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POSTER PRESENTATION

Astrocytic theory of working memory

Maurizio De Pittà^{1,2,3*}, Eshel Ben-Jacob^{4,5}, Hugues Berry^{1,2}

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Working memory (WM) is the ability to transiently hold and manipulate goal-related information to forthcoming actions. In primates performing delayed-response tasks, the neural correlate of WM is the emergence of selective persistent activity in the prefrontal cortex (PFC), during the delay period – i.e., the increase of neuronal firing rates compared to baseline in response of specific stimulatory cues. Neuronal firing during such persistent activity can be highly irregular, with a coefficient of variation (CV) of the interspike interval distribution larger

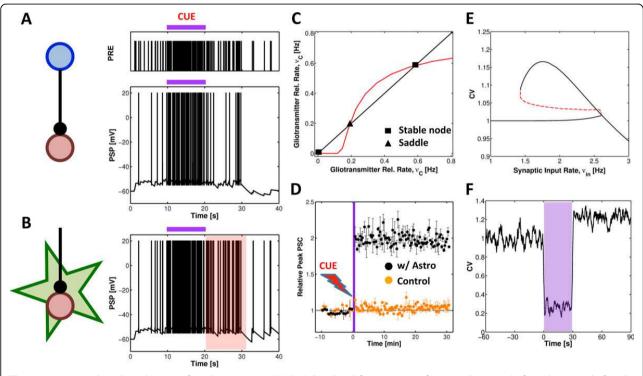


Figure 1 Astrocyte-based mechanism of working memory (WM). **A** Simulated firing activity of a cortical neuron before, during and after the presentation of a stimulatory cue (*purple bar*). **B** The same cue induces persistent firing activity in presence of astrocyte-mediated synaptic facilitation for more than 10 seconds (*red shade*). **C** Astrocyte-mediated facilitation results in bistability of synaptic release. **D** Synaptic release enhanced by the astrocyte may outlast the stimulatory cue as long as the astrocyte is kept active by the very synaptic stimuli impinging on the astrocyte. **E** The resulting neuronal firing statistics is more irregular in presence of the astrocyte, as marked by (**F**) a coefficient of variation (CV) larger than 1 after presentation of the cue (*purple shade*).

* Correspondence: maurizio.depitta@gmail.com

¹EPI Beagle, INRIA Rhône-Alpes, Villeurbanne, France

Full list of author information is available at the end of the article



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Authors' details

¹EPI Beagle, INRIA Rhône-Alpes, Villeurbanne, France. ²LIRIS, Université de Lyon, UMR5205 CNRS-INSA, Villeurbanne, France. ³Department of Statistics, The University of Chicago, 5734 S. University Ave., Chicago, IL, USA. ⁴School of Physics and Astronomy, Tel Aviv University, Ramat Aviv, Israel. ⁵Center for Theoretical Biological Physics, Rice University, Houston, TX, USA.

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