Aurélien Nioche

▬▬ Research Experience

2018– Now **Postdoctoral Researcher**, Aalto University, User Interfaces group, Espoo, Finland.
- ○ **Head of the group**: Pr. Antti Oulasvirta.
- ○ My current work aims to combine cognitive modeling and machine learning to improve human-computer interactions. Namely:
  - – How to improve the personnalization of self-teaching applications, by making inferences on the user's cognitive characteristics. The core idea here is to use a cognitive model that can account for several key individual- and material-specific characteristics related to recall/forgetting, along with a planning technique that considers users' practice schedules.
  - – How to apply decision-making models to naturalistic human-computer interaction data (e.g. gaming data). The core idea here is to evaluate the uncertainty in the inference of the models' parameters, to deliver robust interpretations about the user's cognitive characteristics.

  In both of these research lines, I combine the use of 'classic' cognitive models (such as the Prospect Theory), and the use of probabilistic machine learning algorithms (such as Gaussian process or normalizing flows) to develop techniques that allow to a better adaptability of user interfaces to the specific needs of each individual user.

2014–18 **PhD Sudent**, Sorbonne University, Ecole Normale Supérieure, University of Bordeaux, Paris & Bordeaux, France.
- ○ **Thesis title**: From *homo economicus* to non-human primates: Three case studies on cognitive micro-foundations of economics.
- ○ **Supervision**: Pr. Sacha Bourgeois Gironde & Pr. Thomas Boraud.
- ○ **Funding**: Ministerial grant allocated by the doctoral school [three first years]; grant from ANR (French National Research Agency) [last year].
- ○ The purpose of this PhD project was twofold: (i) enquire about the cognitive foundations of economics and (ii) reveal interaction effects between agents' cognitive abilities and economic structure. As a mean to fulfill this purpose, we use variate techniques, from theoretical modeling and computer-based simulations to the conduct of experiments with humans and non-human primates (macaques). Under the various possible approaches to deal with this matter, we decided to focus on three case studies: (i) the cognitive bias in context of decision-making under risk in non-human primates, (ii) the minimal conditions required for money emergence understood as an agreement on a unique medium of exchange, (iii) the impact of cognitive characteristics both of firms and consumers on market structure in case of duopoly competition.

2013–14 **Intern**, Panthéon-Sorbonne University, Paris, France.
- ○ 2nd year Master thesis.
- ○ **Thesis title**: Free-will and decision-making.
- ○ **Supervision**: Pr. Maximilian Kistler & Pr. Jacques Dubucs.
- ○ By developing a multi-criterion decision-making model, the thesis argues that: (i) agents perform two types of choices when acting: one that can be considered first order is between available actions and the other that can be considered of second order is between different representations of the frame of the choice, (ii) situating free-will in the second order choice allows one to go beyond the classical problem of compatibility between determinism and ability to choose otherwise.

2012–13 **Intern**, Ecole Normale Supérieure, University of Geneva, Paris, France & Geneva, Switzerland.
- ○ 1st year Master thesis.
- ○ **Thesis title**: Reactive attitudes and ascriptions of moral responsibility: an empirical investigation.
- ○ **Supervision**: Pr. Paul Egré & Dr. Florian Cova.
- ○ Strawson (1963) proposed that rather than concentrating on metaphysical issues about determinism, we should focus on people's practices to understand ascription of moral responsibility, and, more precisely, on their reactive attitudes, such as resentment or praise. In collecting participants' reactions towards the story of a famous murderer (Robert Harris) and their beliefs about the link between his childhood and his actions, we sought to determine: (i) if the reactive attitudes indeed drive ascription of moral responsibility and (ii) if the reactive attitudes are sensitive to the question of determinism.

Teaching Experience

2018–Now   **Lecturer**, AALTO UNIVERSITY, Espoo, Finland.
- **ELEC-E7890 - User Research**
  - Professor in charge: Pr. Antti Oulasvirta and myself.
  - Audience: Master students in Computer Science.
  - Course objectives: Provide the students with the conceptual and technical skills required to test interactive technologies with users, involving the whole path from designing experiments to conducting them and analyzing the collected data, and drawing the appropriate implications.
- **ELEC-E7851 - Computational User Interface Design**
  - Professor in charge: Pr. Antti Oulasvirta.
  - Audience: Master students in Computer Science.
  - Courses objectives: Offering a solid introduction to students who seek principled and yet actionable understanding of algorithmic HCI.
- **ELEC-D7010 - Engineering for Humans**
  - Professor in charge: Pr. Antti Oulasvirta.
  - Audience: Bachelor students in Computer Science.
  - Courses objectives: understanding main approaches to the design and engineering of complex systems for human use.

