

The Role of Anxiety Disorders in Understanding the Neurobiology of ASD

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*Disclosure: Shire Pharmaceuticals

Overview

- How Affective Neuroscience Informs ASD Neuroscience
 - Anxiety Predicting Amygdala Function/Structure in ASD
 - Future Directions and Considerations
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The Importance of Affective Neuroscience in ASD

- Take-home message: we have a lot to learn from the fact that anxiety and ASD share overlapping neural systems
 - Consideration of emotion may prove critical to understanding ASD heterogeneity
 - Biological markers may be an important adjunct to self/parent report in tracking anxiety symptoms in ASD
 - Most of the work in this area is ahead of us
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The Many Manifestations of Anxiety

Journal of Behavioral Assessment, Vol. 6, No. 4, 1984

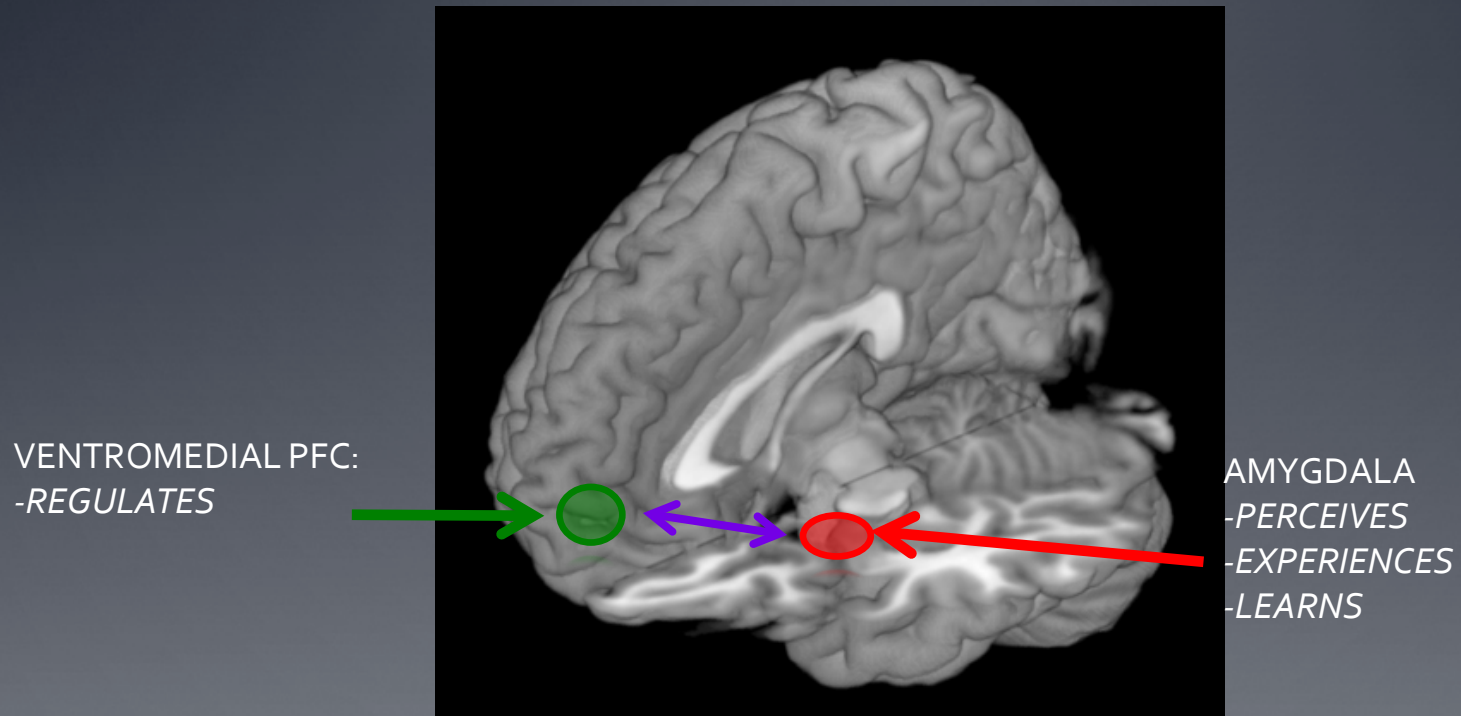
Affective Information Processing and the Assessment of Anxiety

