

I am a final-year PhD student in the Department of Physiology, Anatomy and Genetics (DPAG) at the University of Oxford, enrolled in the Doctoral Programme in Neuroscience (1+3). My research focuses on uncovering the brain's learning mechanisms and their mathematical formalisation. I am supervised by Prof Armin Lak, Prof Andrew Saxe, and Prof Rafal Bogacz.

Academic Milestones

- 2021–Present **DPhil in Neuroscience (1+3 Studentship)**, *University of Oxford*, Oxford (UK)
Thesis title: A theory of long-term learning in the brain.
- 2020–2021 **MSc in Neuroscience (1+3 Studentship)**, *University of Oxford*, Oxford (UK)
- 06–09/2019 **SURF Scholar**, *Caltech*, Pasadena (USA), PI: Prof Frederick Eberhardt
- 06–09/2018 **DAAD Scholar**, *University of Freiburg*, Freiburg (DE), PI: Prof Dr Ulrich Hoffmann
- 2016–2020 **BA & MEng Engineering Tripos**, *University of Cambridge*, Cambridge (UK)
First Class every year; specialised in Information, Electrical, and Control Systems Engineering.

Publications and Preprints

Samuel Liebana, Aeron Laffere, Chiara Toschi, Louisa Schilling, Jacek Podlaski, Matthias Fritsche, Peter Zátka-Haas, Yulong Li, Rafal Bogacz, Andrew Saxe, and Armin Lak. Striatal dopamine reflects individual long-term learning trajectories. *bioRxiv*, 2023 (under review in *Cell*).

Matthias Fritsche, Antara Majumdar, Lauren Strickland, **Samuel Liebana**, Rafal Bogacz, and Armin Lak. Temporal regularities shape perceptual decisions and striatal dopamine signals. *bioRxiv*, 2023.

Gustavo Deco, **Samuel Liebana**, Yonatan Sanz Perl, Olaf Sporns, and Morten L Kringelbach. The effect of turbulence in brain dynamics information transfer measured with magnetoencephalography. *Communications Physics*, 6(1):74, 2023.

Soheil Mottaghi, Sandra Kohl, Dirk Biemann, **Samuel Liebana**, Ruth Eneida Montaña Crespo, Oliver Buchholz, Mareike Wilson, Carolin Klaus, Michelle Uchenik, Christian Münkel, Robert Schmidt, and Ulrich G. Hofmann. Bilateral intracranial beta activity during forced and spontaneous movements in a 6-ohda hemi-pd rat model. *Frontiers in Neuroscience*, 15:700672, 2021.

Soheil Mottaghi, Niloofar Afshari, Oliver Buchholz, **Samuel Liebana**, and Ulrich G. Hofmann. Modular current stimulation system for pre-clinical studies. *Frontiers in Neuroscience*, 14:408, 2020.

Soheil Mottaghi, Sandra Kohl, **Samuel Liebana**, Mareike Wilson, Carolin Klaus, Christian Münkel, and Ulrich G. Hofmann. Hemi-parkinsonian rat motor/non-motor symptom evaluation with deep brain stimulation. In *2019 9th International IEEE/EMBS Conference on Neural Engineering (NER)*, pages 369–372, 2019.

Merton College, Merton Street – OX1 4JD Oxford – United Kingdom

* Nationality: British, Spanish

☎ +44 7456163590 • ✉ samuel.liebanagarcia@merton.ox.ac.uk

🌐 SamuelLiebana • 🆔 0000-0003-2627-802X • 📄 4AotP6EAAAAJ

Conference activity

- Mar 2024 Oxford Neuroscience Symposium talk, Oxford
- Mar 2024 Cosyne poster, Lisbon
- Nov 2023 UCL NeuroAI Annual Conference Lightning Talk, London
- Nov 2023 Society for Neuroscience (SfN) conference poster, Washington D.C.
- Aug 2023 Cognitive Computational Neuroscience (CCN) conference poster, Oxford
- Jul 2023 Kavli Institute for Theoretical Physics (KITP) program affiliate: *Statistical learning in the brain*, Santa Barbara
- Jul 2022 FENS Forum poster, Paris
- Jun 2022 Princeton Machine Learning Theory Summer School poster, Princeton
- Jun 2022 Reinforcement Learning and Decision Making (RLDM) conference poster, Providence
- Dec 2021 Neuromatch conference virtual flash talk, online
- Mar 2019 IEEE NER'19 short paper: *Hemi-Parkinsonian Rat Motor/Non-Motor Symptom Evaluation with Deep Brain Stimulation*, San Francisco

