years, have completed the perceptual closure paradigm during EEG recording. During this task, participants are shown a series of image sets consisting of 8 images of progressively greater fragmentation. Images are presented from least complete (image 8) to most complete (image 1). Participants indicate whether they can identify the image; following identification, the image set is terminated. We examined the amplitude of the closure negativity (Ncl) and the P1 component at the level of the image identification (ID) and 3 levels prior. We also examined the accuracy of image identification and the mean level of image identification.

**Results**: Results show that there is an emerging Ncl in both groups, particularly in older participants, with a less well defined Ncl in younger children. Autistic participants showed a greater P1 amplitude than NT controls across the ID and 3 prior levels. In contrast, NT controls showed a more negative Ncl amplitude across the ID and 3 prior levels. Regarding behavioral performance, NT controls were significantly more accurate in their image identification (93%) than autistic participants (88%; p<0.001). NT controls are trending towards an earlier mean ID level for correct trials (3.18) compared to autistic participants (3.10; p=0.073), though both groups show a mode ID level of 3.

**Discussion:** Overall, we found that neurotypical children are more accurate in their identification of fragmented images compared to autistic children. Additionally, neurotypical children are trending towards a slightly earlier identification level, though both groups show a mode ID level of 3 suggesting that a relatively similar level of information is required to “close” or accurately perceive the object. Our preliminary results show an emerging Ncl in both the autistic and neurotypical children suggesting that perceptual closure abilities may reach adult levels later in development. We also found that both groups show greater modulation within the P1 component, which has not been previously observed in adults. However, the autistic participants showed a greater modulation of P1 and a greater P1 amplitude than NT controls across all levels examined. This finding may suggest a different process of object identification for children than adults and may suggest that autistic children interpret each fragmented image as different objects rather than interpreting the image set as a perceptual whole. Further examination is necessary to understand the development of local-global object perception in autistic children.

**References:**

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 The Frederick J. and Marion A. Schindler Cognitive Neurophysiology Laboratory, Department of Neuroscience and The Ernest J. Del Monte Institute for Neuroscience, University of Rochester School of Medicine and Dentistry, Rochester, NY