Peter J. Lang¹ and Bruce N. Cuthbert¹

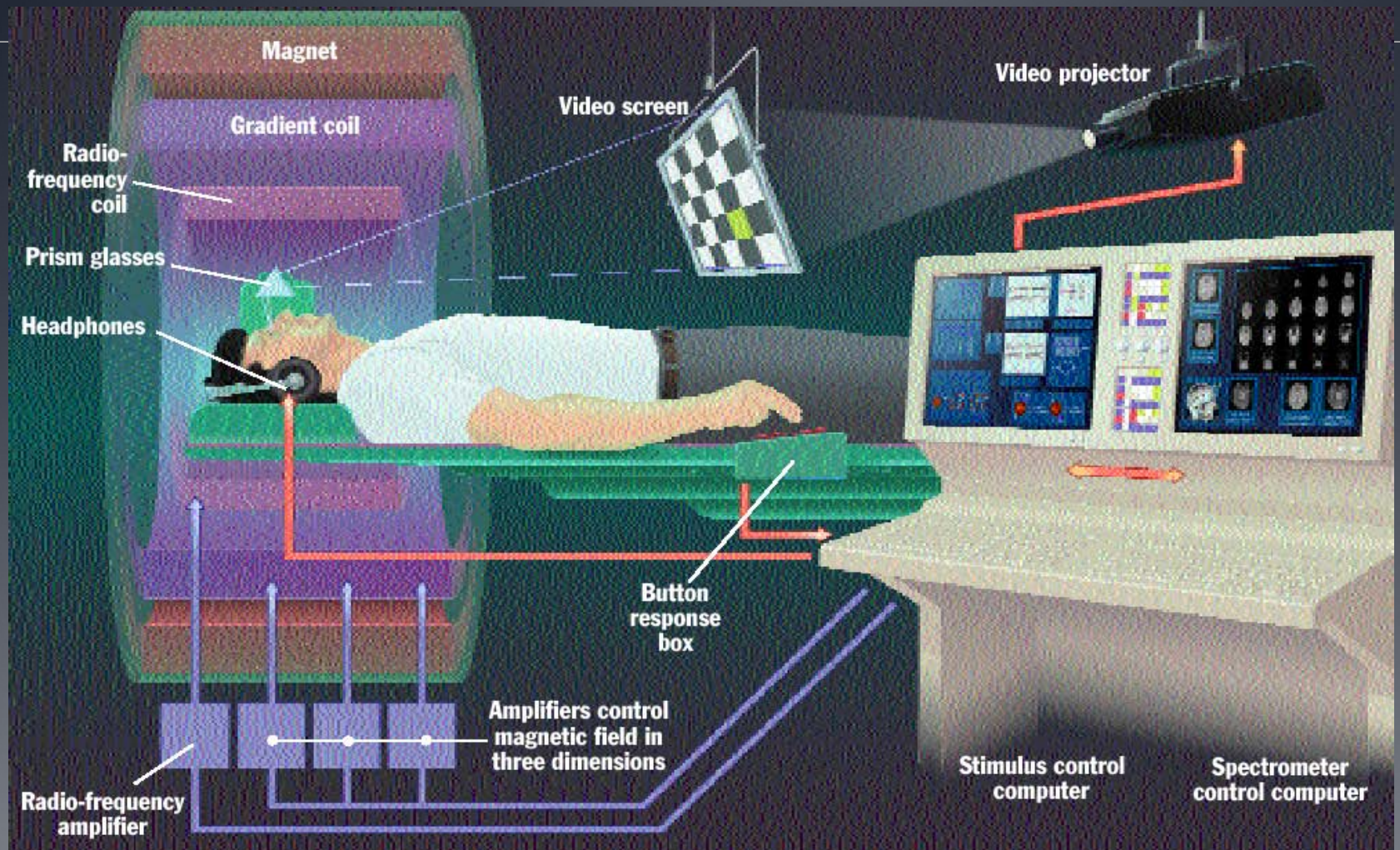
Accepted December 4, 1984

*A conceptualization of anxiety as comprising three loosely coupled response systems of **overt behavior, verbal report, and physiological activation** has proven useful in clinical and theoretical work. With this framework as a starting*

