Neurophysics of learning causality: Space, time, oscillations and sleep

Professor Mayank Mehta
Brown University

Abstract: Learning is a complex process, involving phenomena occurring at vastly different spatio-temporal length scales and brain regions. There are many different forms of learning: from learning of facts to riding a bicycle. I will argue that an important component of most forms of learning is learning of the causal relationship between events. We have studied this using a close combination of experimental and theoretical approaches. I will discuss neural mechanisms of how causality may be learned by an interaction between the old and the new brains, during experience and during sleep, and why the neural oscillations may be indispensable for this process.