Outreach

# Ways to think about the brain: Emergence of cognition from action

**Gyorgy Buzsaki**
Neuroscience Institute, New York University, School of Medicine

Host: Jozsef Csicsvari

Please note that registration for this event is now closed. This talk will be recorded and uploaded to our YouTube channel within the upcoming week.AbstractCurrent neuroscience is largely fueled by an empiricist philosophy that assumes the brain's goal is to perceive, represent the world, and learn the truth. An inevitable consequence of this framework is the assumption of a decision-making homunculus wedged between our perception and actions. In contrast, I advocate that the brain's fundamental function is to induce actions and predict the consequences of those actions to support the survival and prosperity of the brain's host. Only actions can provide a second opinion about the relevance of the sensory inputs and provide meaning for and interpretation of those inputs. In this "inside-out" framework, the brain comes with a preconfigured and self-organized dynamic that constrains how it acts and views the world. In the brain's nonegalitarian organization, preexisting nonsense brain patterns become meaningful through action-based experience. I will show recent experiments that support this framework and illustrate how seemingly disparate neural computations, such as metabolic homeostasis/allostasis and memory-guided behaviors, have co-evolved at every step within the same brain circuits.Buzsaki, G. Rhythms of the Brain (OUP 2006)Buzsaki G. The Brain from Inside Out (OUP 2019)Buzsaki G. How the Brain 'Constructs' the Outside World. Scientific American, April 2022. https://www.scientificamerican.com/article/how-the-brain-constructs-the-outside-world/BioGyörgy Buzsáki identified a hierarchical organization of brain oscillations and proposed how these rhythms support a 'brain syntax', a physiological basis of cognitive operations. His work changed how we think about information encoding in the healthy and diseased brain, such as epilepsy and psychiatric diseases. His most influential work is known as the two-stage model of memory trace consolidation, with hippocampal sharp wave ripples serving as a transfer mechanism from hippocampus to neocortex. Several laboratories worldwide have adopted his framework and provided supporting evidence for the two-stage model of memory in both experimental animals and human subjects. Over the years, the 'ripple' pattern has become a quantifiable biomarker of cognition. Relevant to clinical translation, hippocampal ripples, along with other brain rhythms that his laboratory has identified, lend themselves to diagnosis of disease and drug discovery.Buzsáki is Biggs Professor of Neuroscience at New York University. He is among the top 0.1% most-cited neuroscientists, member of the National Academy of Sciences USA, , member of Academia Europaea and the Hungarian Academy of Sciences. He sits on the

editorial boards of several leading neuroscience journals, including Science and Neuron. He is a co-recipient of the 2011 Brain Prize and the winner of the Ralph W. Gerard Prize (2020; SFN's highest honor), The Goldman-Rakic Prize (2021), The Ariëns Kappers Medal (Royal Netherlands Academy of Arts and Sciences), 2014; Krieg Cortical Discoverer Award from the American Association of Anatomists (2001).Books: Rhythms of the Brain (OUP), 2006; The Brain from Inside Out (OUP), 2019.

## Tuesday, March 14, 2023 05:00pm - 06:00pm

Raiffeisen Lecture Hall

---

This invitation is valid as a ticket for the ISTA Shuttle from and to Heiligenstadt Station.
Please find a schedule of the ISTA Shuttle on our webpage:
https://ista.ac.at/en/campus/how-to-get-here/ The ISTA Shuttle bus is marked ISTA Shuttle (#142) and has the Institute Logo printed on the side.