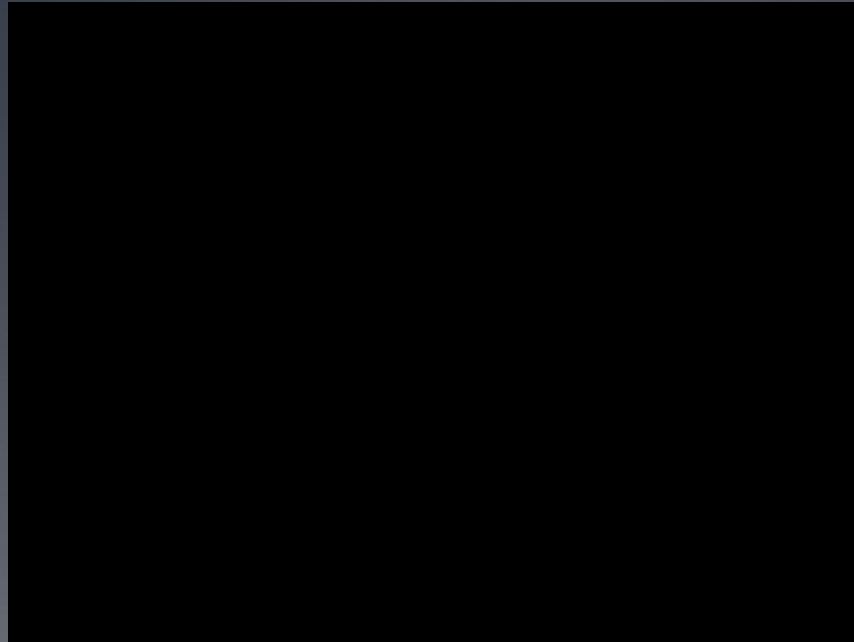
Anxiety and Social-Affective Neuroscience



Functional MRI Setup



Same or Different?

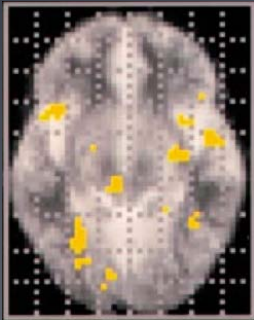


Same or Different?

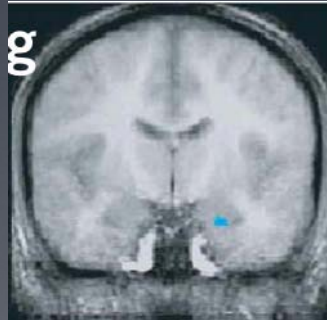


The Role of Amygdala in the Social Brain

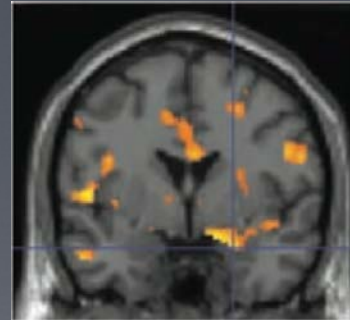
- Amygdala abnormalities figure prominently in neurodevelopmental models of ASD



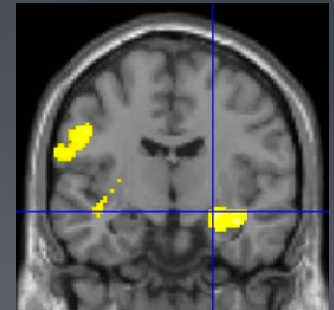
Baron-Cohen et al., 2000
hypoactivation
Early study among many



