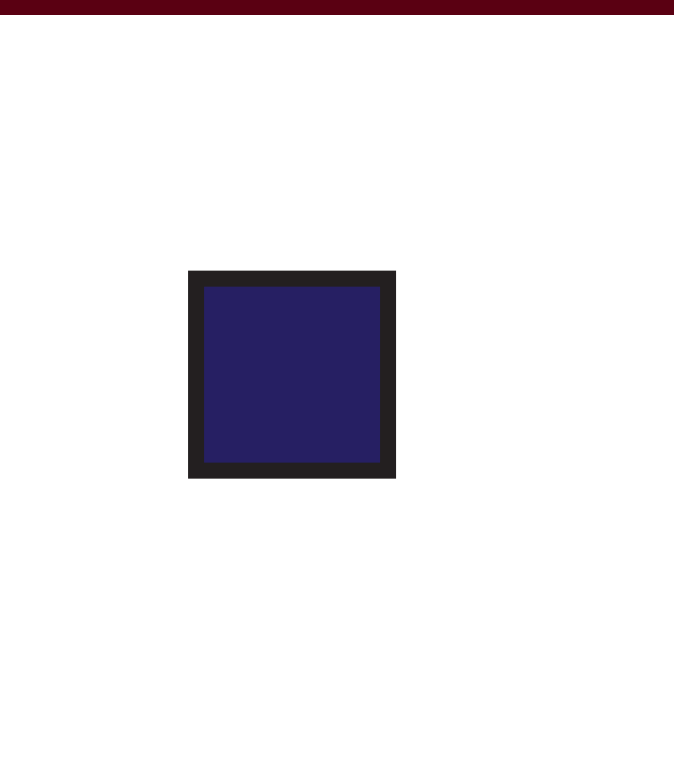




# Causal evidence for hierarchical predictive coding among cingulo-opercular and frontoparietal networks supporting cognitive control

