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April 28(Fri)

11:30am - 1:00pm

CKB 303

From Visual Processing to Visual Perception

Abstract:

Vision is considered by most humans as their most important sense. This ethological importance might be linked to the predominant part of the human brain dedicated to processing visual information. Hence, one of the biggest challenges of today's sensory neuroscience is determining how the activity of visual cortical neurons give rise to visual perception. During this talk, I will present how my laboratory used calcium imaging in mice performing a perceptual discrimination task to determine a direct link between the activity of neurons in the primary visual cortex (V1) and the mouse visual perception. I will first introduce how individual neurons in V1 encode visual information and reveal the limitations of single neuron encoding. We will then see how previous attempts to link population encoding and visual perception led to a paradoxical result: the information carried by the V1 neuronal population is more precise than the animal perceptual ability. Finally, I will present our latest results showing that visual perception is constrained by mechanisms allowing the visual cortex to generalize and categorize visual objects. We will see that if those constraints are detrimental for perceptual accuracy, they are necessary to perceptual learning and to adapt perception to the behavioral needs.

About the Speaker

Pierre-Olivier was born and grew up in Paris, France. His first name been too complicated even for French speakers, he usually goes by the nickname Péo (pronounce "Pay-O"). After studying veterinary medicine at the École Nationale Vétérinaire de Nantes, he obtained a PhD in Neuroscience from the Collège de France for his work on the cellular and network mechanisms underpinning the initiation and propagation of epileptic seizures. His interest in visual processing started during his first postdoctoral fellowship at the University of Pennsylvania where he studied the propagation of visual information between primary and secondary visual areas. During his second postdoc at the University of California Los Angeles, he started to work on the mechanisms adapting visual processing to the behavioral context. Since starting his laboratory at Rutgers - Newark, Péo and his colleagues investigate how multimodal integration, attention and learning shape visual processing in the primary visual cortex.