

# Alumni of the BRAIN and MIND Sciences Seminar Series



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



## Age-related changes of cortical dynamics underlying working memory.

**Alexandra Antoniadou, MSc**

PhD candidate,

Universitat Autònoma de Barcelona, SPAIN



**Thursday, April 23, 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](mailto:raos@uoc.gr)

**The speaker:**

*Alexandra Antoniadou*



BSc (Integrated Master) in Electrical & Computer Engineering, Aristotle University of Thessaloniki, 2012; MSc in Brain and Mind Sciences, 2020; PhD candidate, Universitat Autònoma de Barcelona 2024; Thesis: “Age-related changes of cortical dynamics underlying working memory”

My research interests focus on how higher-order brain regions, such as the prefrontal and parietal cortices, handle information, and how these mechanisms change across the lifespan and in cognitive dysfunction. I am particularly interested in applying advanced mathematical methods to uncover the coding principles that shape neuronal communication and how these are altered in both normal aging and neuropsychiatric conditions.

**Summary of the presentation:**

In this talk, I will present my work on how normal aging affects working memory by altering prefrontal cortical dynamics. Working memory relies on the ability of the dorsolateral prefrontal cortex (dlPFC) to maintain information over time, a process thought to involve recurrent connectivity supporting persistent neural activity.

Although many studies report age-related changes in neuronal excitability, synaptic function, and white matter integrity, how these alterations impact the recurrent circuit mechanisms that sustain persistent activity remains unclear.

To address this, we developed a spiking neural network model of dlPFC working memory based on bump attractor dynamics, in which multiple aging-related factors can be systematically combined and manipulated within the same circuit.

We find that these factors have distinct and competing effects on network function. Hyperexcitability reduces the precision of working memory representations, while myelin loss primarily destabilizes them over time. When combined, these mechanisms produce a tradeoff between stability and precision, suggesting potential compensatory interactions within aging cortical circuits.

Overall, this work provides a mechanistic link between cellular-level changes and circuit-level dysfunction, and offers a framework for understanding how aging impairs working memory computations.