

A decorative graphic on the left side of the slide consists of a network of light blue lines and small circles, resembling a circuit board or neural network, extending from the top to the bottom of the frame.

FUNCTIONAL BRAIN CONNECTIVITY ANALYSIS IN HUMAN CONNECTOME PROJECT DATA

SILVIA OROZCO

BIG DATA & NEUROIMAGING

➡ As imaging technology improves,
the amount of brain data increases

➡ Images of the human brain provide
large amount of information



HUMAN CONNECTOME PROJECT



5-year, \$40-
million
initiative to
map the
human brain
networks

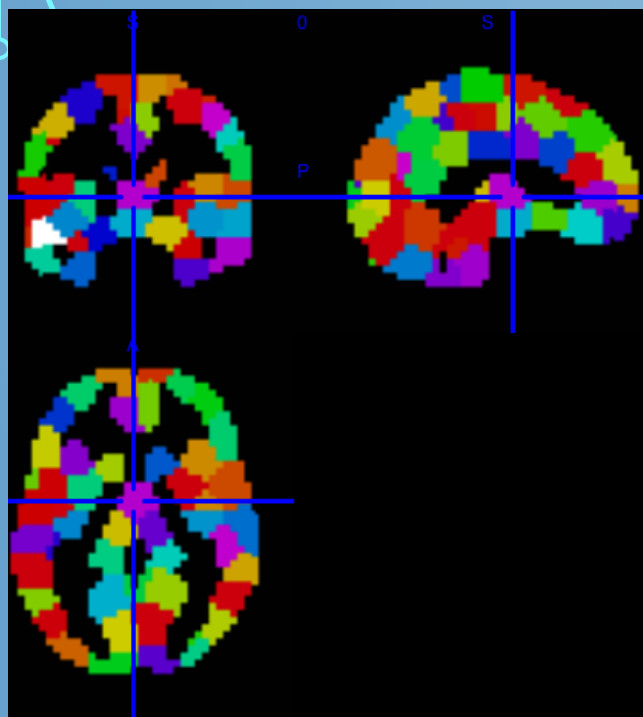
Connectome is
complex and
poorly
understood

Goal: solve
complexity
with new
Magnetic
Resonance
Imaging (MRI)
Technology

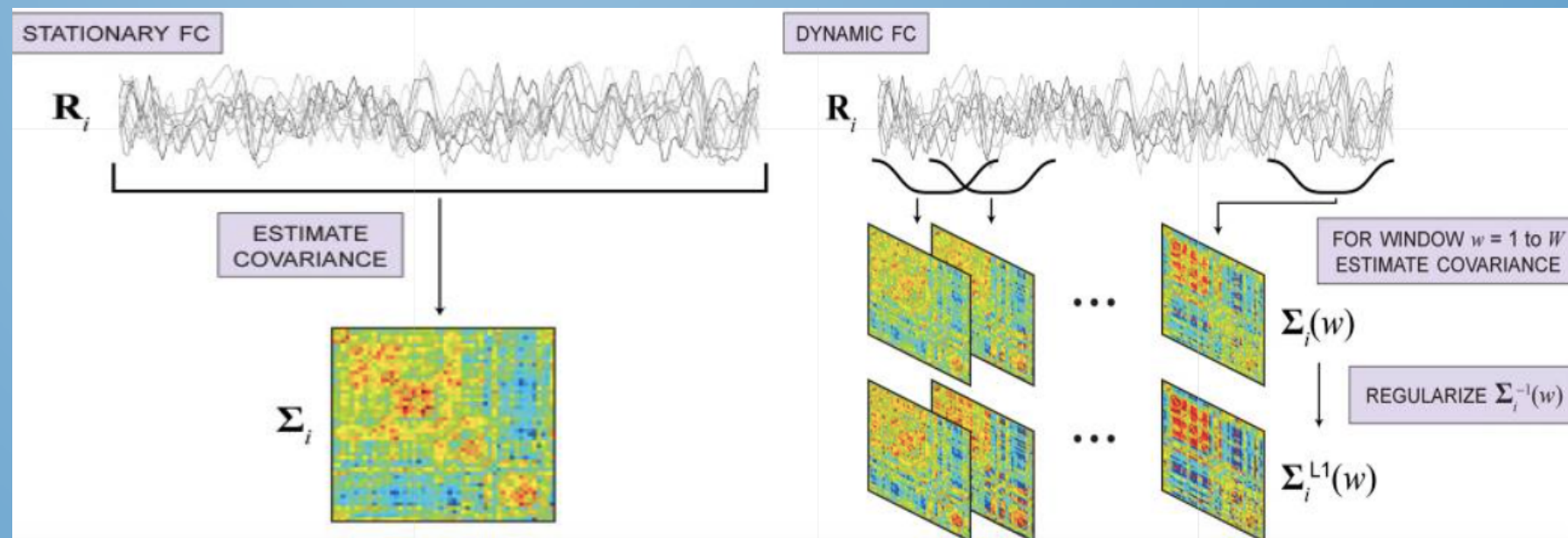
MEASURING FUNCTIONAL BRAIN CONNECTIVITY

- Functional Magnetic Resonance Imaging (fMRI)
- Resting-state fMRI
 - Blood-Oxygen-Level-Dependent (BOLD) Signal



