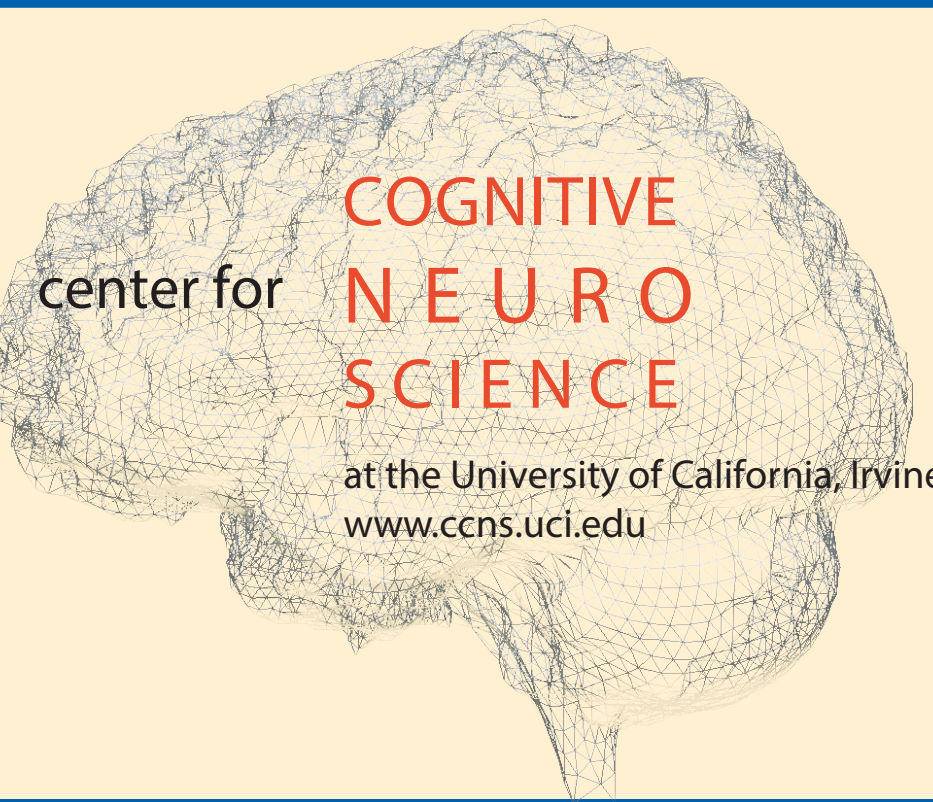


STSp functional connectivity in adults and children during biological motion perception



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BACKGROUND

Biological Motion Perception

1) STSp is a core brain region for Biological Motion Perception. Extended regions include premotor cortex, fusiform gyrus, lateral occipital cortex, medial prefrontal cortex (Grossman, et 2002;)

2) The STSp is a core region for biological motion perception in children too

Question: How is functional connectivity between the core STSp and extended regions similar or different between young children (4-6 years old) and adults?

METHODS

Adults Participants: 16 subjects (7 males; 8 females)

