

Background

- Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by primary difficulties in social function
- The N170 is a face-sensitive event-related potential (ERP) recorded over occipitotemporal scalp regions
- Delayed N170 latencies to upright faces are observed in ASD, reflecting less efficient face processing
- There is a lack of research examining how visual attention to specific facial features, measured via co-occurring eye tracking (ET), affects N170 latency delays

OBJECTIVES

- Present neutral faces to typically developing (TD) and ASD participants and cue participant attention to specific facial features
- Analyze the relationship between feature-specific N170 latencies and autistic traits

Methods

Participants

- Clinical and electroencephalography (EEG) data were collected from 8 ASD and 17 TD adults (Table 1)
- Self report measures:
 - Autism Spectrum Quotient (AQ), Broad Autism Phenotype Questionnaire (BAPQ), & Social Responsiveness Scale (SRS-2)

	n (Female)	Mean Age (SD)	WASI II (SD)	AQ (SD)	BAPQ (SD)	SRS-2 (SD)
ASD	8 (2)	25.3 (6.3)	116 (6.9)	22.3 (6.8)	119.6 (23.5)	67.6 (25.4)
TD	17 (14)	25.8 (4.3)	119.5 (17.5)	13.2 (6.7)	82.2 (18.1)	29.8 (13.4)

Table 1. Participant demographic and clinical data. ASD and TD participants were matched on age and IQ ($p > .05$). ASD participants had higher AQ, BAPQ, and SRS-2 scores than TD participants (all $ps < .05$)

Description of Stimuli

- Fixation crosshair (Figure 1)
 - Black crosshair on a gray background
 - Positioned corresponding to left eye, right eye, nose, or mouth
- Faces (Figure 2)
 - Three upright, neutral female faces
- Houses
 - Three house stimuli were used as non-social control stimuli



Figure 1. Crosshair cueing attention to the mouth (left), nose (middle left), right eye (middle right), and left eye (right)

Methods

Trial Structure

- Crosshair (500-650 ms), face or house stimulus (1000 ms), intertrial period (500-650 ms)

Experiment Structure

- 36 trials per block
- 12 blocks completed in total

EEG Data Acquisition and Collection

- Co-registered ET was used to monitor fixations during EEG acquisition
- EEG collected using a 128-channel HydroCel Geodesic Sensor Net
- ERP data were averaged over the right occipitotemporal region (electrodes 89, 90, 91, 94, 95, 96; Figure 3)

