Alumni of the BRAIN and MIND Sciences Seminar Series

ΔΙΙΔΡΥΜΑΤΙΚΟ ΠΡΟΓΡΑΜΜΑ ΜΕΤΑΠΤΥΧΙΑΚΩΝ ΣΠΟΥΔΩΝ
ΕΓΚΕΦΑΛΟΣ και ΝΟΥΣ
που οδηγεί σε Μεταπτυχιακό Δίπλωμα Ειδίκευσης
INTERDISCIPLINARY GRADUATE PROGRAMME in the
BRAIN and MIND sciences
leading to Master's degree

Human Cognitive Neuroscience:

Exploring Cognition Through Brain Imaging and Brain Stimulation

Gerasimos Gerardos, MSc

PhD candidate,

University of Leipzig & Max Planck Institute for Human Cognitive and Brain Sciences, GERMANY

Thursday, January 22, 2026

14:00-15:00

Alumni of the BRAIN and MIND Sciences Seminar Series ZOOM LINK
Meeting ID: 898 1282 5746
Passcode: 703942

Info: Vassilis Raos, 4512, raos@uoc.gr

The speaker:

Gerasimos Gerardos

BSc in Psychology, Aristotle University of Thessaloniki, 2019; MSc in Brain and Mind Sciences, University of Crete, 2024; PhD candidate in Cognitive Neuroscience, University of Leipzig & Max Planck Institute for Human Cognitive and Brain Sciences, 2024–present; Thesis: Exploring verbal working memory with concurrent tDCS–fMRI; Doctoral Researcher, Cognition and Plasticity Group, University of Leipzig & MPI-CBS, 2024–present; Research Assistant, MPI-CBS, 2023–2024; Research Assistant, School of Medicine, University of Crete, 2022–2023; Neuropsychologist, University Hospital of Heraklion, 2021–2022; Research Assistant, IMBB-FORTH, 2021.
Publications in iScience and Translational Psychiatry (in press), and bioRxiv (2025).
Research interests focus on working memory, large-scale brain networks, non-invasive brain stimulation (tDCS, TMS), and multimodal neuroimaging, with an emphasis on brain plasticity and cognitive control mechanisms.
Methods and skills: fMRI, tDCS, TMS, neuro-navigation; Python, MATLAB, R, SPM.

Summary of the presentation:

This talk introduces **cognitive human neuroscience**, a field that examines how mental functions emerge from interactions between brain function, brain structure, and behavior using behavioral tasks, brain imaging, and brain stimulation.

The **MeMoSLAP project** is introduced as a collaborative research initiative with Leipzig University that is part of a larger inter-institutional research network across Germany. MeMoSLAP combines brain imaging (fMRI) with non-invasive brain stimulation (tDCS) to explore brain networks supporting learning and memory.

The talk then presents three **preliminary analyses** based on data acquired without stimulation, reflecting three complementary levels of investigation: **behavior, brain function, and brain structure**.

The first analysis addresses **behavior**, investigating the cognitive components underlying performance on a widely used working memory task, the n-back task. Using principal component analysis on a broad neuropsychological test battery, results show that executive flexibility plays a stronger role than pure memory storage capacity.

The second analysis focuses on **brain function**, examining how frontal, parietal, and cerebellar regions interact during verbal working memory. Using dynamic causal modeling, communication within frontal–parietal networks is shown to adapt to increasing task demands, while cerebellar involvement decreases. More efficient communication is associated with better performance.

The third analysis examines **brain structure**, exploring how microstructural properties of brain tissue relate to verbal working memory performance. Using diffusion MRI and the NODDI model, more efficient microstructural organization in frontal, parietal, and cerebellar regions is associated with better working memory performance.

Together, these analyses provide a coherent baseline framework that serves as an important reference for interpreting how brain stimulation modulates working memory networks.