

Call for application for an interdisciplinary PhD studentship in neuro/economics at Aix-Marseille Université, jointly led by Laboratoire de neurosciences cognitives (LNC) and Aix-Marseille School of Economics (AMSE) on:

“Effort and prosocial behaviour in adolescence: how does it relate to brain development?”

Summary: We are looking for a highly motivated PhD student to take part in an interdisciplinary research project that will combine approaches from Epistemology, Economics and Cognitive Neuroscience to gain in understanding on what it means to exert cognitive effort and to study experimentally the relationship of effort with people's prosocial and cooperative behaviour, comparing adults and adolescents.

Primary fields of research: neurosciences, cognitive psychology, economics, experimental economics

Required knowledge in cognitive neurosciences , mathematics/economics

Supervision:

For neurosciences: Marie-Helene Grosbras (LNC, CNRS)

For economics: Frederic Arahamian (AMSE, Université de Toulon); Stéphane Luchini (AMSE, CNRS), Miriam Teschl (EHES, AMSE)

Argument of the PhD-topic:

Effort is a key concept in economics. Effort “runs” the economy because only with an optimal level of effort efficiency will be achieved. However, effort as such cannot be observed, only outcome is. In fact, typical principal-agent models in economics have the aim to formulate the right kind of contract that principles can propose to incentivise agents to deliver their optimal effort, despite living in a world of incomplete information about the agents’ effort. Such economic models take outcome as a proxy of effort¹.

Effort is also central to cognitive control in (neuro)psychology, associated with specific neural resources involving notably dopaminergic circuits. Cognitive control and dopaminergic pathways undergo a major developmental step during adolescence, and it is likely that the descriptive and mechanistic features of cognitive effort do also change during this period of life.

Despite its multi-level importance, effort has never been studied and questioned directly and abundantly in economics and the neurosciences, nor the question of

¹ E.g Laffont, Jean-Jacques and David Martimort, 2009, *The Theory of Incentives: the principal-agent model*, Princeton University Press.

effort in a developmental population and consequences on prosocial and cooperative behaviour.

The aim of this interdisciplinary PhD-project will be to study the question of effort in economics and neurosciences. It will put a particular focus on how the exertion of cognitive effort will influence people's prosocial and cooperative behaviour by conducting economic experiments in combination with neurophysiological measures. We will study, conceptually, what effort is and how it is defined and understood in the respective fields, and experimentally, by conducting studies to measure, first of all, cognitive effort and, secondly, to evaluate how effort will determine social proclivity in people's behaviour. We will seek what brain resources participates in these processes. Particular focus will be given to study the influence of effort in adolescents in comparison to adults' behaviour and social preferences.

Objectives of the thesis:

- To set up a paradigm to *measure* cognitive effort and relate it to prosocial and cooperative behaviour and to physiological and cerebral markers of effort.
- To distinguish between objective and subjective measures of effort and to compare them.
- To implement this to investigate the *development* of effort in adolescence, in relation to development of prosocial and cooperative behaviour on the one hand and of brain organisation on another hand.

Expected Outcomes

We expect to establish a reliable tool to assess objective and subjective value of effort. This will allow us to:

- Contribute a more circumscribed definition of cognitive effort
- Provide a mean to efficiently relate cognitive effort to other behaviours, in particular to prosocial and cooperative behaviour
- Enable effective bridges between objective and subjective value of effort and neurophysiological correlates of effort
- Document developmental trajectory of subjective value of effort in adolescence, a pivotal period with respect to this construct

Application requirements:

The candidate should hold a Master degree in Cognitive Sciences, Economics, Psychology, Neuroscience or related area. S/he should demonstrate a high motivation and interest for interdisciplinary research.

The candidate will need to be familiar with cognitive neuroscience methods, including experimental design and brain imaging to be able to understand the relevant literature and implement experiments and analyse data. S/he should have sufficient mathematical abilities to be able to understand economic models such as principal-agent models. Further knowledge in microeconomics of decision-

making and experimental methods is a plus, but not necessary. Proficiency in French language is not a pre-request, but the opportunity to learn it is one of the many advantages of living in Marseille!

The potential PhD-candidate will receive an interdisciplinary training in neurosciences and economics and will have opportunities to follow a number of core PhD-courses in both disciplines.

Duration and stipend:

Monthly salary is 1 685€ (1 368€ net) for a period of 3 years, according to French regulations.

How to apply:

Applications should be sent before **May 14th** by email (marie-helene.grosbras@univ-amu.fr and stephane.luchini@univ-amu.fr) and should include a **CV**, a brief but explicative **statement of research interests**, the expected date of availability to start the PhD and the names of **two references**.

Selection procedure:

A two-step selection procedure will first select suitable and interesting candidates, who will then have a personal interview with an interdisciplinary panel of researchers, members of Aix-Marseille Université, between the 9th and 11th of June 2021. The successful applicant will be informed shortly afterwards.

Contact:

For further information, please send an email to marie-helene.grosbras@univ-amu.fr and stephane.luchini@univ-amu.fr .