Are autistic traits associated with compromised audiovisual integration of socially relevant information?

James Thomas & Maggie Shiffrar
Rutgers University, Newark

Introduction

• Typical observers are more sensitive to human motion when paired with meaningfully related sounds. 1,2
• Individuals with ASD may integrate auditory and visual information differently from typical observers. 3,4, but see 5,6
• We examined whether the ability to detect meaningfully related audiovisual human motion is associated with the magnitude of autistic traits in typically developed individuals.
• The results indicate that sensitivity to meaningfully related AV human motion varies as a function of the observer’s autistic traits. As autistic traits increase, the benefit for meaningfully related sounds on visual sensitivity to human motion decreases.

Background

• Meaningfully related sounds increase sensitivity to human motion in typical observers. 1,2
• Compromised in Autism Spectrum Disorders. 7,8,9

Biological Motion Perception

• Observers with ASD are less sensitive to human motion than typically developed individuals. 12
• Sensitivity to human motion depicted in point-light displays varies as a function of the magnitude of autistic traits in typical observers. 13

Auditoryvisual integration in ASD disorders

• Some studies report preserved auditoryvisual integration. 4,5,6 Others report that auditoryvisual integration is impaired in ASD. 14,15

Rationale & Predictions

1) Meaningful sounds enhance sensitivity to visually presented human motions.
2) Audiospatial integration may be impaired in ASD disorders.
3) Therefore, sensitivity to meaningfully related audiovisual human motion may vary as a function of the observer’s autistic traits.

Research Question

• Are autistic traits are associated with the integration of auditory and visual cues to human actions in typically developed adults?

Hypothesis

• Sensitivity to meaningfully related audiovisual human walking motion will vary as a function of the observer’s autistic traits, while sensitivity to meaningfully unrelated but visually similar displays will not.

Methods

• 83 typically developed participants from Rutgers University
• 37 heard footstep sounds (meaningfully related)
• 46 heard frequency scrambled footstep sounds (control)
• Point-light walker detection task
• ½ movies – spatially coherent point-light walker + mask
• ½ movies – spatially scrambled point-light walker + mask
• Movie duration: 3000ms.
• Sounds were presented over speakers.
• Participants indicated the perceived presence or absence of coherent human motion in each display with a key press.
• Participants completed the Autism Quotient (AQ), a measure of autistic traits. 14

Results

• Pearson correlations conducted for footstep and scrambled footstep groups.
• Significant negative correlation between accuracy and AQ for participants who heard footsteps, r = -.368, n = 37, p = .025.
• No correlation between accuracy and AQ for participants who heard scrambled footsteps, r = -.105, n = 46, p = .486.

Discussion

• We observed a negative correlation between autistic traits in typical observers and the ability to detect human motion in the presence of meaningfully related footstep sounds.
• Sensitivity to meaningfully-related audiovisual human motion was associated with the magnitude of autistic traits in typical observers; sensitivity to meaningfully unrelated audiovisual human motion was not.
• In typical observers, as autistic traits increase, sensitivity to meaningfully related auditory biological motion cues decreases.
• These results suggest that the multisensory integration of meaningfully-related audiovisual information may be compromised in ASD disorders.
• These results may have implications for the social capabilities of individuals with ASD.
• Social capabilities are constrained by one’s ability to integrate cues that are meaningfully related. Such abilities may be compromised in ASD.

References