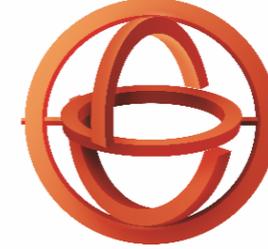


Description of Funded Research Projects

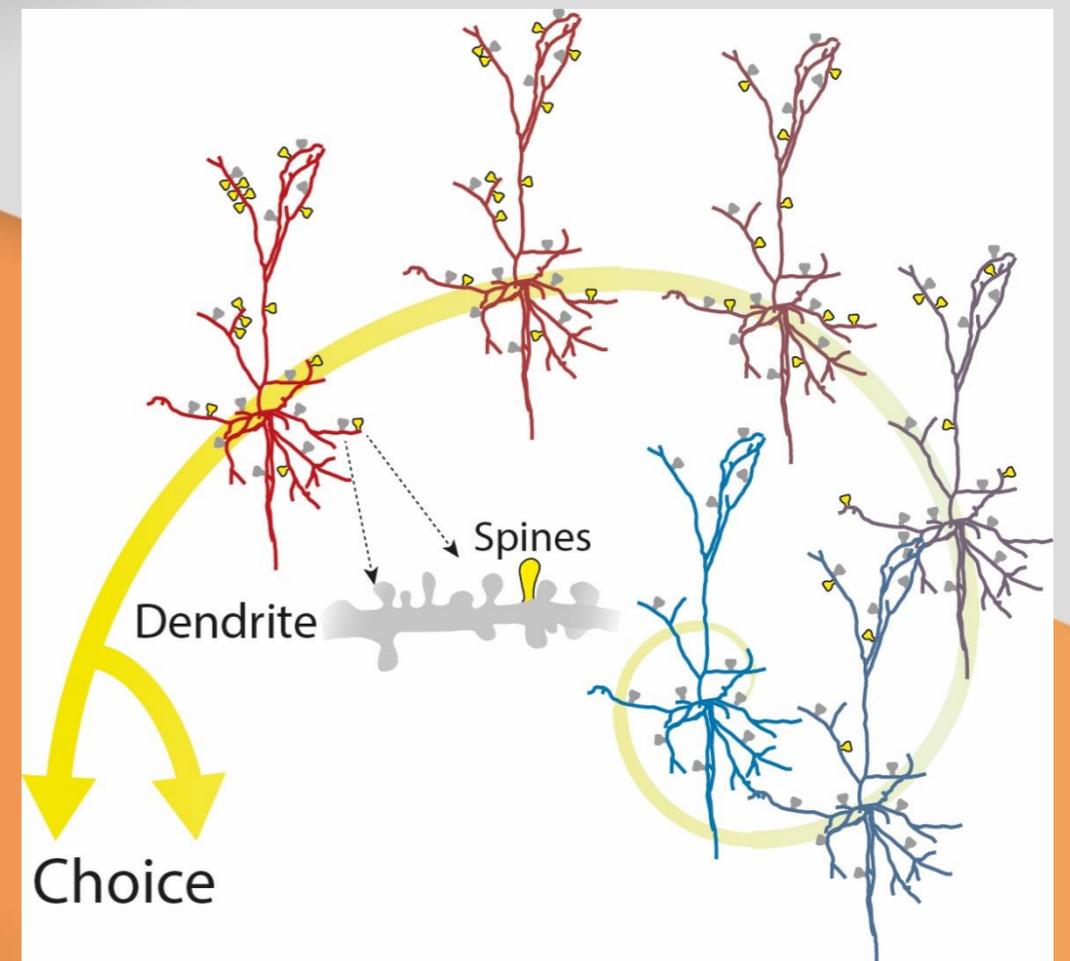
1<sup>st</sup> Call for H.F.R.I. Research Projects  
to support Post-Doctoral Researchers



**H.F.R.I.**  
Hellenic Foundation for  
Research & Innovation

Research Project Title:  
**Synaptic Engram of Flexible  
Behavior**

**Principal Investigator:**  
**Athanasia Papoutsi**



**Popular Title:**  
**Cellular mechanisms of flexible behavior**

**Scientific Field:**  
**Life Sciences**

**Host Institution:**  
**IMBB/FORTH, Greece**



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Action selection should be both stable to maximize positive outcomes and flexible to adapt in a changing environment. The dorsal prefrontal cortex (dPFC) exerts control on action selection and mediates adaptive decision making. Neuronal populations in the dPFC respond with abrupt changes in their state, following accumulative evidence for an environmental change, yet the mechanisms underlying this sudden change in neuronal dynamics remain unexplored. It is hypothesized that newly emerged spines (the locus of excitatory transmission) underlie adaptation of neural systems, while stable spines constitute part of the memory storage machinery. Recent studies further suggest that learning promotes spatially-restricted changes in synaptic properties, seen as the formation of clusters of synaptic connections in dendritic compartments. The main goal of this project is to establish a causal link between flexible behavior and region-specific alterations of spine dynamics and dendritic integration schemes.

We hypothesize that different spine structures that drive diverse dendritic integration modes, support abrupt changes in the network dynamics in response to a changing environment. To realize these goals, we will combine state-of-the-art experimental and theoretical work in order to perform physiological studies of pyramidal neurons (1) in vivo, (2) in vitro and (3) in silico.

The proposed research will be of interest and benefit to the general public, because adaptive behavior is a topic with real life applications, relevant to a wide range of social groups. Since failure to adapt in a changing environment leads to dysfunctional decision-making and related psychiatric disorders such as schizophrenia and depression, it is of utmost importance to unravel the mechanisms that support flexible behavior.

Related to the Neuroscience community in Greece, this project will help counteract human capital flight by providing a stimulating environment where cutting-edge research is conducted for other young scientists. The scientific collaborations ensured by this grant with laboratories of excellence from abroad and the transfer of knowledge from these labs to Greece is also fundamental for promoting of Greek scientific excellence.

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The H.F.R.I. grant provides the necessary means to design, conduct and supervise multi-disciplinary research that will greatly broaden our scientific background. Due to the interdisciplinary approach and timeliness of the proposed project, we will be able to maintain a fast pace in producing high quality research thus increasing the visibility of the Greek scientific community abroad. In the same context, establishing a new, well-defined collaboration between laboratories of excellence both within FORTH and with laboratories of the EU and USA will strengthen links within the global neuroscience community both for the grantees and the host institution. These collaborations are crucial for the attraction of further funding. Finally, via the participation in the scientific, technical, financial management of the project, we will acquire further organizational, planning and leadership skills highly relevant to any future independent research position.

*The Principal Investigator,  
Athanasia Papoutsi*

## Funding

Amount: **180,000 €**

Duration: **36 months**

Foundation: **H.F.R.I.**





**H.F.R.I.**  
Hellenic Foundation for  
Research & Innovation

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