François Cinotti

Computational biologist

French and British citizenship

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SKILLS

- Python, MATLAB, R, GitHub
- HPC: slurm, batch, mpi4py
- Behavioural neuroscience (dopamine, Reinforcement Learning)
- Platelet Biology
- Computational modelling
- Statistics: parametric/non-parametric tests, ANOVAs, repeated-measures ANOVAs, ANCOVAs, PCA, Bayesian inference
- Scientific writing: LaTeX, Overleaf
- Scientific presentation
- Experience with interdisciplinary projects
- French and English bilingual

RESEARCH EXPERIENCE

Feb 2022 – Present

Postdoctoral research assistant, University of Reading, under the supervision of Prof I. Bojak and Prof J. Gibbins

- Designed a model of thrombus growth regulation with computational fluid dynamics simulated using a modified Lattice Boltzmann Method.
- Optimised model parameters through fitting to *in vitro* thrombus growth curves using a research computing cluster to run multiple concurrent simulations.
- Built an app in R shiny as part of an automated pipeline for the processing and analysis of platelet aggregometry data.
- Collaborated with an interdisciplinary team of researchers involving philosophers and scientists from different disciplines on the topic of "Mistakes in Living Systems". Publication of multiple articles.

Jan 2021 – Jan 2022

Postdoctoral research assistant, University of Oxford, Walton lab

- Extraction, preliminary processing and analysis of experimental data from a mouse foraging experiment.
- Designed a model of foraging inspired by the normative Marginal Value Theorem.
- Optimised model parameters by maximisation of log-likelihood.
- Invited to collaborate as modeller on a three-armed bandit task to study behavioural flexibility and the effect of lesions of the orbito-frontal cortex (still ongoing).

July 2019 – Dec 2020

Postdoctoral research fellow, University of Nottingham, Humphries lab

- Developed a Bayesian method of estimating connection rates knowing distance between neurons and applied it to draw a connection map of the striatum. MATLAB code and results published on GitHub and in the *Journal of Neuroscience*.
- Collaboration with a remote international team (US, UK, France) of researchers to study the link between sign-tracking versus goal-tracking tendencies to model-based and model-free instrumental decision-making. Simulated a Pavlovian Conditioned Approach task. Results published in *Journal of Neuroscience*.

Sep 2015 – June 2019

Research engineer then **PhD student,** Institute of Intelligent Systems and Robotics, Université Pierre et Marie Curie, Paris, under the supervision of CNRS research directors Benoît Girard and Mehdi Khamassi

- Analysed experimental (and synthetic) data from rats performing a three-armed bandit task under different levels of pharmacological inhibition of dopamine using repeated-measures two-factor ANOVAs, parametric and non-parametric tests, and PCAs.
- Designed, optimised, and simulated over 30 models of learning and decision-making comprising variations of Q-learning, an optimal Bayesian observer, UCB, and Thompson sampling, in MATLAB to explain experimental behaviour. Models fitted through log-maximisation on a Linux HPC using batch array jobs. Two papers published in *Scientific Reports* and the *European Journal of Neuroscience*.
- Reimplemented into Python and improved a sign-tracking/goal-tracking model previously coded in C++, ran new simulations that led to novel predictions that were verified experimentally, published results in *Psychopharmacology* and code on a public GitHub repository.

2013 – 2014

Master student internships on multiple different projects: using implicit measures to evaluate gustatory pleasure, computational modelling of colour perception (with Prof. Kevin O'Regan, publication in *Journal of Vision*), microfluidics experiment to study the growth of actin filaments under flow with fluorescent microscopy, and conditioning of tethered bees moving in a virtual environment.

TEACHING AND MENTORING

Spring 2023

Teaching assistant on an introductory Python course for undergraduate students in psychology. In-course assistance to students, exercise design and supervision, assessment marking. This was part of a training programme that ultimately let me obtain an **HEA associate fellowship**.

Winter 2022

Co-supervision of a master student internship, Sylvia Blackmore who modelled an armed bandit task and used code developed during my PhD as basis.