Dalton et al., 2005
hyperactivation



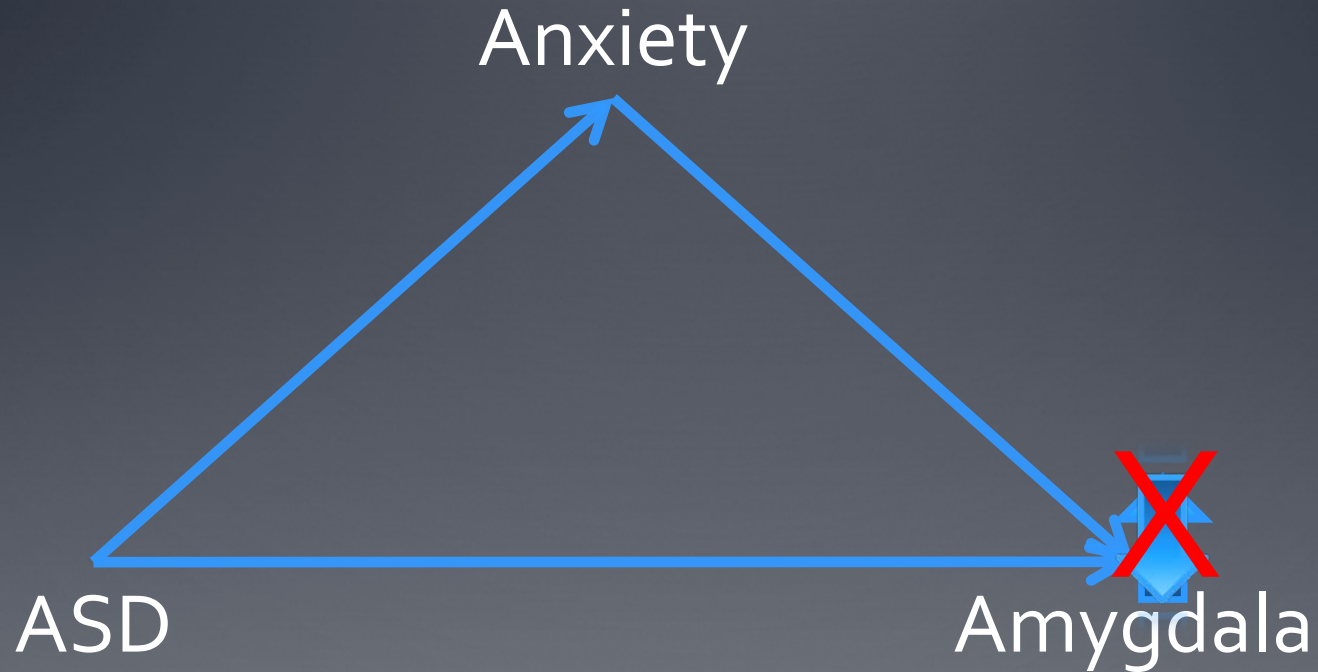
Monk et al., 2010
hyperactivation



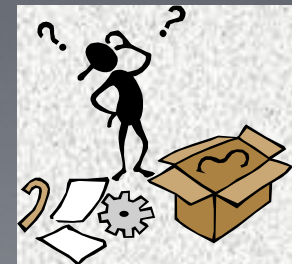
Weng et al., 2011
hyperactivation

- However, imaging findings on amygdala deficits in ASD are mixed

The Amygdala/Anxiety/ASD Conundrum



Amygdala:  \neq  



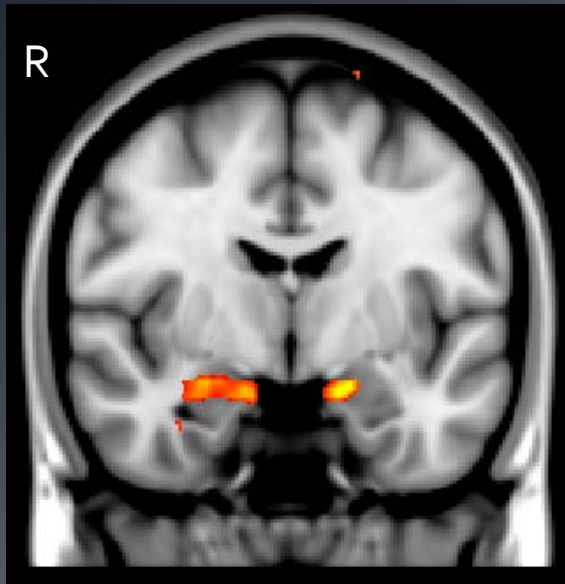
Hybrid Signals: Arousal and Individual Differences

- *Amygdala function is associated with approach as well as avoidance motivation*
 - Approach: social surveillance, social engagement
 - Avoidance: fear, negative affect
 - *Biological hit to amygdala function may affect either approach or avoidance tendencies*
 - An individual difference variable
-