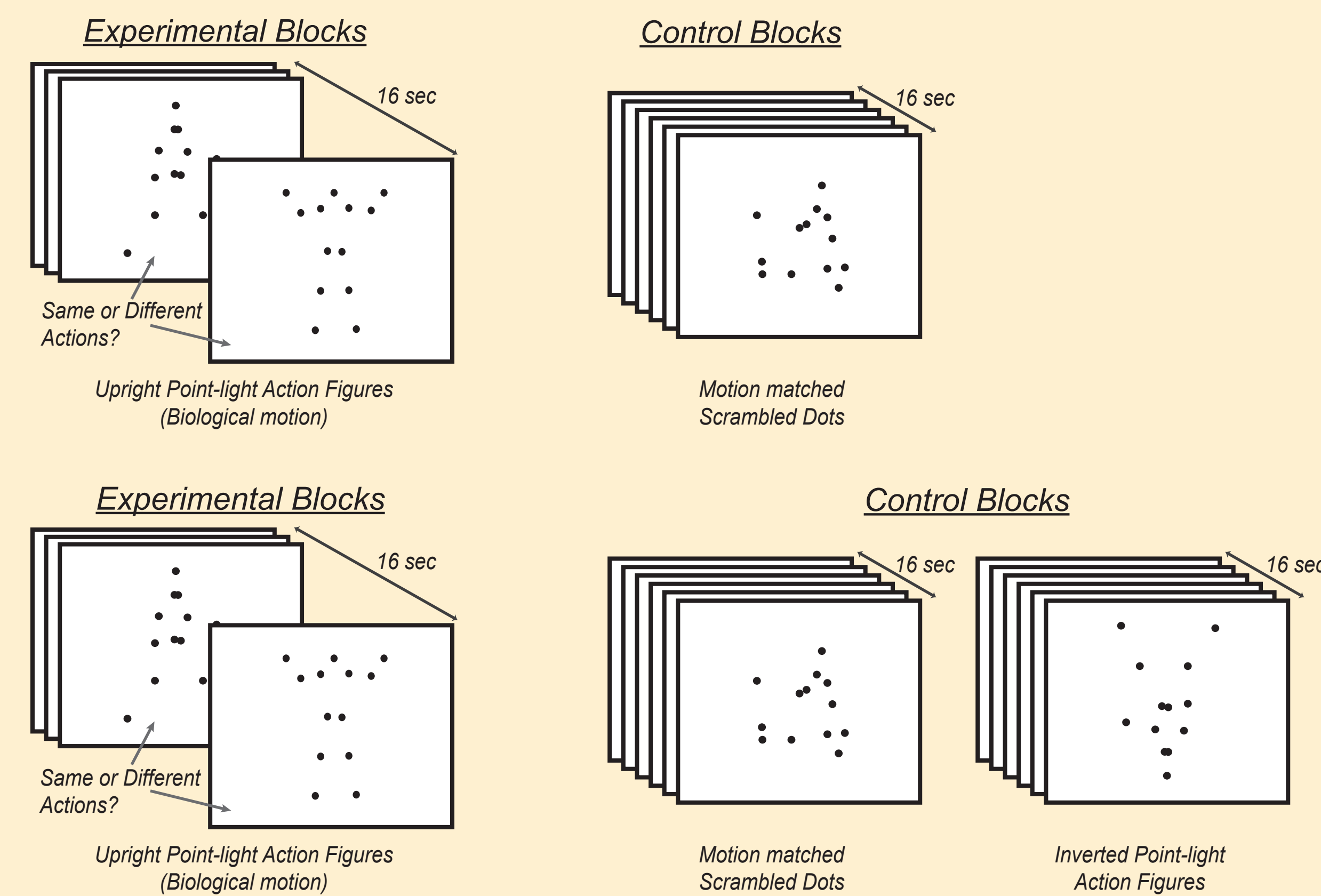
UCI's Philips 3T scanner located in UCI with parallel imaging (SENSE = 2.0). Voxel size: 2.0 x 2.0 x 4.0mm; TR = 2s

Children's data: 13 subjects; age range: 4-6 years (GENDER????)

Data acquired at Indiana University by Karin James 3T Scanner. Voxel size: 3 x 3 x 3.8mm; TR = 2s

Stimuli and Task: Block design: alternating between experimental and control

Localizer for Biological Motion Perception



Standard fMRI Preprocessing: Brain Voyager QX

Motion corrected; Linear trend removal; Co-registration
Adults: mean intensity correction due to scanner spikes

Additional data cleaning procedure: motivated by evidence of increased subject motion in the children's data. Denoising whole brain time series (Kay, Rokem, Winewar, Dougherty & Wandell (2013))

Univariate Data Analysis:

Whole-brain GLM analysis - Bio > Not Bio
Adults: Bio > Scrambled
Childrens: Bio > (Scrambled + Inverted)

CONJUNCTION ANALYSIS

1) Group GLM analysis to identify regions showing higher activation for both adults and children (Bonferonni corrected)

2) Delineated ROIs based on

- Extent of overlap
- Distinct functional regions
- Using coordinates from previous studies

Selected ROIs included

- task positive and task negative regions
- areas that overlapped between children and adults
- areas that were unique to either children or adults

