



Functional Connectivity Differs across Cultures



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Introduction

- People from different cultural backgrounds vary in memory specificity (Millar et al., 2013).
- In terms of neural activity, cultures differ during encoding in fusiform and medial temporal gyrus regions (Paige et al., 2017).
- However, little is known about the functional connectivity at rest right *after* encoding, especially for those areas associated to cultural differences in memory specificity.

Goal of Present Study

- Investigate how resting-state functional connectivity in the regions that showed cultural differences in memory differs across cultures after encoding

Methods

Participants

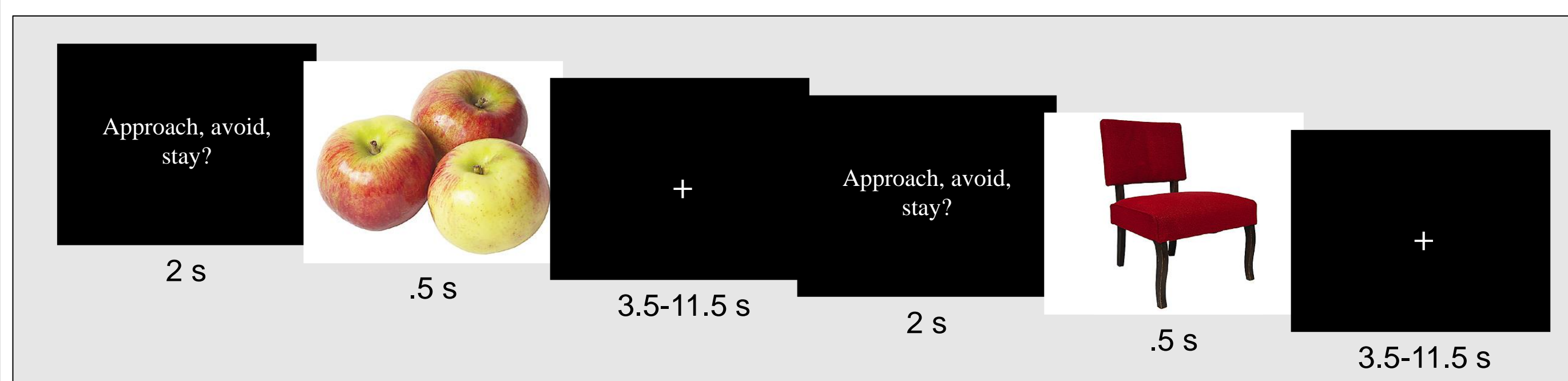
- 20 Americans: 3 Males, native English speakers, lived outside US for less than 5 years, $M_{age}=22.45$
- 20 East Asians: 10 Males, fluent non-native English speakers, lived in US for less than 5 years, $M_{age}=24.25$

Resting State fMRI

- 32-channel head coil
- TR= 755ms, TE = 30ms, Slice Thickness = 2mm
- 6min45s; eyes-opened
- Collected after encoding of stimuli

Object viewing task (encoding; switch task with resting state)

- 108 photos of familiar purchasable objects
- Equivalent familiarity & conceptual agreement across cultures (Millar et al., 2013; Paige et al., 2017; Ksander et al., 2018)

