

# Sensory Thresholds as a Predictive Measure of Autism-Related Social Difficulties

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## Background

One of the two diagnostic domains of Autism Spectrum Disorder (ASD) is a deficit in social communicative.

Sensory processing abnormalities have been noted since the first description of the disorder (Kanner, 1943).

In ASD, it is proposed that low-level sensory processing abnormalities lend to atypical cognitive representations of the world (Baum, Stevenson, & Wallace, 2015). We propose that this pathway is implicated in atypical socialness as seen in ASD.

**Do sensory sensitivities correlate with ASD-related social difficulties?**

## Methods

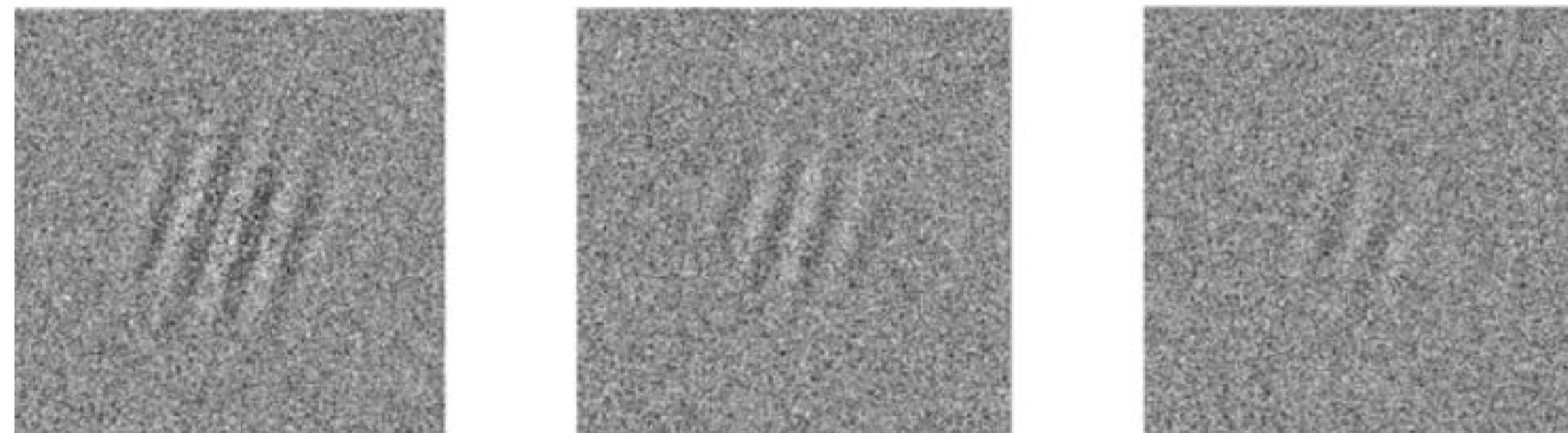
### Participants:

51 typically developed (TD) undergraduates, data collection ongoing. Normal or corrected-to-normal hearing and vision.

### Stimuli/Task:

Auditory Detection Task – Beeps of 880 Hz at various dBs (42.5-65) embedded within white noise (65 dB).

Visual Detection Task - Gabor patches at various contrast luminance levels embedded in white noise, as seen below:

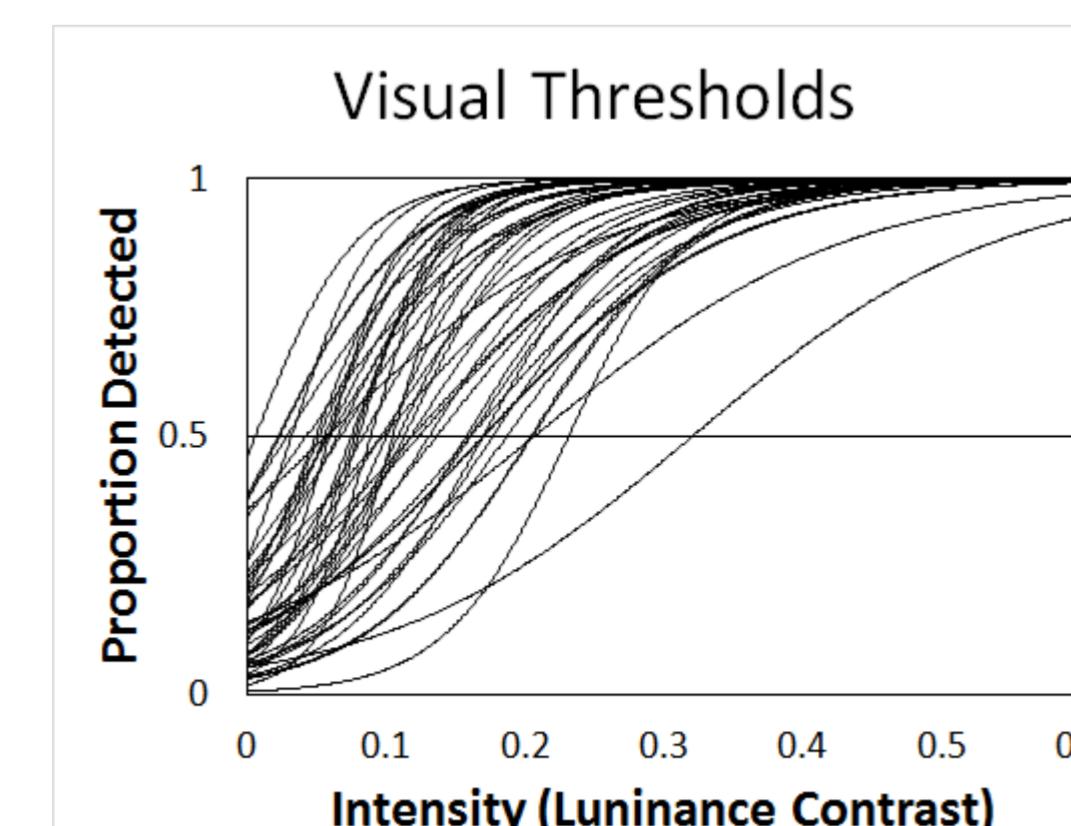
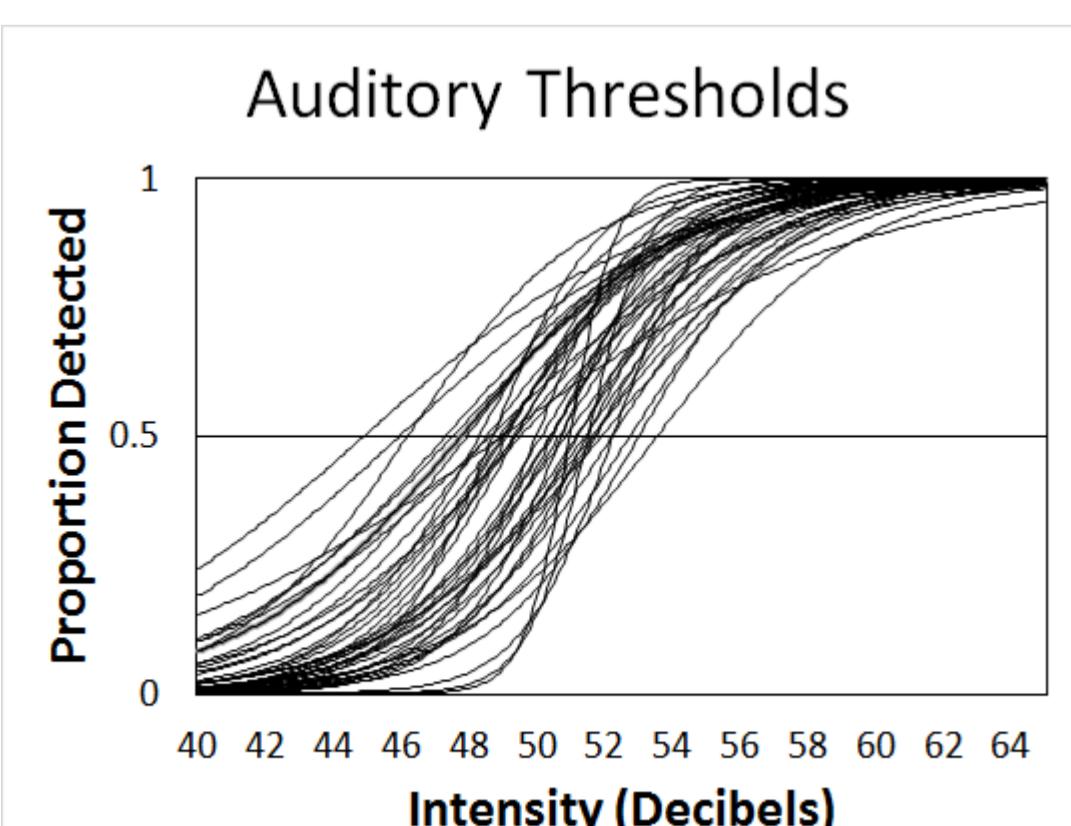


Participants were instructed to press the space bar as quickly and accurately as possible on trials where they heard a beep or saw the grating/patch of lines embedded in the noise.