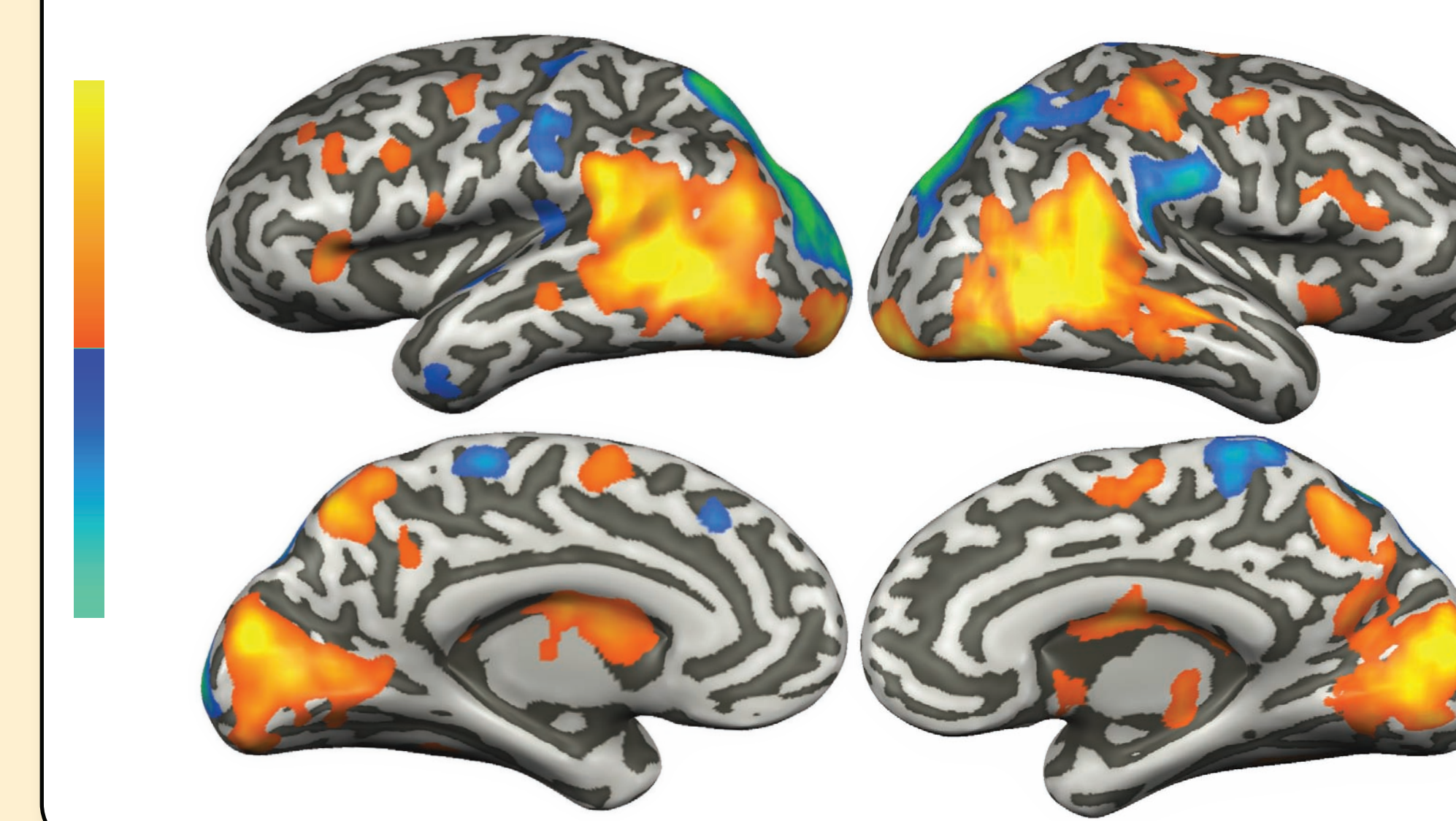
FUNCTIONAL CONNECTIVITY ANALYSIS

For each individual subject

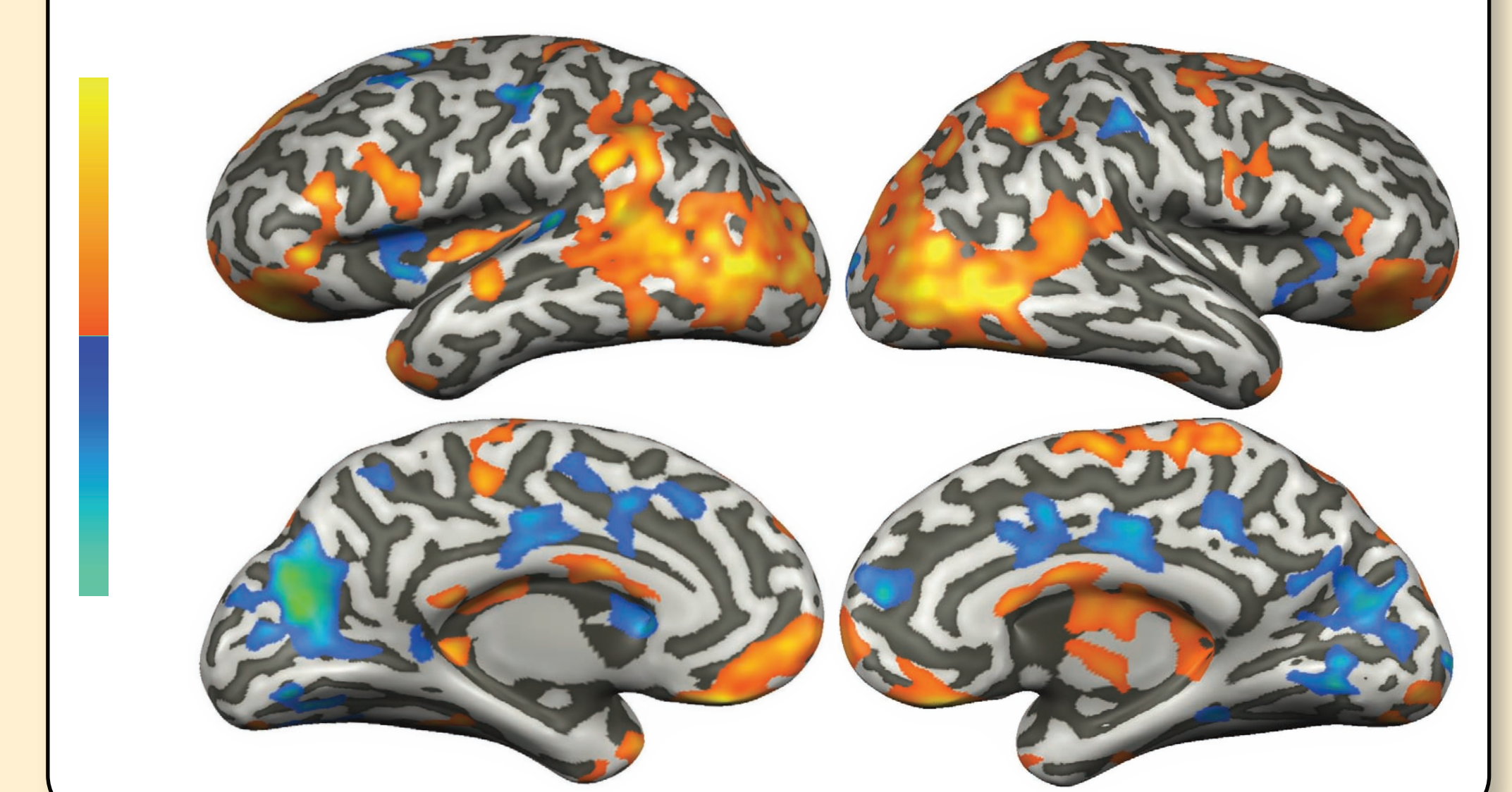
- pairwise correlation of timeseries of STSp and each ROI in the defined network
- Graphical representation of the group STSp connectivity for both adults and children