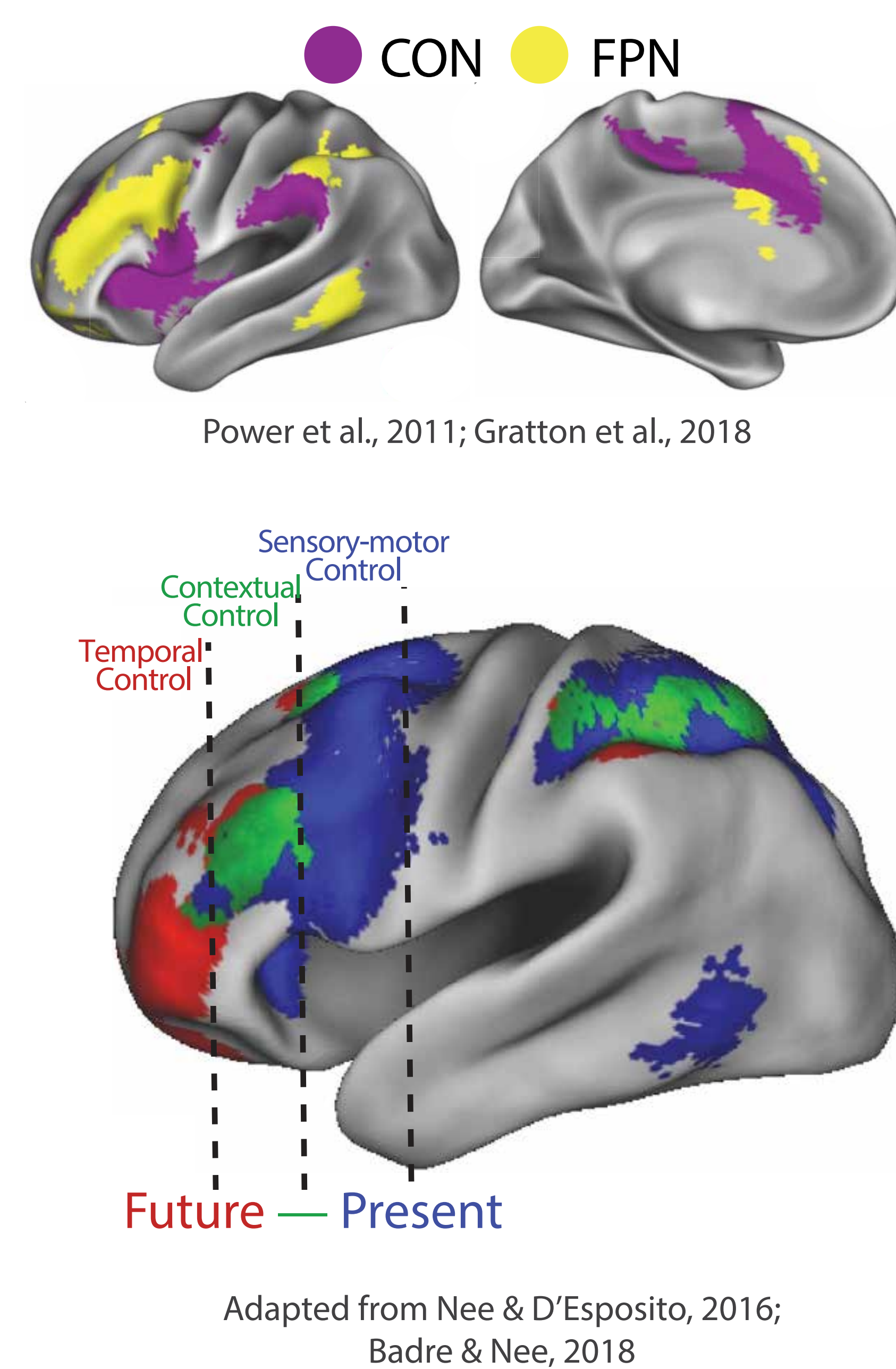


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## Introduction

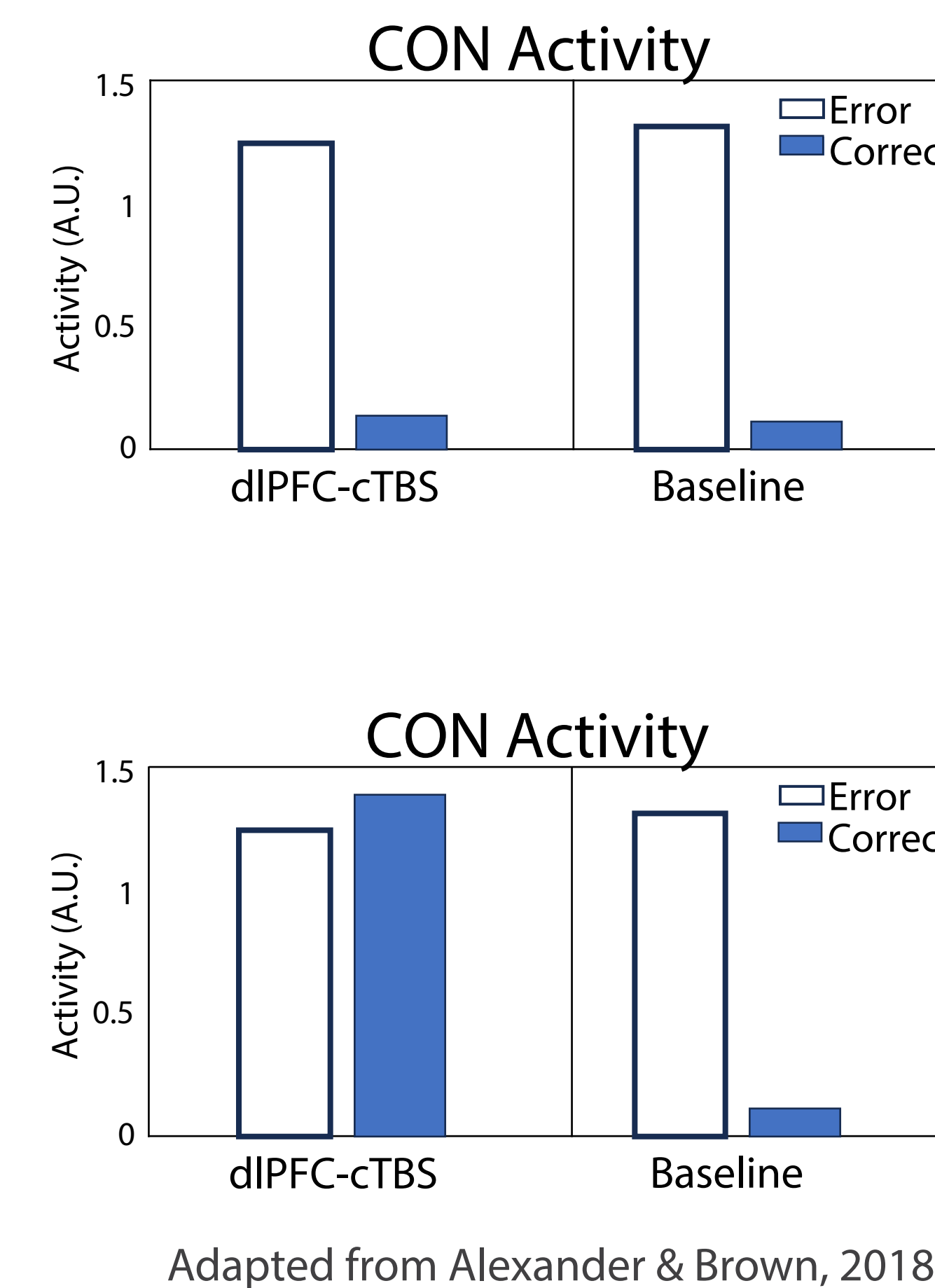
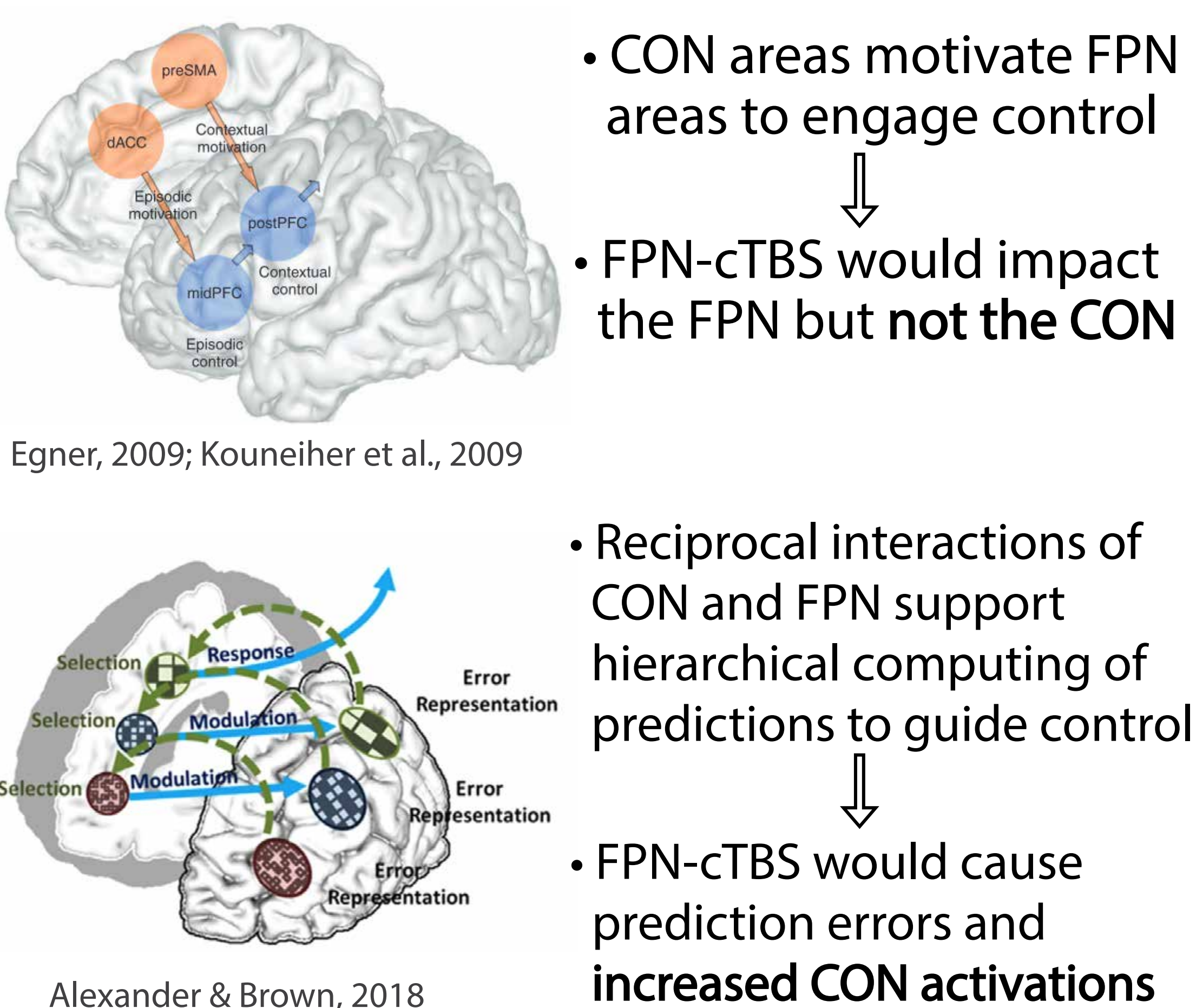
- Cognitive control is the ability to align behaviors with goals when habit will not suffice
- Cognitive Control Networks: cingulo-opercular network (CON) frontoparietal network (FPN)
- Networks are organized along a **present/external** to **future/internal** axis
- How these networks and sub-systems interact to support this temporal organization remains unclear



