Multimodal Functional Cartography: from connectivity to cognition

Organizers:
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In recent years, the neuroimaging community has spent major efforts to propose new representations of brain organization that better account for functional characteristics observed in imaging, such as response magnitude to tasks, functional connectivity or variations of functional tuning along the cortical surface. The use of resting-state fMRI at a large scale, e.g., in the human Connectome project, has been key in that respect. While some consensus has been progressively reached on the units constituting the macroscopic features of brain organization, the question of functional specialization has been handled mostly separately through the framework of coordinate-based meta-analysis. The current situation is that i) the atlasing view focuses mostly on connectivity-based parcellation, i.e. the definition of edges and stable structure according to the large-scale connectivity differences, while ii) the cognitive view considers functional mapping in a coordinate system, without any explicit reference to intermediate structures or boundaries.

The objective of this workshop is to try and reconcile the two views on brain organization: namely that of a set of regions characterized by connectivity on the one hand, and regions that are also functionally specialized. To this end, we will start with current developments on coordinate-based meta-analyses that emphasize a network-oriented view. We will reciprocally consider the impact of functional tasks on brain connectivity measures to assess how extrinsic conditions and intrinsic organization combine to result in inter-subject variability. We will then question our current descriptions of cognitive ontologies, given that the underlying taxonomy used has a central impact on the way brain functional specialization is described and understood. Finally, we will discuss two frontiers of cognitive mapping: that of the statistical assessment of functional specificity and that of individualized cognitive analysis, which opens the way toward high-resolution cognitive mapping.

Symposia Schedule:

14:45-15:00
Coordinate-Based Meta-analysis: From Consensus to Discovery Science
B.T. Thomas Yeo, *National University of Singapore, Singapore, Singapore*

15:00-15:15
Factors influencing how tasks modify brain networks
Caterina Gratton, *Washington University in St Louis, St. Louis, United States*

15:15-15:30
Testing cognitive ontologies using large-scale behavioral and neuroimaging data
Russell Poldrack, *Stanford University, Stanford, CA, United States*

15:30-15:45
In search for functional specificity through large-scale encoding and decoding models
Bertrand Thirion, *Inria, Saclay, France*

15:45-16:00

Questions and Answers