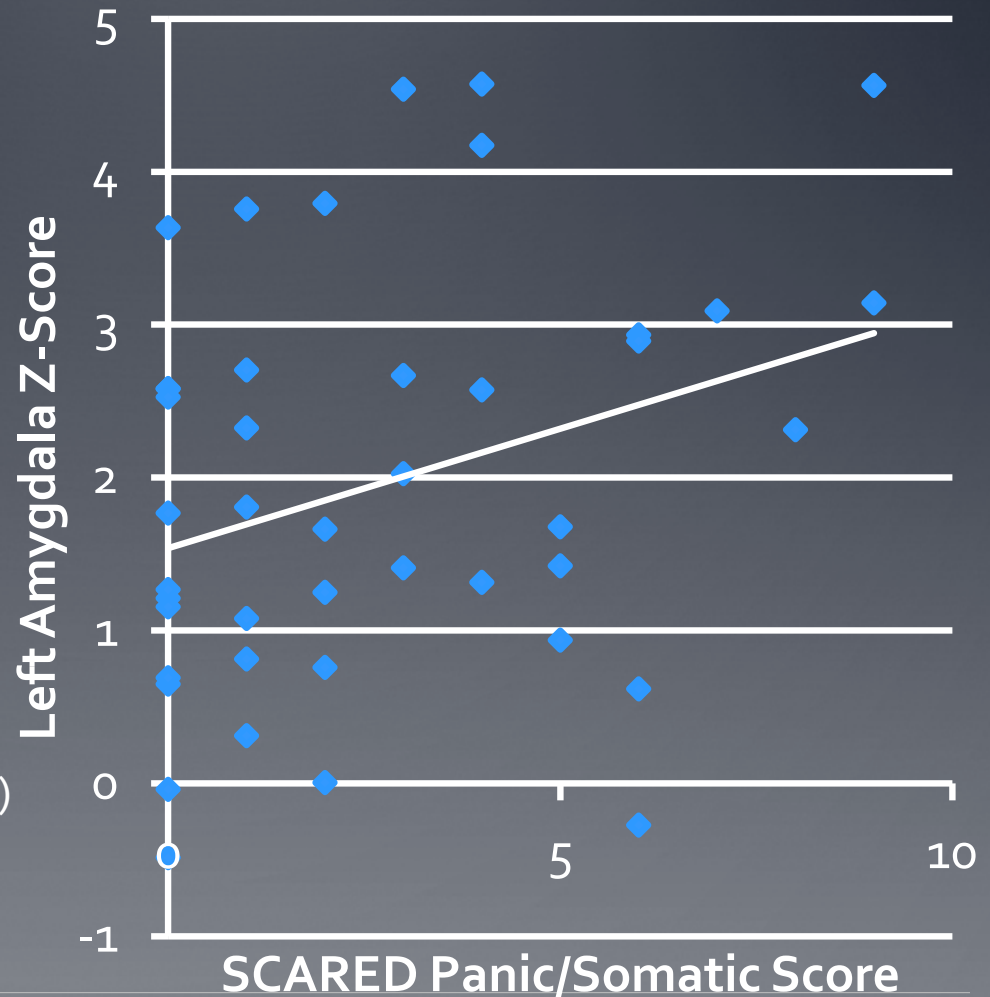
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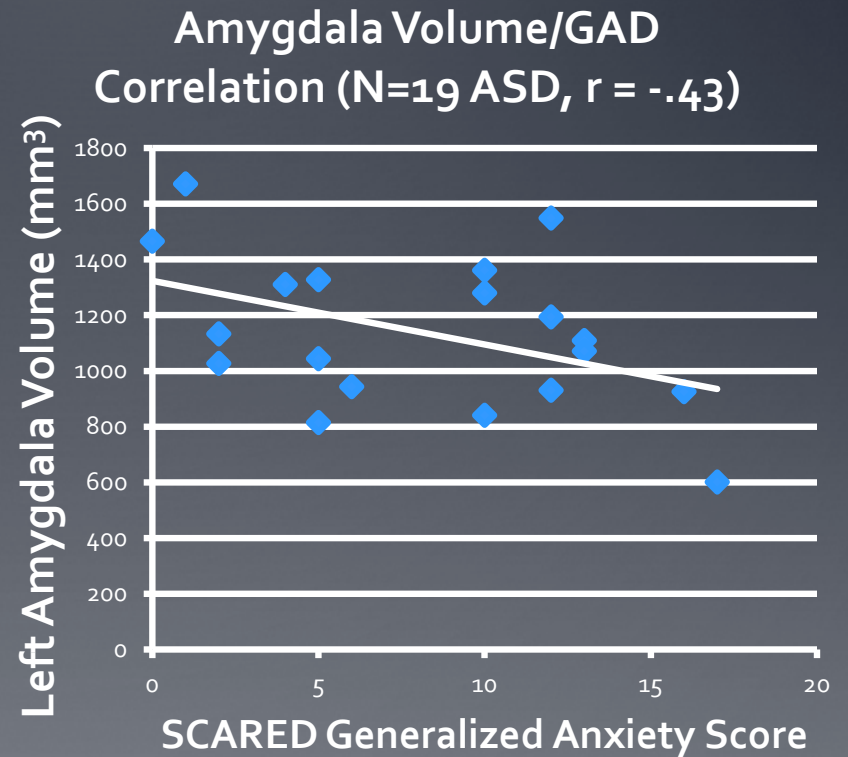