### Questionnaires:

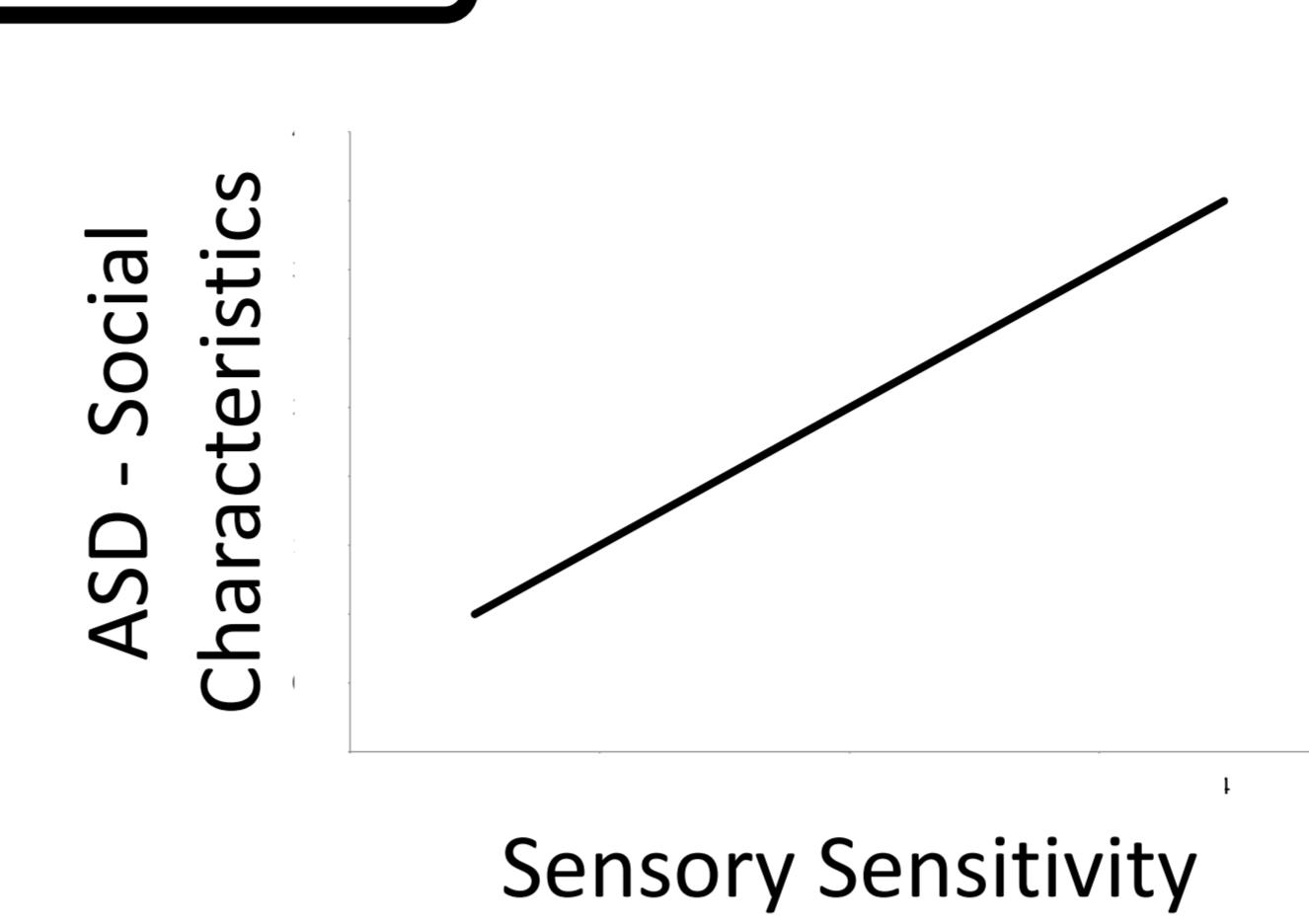
Participants completed 3 questionnaire measures: The Broad Autism Phenotype Questionnaire (BAPQ); The Social Responsiveness Scale (SRS) - Adult; and, The Multidimensional Social Competence Scale (MSCS).