CONTRIBUTIONS TO THE ACADEMIC COMMUNITY

2024 – 2025

Member of the organising committee for the annual School of Biological Sciences (University of Reading) early career researchers symposium. Scheduling of over 30 talks, verification and proof-reading of talk and poster (27) abstracts, and session chairing.

July 2022 and July 2024

Volunteered as session chair for the annual School of Biological Sciences (University of Reading) early career researchers symposium. Coordinated with speakers (6-7 per session) to retrieve their presentations in advance, enforced time limits, and managed audience questions.

2023

Supported the organisation of a three-day workshop + conference (over 30 attendees with several international speakers) for the Templeton cluster meeting in Reading with administrative duties, room booking, and coordination with remote speakers.

2020 – Present

Peer reviewing for *Neuropsychopharmacology*, *Nature Communications*, *Frontiers in Behavioral Neuroscience*, *Scientific Reports*, *eLife*, and *Computational Brain and Behavior*.

2018 – 2019

PhD student representative at administrative lab meetings.

EDUCATION

2016 – 2019 **PhD in Neuroscience,** Université Paris Sorbonne

Computational modelling of the variability and regulation of reinforcement learning and associated dopaminergic signalling in Rats

2014 – 2015 **MSc in Cognitive Science (« Cogmaster »),** Ecole Normale Supérieure / Université Paris Descartes

Courses in cognitive neuroscience including theoretical and computational neuroscience, neuro-anatomy, perception and action, and imaging techniques.

2013 – 2014 **MSc in Interdisciplinary Methods in Life Sciences (« Approches Interdisciplinaires du Vivant »),** Université Paris Diderot

Lab rotations throughout the year with courses in critical reading of scientific articles, bibliographical analysis, and scientific writing.

2011 – 2014 **Engineering Degree in life sciences equivalent to MSc level,** AgroParisTech

AgroParisTech is the leading "Grande Ecole d'Ingénieurs" in life sciences. These are prestigious and highly selective institutes of higher education that function in parallel to the university system. Admittance depends on individual ranking in highly competitive entrance exams. A famous example is Polytechnique.

Courses in agronomy, food sciences, ecology, forestry, thermodynamics, analysis of dynamical systems, linear algebra, control theory, first year coding project in population dynamics, second year coding project in fuzzy logic control, introduction to SQL, population genetics, quantitative genetics, practical in genetic engineering, descriptive and inferential statistics with introduction to R, law, macro-economics, accountancy.

2009 – 2011 **BCPST preparatory school,** Lycée Saint Louis, Paris

Specialised training school for entrance exams to French "Grandes Ecoles". BCPST stands for Biology, Chemistry, Physics, and Geology ("Sciences de la Terre").

Courses in cell biology, molecular biology, biochemistry, histology, neuroscience, botany, genetics, classical mechanics, optics, electricity, thermodynamics, chemical kinetics, organic chemistry, geology, linear algebra, mathematical analysis.

PUBLICATIONS

Cinotti F., Gibbins J. Oderberg D., Hill J., Austin C., and Bojak I. Regulation of thrombus size through a gradient of platelet activation with distance from injury.
[Submitted at *Blood*]

Hill J., Oderberg D., Austin C., **Cinotti F.**, Bojak I., and Gibbins J. (2025) Mistakes in action: On clarifying the phenomenon of goal-directedness. *Biological Theory*
https://link.springer.com/article/10.1007/s13752-025-00496-6

Oderberg D., Hill J., Bojak I., Gibbins J., Austin C., and **Cinotti F**. (2025) Getting it wrong: Biological mistake-making as a cross-system, cross-scale phenomenon. *International Studies in the Philosophy of Science*

https://doi.org/10.1080/02698595.2025.2472482

Oderberg D., Hill J., Austin C., Bojak I., **Cinotti F**. and Gibbins J. (2024) Biological mistake theory and the question of function. *Philosophy of Science*
https://doi.org/10.1017/psa.2024.56