Awards and Honours

- 2022 Princeton Machine Learning Theory Summer School Travel Award.
- 2022 RLDM Student Travel Award.
- 2020 AT&T Cambridge Laboratories Prize in Communications Engineering.
- 2019 Caltech Summer Undergraduate Research Fellowship (SURF). (6300 USD)
- 2019 Liliash Sophia Ashworth Hallett Scholarship for academic excellence.
- 2019 Christina Barnard Prize for academic excellence.
- 2019 Gladstone Memorial Trust Travel Award.
- 2019 Charlotte Rycroft Travel Award.
- 2018 DAAD Research in Science and Engineering (RISE) Scholarship. (2035 EUR)
- 2018 Satyanarayana Madabhushi Prize for top Eng. Girton College student.
- 2018 Mary Ann Leighton Scholarship for academic excellence.
- 2018 Mars Lander Prize for best C++ automatic re-entry controller.
- 2017 Sir Francis Goldsmid Scholarship for academic excellence.
- 2017 Phyllis Tillyard Prize for academic excellence.
- 2016 Participant in the European Union Contest for Young Scientists (EUCYS).
- 2015 1st Prize in Senior Projects of European Schools Science Symposium (ESSS).

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Supervision and Teaching

Doctoral Rotation Students

2023 Day-to-day supervisor: Marko Tvrdic, BBSRC DTP, University of Oxford
Thesis: The Role of Striatal Dopamine in Perceptual Decision Making

Undergraduate Supervision

2023-2024 Day-to-day co-supervisor: Sarah Shah, Medicine, University of Oxford
Thesis: Striatal Dopamine Release in the Tectonigral Pathway During Visually-Guided Behaviours

2023-2024 Day-to-day co-supervisor: Benjamin Chan, Biomedical Sciences, University of Oxford
Thesis: Investigating Striatal Dopamine and Acetylcholine in Visually-guided Decision Making

2022-2023 Day-to-day co-supervisor: Paco Chow, Biomedical Sciences, University of Oxford
Thesis: Modelling Visual Perceptual Learning with Deep Neural Networks

Departmental Teaching

2023 Teaching Assistant, B13 Circuits and Communications, University of Oxford

Service to Profession

2024 FEMBIOBIO, promoting STEM careers for Chilean female high school students.

2023 Reviewer for Cognitive Computational Neuroscience conference (CCN).

2023 Organiser of the Oxford Neurotheory Forum Seminar Series.

2021-2023 IT Officer for the Cortex Club, the University of Oxford's neuroscience society.

Languages

Spanish	Mother tongue	
English	Proficient (C2 of CEFR)	<i>Certificate: Cambridge Certificate of Proficiency in English.</i>
Italian	Proficient (C2 of CEFR)	<i>Certificate: 10 years growing up in Italy.</i>
German	Advanced (C1 of CEFR)	<i>Certificate: Goethe Zertifikat C1.</i>
French	Advanced (C1 of CEFR)	<i>Certificate: CUED Language Unit Advanced Diploma.</i>

Referees (additional upon request)

Prof Armin Lak. *Email:* armin.lak@dpag.ox.ac.uk. *Role:* PhD supervisor. *Position:* Associate Professor at Department of Physiology, Anatomy and Genetics, University of Oxford. *Address:* Sherrington Building, Sherrington Rd, Oxford, OX1 3PT, UK.

Prof Andrew Saxe. *Email:* a.saxe@ucl.ac.uk. *Role:* PhD supervisor. *Position:* Professorial Research Fellow at the Gatsby Computational Neuroscience Unit and Sainsbury Wellcome Centre. *Address:* 25 Howland Street, London, W1T 4JG, UK.




Prof Rafal Bogacz. *Email:* rafal.bogacz@ndcn.ox.ac.uk. *Role:* PhD supervisor. *Position:* Medical Research Council (MRC) Investigator at Brain Network Dynamics Unit, University of Oxford. *Address:* Mansfield Rd, Oxford, OX1 3TH, UK.

Dr Soheil Mottaghi. *Email:* soheil.mottaghi@roche.com. *Role:* DAAD RISE supervisor. *Position:* Technology Evaluation Expert at Roche. *Address:* Albert-Ruprecht-Straße 2, Ludwigsburg, 71636, Germany.

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