

Background

- Repetition suppression** refers to diminished neural response to repeated stimuli.
- Reduced repetition suppression has been observed in autism across sensory modalities, experimental methods, and stages of development.^{1,2,3}
- Reduced repetition suppression is associated with increased autistic traits.²
- No studies have examined repetition suppression of the N170, a marker of early-stage face processing, in autistic children.

Hypotheses

- Neurotypical (NT) but not autistic children will show reduced N170 amplitude across trials.
- Autistic children with attenuated repetition suppression will display more social and sensory autistic features.

Methods

Autism Biomarkers Consortium for Clinical Trials

Large ($N = 399$), multi-site study evaluating a battery of candidate EEG and eye-tracking measures in autistic and neurotypical children ages 6-11 across multiple timepoints.

Participant Demographics

Clinical Diagnosis	N	Sex (M, F)	Age (SD)	IQ (SD)
NT	119	83, 36	8.5 (1.6)	115.1 (12.6)
ASD	280	215, 65	8.6 (1.6)	98.6 (18.1)

Experimental Paradigm

- Stimuli: 72 upright neutral faces and 72 houses, acquired in six blocks.
- Inclusion: ≥ 20 artifact-free trials.
- Primary dependent variable: N170 peak amplitude.



Acquisition

- Electroencephalogram (EEG) was recorded at 1000 Hz with a 128-channel HydroCel Geodesic Sensor Net.
- N170 peak amplitude was extracted from electrodes over the right occipitotemporal scalp.

Methods

Statistical Analyses

- Linear mixed-effects models tested the main and interactive effects of **repetition** (first vs. last half of trials), **stimulus category** (faces, houses), and **diagnostic group** (autistic, NT) on N170 amplitude.
- Secondary analyses used the P100-N170 peak-to-peak difference as the dependent variable to assess the potential confound of attention.
- Linear regressions examined associations between magnitude of repetition effects with social and sensory traits measured by the Social Responsiveness Scale, Second Edition (SRS-2) and the Pervasive Developmental Disorder Behavior Inventory (PDDBI).