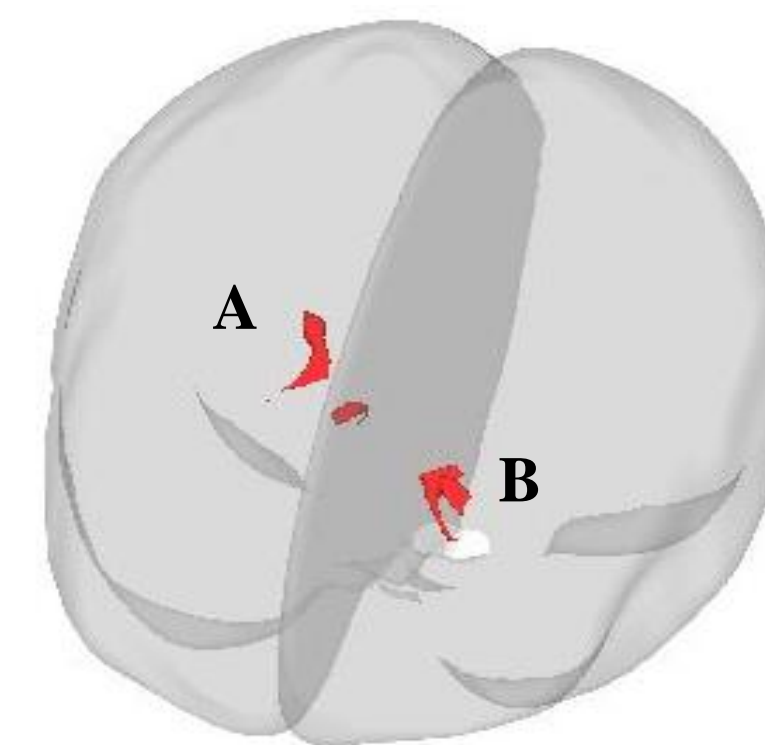


FC Analysis

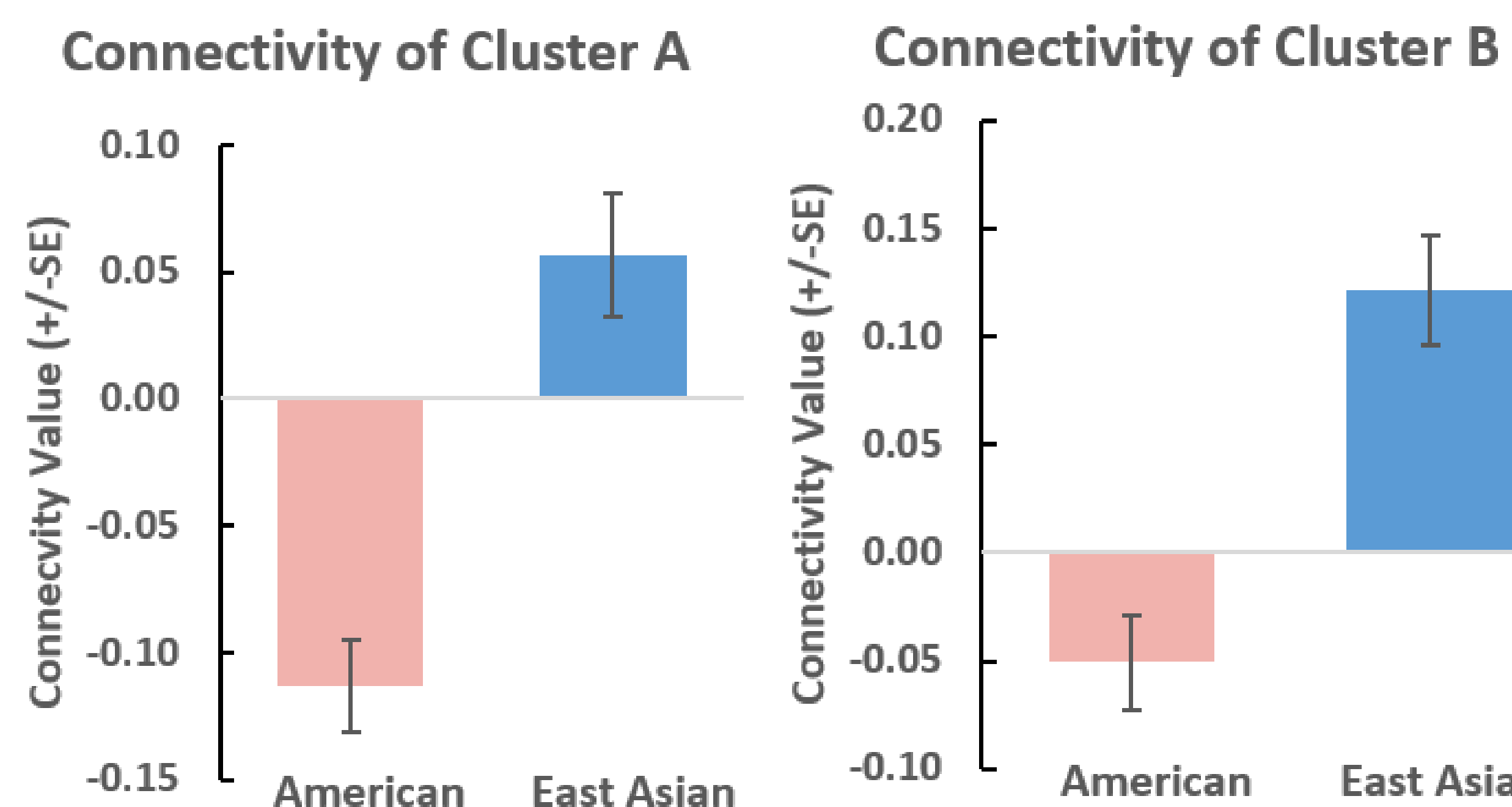
- Seed-to-voxel functional connectivity analysis using CONN
- Left fusiform: activation is very small and close to parahippocampal gyrus. Not further tested.
- Areas that East Asians > Americans in specific but not general memory encoding (Paige et al., 2017):
 - Left fusiform
 - Left parahippocampal gyrus
 - Left hippocampus

Preliminary Results

- Left hippocampus and anterior parahippocampal gyrus: no significant functional connectivity with the rest of the brain
- Only posterior parahippocampal gyrus shows significant cross-cultural differences in its connectivity to the rest of the brain: $p < .001$, connections mostly reside in dorsal striatum (see A and B in graph on the right)
- Effect size: difference between Fisher-transformed correlation coefficient between posterior parahippocampal gyrus and the striatal clusters for East Asians and Americans