Analysis: Detection rates were calculated for each signal-to-noise ratio and fit with a psychometric curve. 50% threshold were extracted, with sensory sensitivities calculated as 1/threshold.



## Hypotheses

- 1) Higher auditory and visual sensory sensitivity (i.e. low sensory threshold) will positively correlate with social deficits as seen in ASD.
- 2) Exploratory analysis to determine which questionnaire measures and respective sub-scales correlate strongest to sensory sensitivity.

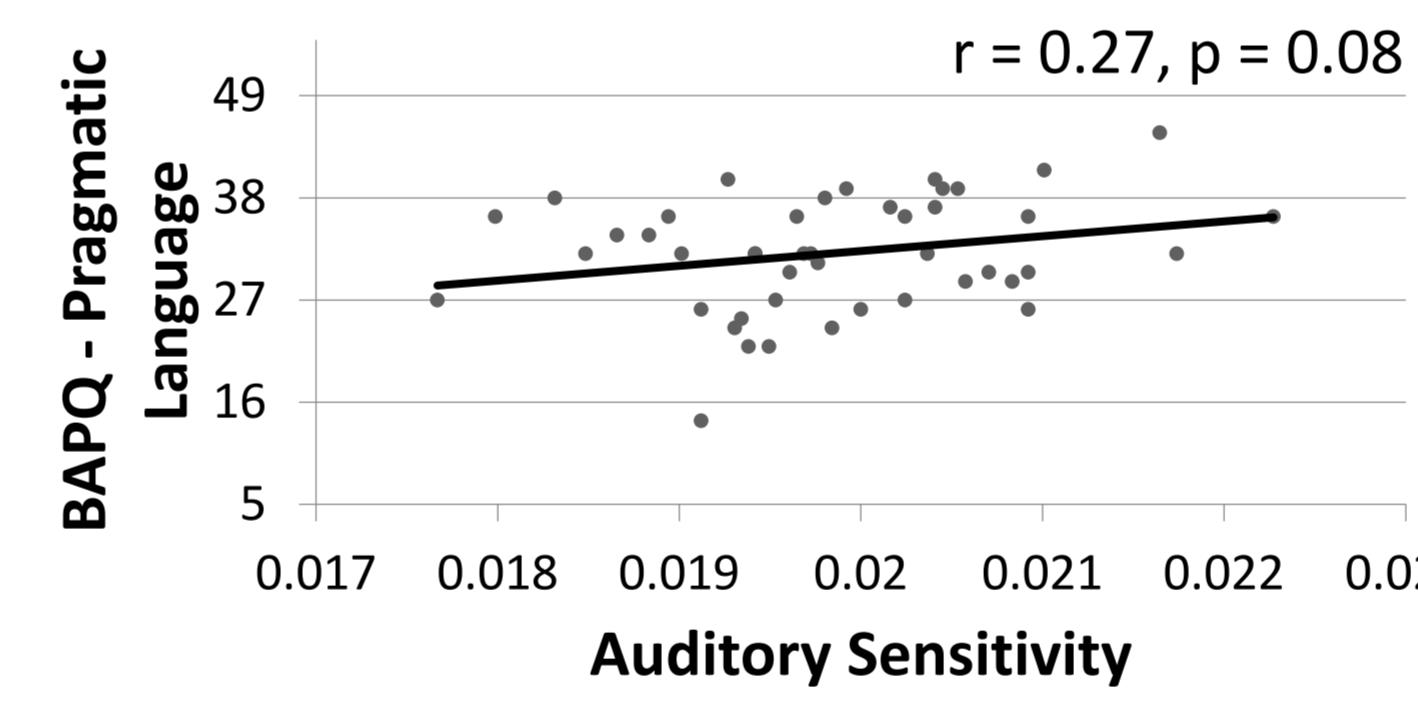
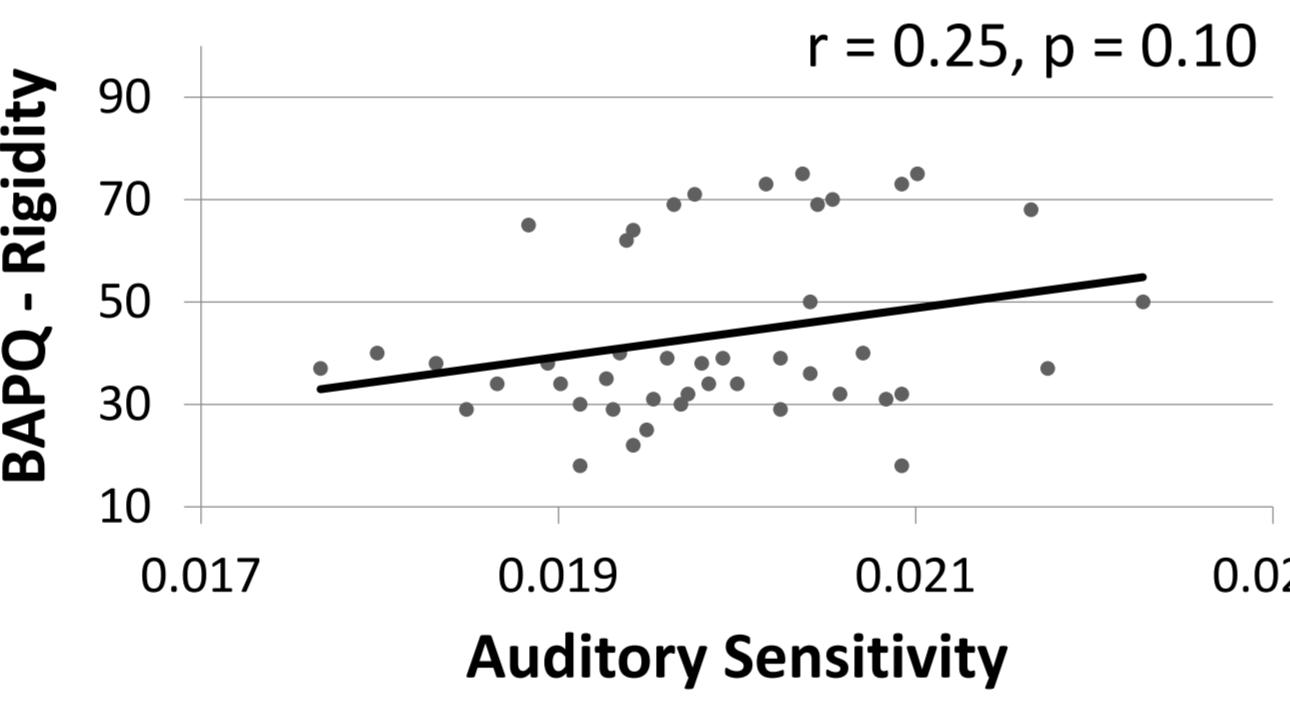
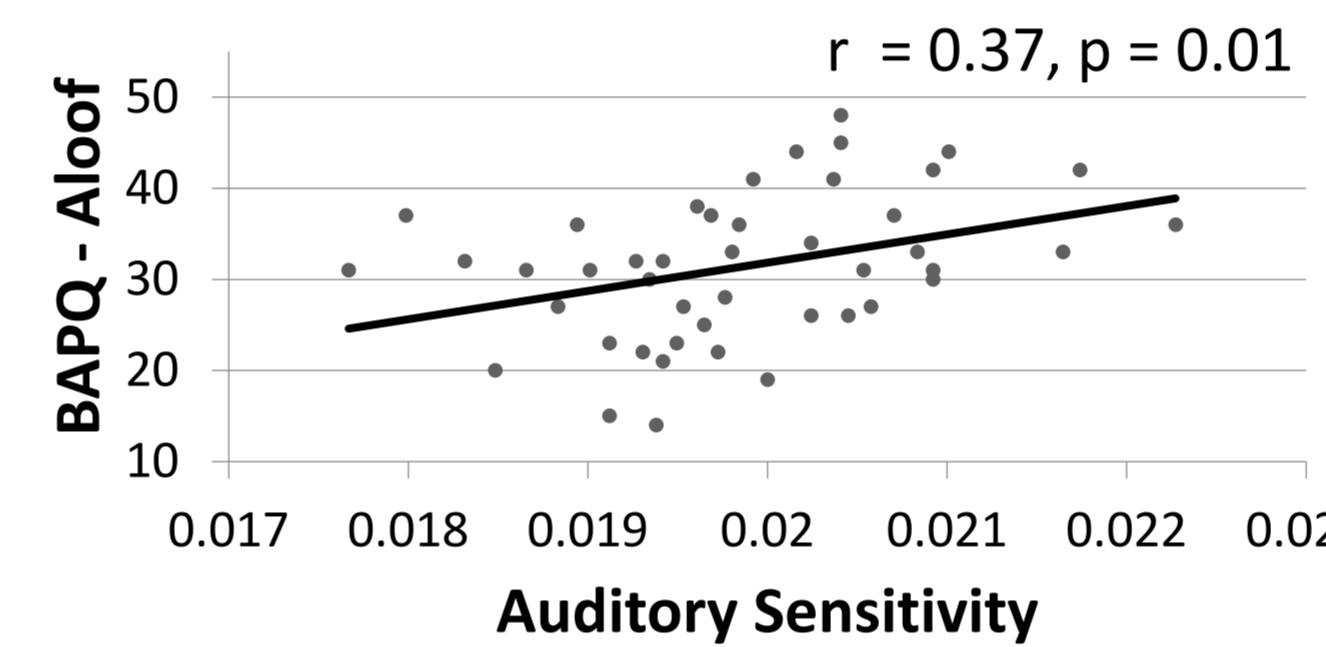
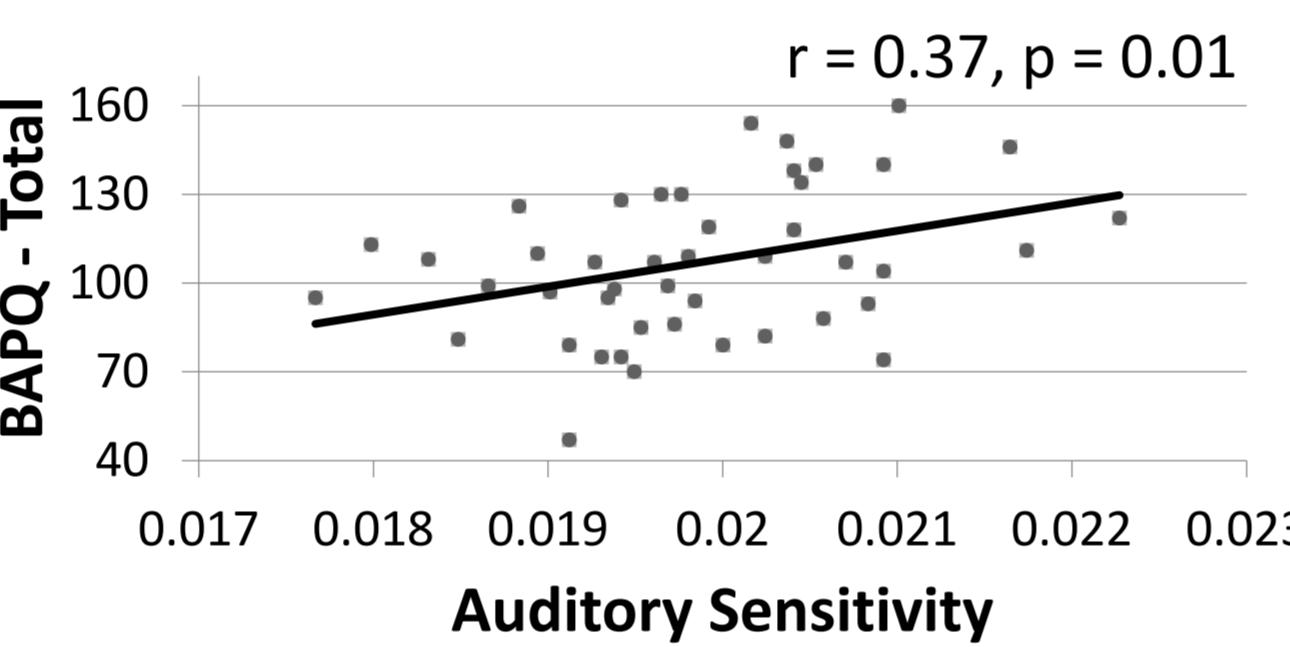


