Department of Psychology
The University of Hong Kong
香港大學心理學系

Nov 24 2025

Departmental Seminar

Mental Navigation and the Default Mode Network: From Spatial Maps to Conceptual Knowledge

Prof. Deniz Vatansever
Research Professor
Institute of Science and Technology for Brain-inspired Intelligence
Fudan University

4:30p.m. – 5:30p.m.
Chamber, 11/F
The Jockey Club Tower
Centennial Campus
The University of Hong Kong

About the talk:

In parallel with other species, humans possess a remarkable ability to encode detailed spatial information about our environments, forming cognitive maps that enable inference and generalisation for goal-directed behaviour. Long linked to the hippocampal-entorhinal system, growing evidence now suggests that the neural mechanisms supporting spatial navigation also extend to abstract domains, involving a broader network of cortical regions. In this talk, I will propose that the default mode network (DMN), traditionally associated with self-referential internal mentation, plays a domain-general role in constructing and traversing cognitive maps: structured representations of relational knowledge that span both spatial and non-spatial domains. I will present recent findings from our lab using ultra-high-field 7T fMRI, showing how spatial learning and memory are encoded across the DMN during navigation in virtual environments, and how these same regions organize conceptual knowledge along interpretable representational axes to support abstract mental navigation. Together, these results suggest that the DMN implements a unified computational architecture for mapping space, memory, meaning, and value. This framework bridges classical theories of cognitive maps with contemporary systems neuroscience and offers translational insights into disorders such as Alzheimer's disease, where both spatial navigation and DMN function are compromised.

About the speaker:

Professor Deniz Vatansever is a full-time Research Professor at the Institute of Science and Technology for Brain-inspired Intelligence (ISTBI), Fudan University, where he leads the Cognition and Brain Imaging Laboratory (COGNISE Lab). His research aims to elucidate the neural mechanisms underlying learning and memory, with a particular focus on the default mode network and its role in mental navigation. Combining cognitive, clinical, and computational neuroscience approaches, his work spans domains such as value-based decision making, object and concept representation, aesthetic experience, and neural plasticity. Professor Vatansever's research has been supported by competitive grants from the Ministry of Science and Technology (STI-2030) and the National Natural Science Foundation of China. His findings have been published in leading international journals, including Nature Communications, Journal of Neuroscience, Human Brain Mapping, NeuroImage, and Proceedings of the National Academy of Sciences (USA).

Zoom Meeting (For participants who couldn't attend the Seminar in person)

https://hku.zoom.us/j/6985555998?pwd=V05yTGJWNTlzazd2OFZ0Q3FReHVkdz09
Meeting ID: 698 555 5998 | Password: Psyc

~ All are Welcome ~

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