Attentional disengagement in school-age children with ASD and relationship to phenotype: Results from the ABC-CT Feasibility Study

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Introduction

Children with Autism Spectrum Disorder (ASD) exhibit atypicalities in attentional disengagement compared to controls. However results have been inconsistent with some groups noting longer [1, 2, 3] while others observe shorter disengagement times [4, 5], or no difference [6, 7]. Furthermore, little is known about relationships between atypical disengagement and phenotypic characteristics in both typically developing (TD) children and children with ASD.

Objectives

1. Analyze group differences in reaction times during a gap overlap paradigm (including gap, overlap, and baseline phases).
2. Examine the association between engagement on screen and reaction times with behavioral characterization.
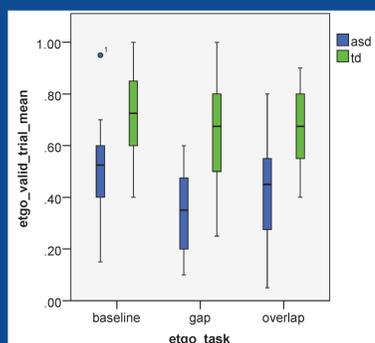
Methods

Paradigms were adapted from [1,2,8] with in-house trial randomization and no gaze contingency. Dependent measures were percentage of valid looking time (%Valid) and reaction time to the peripheral stimulus (RT). Data were analyzed using linear mixed models (LMM) with diagnosis, condition and their interaction as factors, covarying for full scale IQ (FSIQ). For RT, a natural base logarithm transformation was used.

|	ASD	TD
Participants with Analyzable Data	25	26
Participants with Valid Data	19	26
Age at Enrollment (years)	7.77 (2.30)	6.60 (1.98)
FSIQ	91.08 (19.51)	114.08 (9.34)
VIQ	89.40 (21.38)	115.23 (13.79)
NVIQ	92.84 (19.03)	111.04 (8.03)
ADOS Calibrated Severity Score	7.84 (1.57)	1.19 (0.40)
ADOS SA Severity Score	7.76 (2.05)	1.38 (0.70)
ADOS RRB Severity Score	7.36 (2.43)	1.69 (1.69)

Table 1: Characterization of participants

Spearman's rank correlations were applied to compare T scores from the Social Responsiveness Scale (SRS) to the eye-tracking measures in children with and without ASD respectively.
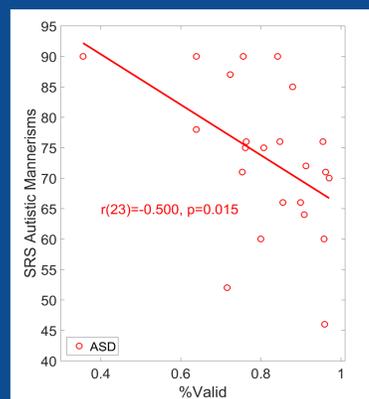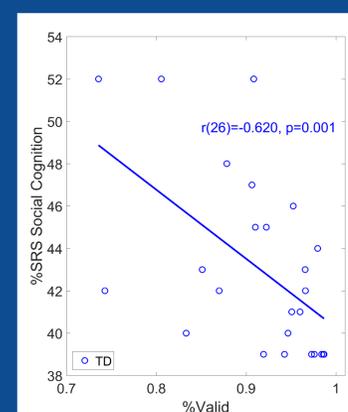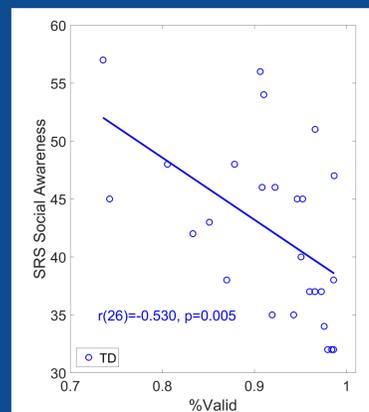
Results

A LMM of %Valid showed a main effect of group ($d = 0.98$, $p = 0.038$), with the ASD group looking less than TD, and no effect of task condition, interaction, or FSIQ.

A LMM of RT showed a main effect of group ($d = 0.28$, $p = 0.048$), with shorter RTs in the participants with ASD than TD. Condition effects were observed ($p < 0.001$), with fastest RTs in the gap condition, then baseline, and slowest in overlap. The interaction and FSIQ were not significant.
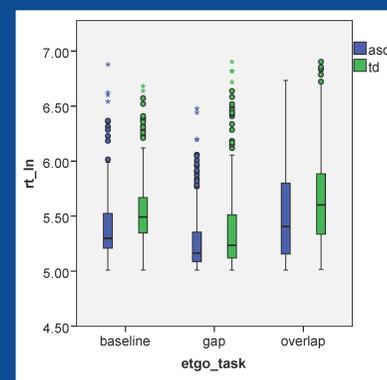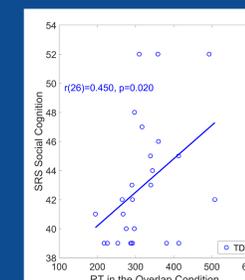

A negative correlation was observed between %Valid and SRS Autistic Mannerisms in participants with ASD ($r(23) = -0.50$, $p = .015$).

In the TD group, a negative correlation was observed between %Valid and SRS Social Awareness ($r(26) = -0.53$, $p = 0.005$) and Social Cognition ($r(26) = -0.62$, $p = 0.001$).

In the TD group, RT in the overlap condition was correlated with SRS Social Cognition ($r(26) = 0.45$, $p = 0.02$), while no correlation between the RT and SRS was found for children with ASD (p's > 0.1).

Conclusions

Children with ASD showed faster disengagement times compared to TD children. This effect was not specific to any condition, suggesting greater bias for exogenously driven salient cues, limited processing of the central stimulus, or greater efficiency in visual exploration in ASD. In TD children, slower disengagement was associated with social cognition difficulties, contrary to continuum-based expectations that children with ASD should be slowest of all. These results suggest that a simple deficit model of attentional disengagement in ASD may not adequately describe our observed results.

References

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