## Results

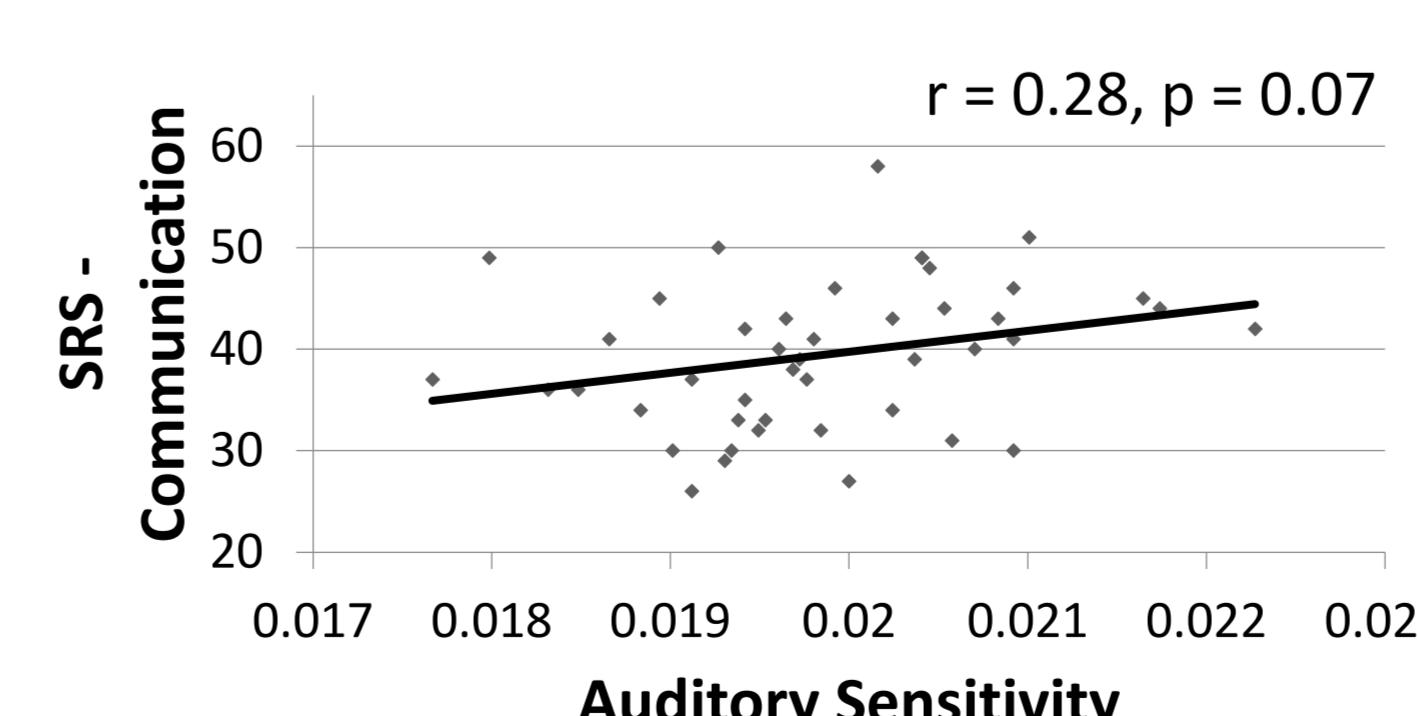
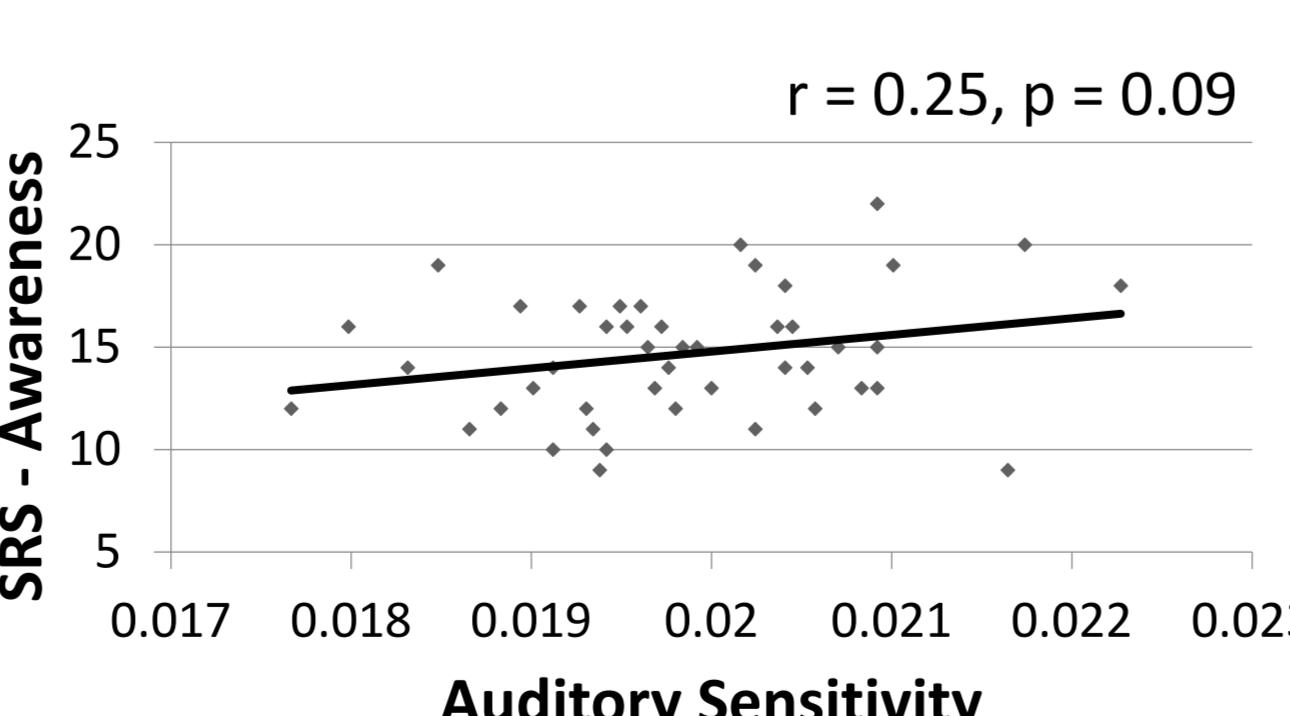
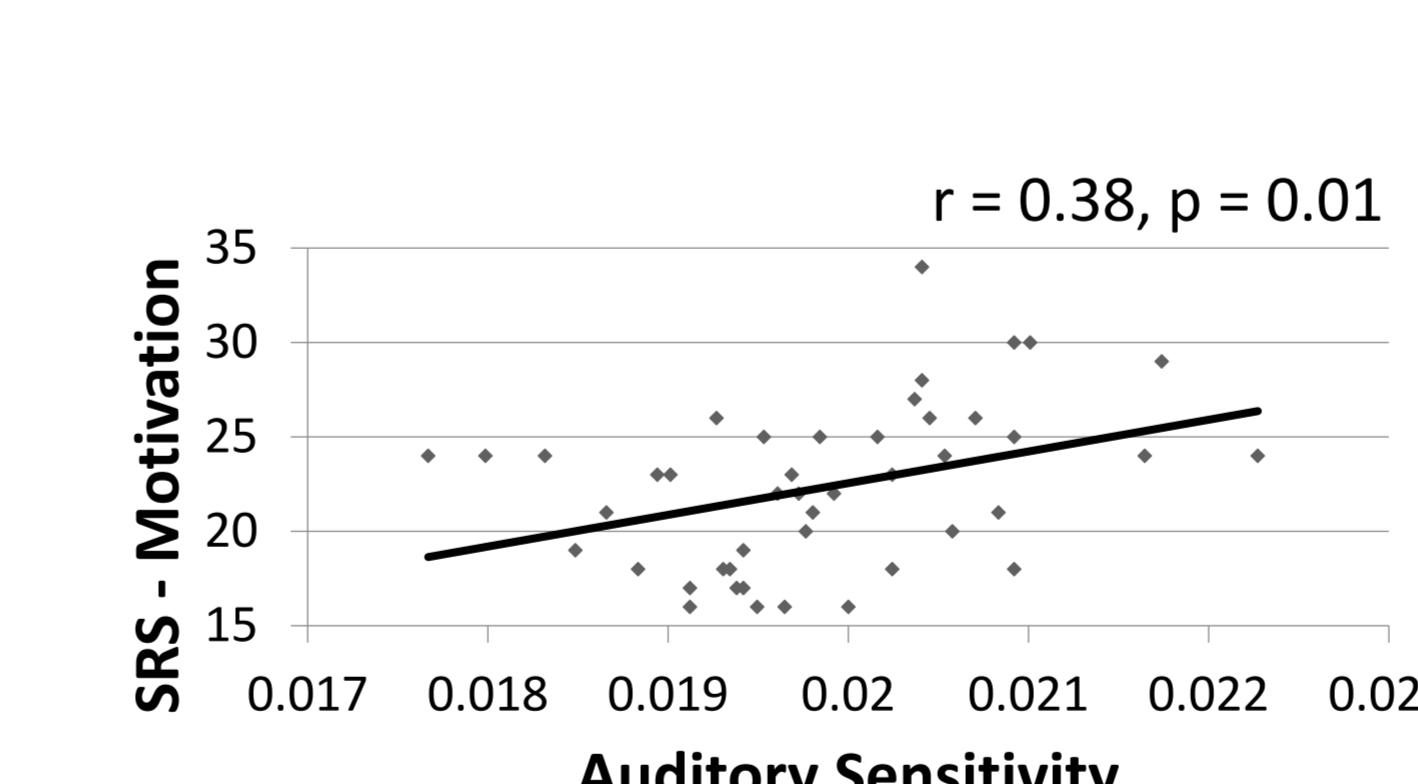
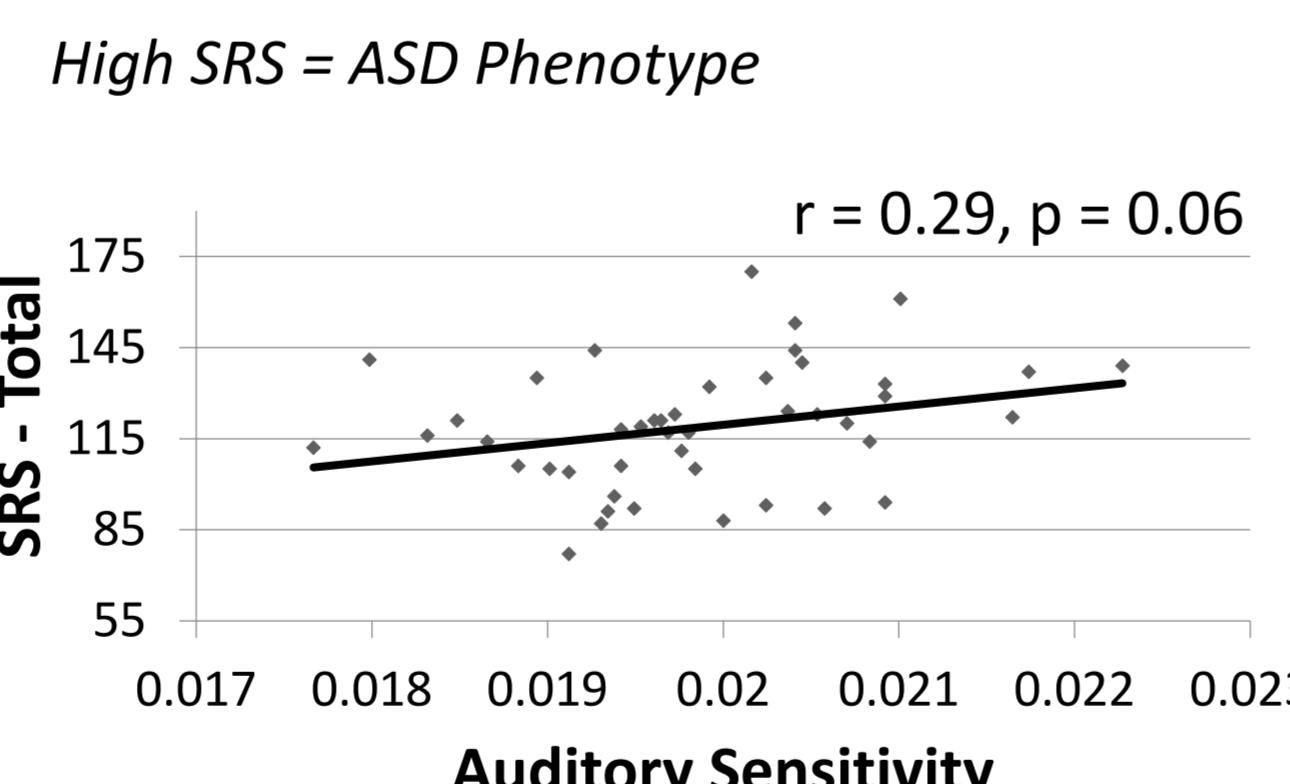
A 2-tailed correlation analysis was conducted between sensory sensitivities and total scores on each questionnaire, as well as subscales.