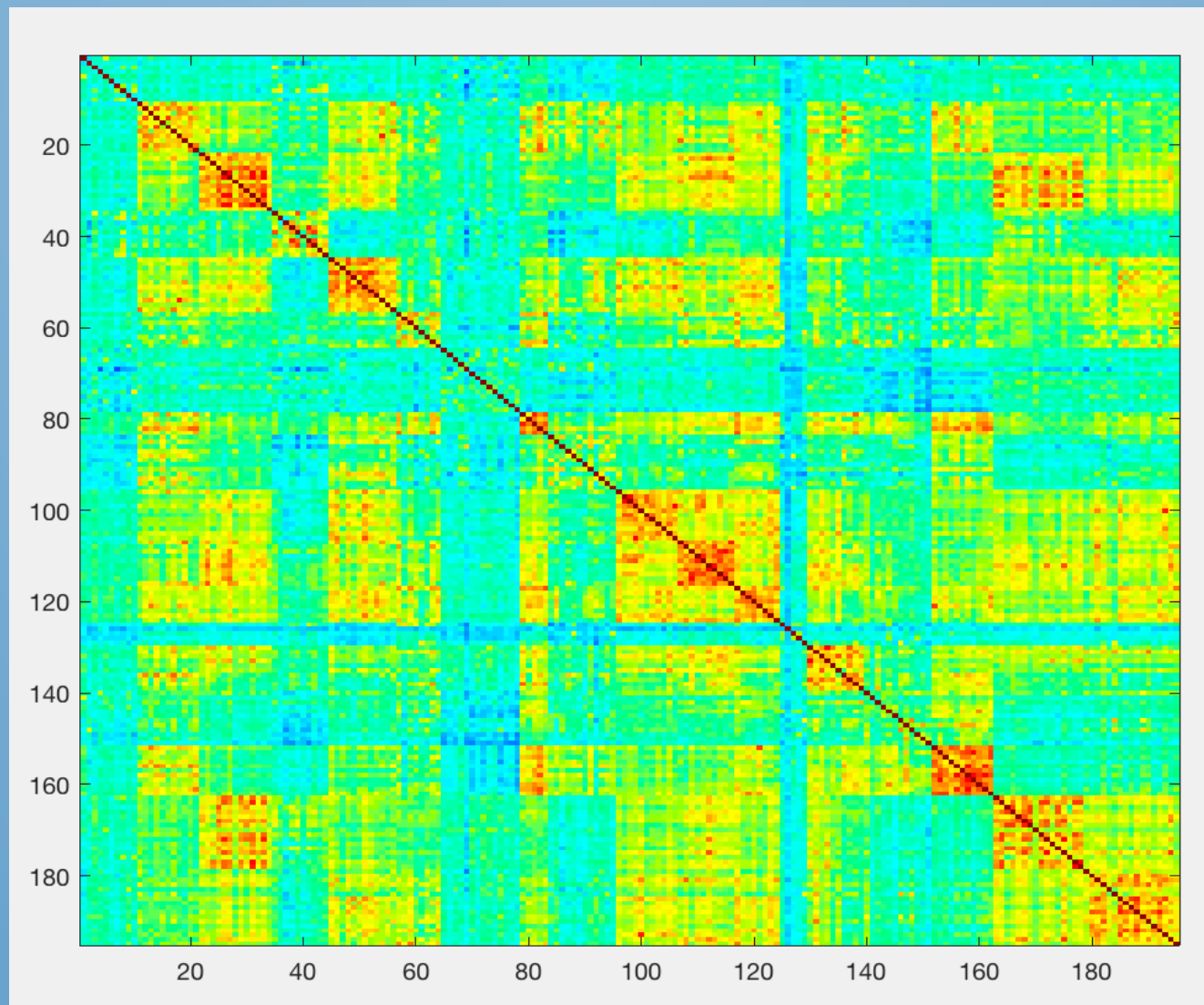


Craddock et al, 2011

