

The Roles of Semantic Relatedness and Narrative Structure in Visual Narratives in Autism Spectrum Disorder

BACKGROUND

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by a range of persistent deficits in social interaction and social communication across diverse contexts, including both verbal and nonverbal communication, and restrictive or repetitive behaviors and interests [1].

Language difficulties are common in ASD, particularly in higherlevel language processes like narrative comprehension.

Visual narratives, like linguistic narratives, require the combination of semantic relatedness and a visual narrative grammar or structure to establish context across a sequence of images [2].

The N400 ERP component, which shows a reduced amplitude to semantically-related stimuli, is an established index of semantic processing and integration [3].

The Left Anterior Negativity (LAN) component reflects syntactic violations and shows structural processing in the absence of semantics [4].

Some studies suggest deficits in semantic processing in ASD are language-specific, finding visuo-semantic processing to be intact [5]. No studies have investigated visual narrative grammar in ASD.

This study examines the contributions of semantic relatedness and narrative structure to visual narrative comprehension in ASD.









RESULTS



4 (condition) x 3 (site) x 3 (laterality) x 2 (group) ANOVAs in 3 time windows (300-400, 400-600, 600-900 ms) showed no main effect of group or group*condition interactions.

Although not statistically significant, Scrambled-Semantic and Scrambled-Structural difference waves show some facilitation of processing from semantics and narrative structure in isolation for the TD group but not the ASD group.



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METHODS

NORMAL: Both semantic relatedness and narrative structure







SEMANTIC: Semantic relatedness but no narrative structure



STRUCTURAL: No semantic relatedness but narrative structure







Story coherence rated most accurately for Normal, Scrambled, and Structural; least accurate for Semantic.

Scrambled-Structural difference waves of N400 amplitude plotted on topographic maps

Participants

lists)

5.3

processing.

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10 adults with ASD (M = 24 years old); 7 male, 3 female 10 typically-developing (TD) participants (M = 22 years old); 6 male, 4 female

Stimuli and Procedure

- Participants viewed four conditions of comic strips panel-by panel (60 strips per condition, randomly sequenced and counterbalanced in four
- Behavioral response accuracy and reaction time data collected for each strip ("Did that make sense? YES or NO")
- EEG Data Acquisition and Preprocessing EEG data collected using 128-channel Geodesics Sensor nets and NetStation
- Data was bandpass filtered from 0.1-50 Hz and segmented into epochs which were time-locked to the stimulus onset

CONCLUSIONS

- Data collection is ongoing, but preliminary findings show similar patterns in ERP waveforms and N400 effects in both TD and ASD groups to the replicated study [2].
- Groups did not differ in N400 amplitude across condition. A LAN is not observed at this time, likely due to the exploratory sample size.
- Currently, there are no main effects of group or group*condition interactions. However, Scrambled minus Structural difference waves and topography for the TD and ASD groups show varying levels of activation for isolated structural
- Results suggest that a combination of semantic relatedness and narrative structure is necessary for visual narrative comprehension; TD and ASD individuals process both components similarly.

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