### Auditory Sensitivity Correlated to ASD-Traits (BAPQ):

High BAPQ = ASD Phenotype



### Auditory Sensitivity Correlated to ASD-Related Social Difficulties (SRS):

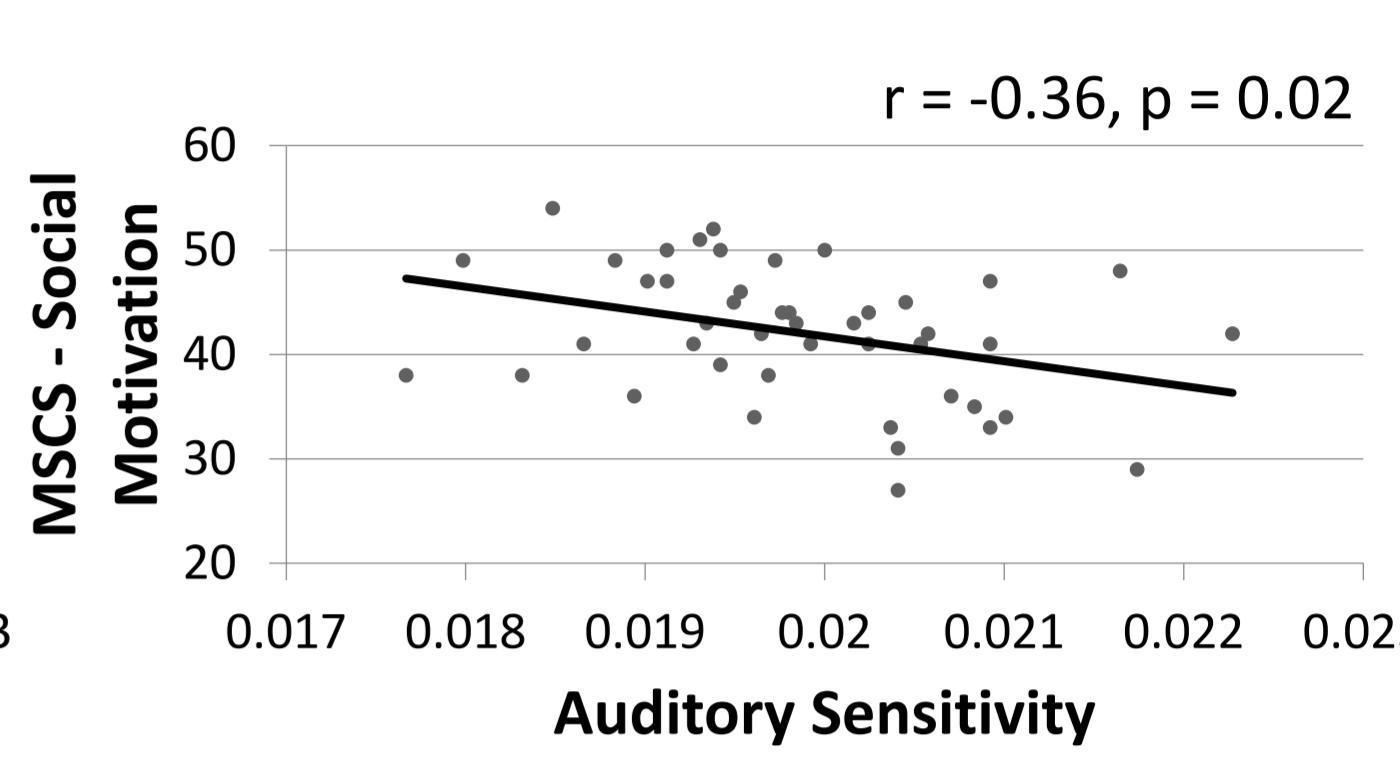
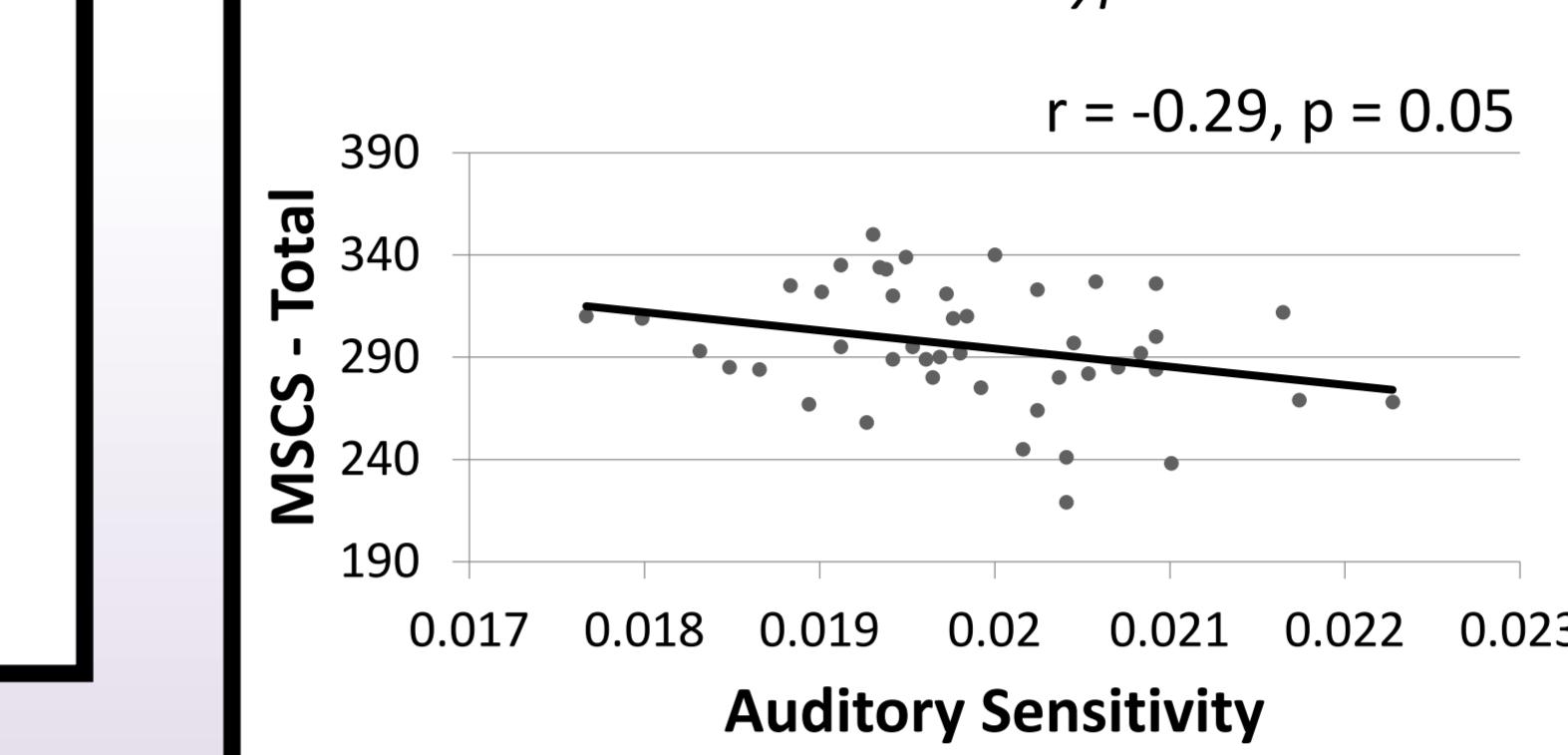


The Social Cognition and Autistic Mannerisms subscales of the SRS did not approach significant correlations with auditory sensitivity.

## Results

### Auditory Sensitivity Correlated to ASD-Related Social Difficulties (MSCS):

Low MSCS = ASD Phenotype



The remainder of the MSCS subscales did not approach significant correlations with auditory sensitivity.

**Visual Sensitivity:** No significant correlations.

## Discussion

**Individuals with more ASD-related social traits exhibited higher auditory sensitivities.**

Auditory sensitivity was widely correlated with ASD traits, suggesting a strong link between sensory symptoms and more canonical ASD symptomatology.

Specific to social measures, auditory sensitivity was correlated with both full-scale measures of social difficulties, the SRS and the MSCS.

On both the SRS and the MSCS, auditory sensitivity was correlated with subscales of *Social Motivation*, a consistency across measures that highlights this as a possible area of future inquiry.

Some of the social difficulties associated with ASD, particularly in the area of *Social Motivation*, may be the result of a developmental cascade beginning with improper sensory sensitivities.

It is known that individuals with ASD respond differently to different stimuli and frequencies; this may explain the lack of significant results with regard to visual sensitivities. Other frequencies of visual stimuli or different tasks may yield significant results in future research.

## References

Baum, S.H., Stevenson, R.A., & Wallace, M.T. (2015). Behavioural, perceptual, and neural alterations in sensory and multisensory function in autism spectrum disorder. *Progress in Neurobiology*, 134, 140-160.

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child*, 2, 217-250. *Journal of Autism and Developmental Disorders*, 19, 363-387.

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