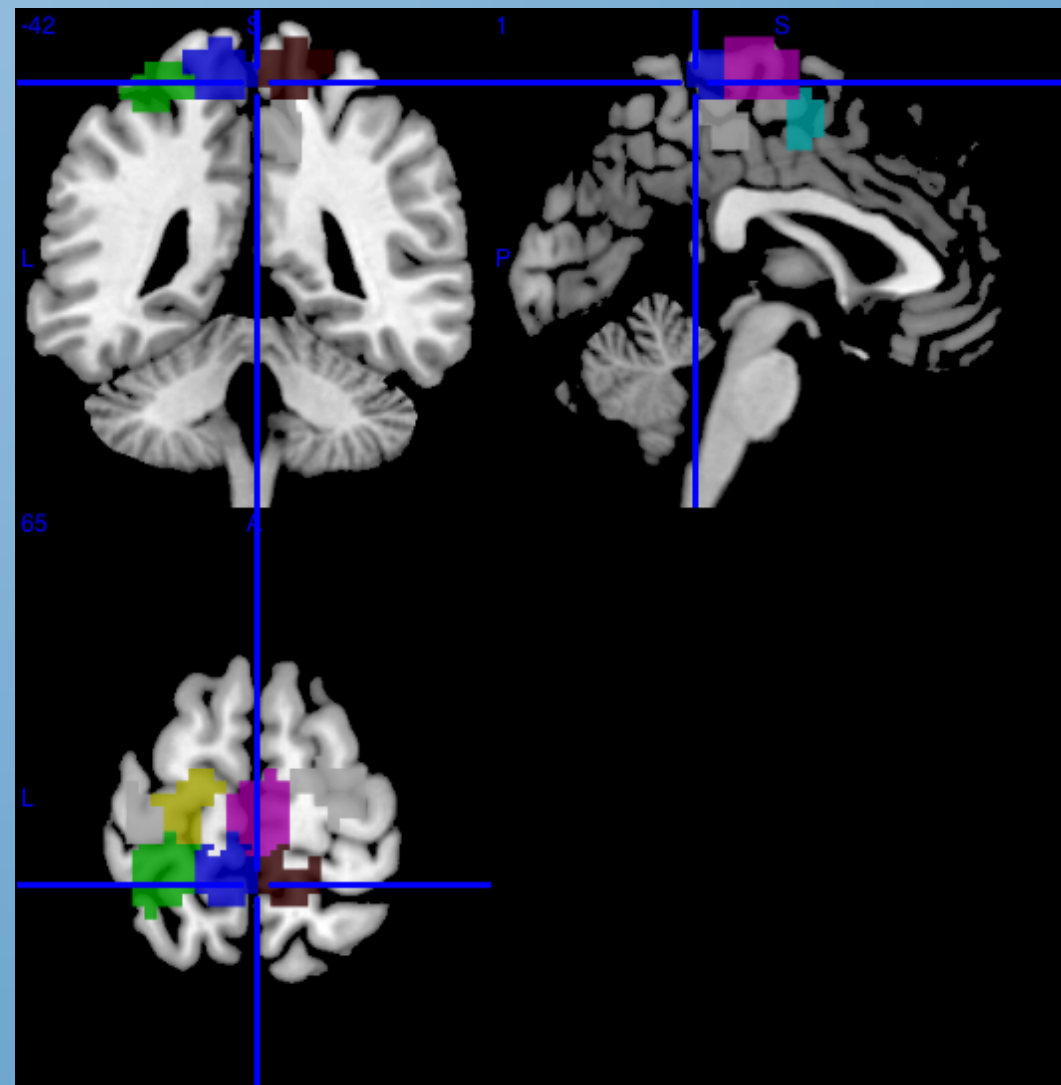
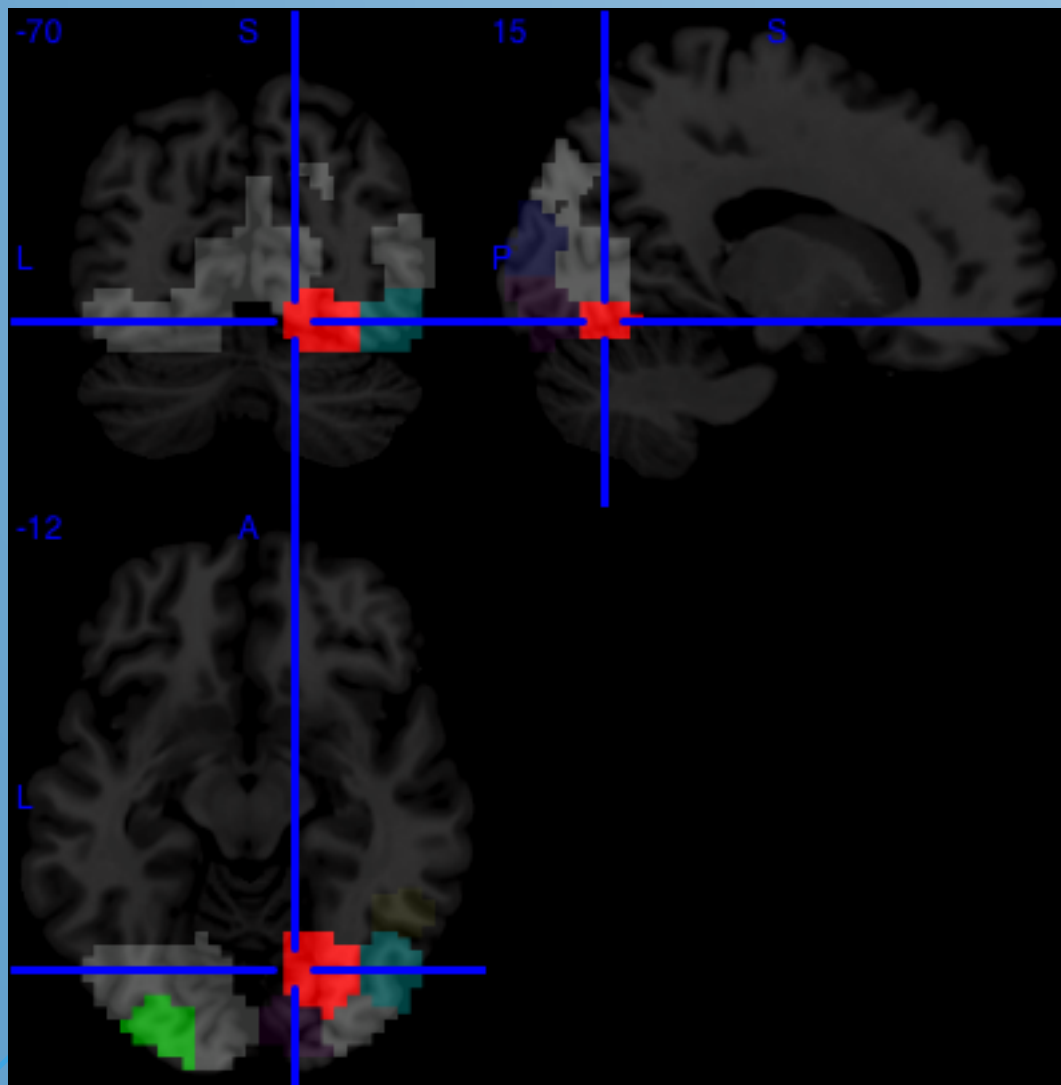


