Episodic odor memory formation and theta oscillation dynamics

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Affiliation

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Abstract

In this talk, I will discuss our recent research on the neural basis of odor-evoked autobiographical memory, also known as Proustian memory. Smells, more than almost any other sensory input, can trigger very rich and vivid memories, immediately transporting us back to a long-forgotten time and place. This fascinating phenomenon has been coined Proustian memory, in reference to a passage in Marcel Proust's 1913 book Swann's way, in which the narrator describes how eating the crumbs of a madeleine dipped in lime blossom tea triggers a powerful process of remembering that takes him back to a pleasant long-buried childhood memory. But how does the brain create and recall odor-related memories? And why are some of these memories vivid and strong while others are poor and incomplete? Using intracranial EEG recordings and representational neural geometry analysis, we shed new light on the role of orbitofrontal and hippocampal theta oscillations in memory formation and propose a mechanistic account of their role in the richness of odor-related episodic memory.

Short biography:

Karim Jerbi is a professor at the Psychology department of the University of Montreal. He is Canada Research Chair in Computational Neuroscience and Cognitive Neuroimaging and heads UNIQUE, a Neuro-AI research center (Unifying Neuroscience and AI in Quebec). He obtained a PhD in Cognitive Neuroscience and Brain Imaging from the Pierre & Marie Curie University in Paris and a biomedical engineering degree from the University of Karlsruhe (Germany). His research lies at the crossroads between cognitive, computational and clinical neuroscience. The goal of his research is (1) to elucidate the role of neural oscillations and large-scale neural communication in cognition, and (2) to investigate brain network alterations in the case of psychiatric and neurological disorders. The multidisciplinary research conducted in his laboratory combines magnetoencephalography (MEG) and electroencephalography (EEG) with advanced signal processing and data analytics including artificial intelligence. Dr Jerbi also has a strong interest in the convergence between biological and artificial intelligence.