Relating connectivity to inter- and intra-individual differences in attention and cognition

Organizers:

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More than a decade of fMRI-based functional connectivity research has established a general blueprint for brain functional organization, but less is known about the interactions between brain regions that occur atop this architecture in the context of ongoing behavior. Although traditional functional connectivity analyses have focused on data acquired at rest, this symposium will demonstrate practical ways that investigators can leverage connectivity analyses during various task states to discover the mechanisms underlying brain network reorganization during ongoing cognition. Studying both the inter- and intra-individual variation in these measures is critical from both a basic scientific perspective as well as a practical one, as mapping from individual brains to individual behaviors is crucial for developing imaging-based biomarkers with robust translational utility.

The speakers at our symposium will present evidence from tasks that probe attention and working memory, as well as during naturalistic paradigms such as reading and listening to narratives. Across all four presentations, we will emphasize the importance of behavior as a ground-truth measurement, demonstrating the manner in which imaging-derived measures can be used to build models capable of predicting behavior both within and across individuals. Specifically, we will describe practical approaches for estimating time-averaged and time-resolved functional connectivity, applying machine learning and cross-dataset prediction, and designing paradigms that lend themselves to inter-subject correlation and real-time fMRI. In each case, we will discuss the importance of combining data-driven approaches with rigorous validation to ensure that results are robust and generalizable.

Symposia Schedule:
8:00-8:15
Large-scale functional connectivity networks predict individual differences and fluctuations in attention
Monica Rosenberg, Yale University, New Haven, CT, United States

8:15-8:30
Functional Connectivity-Based Predictors of Multi-Task Behavioral Performance
David Jangraw, NIMH, Bethesda, MD, United States

8:30-8:45
Can brain state be manipulated to emphasize individual differences in functional connectivity?
Emily Finn, National Institute of Mental Health, Bethesda, MD, United States

8:45-9:00

The role of neuromodulatory gain in functional brain network dynamics

Mac Shine, Brain and Mind Centre, University of Sydney, Camperdown, New South Wales

9:00-9:15

Questions and Answers