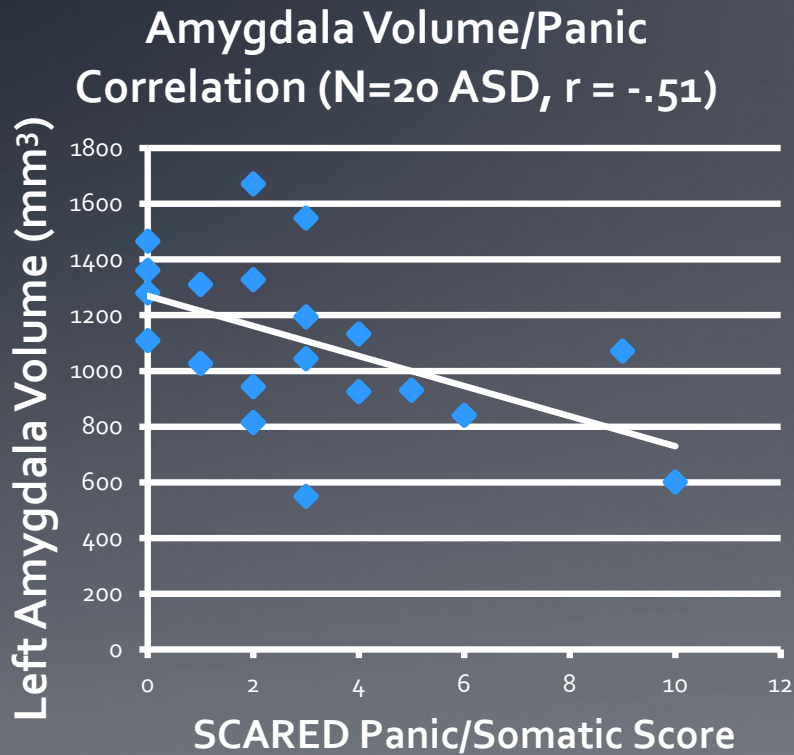
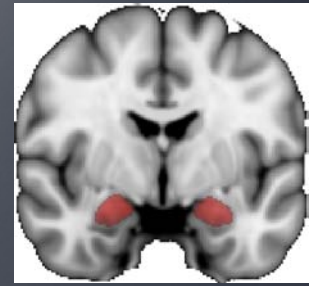
Amygdala Activation/Anxiety Correlations in ASD



