

## Research Question

Is the typical connectivity of brain networks altered in people with Autism Spectrum Disorder (ASD)?

## Abstract

I used fMRI to compare resting brain activity between participants with ASD and healthy controls. Using a clustering algorithm, I identified differences in the functional connectivity of three brain networks.

## Introduction

### What is Autism?

- Autism spectrum disorders (ASD) are characterized by impaired social communication and repetitive patterns of behavior.
- The incidence of ASD is increasing and is currently believed to affect 1 in every 54 children.

### The Three-Network Model

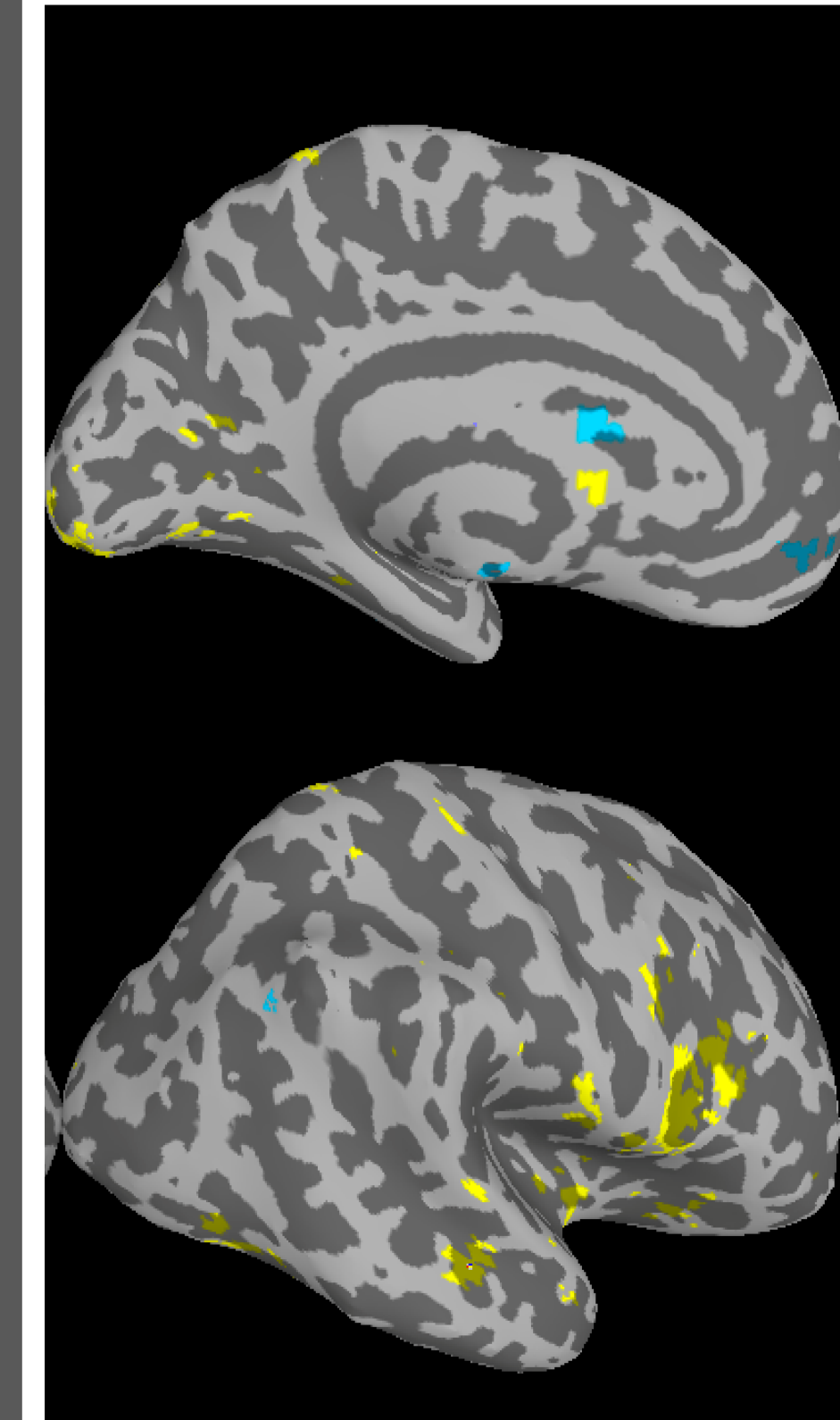
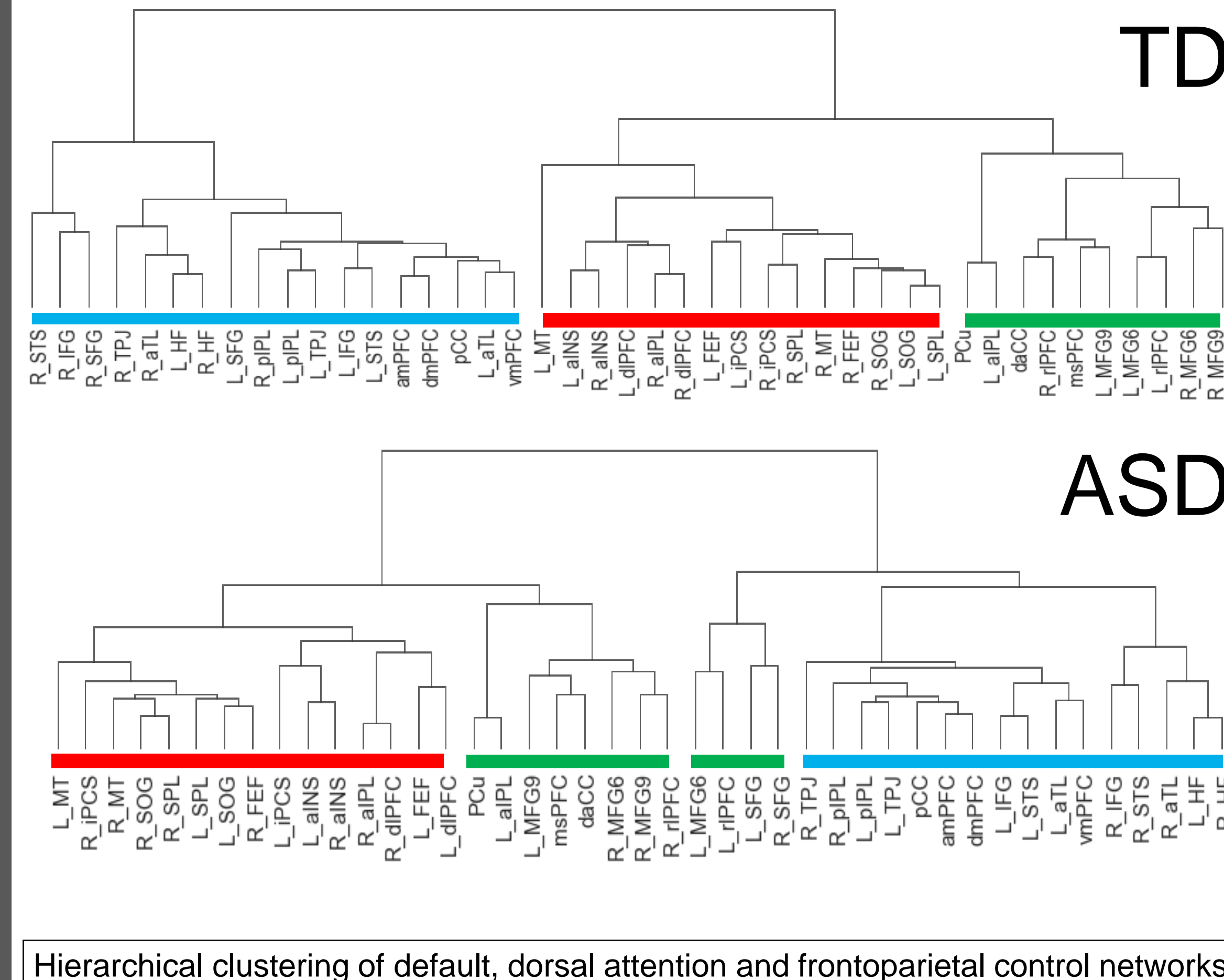
- The **Default Network** is activated during internally directed cognition, such as daydreaming or introspection.
- The **Dorsal Attention Network** is activated during externally directed cognition, such as playing a game or intently watching something.
- The **Frontoparietal Control Network** contributes to executive functioning and can flexibly couple with either the Default or Dorsal Attention networks depending on the task.
- The Default and Dorsal Attention networks are typically anticorrelated with each other.

In the healthy controls, I reproduced results in the previous literature showing separation between the three networks and high cohesion within them.

In the ASD group, the Frontoparietal Control Network did not exist as an independent network; half of the FPCN was incorporated into the Default Network, and the other half into the Dorsal Attention Network.

The number of nodes exhibiting anticorrelation between the Default and Dorsal Attention networks was reduced in the ASD group.

## Results



Cortical surface projection of TD > ASD L-FEF BOLD covariance, Bonferroni corrected ( $P < .05$ )

## Methods

- Functional MRI was used to compare 25 adult males with ASD and 25 typically developing adult males, who were matched on age, I.Q., handedness and motion parameters.
- Participants were instructed to lie still and awake in the scanner while viewing a cross.
- Nodes of each of the three networks were identified using an independent brain atlas.
- Average-linkage clustering was used to determine the hierarchical organization of the network nodes.

## Discussion

- Age-related declines in the anticorrelations between the Default and Dorsal Attention networks are associated with age-related declines in executive functioning.
- As the Frontoparietal Control Network is thought to be responsible for mediating the relationship between the Default and Dorsal Attention networks, these findings may provide evidence for the specific alterations of brain network connectivity which underlie impaired executive functioning in ASD.