GROUP CONJUNCTION

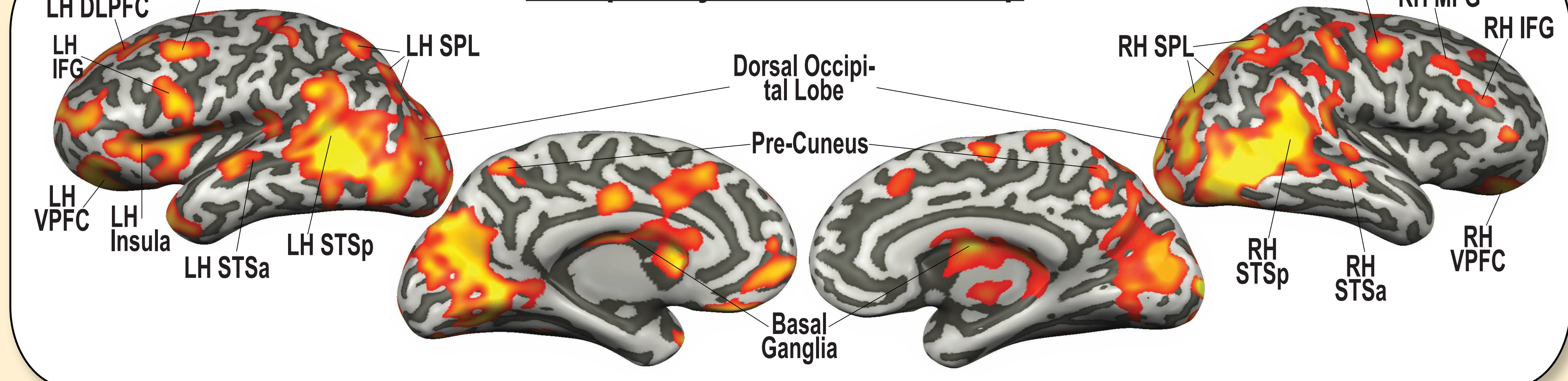
Adult's Group Bio-Motion Localizer



Children's Group Bio-Motion Localizer



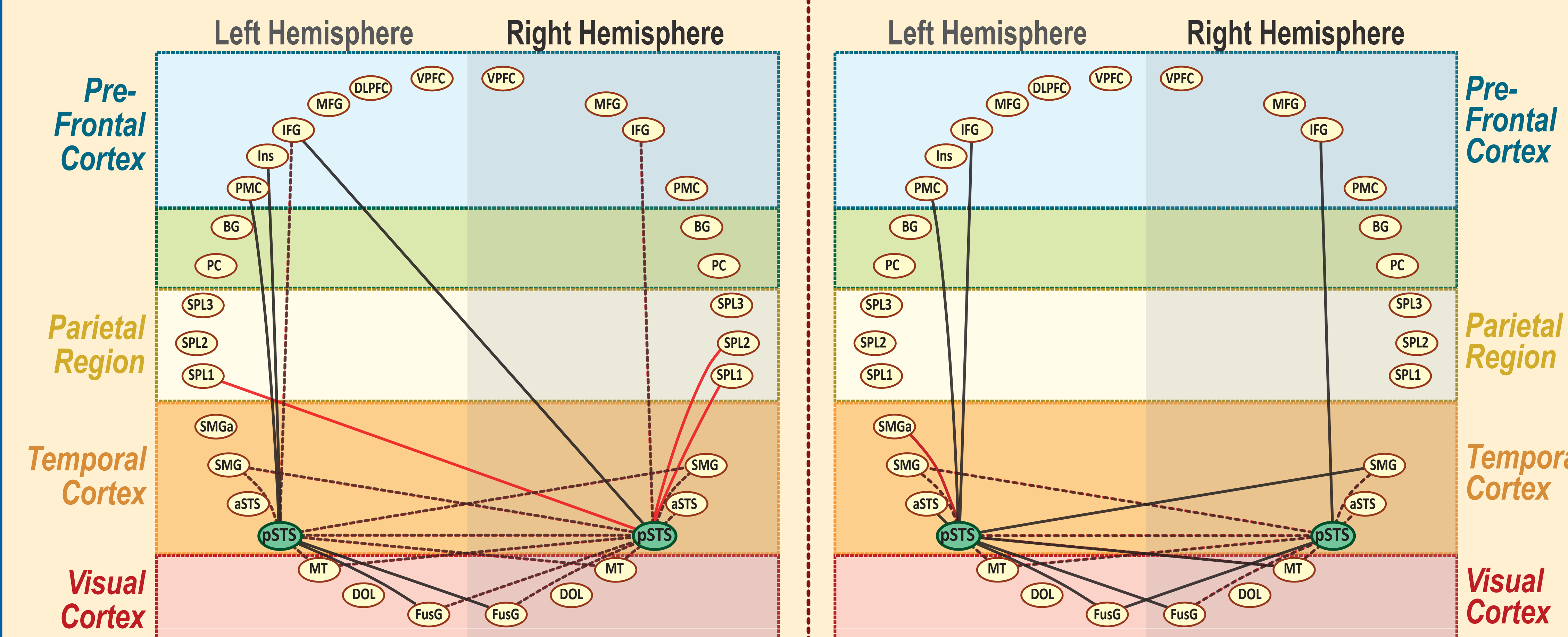
Group Conjunction - CountMap



NETWORK CONNECTIVITY GRAPHS

— Connectivity in Adult's Group
— Connectivity in Children's group
- - - Common Connectivity

Bio Motion Blocks



• Children and Adults brain have different FC when interpreting point-light sequences

• STSp <--> Pre-frontal Cortex

Adults: long-range STSp-prefrontal connections (left-lateralized) in Bio conditions. Non-Bio connections are similar to Bio conditions.

Children: STSp-IFG connections in Bio. No connections in Non-bio

• StSp <--> Parietal Cortex

Adults: No STSp connections in either condition

Children: right STSp- SPL connections (both hemispheres) only in Bio Blocks

• Visual Cortex

Adults: STSp symmetrically connections to the visual cortex

Children: right STSp has more connections than the left

CONCLUSION

Children and adults share similar brain maps for biological motion perception. Functional connectivity patterns differ between the two populations.

STSp - SPL connections in children during biological motion perception suggest they extract socially guided orienting cues.

STSp - prefrontal cortex (i.e. mirror neuron network) suggest adults have a more strongly developed long-range connectivity within the action observation network. This connection is present in scrambled condition, suggesting adults are seeking action interpretations in both conditions.