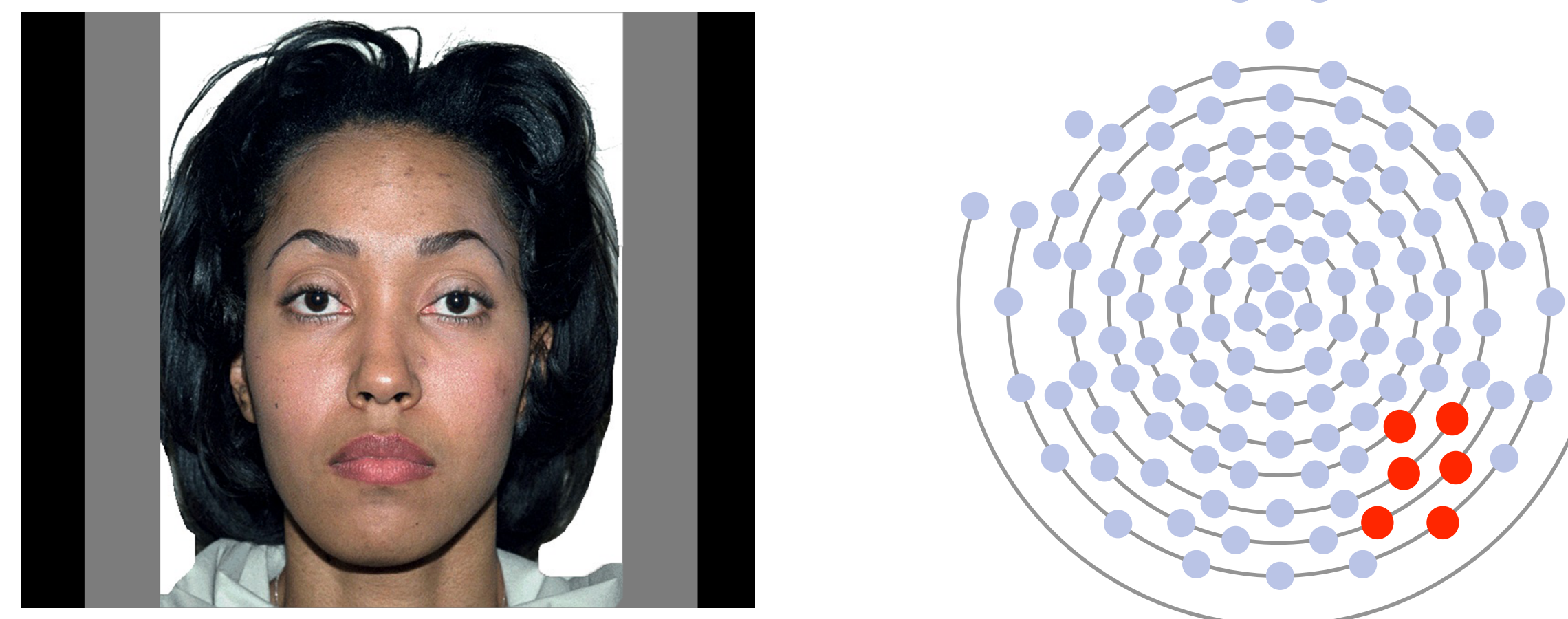


Figure 2. Face stimuli displaying neutral emotion (left) **Figure 3.** EEG electrode recording sites (electrodes 89, 90, 91, 94, 95, 96; right)

Results

- ASDs had longer N170 latencies than TDs at each of the four facial features (all $ps < .001$) (Figure 4)