2013–14   *Chargé de cours* **(Lecturer)**, PARIS-DESCARTES UNIVERSITY, Paris, France.
- **History and Epistemology of Psychology**
  - Professor in charge: Pr. Françoise Parot.
  - Audience: Bachelor students in Psychology.
  - Course objectives: introduction to epistemology by a brief history of ideas from Descartes to the present day, including a critic presentation of Empiricism, Enlightenment and Romanticism, Lamarck's Transformism and Evolutionary Theory, Comte's Positivism and Freudian Psychoanalysis.
- **Supervised Individual Work**
  - Professor in charge: Pr. Noëlle Lidvan.
  - Audience: Bachelor students in Psychology.
  - Courses objectives: developing methodology for literature reviews.

Thesis Supervision

2020   **Aini Putkonen**, Master's thesis (Aalto University, Finland): *Inverse modelling of players' attitudes towards risk in tactical turn-based games*.

2018   **Basile Garcia**, Master's thesis (University of Bordeaux, France): *Bounded rationality and spatial cognitive: Study of the role of information in a spatial competition model*.

Other working experiences

2011–12   **Intern**, HOSPITAL COCHIN. ADULT PSYCHIATRIC DEPARTMENT, Paris, France.
Cognitive behavioral therapies for adults in day-care.

2007–10   **Social Worker**, INSTITUT MÉDICO-ÉDUCATIF LES PETITES VICTOIRES, Paris, France.
Cognitive behavioral therapies for children with Pervasive Developmental Disorders (PDD).

Education

2014–18   **PhD, Life Science**, SORBONNE UNIVERSITY, Paris, France.
Doctoral school *Cerveau, Cognition, Comportement* (ED3C; *Brain, Cognition, Behavior*).

2012–14   **MA, Cognitive Science**, ECOLE DES HAUTES ETUDES EN SCIENCES SOCIALES, ECOLE NORMALE SUPÉRIEURE, PARIS DESCARTES, Paris, France.

2010–12   **BA, Psychology**, UNIVERSITÉ PARIS DESCARTES, Paris, France.

2004–07   **BA, Musicology**, UNIVERSITÉ FRANÇOIS RABELAIS, Tours, France.

Languages

Natural languages: French, English.

Programming languages: Python, C#, HTML/CSS, SQL.

2021 Nioche, Aurélien, Pierre-Alexandre Murena, Carlos de la Torre-Ortiz, and Antti Oulasvirta (2021). "Improving Artificial Teachers by Considering How People Learn and Forget". In: *Proceedings of the 26th International Conference on Intelligent User Interfaces*. New York, NY, USA: Association for Computing Machinery.

Nioche, Aurélien, Nicolas P Rougier, Marc Deffains, Sacha Bourgeois-Gironde, Sébastien Ballesta, and Thomas Boraud (2021). "The adaptive value of probability distortion and risk-seeking in macaques' decision-making". In: *Philosophical Transactions of the Royal Society B* 376.1819, p. 20190668.

Torre-Ortiz, Carlos de la and Aurélien Nioche (2021). "[Re] Neural Network Model of Memory Retrieval". In: *ReScience C*.

2020 Bourdenx, Mathieu, Aurélien Nioche, Sandra Dovero, M-L Arotcarena, Sandrine Camus, Gregory Porras, M-L Thiolat, Nicolas P Rougier, Alice Prigent, Philippe Aubert, et al. (2020). "Identification of distinct pathological signatures induced by patient-derived α-synuclein structures in nonhuman primates". In: *Science advances* 6.20, eaaz9165.

Brückner, Lukas and Aurélien Nioche (2020). "[Re] Faster Teaching via POMDP Planning". In: *ReScience C*.

2019 Nioche, Aurélien, Sacha Bourgeois-Gironde, and Thomas Boraud (2019). "An asymmetry of treatment between lotteries involving gains and losses in rhesus monkeys". In: *Scientific reports* 9.1, pp. 1–13.

Nioche, Aurélien, Basile Garcia, Thomas Boraud, Nicolas Rougier, and Sacha Bourgeois-Gironde (2019). "Interaction effects between consumer information and firms' decision rules in a duopoly: how cognitive features can impact market dynamics". In: *Palgrave Communications* 5.1, pp. 1–11.

Nioche, Aurélien, Basile Garcia, Germain Lefebvre, Thomas Boraud, Nicolas P Rougier, and Sacha Bourgeois-Gironde (2019). "Coordination over a unique medium of exchange under information scarcity". In: *Palgrave Communications* 5.1, pp. 1–11.

2018 Lefebvre, Germain, Aurélien Nioche, Sacha Bourgeois-Gironde, and Stefano Palminteri (2018). "Contrasting temporal difference and opportunity cost reinforcement learning in an empirical money-emergence paradigm". In: *Proceedings of the National Academy of Sciences* 115.49, E11446–E11454.

Nioche, Aurélien (2018). "Exercer son libre arbitre : un processus décisionnel". In: *Le libre arbitre : perspectives contemporaines*.

Nioche, Aurélien, Paul Egré, and Florian Cova (2018). "Les attitudes réactives et le déterminisme: une étude expérimentale". In: *Le libre arbitre : perspectives contemporaines*.