

Introductory Remarks to Symposium 12

Structural and functional implementation of bottom-up and top-down influences in the primate brain

Julien Vezoli and Georgios Michalareas, Frankfurt/Main

Recent anatomical data demonstrated unequivocal hierarchy of primate visual areas. In parallel, predictive coding framework is based on a functional hierarchy processing framework. Yet, anatomical data have so far been hardly integrated with functional data and the potentially distinct mechanisms of bottom-up (BU) and top-down (TD) signaling have not yet been fully revealed.

The proposed symposium aims to address these mechanisms and conclude with unified proposals about their instantiation. The presenting experts are studying such principles at diverse levels, from anatomical to functional cortical networks, and will offer to the audience a more complete grasp of the full complexity of brain structural and functional organization.

One of the most challenging problems in neuroscience today is understanding how the primate brain processes, modulates and integrates information from local neuronal ensembles according to complex and ever-changing task demands. These emergent neuronal ensembles produce a range of complex cognitive functions such as attention, perception, language, and memory. The anatomical hierarchy imposes key constraints and provides important clues on how BU and TD information is processed and integrated. Having a fine grained description of this hierarchical framework is crucial for understanding the computational function of this hierarchy. It also requires that we understand the functional rules and logic that govern dynamical interactions between neurons at different levels of the hierarchy. Such functional rules need to be studied all the way from the micro to the macro-scale, in order to understand how activity in small neural populations leads to coherent large-scale cortical networks.

This symposium aims to provide insight into the fine grained structural details of the hierarchy and the functional hierarchical principles of the neocortex, from local neural populations to entire brain areas. Research from non-human and human primates and data from different modalities will provide to the audience a comprehensive understanding of the relation between structural and functional connectivity and of the role and importance of such functional hierarchies in the brain.

Symposium 12

Thursday, March 23, 2017
11:30 - 13:30, Lecture Hall 101

Chairs: Julien Vezoli and Martin Vinck,
Frankfurt/Main

11:30 Opening Remarks

- 11:35 Anne-Lise Giraud, Geneva, Switzerland
OSCILLATION-BASED PREDICTIVE MECHANISMS IN SPEECH PROCESSING (S12-1)
- 12:05 Pascal Fries, Frankfurt/Main
THE RHYTHMS OF HIERARCHY (S12-2)
- 12:35 Henry Kennedy, Bron, France
THE SPATIALLY-EMBEDDED BRAIN (S12-3)
- 13:05 Alina Peter, Frankfurt/Main
REPETITION-INDUCED CHANGES IN GAMMA-BAND SYNCHRONIZATION ARE STIMULUS SPECIFIC (S12-4)
- 13:15 Georgios Spyropoulos, Frankfurt/Main
A THETA RHYTHM IN AWAKE MACAQUE V1 AND V4 AND ITS ATTENTIONAL MODULATION (S12-5)
- 13:25 **Concluding Remarks**