Allen, 2014

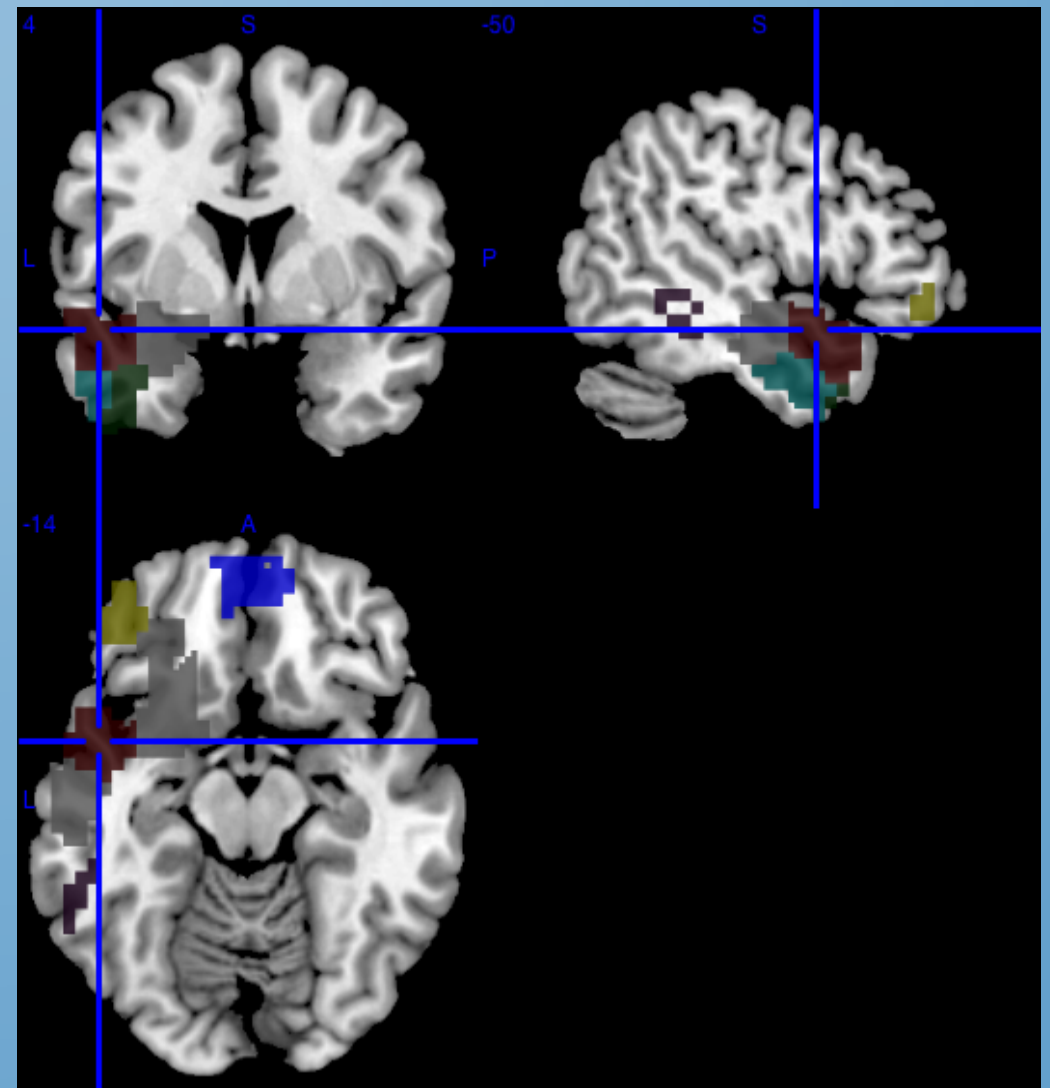
