Multisensory Integration and Autistic Traits

Sébastien A. Lauzon[1,2], Samantha E. Schulz[1,2], Zack I. Cohen[1,2], Ryan A. Stevenson[1,2]

[1]Department of Psychology, University of Western Ontario; [2]Brain and Mind Institute, University of Western Ontario

Background

Issues in sensory processing are very common in autism spectrum disorder (ASD)

One area of difficulty is multisensory integration (MSI), or integrating multiple pieces of sensory information into a single, unified percept

These issues are nearly universally found when processing social or linguistic information, but it is less clear with simple, non-social stimuli

Through the use of well-established paradigms, we aim to see whether multisensory integration of non-sociolinguistic stimuli is related to ASD traits in a typically-developing (TD) population

Is multisensory integration of non-social stimuli related to autistic traits?

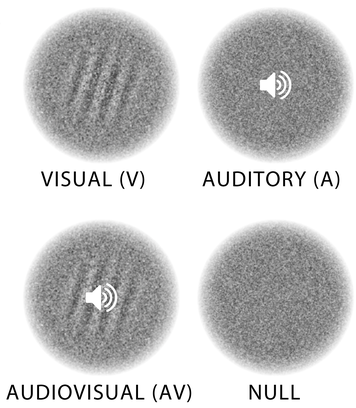
Methods

Participants:

N	Males	Females	Age
64	32	32	18.44 (1.08)

Stimuli: Gabor patches (in visual white noise) and auditory pure tones (in auditory white noise)

Stimuli were individualized for each participant using a unimodal detection task. The stimuli used was their 60% detection threshold



Task: Detect Gabor patch or auditory tone in white noise

Trials: 80 V, A, and AV, and 240 null
(all in randomized order)

Analysis & Hypothesis

Baseline: Auditory and visual information processed independently, calculated as:

$$pAV_{acc} = A_{acc} + V_{acc} - (A_{acc} * V_{acc})$$

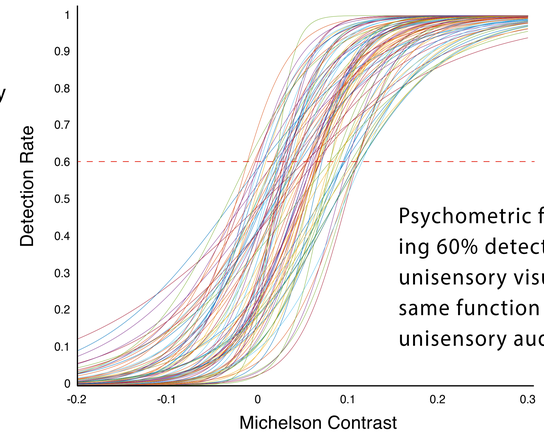
Multisensory enhancement (ME): To determine the magnitude of ME, we subtracted the predicted AV accuracy rate by the observed accuracy rate:

$$ME = AV_{acc} - pAV_{acc}$$

We then ran correlations between ME and questionnaires assessing ASD traits:

- General autistic traits (Autism Spectrum Quotient & Broad Autism Phenotype Questionnaire)
- Social abilities (Multidimensional Scale of Social Competency & Social Responsiveness Scale)
- Sensory issues (Sensory Profile 2 & Sensory Perception Quotient)
- Restricted and repetitive behaviours (Repetitive Behaviours Questionnaire)

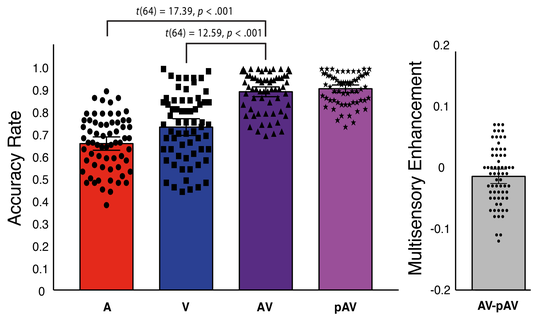
Hypothesis: We predict that individuals with higher autistic traits will exhibit less multisensory enhancement

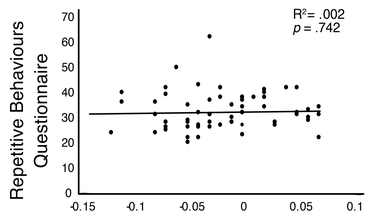


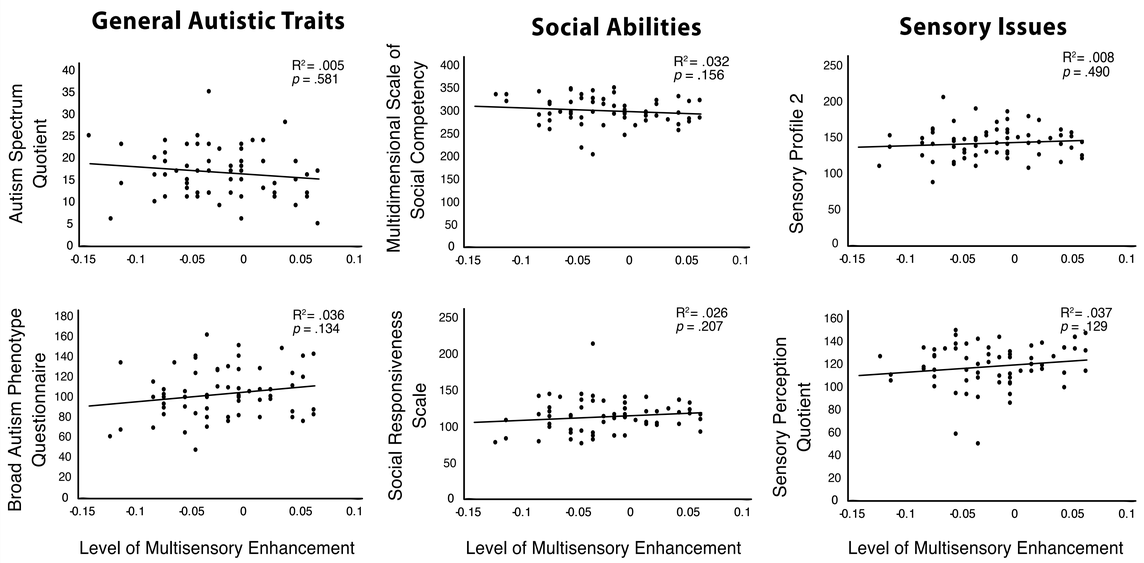
Psychometric function depicting 60% detection rates for the unisensory visual task. The same function was fit for the unisensory auditory task.

Results

No ME was found at the group level, $t(64) = .99$, $p = .324$







No significant correlations were found between multisensory enhancement and any of the questionnaires assessing autistic traits

R^2 values showed that level of multisensory enhancement in simple non-social, non-liguistic stimuli does not predict the magnitude of ASD traits

Discussion

1) Accuracy for multisensory trials was greater than unisensory A and V trials but not the predicted AV accuracy, assuming independent A and V processing

2) No significant relationship between ME of simple, non-social sensory information and autistic traits

3) Suggests that issues in MSI in ASD may be restricted to social or linguistic information, which supports previous research

4) However, there are potential caveats to this study:

- Ceiling effects: our choice of a 60% detection (as opposed to a lower) threshold may have decreased possibility of seeing ME
- In TD individuals, there may be restricted range of trait severity
- Lack of relationship with questionnaires may be due to ME not being observed or restricted range of questionnaire data

Multisensory integration of non-social stimuli is not related to autistic traits and symptomatology

Contact: slauzon6@uwo.ca

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