

Autistic-Like Behaviors, Social Personality Characteristics, and Neural Correlates of Face Perception in the General Population

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Background

FACE PERCEPTION is a critical social ability central to interpersonal interactions.

- The N170 is a face-sensitive ERP component measured over occipitotemporal scalp 170 ms after viewing faces.
- Experience with face perception is reflected in the amplitude and latency of the N170.
- Faces are more difficult to identify when presented upside down, and the N170 is larger and slower for upside down faces relative to upright faces.
- This *inversion effect* suggests that faces are processed configurally.

INDIVIDUALS WITH ASD show deficits in face perception and anomalous face-related ERPs.

- A reduced face inversion effect for individuals with ASD may stem from atypical developmental exposure secondary to diminished social motivation.

PERSONALITY DIFFERENCES associated with social motivation modulate ERP indices of face perception.

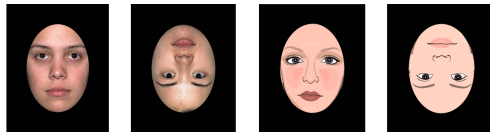
- Extreme extroverts show a prototypic N170 inversion effect.
- Extreme introverts fail to show an N170 inversion effect.

THE CURRENT STUDY investigates the relationship between neural response to faces and autistic-like traits in the general population.

Method

PARTICIPANTS: 35 typically developing adults were screened for the study. Based on Autism Quotient score (Minimum score: 4, Maximum score: 26, $M = 14.9$, $SD = 5.9$), EEG was analyzed for the 11 lowest scoring subjects (*Low-AQ*; score < 12) and the 11 highest scoring subjects (*High-AQ*; score > 17).

STIMULI: 60 faces in natural and cartoon face **condition** and in upright and inverted **orientation** (240 total). Targets included 25 faces shaded red.



MEASURES:

- Eysenck Personality Questionnaire – Revised, Extroversion subscale:** 12 yes/no items assessing social motivation.
- Autism Quotient (AQ):** A 40-item measure of autistic-like traits with five subscales: social skills, attention switching, attention to detail, communication, and imagination.

ERP DATA ACQUISITION AND PROCESSING:

- ERP recorded continuously at 250 Hz using EGI 128-channel sensor net.
- N170 windowed from 119–175 ms and averaged over six electrodes in each hemisphere (left: 58,59,64,64,69,70; right: 92,97,91,96,90,95).

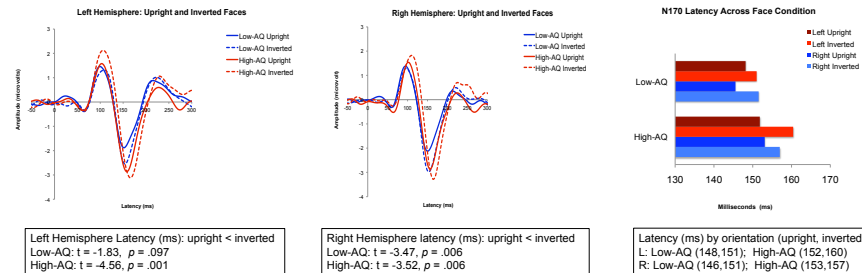
ANALYSES:

- Repeated measures analysis of variance (ANOVA)
- Within-subject factors: hemisphere (left, right), orientation (upright, inverted), and face condition (natural, cartoon).
- Between subject factor: group (Low- vs. High-AQ)

Results: N170 Response

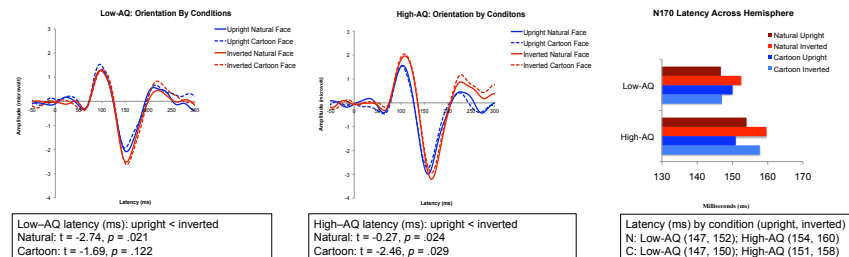
HEMISPHERE AND ORIENTATION EFFECTS ACROSS CONDITION: N170 LATENCY

Low-AQ group showed right lateralized inversion effect
High-AQ group showed bilateral inversion effect



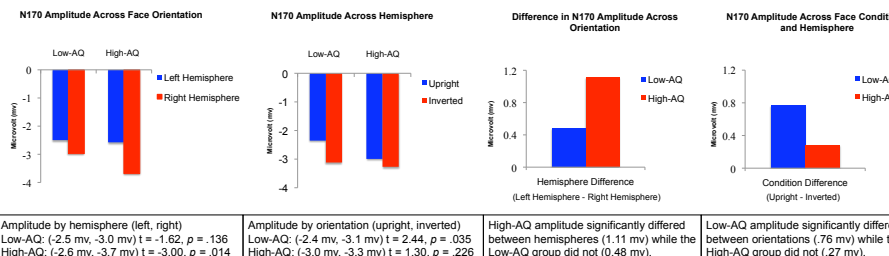
CONDITION AND ORIENTATION EFFECTS ACROSS HEMISPHERE: N170 LATENCY

Low-AQ group showed an inversion effect for natural faces
High-AQ group showed an inversion effect for both natural and cartoon faces



HEMISPHERE AND ORIENTATION EFFECTS ACROSS CONDITION: N170 AMPLITUDE

Low-AQ group showed greater inversion effect across hemisphere
High-AQ group showed greater lateralization across orientation



Results: Questionnaires

AUTISTIC-LIKE BEHAVIORS AND NEURAL RESPONSE TO FACES

- Correlations between AQ subscale scores and N170 amplitude and latency were examined for individuals with high levels of autistic-type behaviors
- Pearson product moment correlations with Bonferroni correction

•ATTENTION TO DETAIL SUBSCALE:

- Left hemisphere upright cartoon amplitude, $r = -.760$, $p = .048$
- Left hemisphere inverted natural face amplitude, $r = -.755$, $p = .040$

•IMAGINATION SUBSCALE:

- Right hemisphere inverted natural face latency, $r = .740$, $p = .050$

SOCIAL MOTIVATION AND AUTISTIC-LIKE BEHAVIORS

- EPQ Extroversion subscale negatively correlated with AQ, $r = -.597$, $p < 0.01$
- Lower extroversion scores were associated with more autistic-type traits

Conclusions

AUTISTIC-LIKE TRAITS relate to face processing as revealed by N170 differences between individuals scoring high or low on the AQ.

- Individuals with higher levels of autistic-type behaviors exhibited:
 - Slower but larger N170s to faces
 - Association between imagination and N170 latency to inverted natural faces (poorer imagination associated with shorter latency)
 - Association between attention to detail and N170 amplitude to upright cartoon and inverted natural faces (greater attention to detail correlated with decreased amplitude)
- Larger, slower face responses in individuals with higher autistic traits resemble a typical N170 inversion effect
- May reflect recruitment of additional resources, resulting in slower response but stronger signal
- Correlation with attention to detail may also reflect implementation of feature-based rather than configural processing strategy

FUTURE RESEARCH will compare neural responses to face and non-face stimuli in individuals with high and low levels of autistic-type traits. This will clarify the face specificity of differences observed in the current study.

References

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