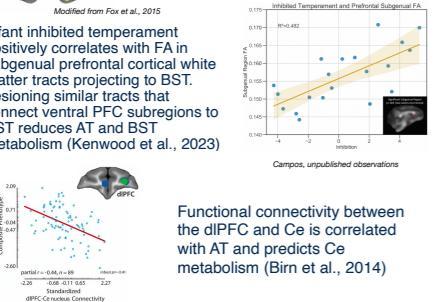
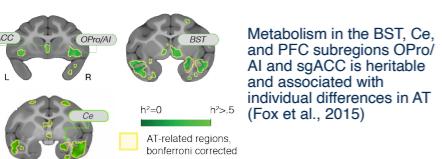


Functional Connectivity of the Prefrontal Cortex and Its Relationship to Anxious Temperament in Rhesus Macaques

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Introduction

An early-life anxious/inhibited temperament (AT) is a well-established risk factor for developing anxiety disorders. The central extended amygdala (EAc) and its components, the central amygdala (Ce) and bed nucleus of the stria terminals (BST), mediate the expression of fear and anxiety in part via direct and indirect projections with the functionally heterogeneous prefrontal cortex (PFC).

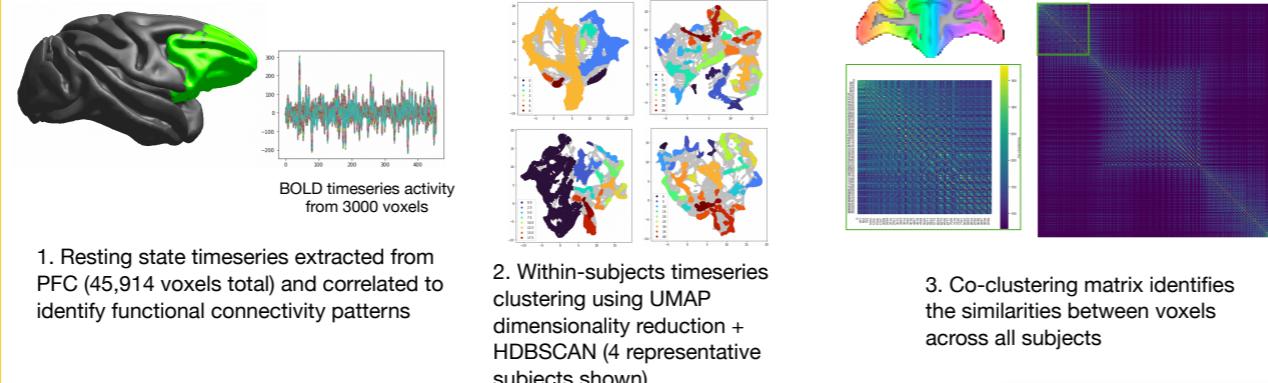


Here we employ a novel clustering method to parcellate PFC subregions based on intrinsic functional connectivity. We can further use these data-derived PFC regions to explore the effects of PFC-EAc functional connectivity on individual differences in AT and BST metabolism.

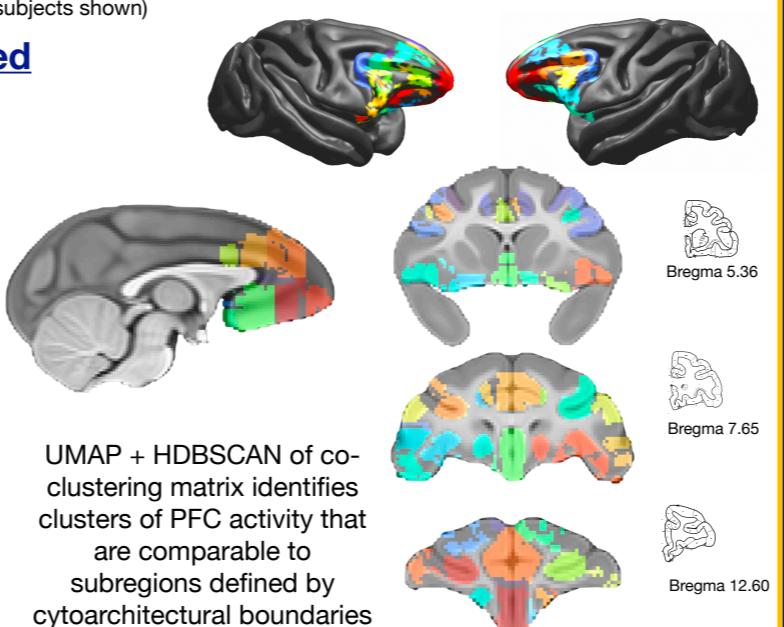
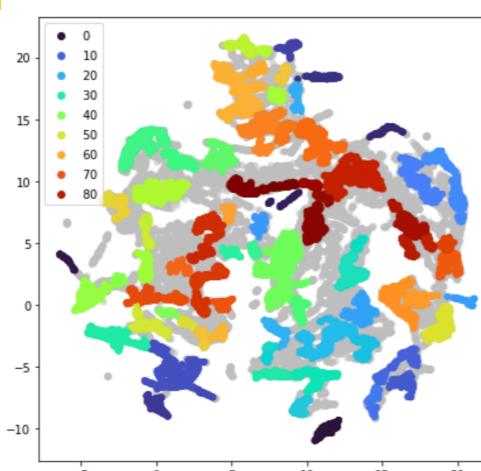
Methods

