



Individual Differences in Self-Reported Autistic Traits and the N2pc



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Abstract

The N2pc has been shown to be an effective marker of attentional object selection when presented with a visual search task, reflecting selection of a target item among distractors (Eimer, Kiss, & Nicholas, 2011). Research also suggests that those with autism spectrum conditions have atypical selective attention when compared to typically developing populations (Burack, 1994). Moreover, recent research suggests that the N2pc may also reflect such atypical selective attention, specifically spatial selective attention (Dunn et al., 2016). This study further investigated this relationship by examining individual differences in autistic traits in relation to the N2pc. Here, 187 adults (ages 18-30) completed a visual search task designed to elicit the N2pc. Participants were asked to search for either a pink or blue vertical U among lateral facing U's and indicate if the gap was at the top or bottom of the U. Participants also completed the Autism Quotient (AQ) Questionnaire (Baron-Cohen, 2001). A Linear Regression of the overall N2pc at electrodes P07/P08 showed a significant relationship between AQ score and the N2pc ($F(1,185)=4.10, p=.044$). Results suggest that participants with higher AQ scores show a reduced N2pc, contrary to previous research by Dunn et al. (2016). Findings are discussed in light of differences between the studies in regards to tasks and populations as well as how the N2pc may index alterations of spatial selective attention in those with autism spectrum conditions.

Background

Previous research on selective attention in visual search suggests that the N2pc can be a good measure of attention during visual search (Eimer, 1996)

Research also suggests that those with autism spectrum conditions have atypical selective attention when compared to typically developing populations (Burack, 1994).

Moreover, recent research suggests that the N2pc may reflect such atypical selective attention, specifically spatial selective attention (Dunn et al., 2016).

This study further investigated this relationship by examining individual differences in autistic traits in relation to the N2pc.

Methods

Participants

Adult participants (N=187, ages 18-30, M=19.61, SD=1.58) were recruited on three college campuses, University of Richmond, Claremont McKenna College, and Hampshire College.

Autism Quotient (AQ)

Participants completed the Autism Quotient (AQ) Questionnaire (Baron-Cohen, 2001). The asks respondents to indicate whether they agree or disagree with 50 statements describing behavioral and social/communication traits and preferences. Utilizing the questionnaire in a college population allowed for a wide range of scores relating to autistic traits (minimum score: 8, maximum score: 46, M=20.58, SD=5.63).