## Purpose

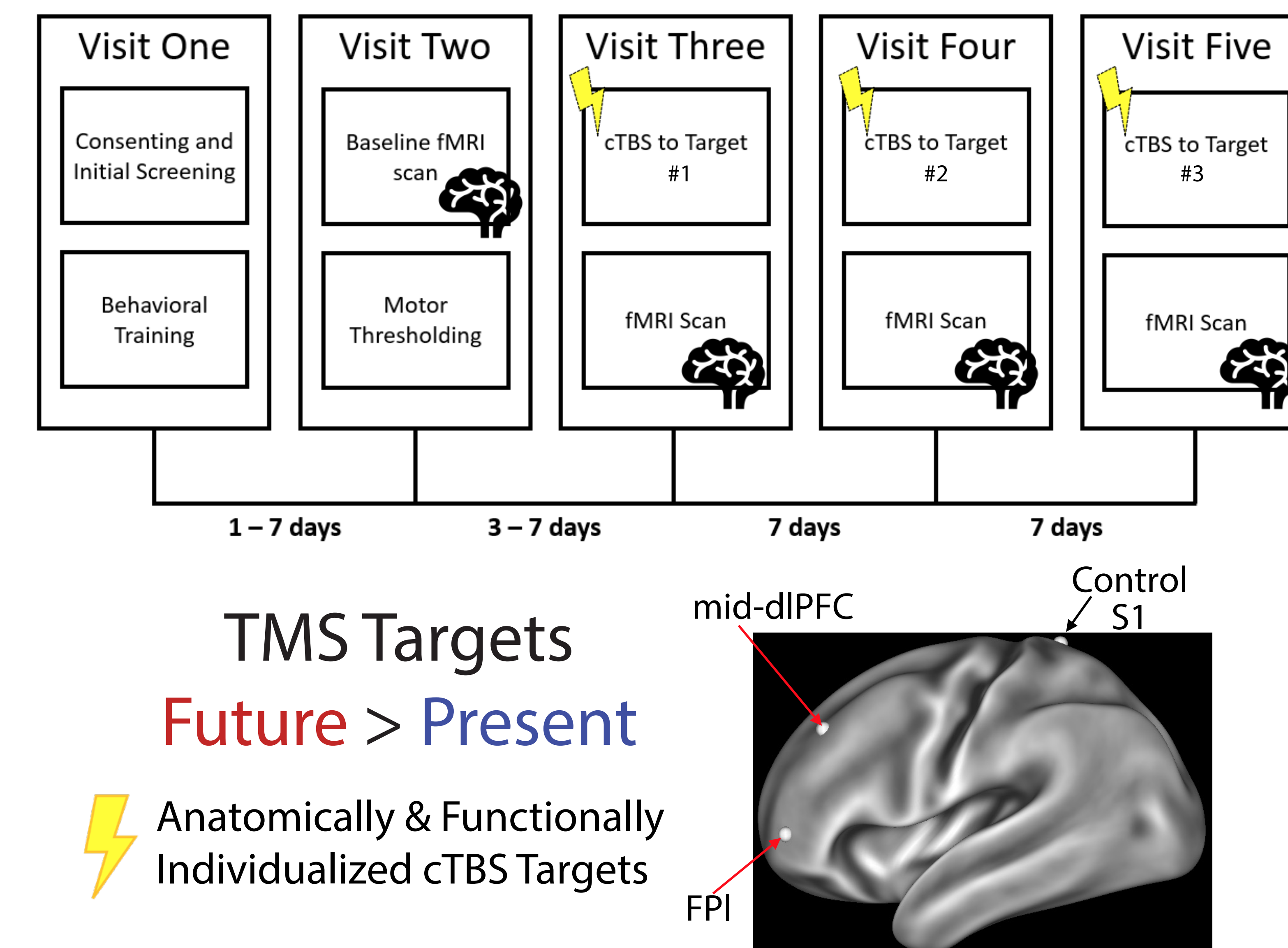
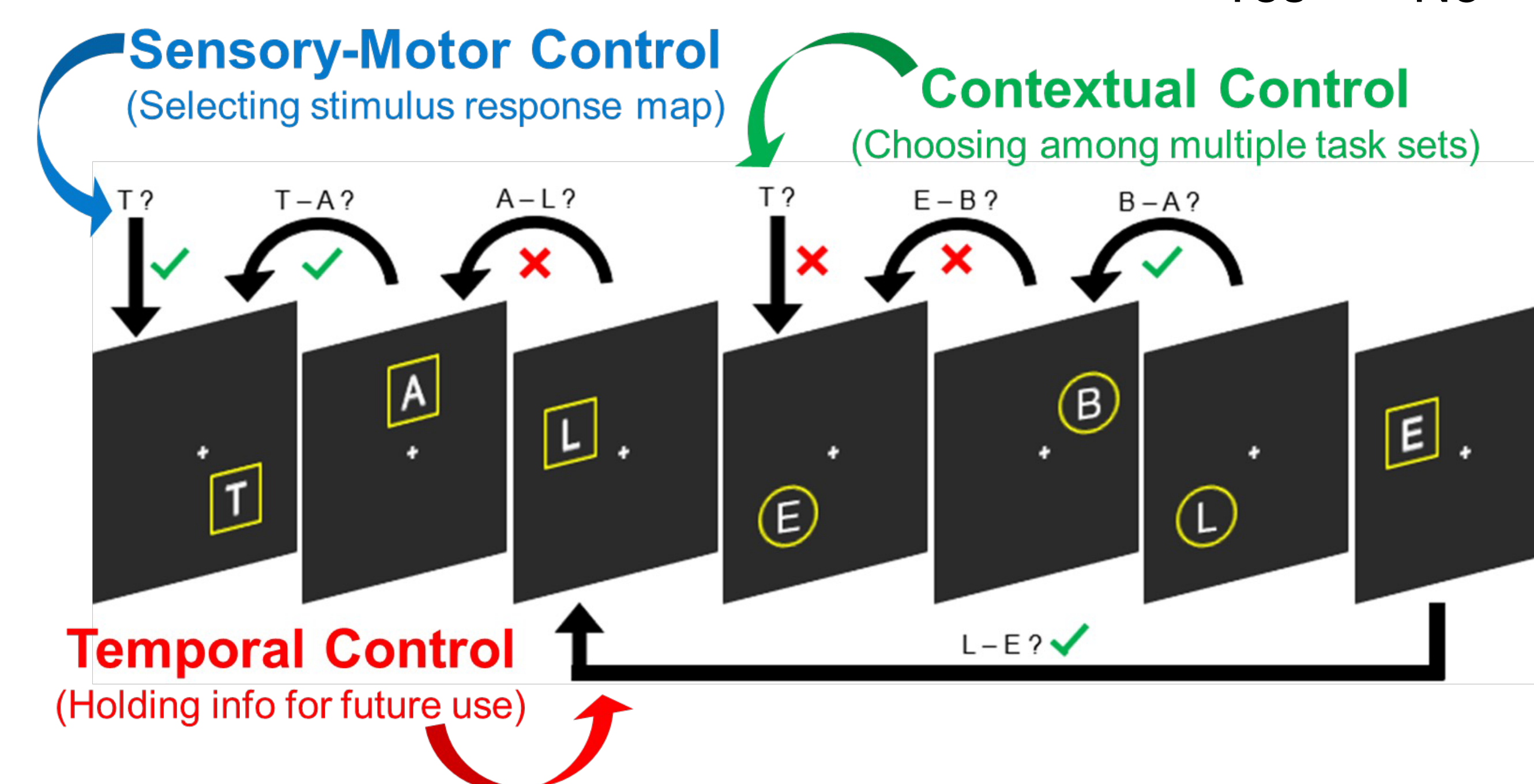
Use causal methods to test hypotheses regarding how CON and FPN interact to support cognitive control

## Hypotheses



## Methods

- Within-subjects design: Individualized cTBS sites: mid-dIPFC, lateral frontal pole (FPI), and a control site (S1)
- N=34 completed study; Task activations based on N=31, FC analysis N=32