Cinotti F., Coutureau E., Khamassi M., Marchand A., Girard B. (2024) Regulation of reinforcement learning parameters captures long-term changes in rat behaviour. *European Journal of Neuroscience,* 1-22
https://doi.org/10.1111/ejn.16449

Oderberg D., Hill J., Austin C., Bojak I., **Cinotti F**. and Gibbins J. (2023) Biological mistakes: what they are and what they mean for the experimental biologist. *British Journal for the Philosophy of Science*
https://doi.org/10.1086/724444

Afshar N. M., **Cinotti F.,** Martin D., Khamassi M., Calu D. J., Taylor J. R. and Groman S. M. (2023) Reward-mediated, model-free reinforcement-learning mechanisms in Pavlovian and instrumental tasks are related. *Journal of Neuroscience, 43(3) 458-471*
https://doi.org/10.1523/JNEUROSCI.1113-22.2022

Cinotti F. and Humphries M. D. (2022) Bayesian mapping of the striatal microcircuit reveals robust asymmetries in the probabilities and distances of connections. *Journal of Neuroscience, 42(8) 1417-1435*
https://doi.org/10.1523/JNEUROSCI.1487-21.2021

Cinotti F., Marchand A. R., Roesch M. R., Girard B., and Khamassi M. (2019) Impacts of inter-trial interval duration on a computational model of sign-tracking vs. goal-tracking behaviour. *Psychopharmacology* 236:2373
https://link.springer.com/article/10.1007/s00213-019-05323-y

Cinotti F., Fresno V., Aklil N., Coutureau E., Girard B., Marchand A. R. and Khamassi M. (2019) Dopamine blockade impairs the exploration-exploitation trade-off in rats. *Sci Rep* **9,** 6770
https://doi.org/10.1038/s41598-019-43245-z

Witzel C., **Cinotti F.,** and O'Regan K. (2015) What determines the relationship between color naming, unique hues, and sensory singularities: Illuminations, surfaces, or photoreceptors? *Journal of Vision* Vol.15, 19
https://doi.org/10.1167/15.8.19

CONFERENCE TALKS AND POSTERS

March 2025	30-minute presentation of my work on platelet modelling upon invitation by Prof. Christophe Dubois to an inaugural meeting of French thrombosis experts.
Jan 2024	Templeton Early Career Researchers meeting. Plenary talk for an external panel representing our funders (Templeton Foundation).
Sep 2023	"Re-conceptualizing function and goal-directedness": an international workshop for members of the Templeton program grant on agency and biology. I presented my work during a 20 minute talk followed by questions from the audience that was made up of philosophers and scientists from different disciplines (theoretical biologists, physicists, mathematicians).
Oct 2020	Neuromatch conference 3.0, a virtual international conference organised during COVID lockdowns. Presentation of my work on Bayesian inference of interneuronal connection rates in the striatum: https://www.youtube.com/watch?v=nm2RLJwUXx4
July 2019	UK Neural Computation 2019 Conference in Nottingham. Poster summarising all my PhD results.

June 2018	Collaborative Research in Computational Neuroscience (CRCNS) conference at UC Berkeley, which assembled researchers funded by this research program. Poster presentation.
May 2018	Eighth International Symposium on Biology of Decision Making (SBDM), in Paris. Poster focusing on dopamine regulation of the exploration-exploitation trade-off.
June 2017	The third multidisciplinary conference on Reinforcement Learning and Decision Making (RLDM) at the University of Michigan, Ann Arbor. Poster presenting my work on meta-learning.
June 2016	Okinawa Computational Neuroscience Course, a three-week summer school based at the Okinawa Institute for Science and Technology where I developed a molecular model of the cortico-striatal synapse to study dopamine-regulated plasticity under the guidance of Dr. Andrew Gallimore. At the end of the summer school, I presented my completed project to speakers and external reviewers.
May 2016	Sixth International Symposium on Biology of Decision Making (SBDM) in Paris. Poster presenting my first results.