Assessing Human Performance in Recognition of Spatial and Temporal Patterns

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Autism spectrum disorder (ASD) involves a wide variety of behavioral symptoms, including impaired communication skills and inclination towards repetitive actions. In the past, the Sinha Lab has explored the idea that one of the causes for ASD is the inability to predict movements and patterns. Here, we investigate the behavior of individuals presented with probabilistic movements of different colored stimuli, testing capabilities to recognize spatial and temporal patterns. We developed an online test in which the stimuli, red and blue balls, could move in one of three directions, and the subject would need to press a key corresponding to the direction in which they think the ball would move. The second part of this test consisted of the same setup, but the stimuli would move at a random time given by a Gaussian curve, making the subject predict the time at which the stimuli would move. While we are yet to collect data on ASD patients, we have collected baseline data and noticed some patterns in both the spatial and temporal experiments. In both experiments, the percentages for each key roughly match with the true percentages, demonstrating that people can generally distinguish the fact that the two balls are moving separately and predict the direction of ball movement well. There is also evidence to show that the probabilities of one ball influence the subjects’ prediction for the other. After running statistical tests, we determined that people can quickly detect changes in patterns but are sometimes confused when the changes are small in the temporal condition. These data strongly suggest that humans generally perform well at predicting patterns, so in the future we hope to see how this compares to ASD patients in order to see exactly which aspect of prediction they lack.