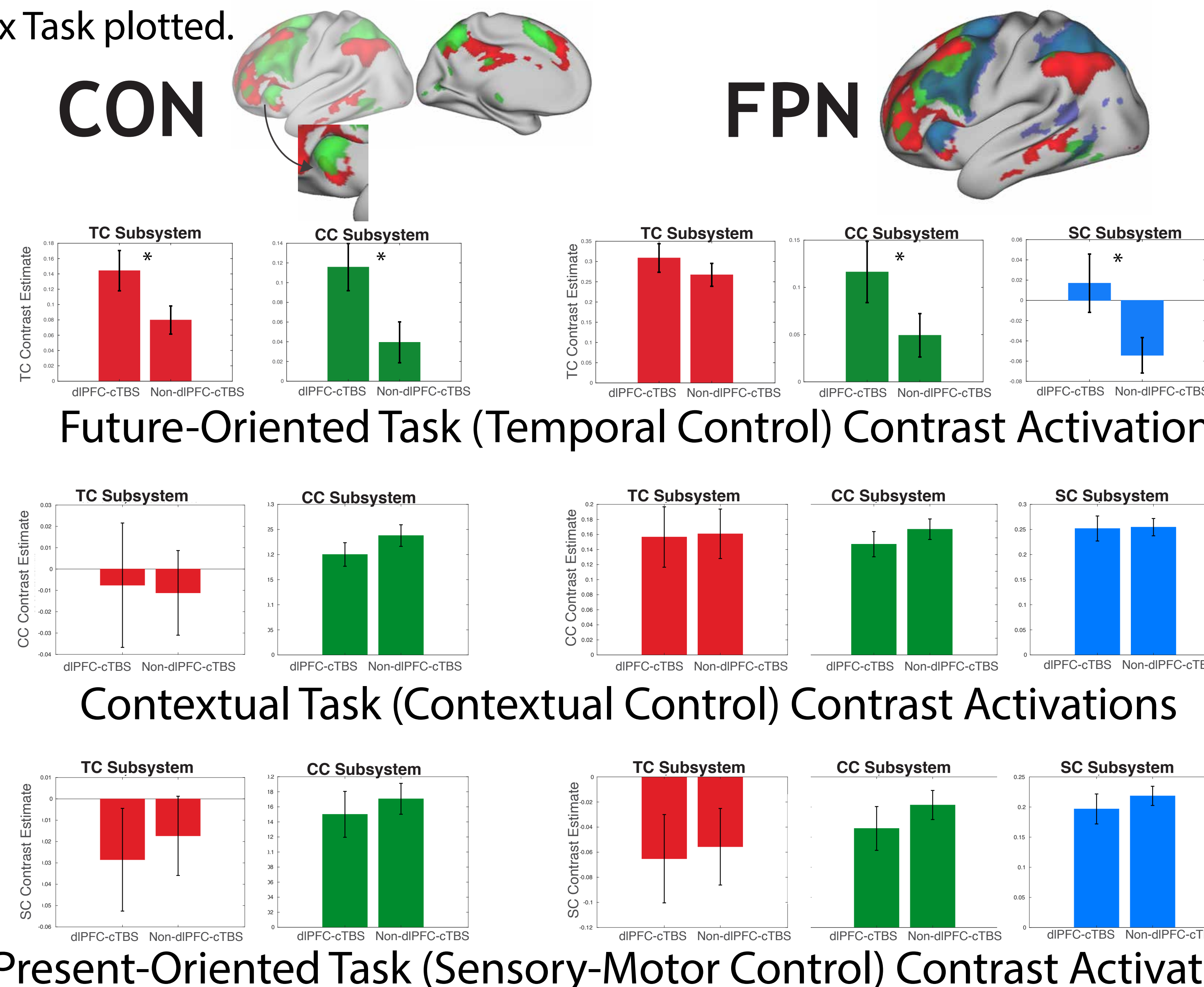


## Conclusions

- cTBS to the mid-dIPFC increased both CON and FPN future-oriented control activation
- cTBS to the FPN did not change functional connectivity
- Results suggest cTBS to the mid-dIPFC does not affect the amount of communication, rather it leads to prediction errors which propagate across networks and sub-systems
- These results suggest temporally organized cognitive control aligns with a framework of hierarchical predictive coding