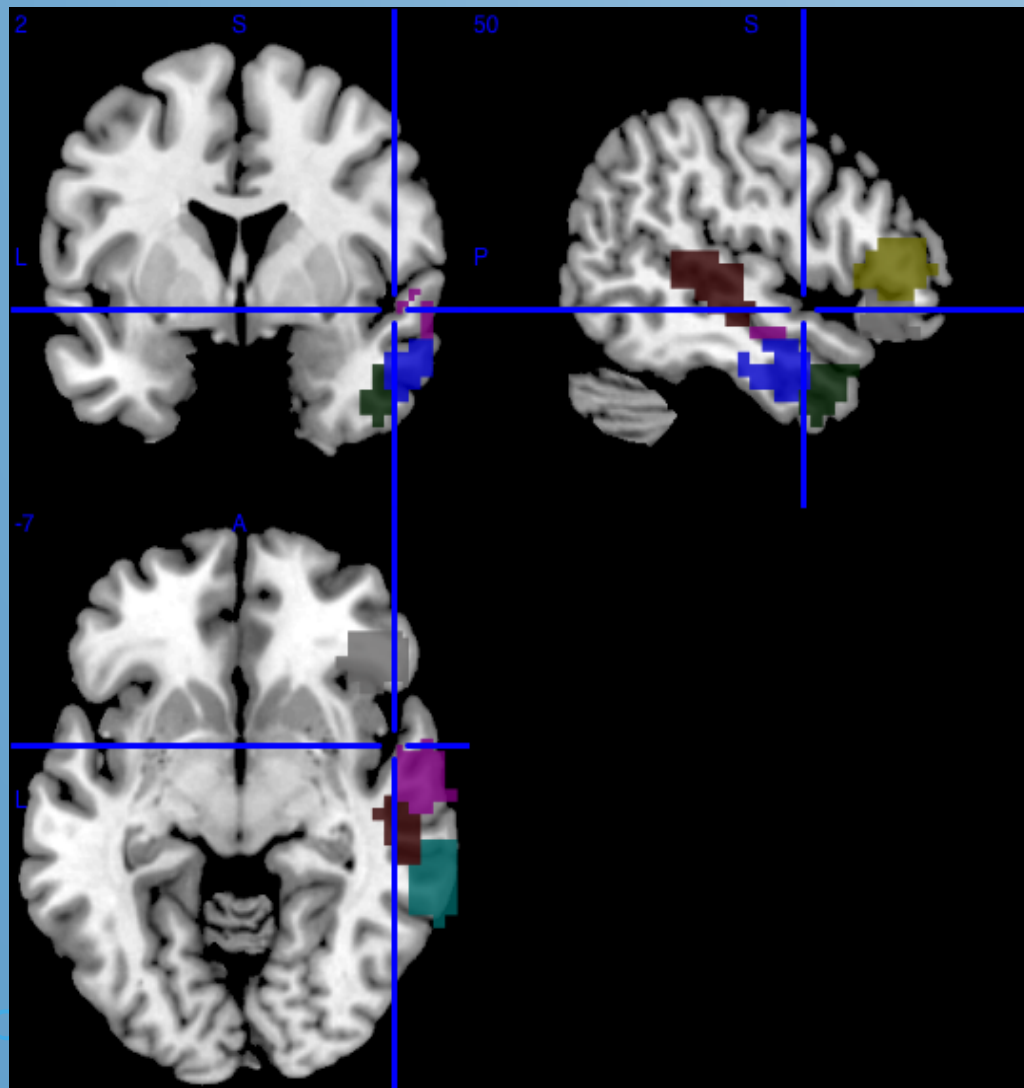
Stationary Functional Connectivity



