

2-Year postdoctoral position Turing Centre for Living Systems

Ref offer: [PD2018-10](#)

Deep Learning and animal behavior modelling

The Turing Centre for Living Systems in Marseille seeks applicants for a postdoc position in computational neuroscience/robotics under the joint supervision of David Robbe and Christophe Eloy.

Project abstract – The goal of this project is to understand, at an algorithmic level, how animals learn to develop adaptative behavior by trial-and-error interaction with their environment. We propose an interdisciplinary approach combining behavioral experiments in rats and the development of an «artificial» agent facing challenges similar to those experienced by the rats. The experimental data (already available) show that rats challenged in a time estimation task converged progressively toward a conserved embodied strategy (Rueda-Orozco and Robbe, Nature Neuroscience, 2015). Key determinants of that strategy have been isolated experimentally, by altering task rules and environment and quantifying how these alterations affect animal performance. The core of the artificial agent will be a reinforcement-learning algorithm, which will be trained through virtual experiments simulating the time estimation task. A first objective will be to parametrize algorithms such that they solve this time estimation task and to compare artificial and natural (rat) strategies. The artificial double will eventually be complemented by a robot embodying the learning algorithm. Assessment of algorithmic predictions and possible biological implementation will be tested in new experiments in which the impact of alterations of key task parameters and brain activity on animals performance will be measured. This back and forth interaction between experiments and theory will provide us with new understandings of the mechanisms underlying adaptative motor learning.

Expected profile – The main task of the project will be to develop reinforcement learning algorithms and therefore we expect the candidates to have a solid background in machine learning. Since one of the objective is to build simple robots, knowledge in robotics would be an asset. The successful applicant will work in close collaboration with experimentalists and robotic engineers. We are therefore looking for an enthusiastic applicant with excellent communication skills and a track record in interdisciplinary collaborative environments.

Supervisors

[David Robbe](#) - Inmed, UMR 1249 - [The neural bases of sensorimotor learning](#)

[Christophe Eloy](#) - IRPHE, UMR 7342- [Biomechanics, aerodynamics, soft matter and biophysics](#)

Deadline for application: 28th February