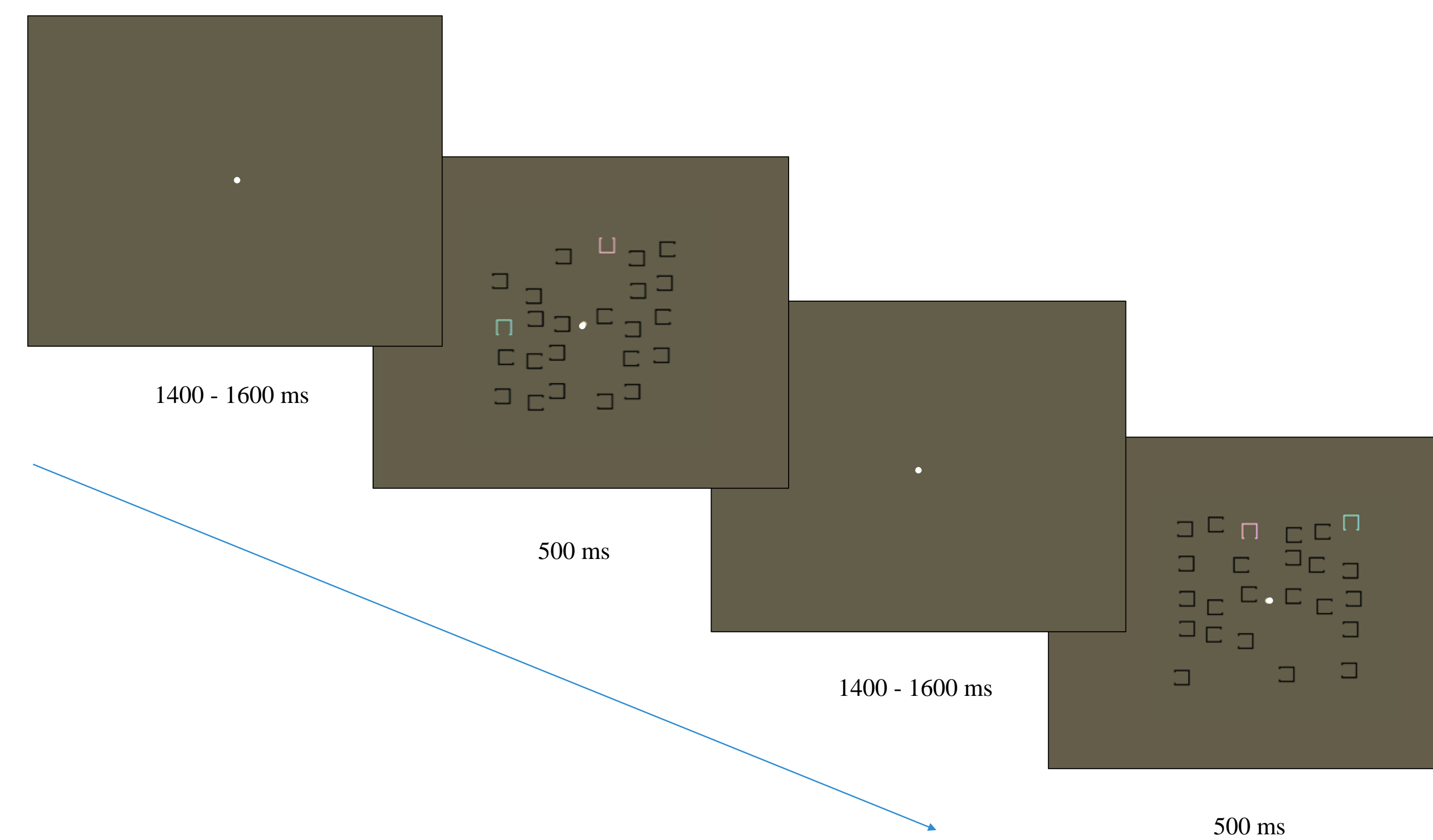
Electrophysiological Recordings

Electrophysiological recordings were collected using the Brainvision 32 Channel system. EEGlab (<https://sccn.ucsd.edu/eeglab/index.php>) was used with the plugin ERPLab (<https://erpinfo.org/erplab>) to process the raw EEG data into ERP data that was used in analyses.

Methods Cont.

