

# Assignment 0

( to be discussed on 28.09.2021 )

## Reading for the seminar



Neuron  
Primer

### EEG and MEG: Relevance to Neuroscience

Fernando Lopes da Silva<sup>1,2,\*</sup>

<sup>1</sup>Center of Neuroscience, Swammerdam Institute for Life Sciences, Science Park 904, Kamer C3.274, 1098XH Amsterdam, the Netherlands

<sup>2</sup>Instituto Superior Técnico, University of Lisbon, 1049-001 Lisbon, Portugal

\*Correspondence: f.h.lopesdasilva@uva.nl

<http://dx.doi.org/10.1016/j.neuron.2013.10.017>

To understand dynamic cognitive processes, the high time resolution of EEG/MEG is invaluable. EEG/MEG signals can play an important role in providing measures of functional and effective connectivity in the brain. After a brief description of the foundations and basic methodological aspects of EEG/MEG signals, the relevance of the signals to obtain novel insights into the neuronal mechanisms underlying cognitive processes is surveyed, with emphasis on neuronal oscillations (ultra-slow, theta, alpha, beta, gamma, and HFOs) and combinations of oscillations. Three main functional roles of brain oscillations are put in evidence: (1) coding specific information, (2) setting and modulating brain attentional states, and (3) assuring the communication between neuronal populations such that specific dynamic workspaces may be created. The latter form the material core of cognitive functions.

(PDFs of this and relevant refs in folder Assignments)

- Read the review
  - Be prepared to explain the study
- from the figures 3, 4, 6 7

## Coding in Matlab

### Understand the code in

RSII\_200922\_1a.m

RSII\_200922\_1b.m

RSII\_200922\_1c.m

### Based on RSII\_200922\_1.m

1. Create a 5x6 matrix A of randomly generated numbers. Loop through all row and columns and test whether each element is greater than 0.5
2. Report the result of the test in a 5x6 matrix A\_bin with values 1 if >0.5 and 0 if <0.5
3. [OPTIONAL] Write the function matrix\_gt\_05.m with A\_bin(0 or 1) and input the matrix A

### Based on RSII\_200922\_1b.m

4. Import the picture of Moscow that comes with the Matlab code  
(to import: see line 251 in RSII\_200922\_1b.m)
  5. Find the maximum value of each color (R,G,B) and plot a **star** of that color on the pixel with maximum value (if more than one maximum, the first pixel from top left).  
(for the star: see line 169 in RSII\_200922\_1b.m)
- Use built-in functions : max, imagesc