Results

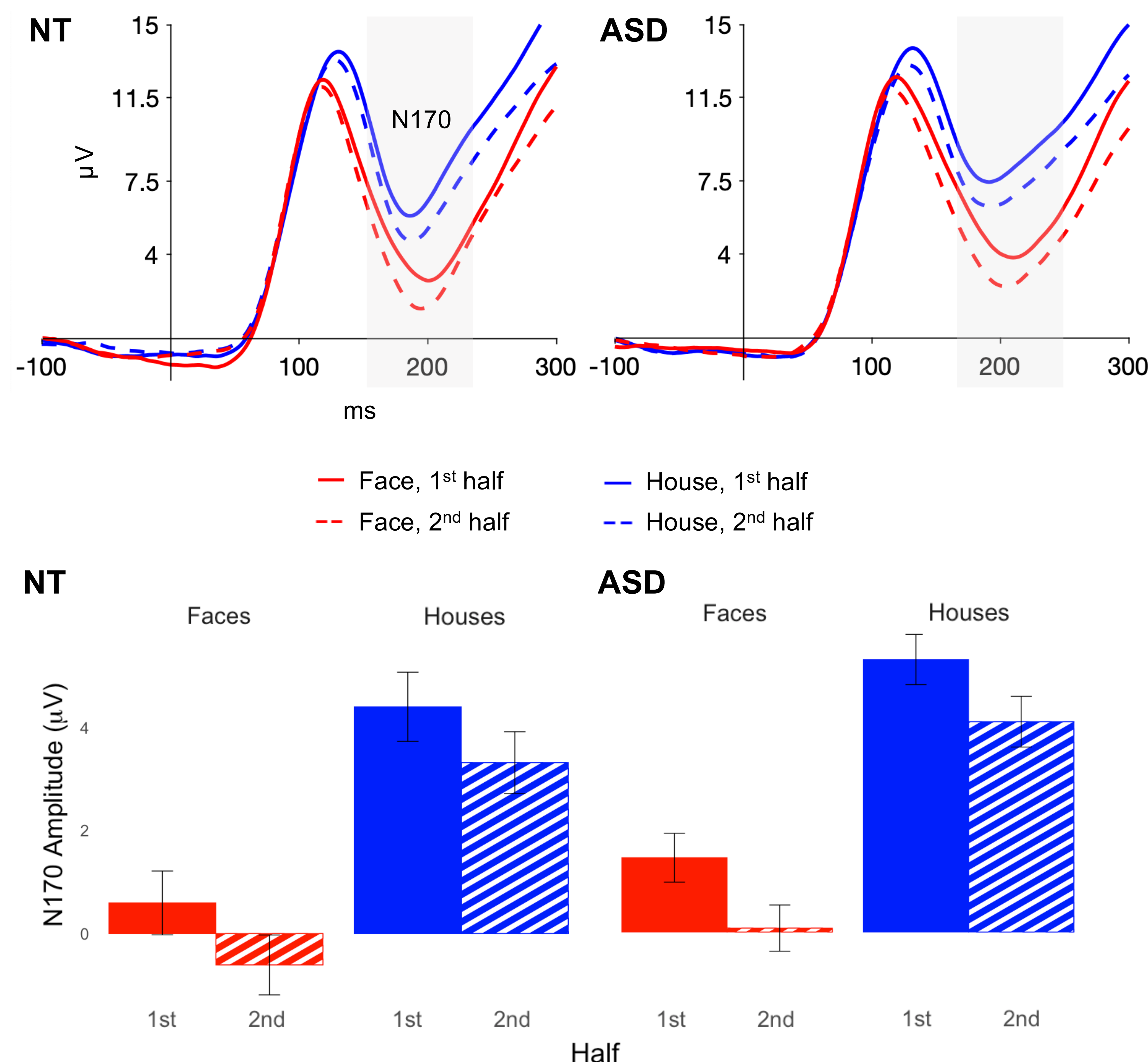


Figure 1. N170 ERP waveforms (top) and mean amplitude (bottom) for NT ($n = 108$) and autistic ($n = 193$) participants in the first and second half of trials for faces and houses.

Results

There were significant main effects of repetition and stimulus category, but not diagnosis.

- N170 amplitude increased from the first to the second half of trials [$F_{1,828.71} = 27.7$, $p < .001$].
- N170 amplitude was greater for faces compared to houses [$F_{1,273.56} = 27.7$, $p < .001$].

No interaction terms were significant.

- Change in N170 amplitude between the first and second half did not differ between faces and houses [$F_{1,829.38} = 0.025$, $p = 0.875$] or autistic and NT children [$F_{1,828.71} = 0.088$, $p = .767$].

Among autistic children, greater changes in N170 amplitude showed modest correlations with:

- Higher sensory symptoms (PDD-BI Sensory subscale, $r = .18$, $p < .05$).
- Lower social cognition (SRS-2, $r = .18$, $p < .05$).
- Lower social motivation (SRS-2, $r = .16$, $p < .05$).

Conclusions

- Both autistic and NT children showed **repetition enhancement**—an increase in N170 amplitude over time—rather than the hypothesized suppression.
- Repetition enhancement may reflect **an early, temporary increase in encoding effort** related to the formation of novel neural representations (i.e., there may have been insufficient trials to induce suppression).⁴
- Ongoing analyses will examine changes in N170 amplitude based on whether the preceding stimulus was the same or different category to rule out between-block attention differences as a confound.

References

- D'Mello, et al. (2023). Diminished repetition suppression reveals selective and systems-level face processing differences in ASD. *The Journal of Neuroscience*, 43(11), 1952-62.
- Jamal, et al. (2021). Reduced sensory habituation in autism and its correlation with behavioral measures. *Journal of Autism and Developmental Disorders*, 51(9), 3153-64.
- Webb, et al. (2010). Toddlers with elevated autism symptoms show slowed habituation to faces. *Child Neuropsychology*, 16(3), 255-78.
- Muller, et al. (2013). Repetition suppression versus enhancement—it's quantity that matters. *Cerebral Cortex*, 23(2), 315-22.

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