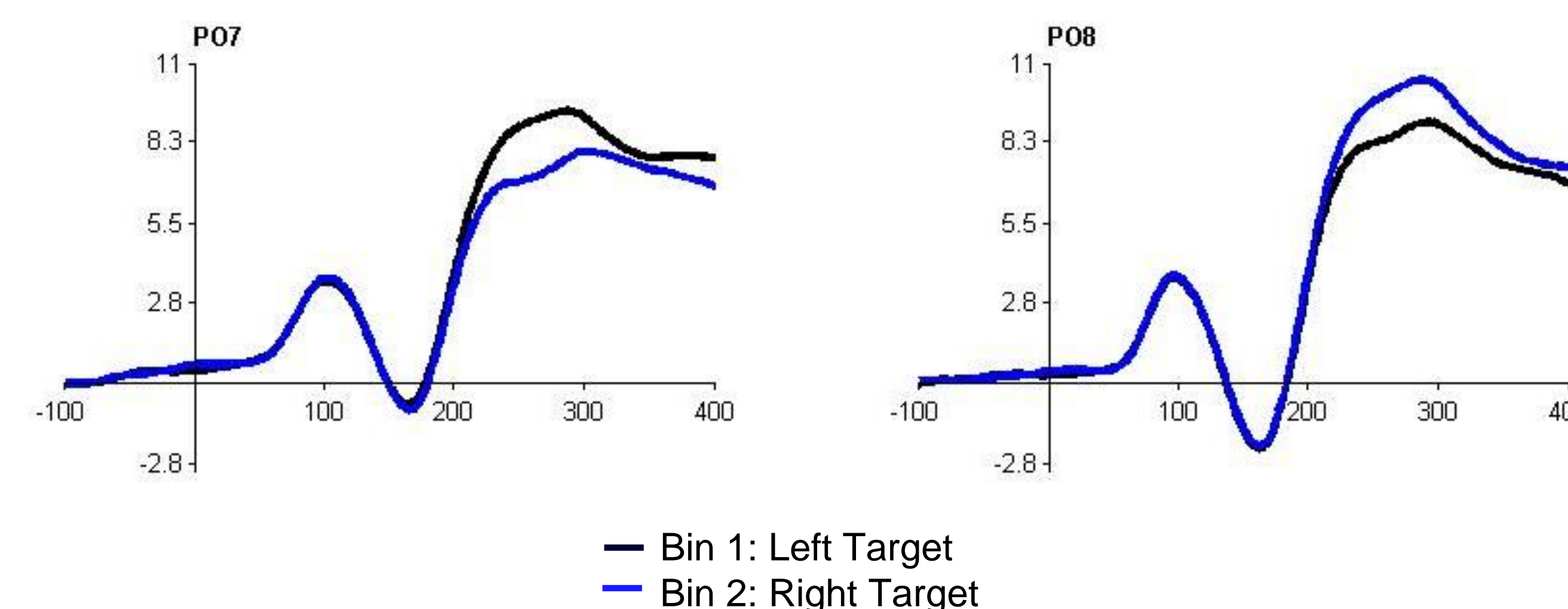
Visual Search Task:

In the visual search task, Participants were asked to identify either a blue or pink "U" and state whether the gap was facing upwards or downwards (shown below) in the