

**2017-2018**

**CIMeC Doctoral Program Colloquia**

*LIST:*

November 23: SPEAKER: **Roi Cohen Kadosh** - Full Professor Department of Experimental Psychology, University of Oxford Senior Research Fellow in Experimental Psychology, Jesus College, University of Oxford

TITLE: The effect of brain stimulation on cognitive training.

March 22: SPEAKER: **Martine van Zandvoort** - Associate Professor Department of Experimental Psychology, Utrecht University / Department of Neurology & Neurosurgery University Medical Center Utrecht, NL.

TITLE: Cognitive Monitoring in Awake Surgery.

May 3: SPEAKER: **Serge O. Dumoulin** - Scientific Director Spinoza Centre for Neuroimaging, Full Professor of Perception, Cognition and Neuroscience both at the department of Experimental Psychology of Utrecht University, and at the department of Experimental and Applied Psychology of VU University Amsterdam in the Netherlands.

TITLE: How population receptive fields interact with attention and numerical cognition.

May 25: SPEAKER: **Bill Hansson** - Professor and Head of Chemical Ecology at the Swedish University of Agricultural Sciences, Alnarp (since 2001), Director and Scientific Member at the Max Planck Institute for Chemical Ecology (since 2006), Honorary Professor Friedrich Schiller University Jena (since 2010), Vice-President of the Max Planck Society (since 2014).

TITLE: Ecologically labeled lines through the insect olfactory system.

June 8: SPEAKER: **Tommaso Fellin** - Senior Researcher Tenured, IIT.

TITLE: Optical dissection of the neural circuits underlying the processing of sensory information in the mouse somatosensory cortex

June 14: SPEAKER: **Colin Phillips** - Professor of Linguistics, University of Maryland (USA)

TITLE: Grammar in Speaking and Understanding

June 21: SPEAKER: **Brenda Rapp** - Professor of Cognitive Science, Johns Hopkins University (USA)

TITLE: Understanding lesions and recovery in the age of networks

*DETAIL:*

November 23: SPEAKER: **Roi Cohen Kadosh** - Full Professor Department of Experimental Psychology, University of Oxford Senior Research Fellow in Experimental Psychology, Jesus College, University of Oxford

TITLE: The effect of brain stimulation on cognitive training.

“Fluid cognitive skills, such as working memory, reasoning, and mathematics, are critical in most academic settings. Current attempts to improve cognitive skills have yielded mixed results and limited evidence of transfer beyond the immediate cognitive training materials. These failures have led some to suggest that cognitive skills are fixed. Another suggestion is that these failures are due to suboptimal approaches to exploit neuroplasticity. An innovative method to modulate neuroplasticity is using brain stimulation, with the assumption that concurrent brain stimulation and cognitive intervention interact synergistically, enhancing the benefits derived from the intervention. I will present a series of experiments that involved executive control, arithmetic learning or executive functions training. The effect of brain stimulation was not beneficial in all the cases, but varied as a function of the neural system we tried to affect. The results lead to the idea that a consideration of the neurocognitive factors characterising the individuals in the experiment can lead to a much clearer understanding of effects than considering only the group they belong to. This approach yields advancement at the basic and translational level. It would enable the improvement and individualisation of interventions, and produce a better understanding of the underlying neurocognitive mechanisms.”

March 22: SPEAKER: **Martine van Zandvoort** - Associate Professor Department of Experimental Psychology, Utrecht University / Department of Neurology & Neurosurgery University Medical Center Utrecht, NL.

TITLE: Cognitive Monitoring in Awake Surgery.

“Awake surgery in patients with a brain tumor, both low and high grade, is becoming more and more part of clinical care as usual. Cognitive monitoring to preserve patients autonomy is the most important reason for this procedure. Concrete guidelines looking at the literature so far, however, are limited and much of the work done in this field is pioneering. In the current talk I will describe our experience in the University Medical Center Utrecht (the Netherlands) with awake surgery from a neuropsychological perspective. We currently monitor besides language also for visuoperception, neglect, body image, inhibition of control, attention and working memory. By means of group data (n>200) and casus I will illustrate and discuss the feasibility of these procedures. In addition, I will discuss the value of neuropsychological evaluation pre and post surgery with respect to outcome.”