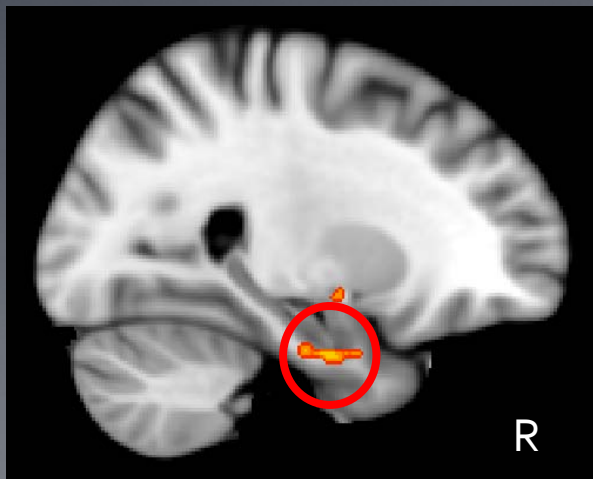
- Face Identity Task (5 minutes)
- N=43 ASD (mean age 12 years)
- Left amygdala/Panic $r = .43$ ($p = .003$)
- Left amygdala/Separation $r = .48$ ($p = .001$)
- *Both correlations survive removal of SRS and SCQ variability*



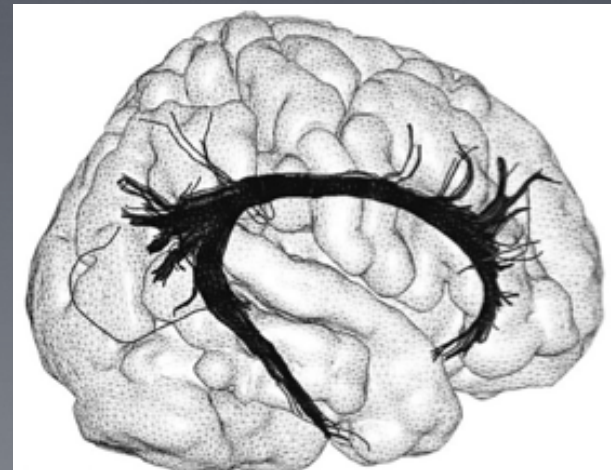
Amygdala Volume and Anxiety in ASD



White Matter Integrity and Anxiety in ASD



- 94 ASD participants (mean age 12.4 years)
- SCARED separation anxiety significantly correlated with white matter integrity (fractional anisotropy) in portions of the cingulum, which connects medial PFC and medial temporal cortex



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Future Directions and Considerations

- Little consensus on the best way to probe emotion systems in ASD
 - Emotional face perception is the standard in typically developing populations
 - ... but complicated by social perception deficits in ASD
 - The MRI procedure is itself a mood manipulation
 - The question of habituation
 - The need for a better model of amygdala function
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Collaborators

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Connor Puleo (Temple U.)

Lawrence Scahill (Yale U.)

Thank you!