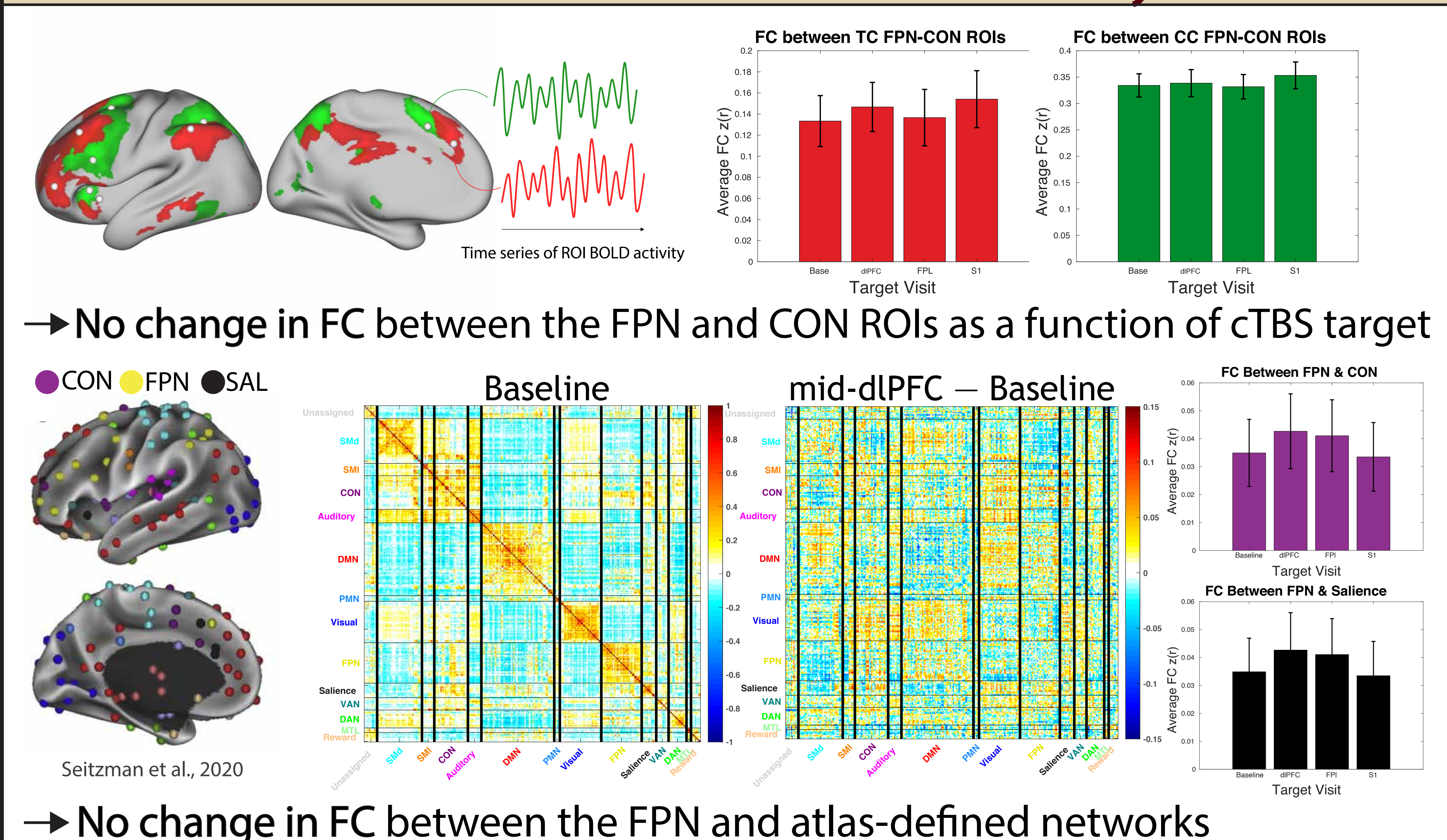
## Results - BOLD Task Activations

ANOVAs of control contrast activations for the CON and FPN: Interactions of Visit x ROI x Task plotted.



→ dIPFC-cTBS increases both CON and FPN future-oriented control activation

## Results - Functional Connectivity



## References & Acknowledgments

Funded by NIMH R01 MH121509. Power et al., 2011; Gratton et al., 2018; Nee & D'Esposito 2016; Badre & Nee 2018; Egner 2009; Kouneiher et al., 2009; Alexander & Brown 2018; Seitzman et al., 2020