MASTER 2 Fundamental and Clinical Neurosciences

Internship proposal 2022-2023

(internship from January to June 2023)

Host laboratory: **CRNL**
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Host team: **COPHY** (https://www.crnl.fr/fr/equipe/cophy)

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Project title: Implicit adaptation of auditory processing under uncertainty: modeling EEG single-trial responses

Project summary: Recent computational neuroscience frameworks for perception have underlined the importance to address the dynamics of sensory processing in changing environments. Under these views, context adaptation leverages on Bayesian learning of environmental regularities and fortunately, it is now examinable using dynamic models of brain responses.
We revisited the auditory oddball paradigm eliciting mismatch responses by manipulating the stability of the statistical structure of sound sequences. Sixty-five adults participated to our electro-encephalography (EEG) study. All data have already been preprocessed and a traditional analysis of the averaged evoked responses has been performed. As expected, the latter appears to be insensitive to subtle experimental manipulations and emphasizes the need for models of inter-trial signal fluctuations.
First, the intern will pursue this initial analysis using a general lineal model (GLM). He/she will investigate the effect of our experimental manipulations onto single trial EEG responses. Next, he/she will apply computational learning models to assess if the inter-trial fluctuations of auditory responses reflect the dynamics of Bayesian belief updating.
Expected background: cognitive neurosciences; some familiarity with Computational Neuroscience approaches; basic programming skills (Matlab and/or Python).

3-5 recent publications:

- Lecaignard, F., Bertrand, O., Caclin, A., & Mattout, J. (2022). Neurocomputational underpinnings of expected surprise. *Journal of Neuroscience*, *42*(3), 474-486.
- Lecaignard, F., Bertrand, R., Brunner, P., Caclin, A., Schalk, G., & Mattout, J. (2021). Dynamics of oddball sound processing: Trial-by-trial modeling of ECoG signals. *Frontiers in human neuroscience*, *15*.

Please send your proposal to marion.richard@univ-lyon1.fr for publication on the Master of Neuroscience website.