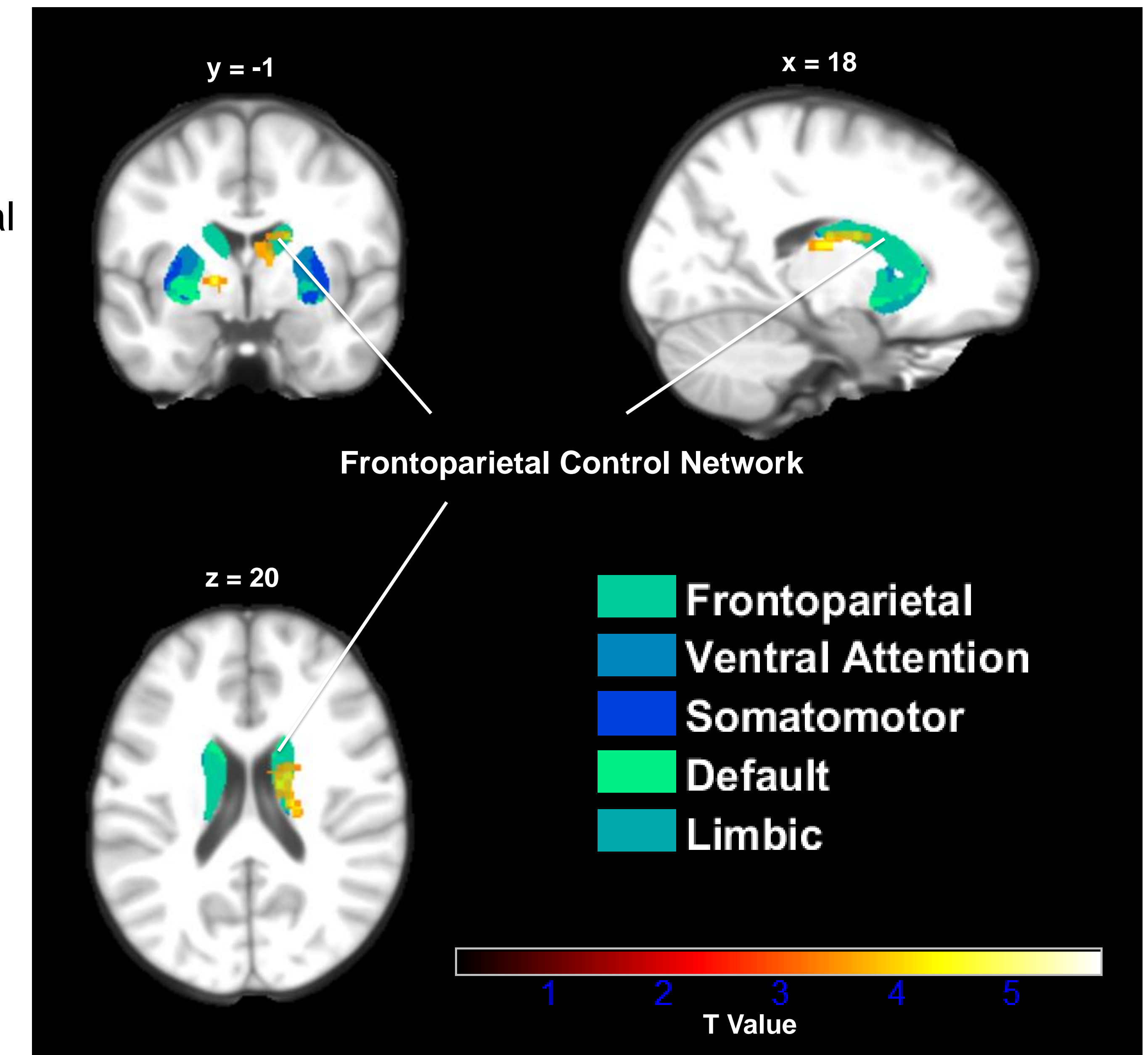


	Cluster (x, y, z)	Effect Size (β)	T (38)	p-FDR
A	(+20, -18, +16)	.17	5.53	.000005
B	(-14, -2, 0)	.17	4.98	.000014



Striatal Parcellation:

- What part/network of the cerebral cortex does these parts of the striatum project to?
- Mainly the frontoparietal control network, according to Choi et al. (2012)
- Cooler colors: parcellations from the paper of Choi et al.
- Hotter colors: Connections found in current study, based on t-values



Conclusions and Next steps

- The left parahippocampal gyrus showed a significantly greater functional connectivity to the striatum (including bilateral caudate, left pallidum, and left putamen) in East Asian compared to American participants.
- The activations overlapped with striatal parcellations typically thought to project to the frontoparietal control network.
- This may suggest that the hippocampal-striatum connection is important for studying cross-cultural differences in consolidating specific information about details of items.
- Next steps: further compare cultural difference using beta correlation analysis
 - Advantage: only look at the amplitude across trials rather than the whole time series; minimize issues of inter-region neurovascular coupling

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References

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