presence of laterally-facing "U" distractors. The participants made this selection using a button press response.



Results

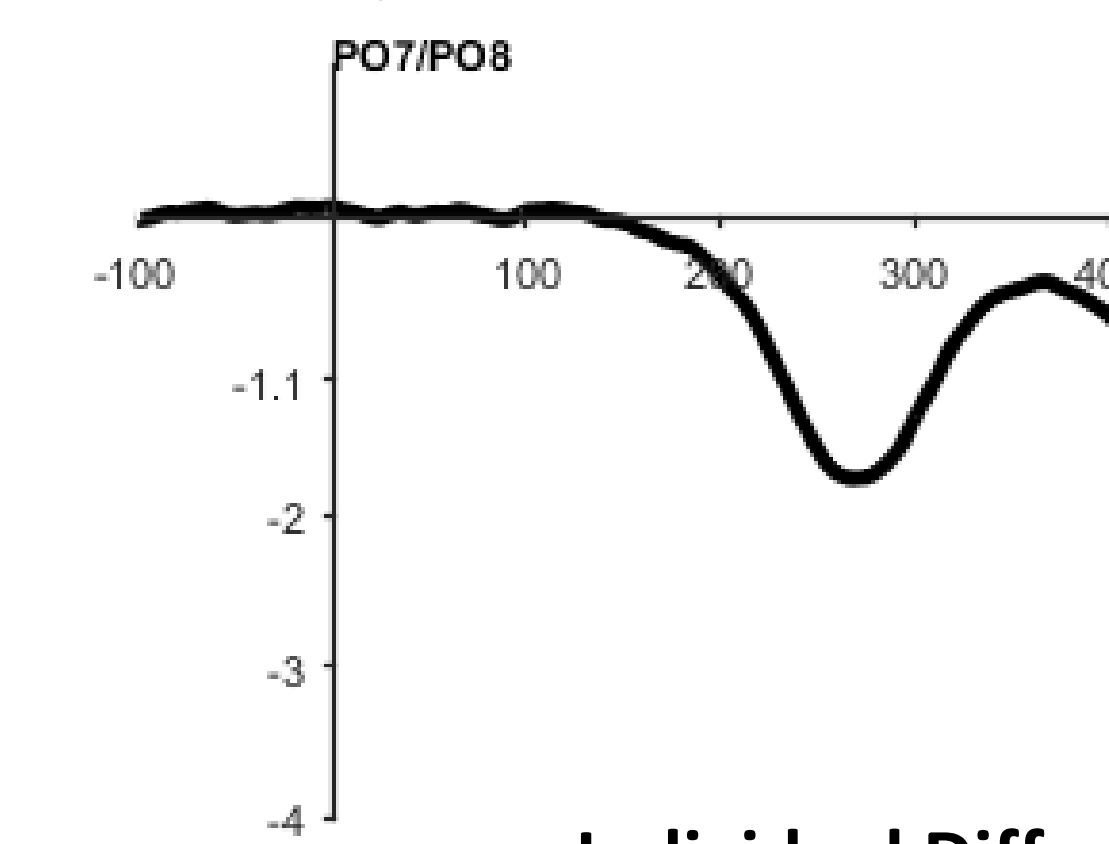
Left and Right Targets for the N2pc When Target Colors are Correct