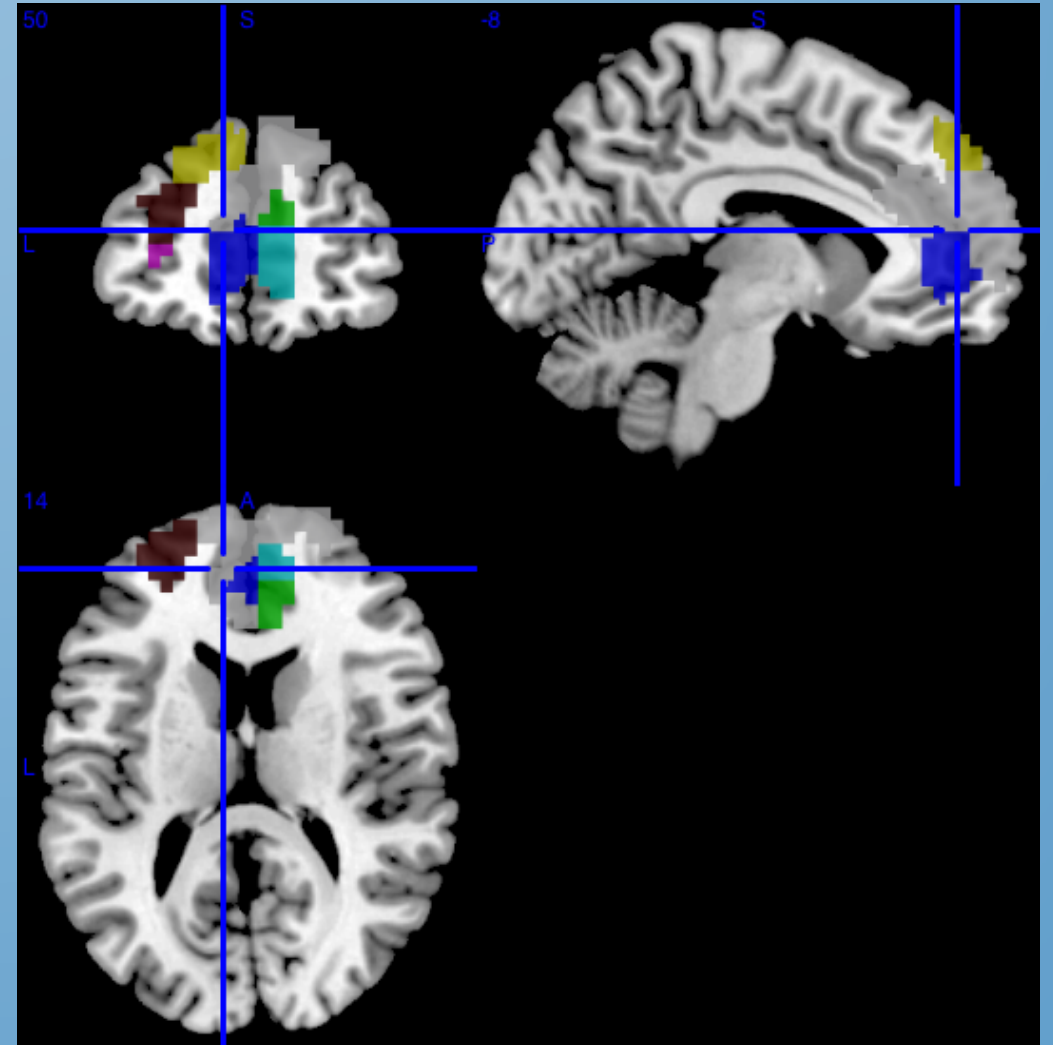
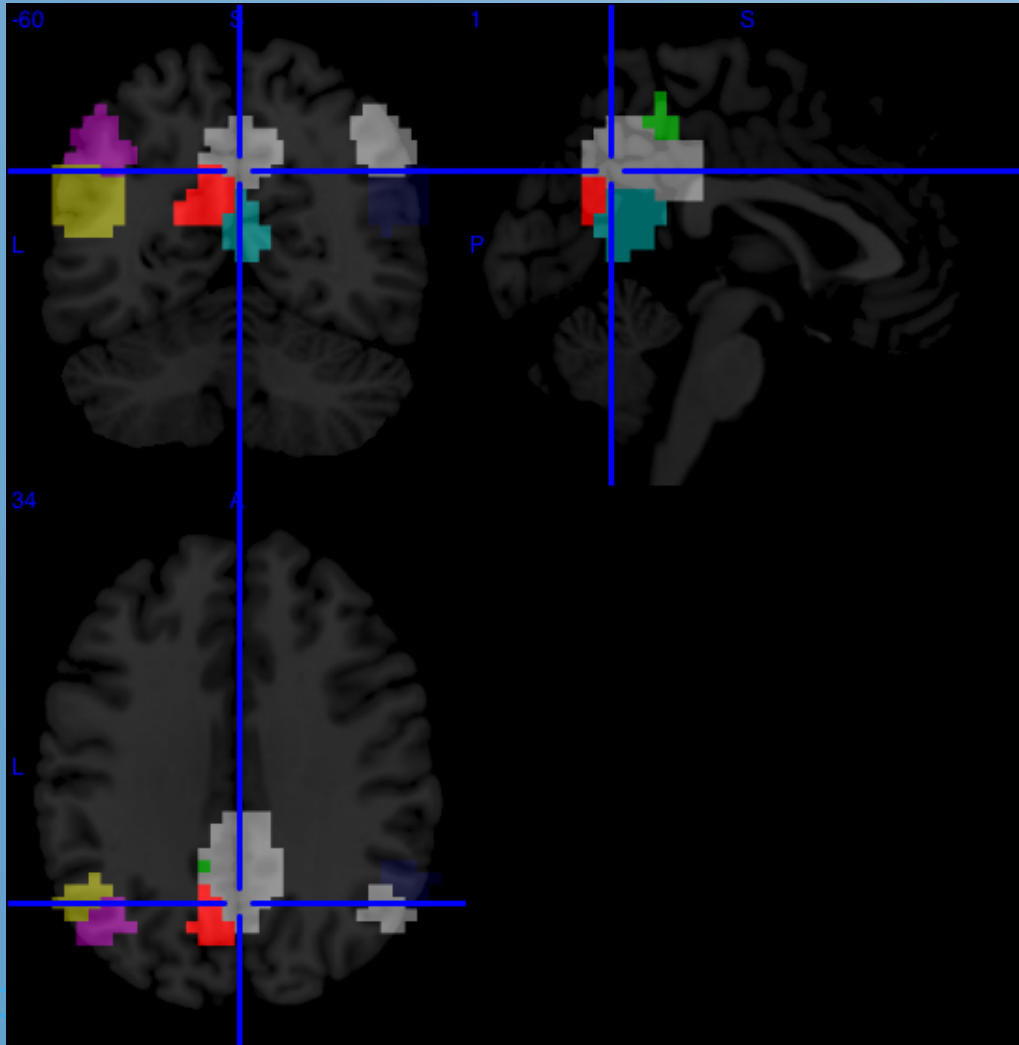
PRIMARY SENSORY (VISUAL & MOTOR)