May 3: SPEAKER: **Serge O. Dumoulin** - Scientific Director Spinoza Centre for Neuroimaging, Full Professor of Perception, Cognition and Neuroscience both at the department of Experimental Psychology of Utrecht University, and at the department of Experimental and Applied Psychology of VU University Amsterdam in the Netherlands.

TITLE: How population receptive fields interact with attention and numerical cognition.

“I will discuss new advances in biologically-inspired data-analyses and ultra-high field MRI at 7 Tesla in human visual cortex with implications for mechanisms of attention and numerical cognition. In human

visual cortex, we show that these methods can reconstruct population receptive field properties. These pRF properties vary systematically between and within different visual field maps and across cortical layers. Next, I will describe how spatial attention draws pRFs across the visual field towards its focus at multiple levels of the visual hierarchy. An additional “attention field” captures these changes in pRF positions. In essence, we show that spatial attention transforms the visual field representation analogous to a magnifying glass or zoom lens. Last, I will discuss how pRF analyses capture aspects of non-symbolic numerical processes in humans. We describe neural populations tuned to numerosities and item size that are organized topographically in human parietal cortex. This suggests that pRFs and topography may be a general organization principle of human cortex.”

May 25: SPEAKER: **Bill Hansson** - Professor and Head of Chemical Ecology at the Swedish University of Agricultural Sciences, Alnarp (since 2001), Director and Scientific Member at the Max Planck Institute for Chemical Ecology (since 2006), Honorary Professor Friedrich Schiller University Jena (since 2010), Vice-President of the Max Planck Society (since 2014).

TITLE: Ecologically labeled lines through the insect olfactory system.

“Insects are heavily dependent on olfactory input for more or less every fitness-related behavior. Here I will present a number of cases where we have used every technique available to dissect such systems. Both in drosophilid flies and in sphingid moths highly specific neural lines can be identified, which, when activated, release a predictable behavioral response.”

June 8: SPEAKER: **Tommaso Fellin** - Senior Researcher Tenured, IIT.

TITLE: Optical dissection of the neural circuits underlying the processing of sensory information in the mouse somatosensory cortex

“Sensory cortices are organized in multiple interconnected layers and contain several functionally distinct neuronal subnetworks. Elucidating the logic of interaction within and between cortical layers and subnetworks is essential for understanding the cellular basis of cortical function. In this seminar, I will focus on the role of specific layers in the modulation of sensory responses in the mouse somatosensory cortex. I will also present the development and application of new optical methods to monitor and bidirectionally manipulate the activity of neurons with high spatial resolution. I will discuss how these new technologies may greatly facilitate our understanding of the network mechanisms underlying cortical function.”

June 14: SPEAKER: **Colin Phillips** - Professor of Linguistics, University of Maryland (USA)

TITLE: Grammar in Speaking and Understanding

“Language comprehension, language production, and grammatical analysis are typically pursued relatively independently of one another. We have long been interested in the relation between parsing and grammar, but have neglected mechanisms for production. If we cannot unify mechanisms for speaking and understanding, then unifying grammatical computation with either of them is likely fruitless. I will discuss the progress that we have made on understanding these issues.”

June 21: SPEAKER: **Brenda Rapp** - Professor of Cognitive Science, Johns Hopkins University (USA)

TITLE: Understanding lesions and recovery in the age of networks

“In the past few years there has been significant and increasing interest in understanding the properties of the brain networks that support cognitive processes. This research has been facilitated by the development and availability of relevant analytic approaches (e.g., graph-theoretic methods). However, to date, this work has almost entirely involved the analysis of neuroimaging data (resting state and/or task-based fMRI) from neurologically healthy individuals, with only a handful of studies examining the network-level consequences of lesions or post-lesion recovery of cognitive functions. Nonetheless, this type of research has the potential for deepening our understanding of basic properties of brain organization such as functional modularity. I discuss research from my laboratory using task-based fMRI with brain-lesioned individuals who have acquired language deficits. This work investigates functional connectivity properties at multiple-scales: large (multi-centimeter) and small (sub-centimeter). At the large scale, we identify changes in the modularity properties of specific networks that are systematically associated with behavior. At the small scale, we find changes in the local (adjacent voxel) heterogeneity of neural connectivity that are associated with cognitive impairment and recovery of function. I discuss some theoretical implications of these findings for our understanding of how modularity is affected by damage and its role in recovery as well as, more generally, for network-based approaches to understanding the lesioned brain and recovery of function.”