- A sample of 378 young rhesus macaques at the University of Wisconsin - Madison were used for this study (0.95 yrs - 4.4 yrs, mean age 1.89; 208 males)
- Resting state fMRI scans were collected under anesthesia using a General Electric Signa 3T scanner (GE Medical Systems) equipped with a standard 16 cm quadrature extremity coil
- Subjects underwent behavioral testing to assess phenotypic AT. BST metabolism was collected via PET scan, results have been previously reported (Fox et al., 2015)

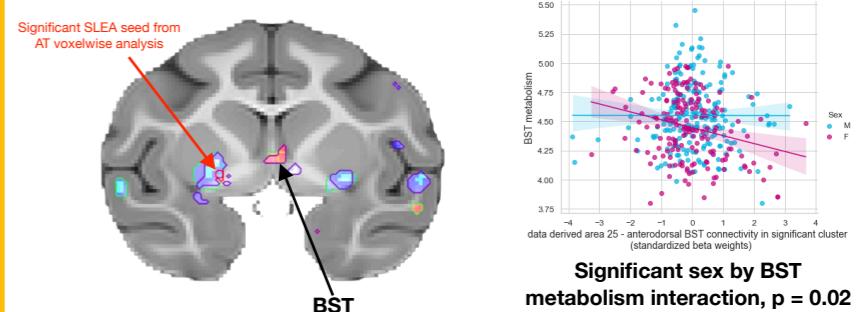
Clustering Approach - Methods



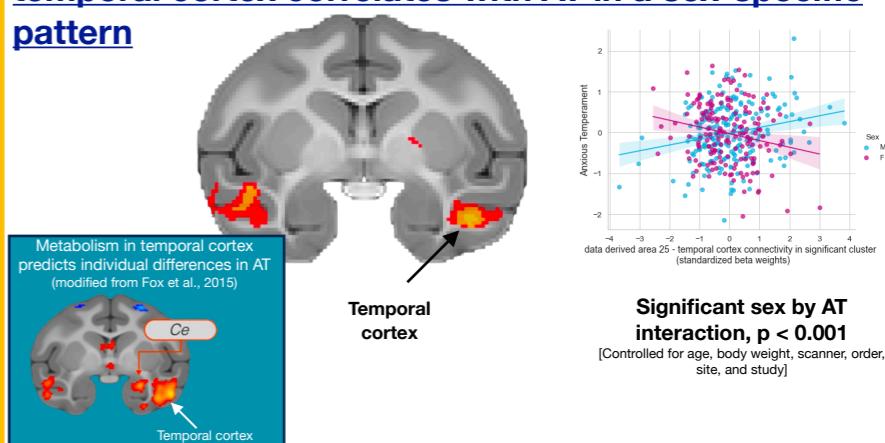
88 PFC subregions identified



Functional connectivity between area 25 and the BST correlates with BST metabolism in females

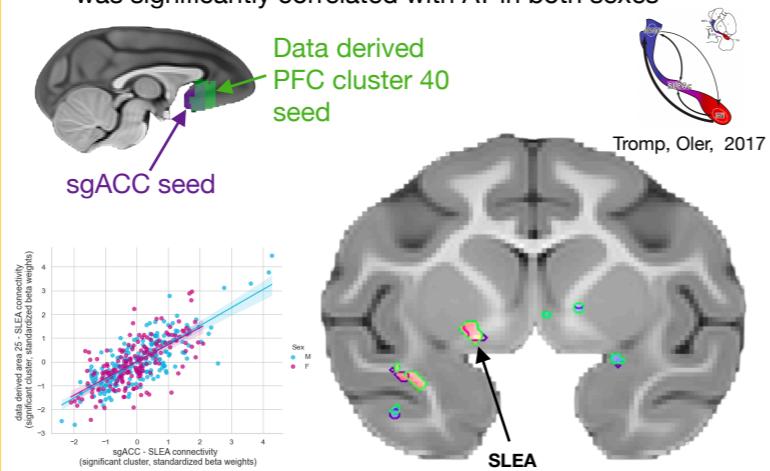


Functional connectivity between area 25 and temporal cortex correlates with AT in a sex-specific pattern



Voxelwise analysis of AT-related area 25 functional connectivity

Seed-based analyses using a sgACC seed and the data derived area 25 seed found functional connectivity between both regions and sublenticular extended amygdala (SLEA) was significantly correlated with AT in both sexes



Conclusions & Future Directions

Our novel data-driven parcellation method identified 88 unique PFC subregions that roughly correspond with preexisting boundaries. To validate our parcellation method, data-derived area 25 subregion shows similar functional connectivity patterns as equivalent hand-selected voxels with the SLEA. Furthermore, functional connectivity between area 25 and the SLEA predicts metabolism in the BST in a sex-specific pattern.

These methodologies aim to further link the role of PFC regions in the expression of fear and anxiety, and future work using our clustering parcellation method can unpack how PFC subregions circuits impact extended amygdala functioning.

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