Detailed program of the UE NeuroConferences 2022

Organized by the Master 2 FCN of UCB Lyon 1 - with the support of Labex Cortex

Naturalistic Neurosciences	Organizer: **Pr. Emiliano Macaluso** emiliano.macaluso@univ-lyon1.fr

Naturalistic neurosciences seek to push the boundaries of scientific research beyond the strong constraints that characterise simple and stereotyped paradigms traditionally used in the laboratory. This can help confirming the relevance of classical observations but now in natural conditions, or can reveal novel patterns of brain activation thus contributing to expand and/or revise our understanding of brain functioning. In this symposium we will address questions related to attention, memory, navigation and social behaviour presenting studies that comprise a wide spectrum of methodologies aimed at narrowing the gap between neuroscience research and cognition in the real world.

Conference abstracts available below and on the next page.

	Wed 05/10	10.00-11.00	**Pr. Emiliano MACALUSO** *(Centre de Recherche en Neurosciences de Lyon)* Title: Episodic memory in virtual and natural environments.	Amphi Neurocampus
		11.00-12.00	**Dr. Zita PATAI** *(Queen Mary University of London, UK)* Title: Charting the Human Navigation System	**Visioconference** Amphi Neurocampus
		13.00-14.00	**Dr. Jean-René DUHAMEL** *(Institut des Sciences Cognitives Marc Jeannerod, Lyon)* Title: New perspectives in non-human primate social neuroscience.	Amphi Neurocampus
		14.00-15.00	**Dr. Juha SALMITAIYAL** *(Aalto University, Finland)* Title: How to study neurodevelopmental disorders with naturalistic neuroscience methods?,	**Visioconference** Amphi Neurocampus

Episodic memory in virtual and natural environments

Emiliano Macaluso, CRNL, Lyon, France

Extensive research both in animals and in humans pointed to the medial temporal cortex and the prefrontal cortex as the main brain regions involved in the processing and integration of the multiple elements that characterize episodic memory (e.g. what, where, when). Here, I will present human behavioral and imaging studies that targeted the multi-dimensional nature of episodic memory in naturalistic contexts. I used a large scale virtual city that participants actively explored for 45 min (VR protocol) and an innovative approach based on mobile phone technology, which permits encoding of object-pictures in the everyday life of the participants (with up to 3 weeks encoding durations, RW protocol). I targeted the role of contextual information during explicit retrieval, as well as the implicit effect of memory on eye-movement guidance. The results showed that context-related source information (when/where) contributed to the subjective sense of recollection of individual events ("remembered vs. familiar" what-objects), both in the VR and RW protocols. The imaging data showed that, together with the medial temporal and the medial prefrontal cortex, also the medial parietal cortex (precuneus) participates to the retrieval of memories with episodic characteristics, and it engages when memory guides spatial orienting in an implicit manner. These results fit with the proposal that the medial parietal cortex instantiates situational models combining episode-specific multidimensional knowledge and that, together with the medial temporal cortex, it contributes to the allocation of processing resources in complex and naturalistic environments.

Charting the Human Navigation System

Zita Patai, School of Biological and Behavioural Sciences, Queen Mary University of London, UK

When we move from place to place, we do so in the context of a dynamic world: detours force us to adapt to new routes, and the passage of time changes our understanding of space itself. While the hippocampus has been the primary focus of the navigation field, the prefrontal cortex (PFC) supports decision- making, goal tracking, and planning. Spatial navigation is a behavior that taxes these cognitive processes, yet the role of the PFC in navigation has been largely overlooked. I will present recent neuroimaging studies on spatial navigation in humans that reveals the nuances of how and when the cortex is involved and when it's the hippocampus, and I will try to integrate these findings with models of prefrontal function and well as models of memory consolidation for a more complete understanding of navigation behaviour.

New perspectives in non-human primate social neuroscience

Jean-René Duhamel, ISC Marc Jeannerod, Lyon, France

Although invaluable to scientific progress, the laboratory approach commonly used to explore brain function in monkeys is reductionistic by essence, employing varying degrees of bodily restraint and deliberately impoverished sensory stimuli. Designed to facilitate experimental manipulations and to guarantee reliable and interpretable data, this approach nevertheless limits our capacity to understand how brain circuits govern ethologically-relevant interactions of an individual within its physical and social environment. Investigating brain function in richer naturalistic contexts requires adopting a different framework. A small but growing number of research labs have begun to develop semi-naturalistic observational approaches allowing to track with high precision the movements and actions of freely behaving monkeys and simultaneously wirelessly record the brain activity in these animals. By bridging neurophysiology and ethology in this manner, the goal is to achieve a new understanding of how information about the environment is acquired and represented at the neuronal and circuit levels. This approach can be used to study a number of important issues, such as motor behavior, space coding or social interactions. This experimental framework also opens new avenues for investigating causal mechanisms through the use of novel interference approaches (optogenetic and chemo-genetic stimulation, cell-specific lesions) in order to understand the possible functions of specific brain areas in psychopathological conditions where behaviors are impaired.

How to study neurodevelopmental disorders with naturalistic neuroscience methods?

Juha Salmitaival, Department of Neuroscience and Biomedical Engineering, Aalto University, Espoo, Finland

Neurodevelopmental disorders, such as ADHD and autism, are diagnosed based on specific symptoms manifesting in everyday life. Widely used cognitive tasks, which also provide the most frequently used experimental option to serve cognitive neuroscience, have not been very successful in capturing complex phenotypes in these disorders. Resting state neuroimaging, in turn, usually does not provide direct evidence of the cognitive processes underlying measured brain signals. Naturalistic neuroscience provides an alternative that can be used to simulate complex real-world conditions where the symptoms are manifested. In this talk, I will go through some of the advances in related fMRI, introducing regional and network -based methods. I will also address the pros and cons of widely used passive viewing conditions and present some future prospects of utilising virtual and mixed reality.

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Integrated aspects of sleep/wake regulation				Organizer: **Dr. Laurent SEUGNET** laurent.seugnet@inserm.fr
Sleep/wake rhythms orchestrate most aspects of life, from behavior to physiology. In turn, sleep/wake regulation integrates physiology and behavior through numerous neuronal networks and peripheral inputs. It is also under strong genetic, cellular and metabolic influence. In this topic we will address 1) how sleep/wake regulatory factors can be identified notably through various genetic, molecular, electrophysiological and anatomical approaches in rodent models and in an invertebrate model, Drosophila, and 2) how this knowledge can be used to investigate the pathophysiology of a disease, narcolepsy.				
	Tue 11/10	14.00-15.30	**Pr. Mehdi TAFTI** *(Department of Biomedical Sciences, University of Lausanne)* Title: Molecular genetics of sleep in mice.	Amphi Neurocampus
		15.30-17.00	**Dr. Luc GENTET** *(Centre de Recherche en Neurosciences de Lyon)* Title: Cortical interneurons and the sleep-wake cycle	
	Wed 12/10	09.00-10.300	**Dr. Laurent SEUGNET** *(Centre de Recherche en Neurosciences de Lyon)* Title: Integrated regulation of sleep, insights from studies in Drosophila	Amphi Neurocampus
		Lunch break		
		14.00-15.30	**Dr. Armelle RANCILLAC** *(Center for Interdisciplinary Research in Biology, Paris)* Title: Metabolic and cellular regulation of sleep, inside and outside the VLPO.	Amphi Neurocampus
		15.30-17.00	**Dr. Christelle PEYRON** *(Centre de Recherche en Neurosciences de Lyon* Title: The study of narcolepsy using mouse models	