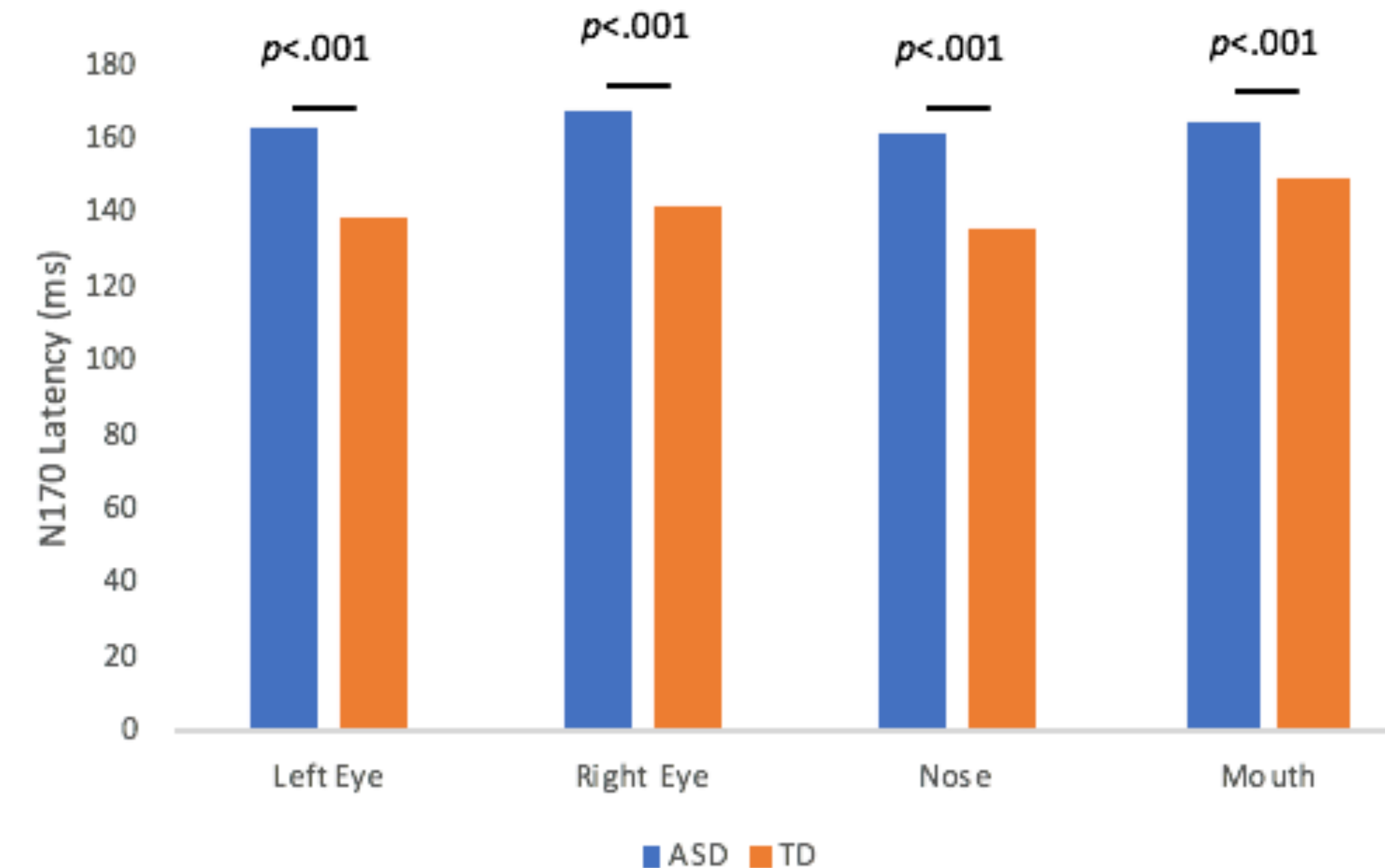


Figure 4. N170 latencies elicited by specific facial features in ASD (blue) and TD (orange) participants. At each facial feature, ASDs demonstrated longer N170 latencies than TDs ($ps < .001$). Within each diagnostic group, no differences in N170 latency emerged ($ps > .05$).

Results

- Within diagnostic groups no differences in feature-specific N170 latencies were observed
 - ASD: $F(3,5)=1.68$, $p=.29$
 - TD: $F(3,14)=1.05$, $p=.40$
- Across groups, N170 latencies to all four facial features significantly correlated with BAPQ and SRS-2 scores while only N170 latencies to left eye and right eye correlated with AQ scores (Table 2)
 - Left eye N170 latency most strongly correlated with AQ, BAPQ, and SRS-2 scores

	Autism Spectrum Quotient Total Score		Broad Autism Phenotype Questionnaire Total Score		Social Responsiveness Scale Total Raw Score	
	r	p-value	r	p-value	r	p-value
Left eye N170 latency	0.441	0.027*	0.532	0.006**	0.563	0.003**
Right eye N170 latency	0.409	0.043*	0.458	0.021*	0.524	0.007**
Mouth N170 latency	0.385	0.058	0.464	0.019*	0.553	0.004**
Nose N170 latency	0.373	0.066	0.426	0.034*	0.488	0.013*

Table 2. Summary of correlations between N170 latency and ASD symptomatology according to the AQ, BAPQ, and SRS across diagnostic groups. * indicates $p < .05$, ** indicates $p < .01$

Conclusions

- Consistent with prior literature, ASD participants had longer N170 latencies than TD controls
- No facial feature differences in N170 latency emerged within diagnostic groups
- Across groups, left eye latency exhibited largest correlations with autistic symptomatology

TAKEAWAYS

- N170 latency delays in ASD are evident irrespective of visual attention to specific facial features
- These data suggest the importance of considering visual attention in EEG studies of face perception

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