The ERP data was analyzed using a repeated measures ANOVA (2 hemisphere x 2 electrode (P07/P08) to confirm the presence of the N2pc:

- There was a main effect of the side of electrode ($F(1,186)=34.13, p<.001$), a trend effect of side of presentation ($F(1,186)=2.83, p=.096$) and a significant interaction between hemisphere of presentation and electrode ($F(1,186)=553.14, p<.001$). This reflects the presence of the N2pc.

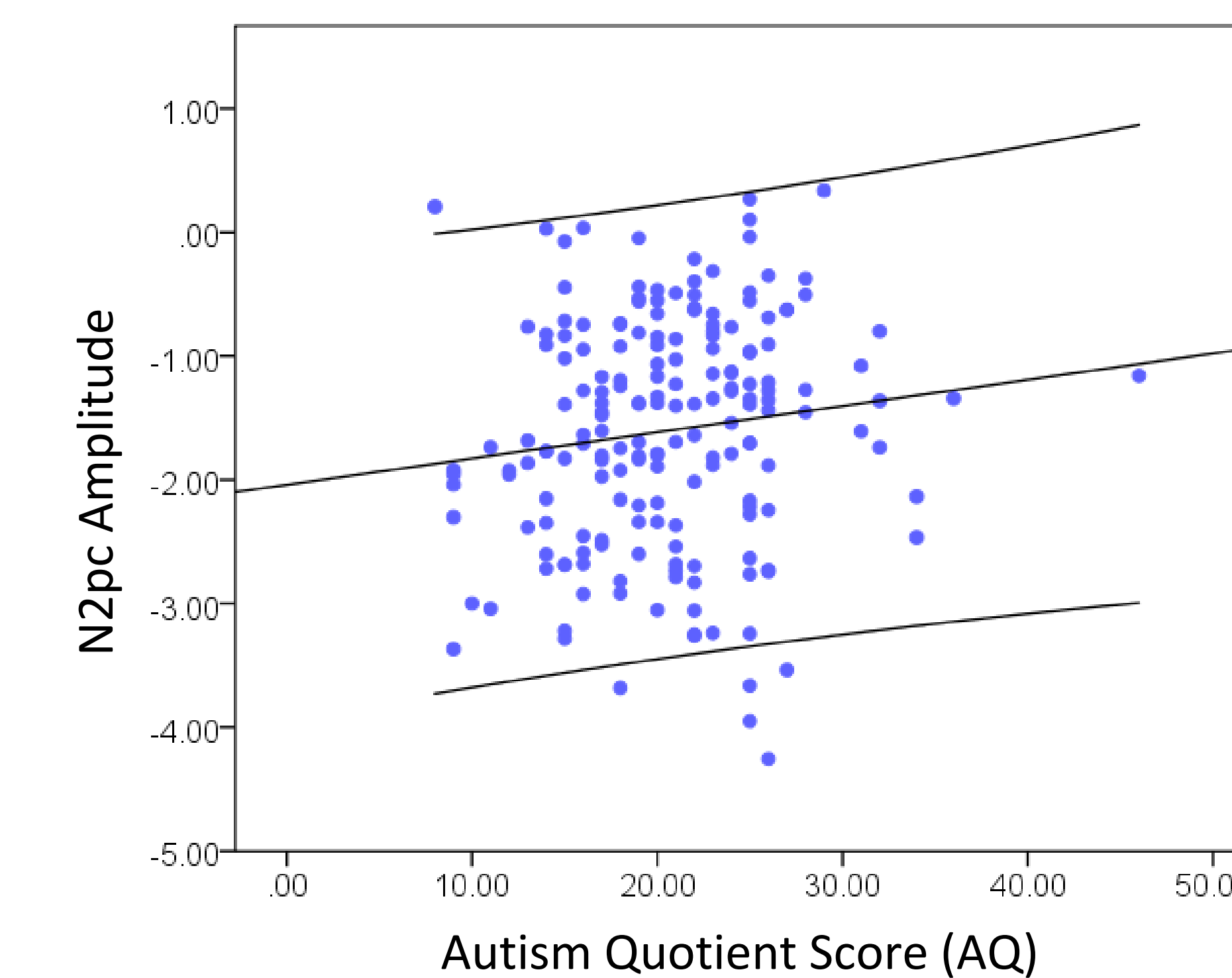
N2pc Difference Wave



Results Cont.

- The N2pc is shown here as a difference wave, the amplitude of this difference wave was used below in a scatterplot to highlight the relation between individual differences in AQ score and N2pc amplitude.

Individual Differences in N2pc Amplitude and Autism Quotient (AQ) Score



A Linear Regression was performed using overall N2pc at electrodes P07/P08 to examine the relation between N2pc and AQ score.

- There was a significant relation between AQ score and N2pc amplitude ($F(1,185)=4.10, p=.044$).
- Participants with higher AQ scores show a reduced N2pc.

Discussion

This study was designed to look at how individual differences in autistic traits may be reflected in the N2pc. Thus, individual scores on the Autism Quotient (AQ) were examined in relation to N2pc Amplitude. Importantly, findings suggest that:

- Individual differences in autistic traits are reflected in the amplitude of the N2pc.
- However, results suggest that participants with higher AQ scores show a reduced N2pc, contrary to previous research by Dunn et al. (2016).

Differences seen in this study as compared to Dunn et al. may stem from a number of places including Dunn et al. using a smaller sample size, using the extreme ends of the population, and the task itself. The most likely explanation is in the tasks used. While Dunn et al. used a task with low perceptual load, the current study has a much higher perceptual load. Bayliss and Kritikos (2011) found stronger interference from distractors at high perceptual load among those with a higher AQ than those with lower AQ. The Dunn et al. task may not have exceeded the ability to parallel process for those with high AQ scores (parallel processing being theorized to be better in those with high AQ scores). In contrast, in the current task parallel processing may not have been possible, thus leading to greater distractor interference, reducing the overall N2pc. However, as this study did not look at the N2pc in relation to its component parts the N2pc_T and N2pc_D, future studies should clarify which aspects of attentional processing are reduced among those with high AQ scores.

Further Information

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