

AUTISM AND VISUAL SEARCH: COGNITIVE EFFORT IS RELATED TO RESPONSE TIME

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Although participants with autism spectrum disorder (ASD) are superior to control participants on visual search tasks, the oculomotor and cognitive mechanisms of enhanced performance remain undetermined. It is unknown, for example, whether the relatively faster response times (RTs) recorded for ASD participants are associated with more or less cognitive effort. One physiological indicator of cognitive effort is pupil dilation. Our objective was to investigate the relationship between RT and cognitive effort (indexed as a specific pupillary reflex) for a visual search task. The participants in our study were 6 male adolescents with high-functioning autism or Aspergers Syndrome ($m = 13.8$ years) and 4 age-, gender-, and handedness-matched controls ($m = 16$ years). Due to lack of cooperation, eye-data for only 4/6 and RT-data for 5/6 autistic participants were analyzed. Our visual search task varied along the dimensions of inter-distractor similarity, set-size, and target presence/absence yielding 12 different conditions. The binocular EyeLink II Eye-Tracking System was used to record relative changes in pupil dilation for each individual. Pupil dilation coefficients were analyzed using the cognitive activity index (CAI), a previously -validated, patented technique that relies on the mathematical theory of wavelets. High CAI values indicate significant changes in pupil diameter and are associated with cognitively demanding tasks. Compared to the control group, the autism group had lower RTs for difficult conditions (e.g. low distractor similarity), $t(8) = 2.31$, $p < .05$. The correlation between RT and pupil dilation was statistically significant, $r(6) = .73$. In other words, fast RTs were associated with low cognitive effort. We confirm previous findings of superior visual search in adolescents with autism. Although the sample size is small, the correlation between RT and cognitive effort suggests that autistic participants may require lower cognitive effort to achieve superior performance. Supported by NIH RO1-DC006155

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