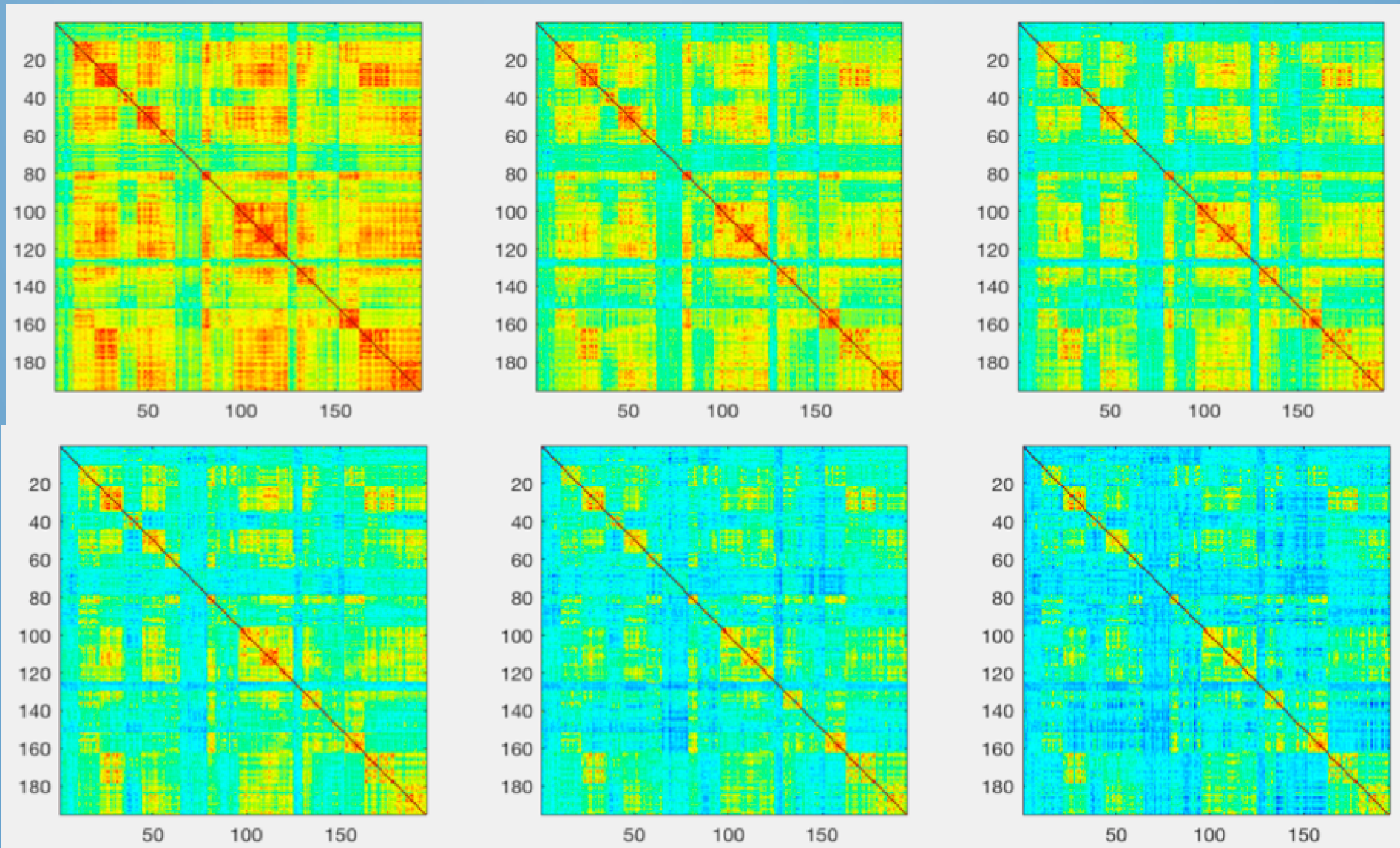
FRONTOTEMPORAL R/L LATERALIZATION



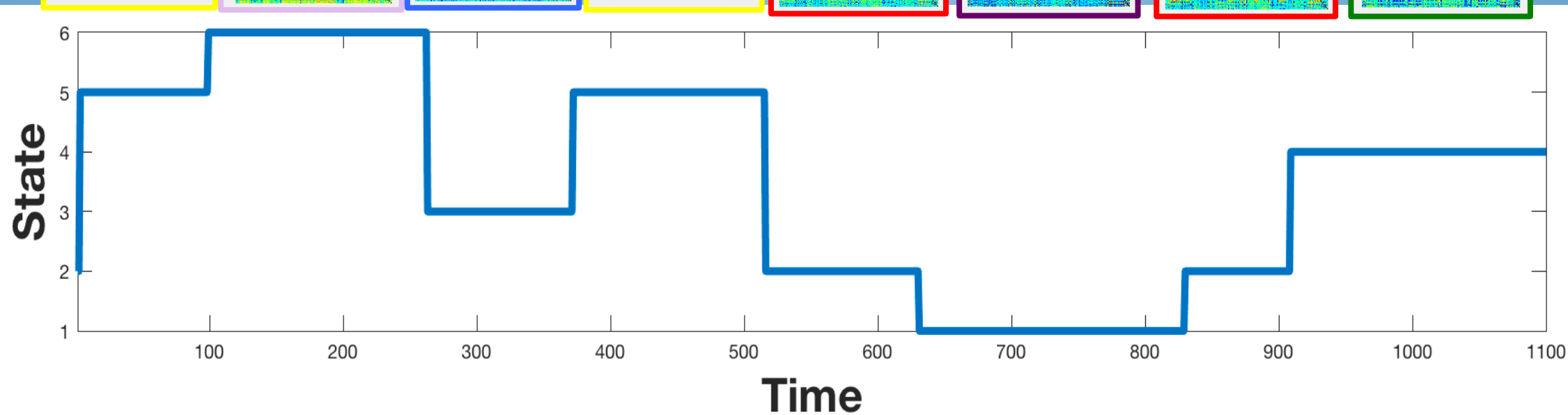
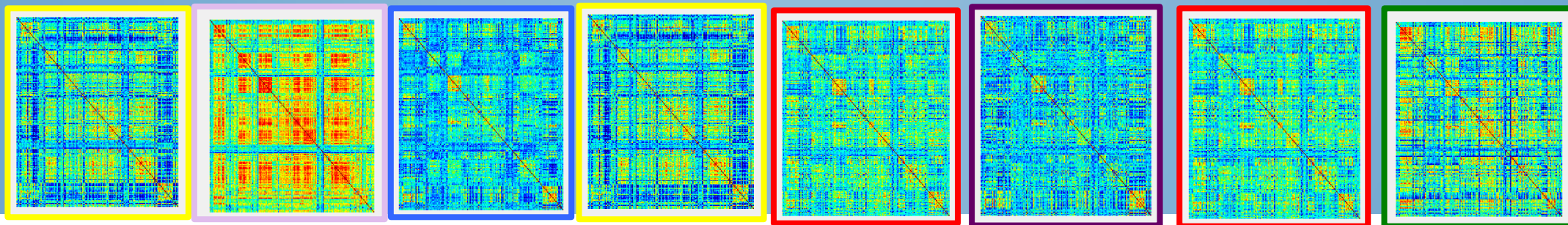
DEFAULT MODE NETWORK



Dynamic Functional Connectivity



Dynamic Functional Connectivity



OUTLOOK

- Stationary Functional Connectivity
 - Less Clustering
- Dynamic Functional Connectivity
 - Focus on a specific network

ACKNOWLEDGEMENTS

- Dr. Jann
- Dr. Cuajungco
- Dr. Behseta
- Dr. McEligot
- USC

SOURCES

- Forcom, A. M. & Fletcher, P. C. (2007). Does the brain have a baseline? Why we should be resisting a rest state. *Elsevier* 37: 1073– 1082.
- Damoiseaux, J. S. & Greicius, M. D. (2009). Greather than the sum of its parts: a review of studies combining structural connectivity and resting-state functional connectivity. *Brain Structure Function* 213: 525 – 533.
- Allen, E. A., Damaraju, E., & Calhoun, V. D. (2014). Tracking whole-brain connectivity dynamics in the resting state. *Cerebral Cortex* 24(3): 663-676
- Cole, D.M., Smith, S. M. & Beckman, C. F. (2011) Advances and pitfalls in the analysis and interpretation of resting-state fMRI data. *Frontiers in Systems Neuroscience* 4(8): 1-15.
- Bardin, J. (2012). Making Connections. *Nature* (483): 395-398
- Logothetis, N. K. & Wandell, B. A. (2004). Interpreting the BOLD Signal. *Physiology* 66: 735-769.