Francesco Innocenti

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Education

Sept 2021 - 2025 **PhD, Machine Learning & Theoretical Neuroscience**, *University of Sussex*, UK.
- Thesis: "Towards Scaling Deep Neural Networks with Predictive Coding: Theory and Practice".
- Teaching Assistant on Fundamentals of Machine Learning.
- Developed JPC (★ 53), a JAX library for training neural networks with predictive coding.
- Curated repositories of papers on Neuro-AI (★ 47) and Hessian of neural networks (★ 2).

Sept 2018 - Jun 2021 **B.Sc. Psychology with Cognitive Neuroscience**, *Goldsmiths, University of London.*
- 1st Class Honours.†
- Thesis: "Modelling the Evolution of Visual Perception with Evolutionary Algorithms".

Experience

Oct 2023 - Apr 2024 **Applied Scientist Intern**, *Amazon*, Barcelona.
- Helped improve and evaluate a short-term forecast of Amazon packages delivered throughout Europe, contributing to an internal conference paper and $MM savings in operational costs.

Oct 2018 - Jun 2021 **Research Assistant**, *ART LAB.*
- Helped develop and validate a neuropsychological test of face recognition.

Jun-Aug 2020 **Research Intern**, *TIMING, AWARENESS, AND SUGGESTION LAB.*
- Trained and tested machine learning classifiers to categorise the subjective experiences associated with different psychedelic drugs, based on psychometric data from 55 peer-reviewed studies.

Skills

Coding: Python (highly experienced), git (highly experienced), Docker (basic) CI/CD (experienced), SQL (experienced), AWS (experienced), SLURM (basic), LaTeX (highly experienced).

Autodiff.: PyTorch (highly experienced), JAX (highly experienced), TensorFlow (experienced).

Web dev.: HTML (basic), streamlit (experienced).

Languages: English (proficient), Italian (native), Spanish (fluent).

Selected papers

[1] **Innocenti, F.**, and Achour, E. M. (2025). A Simple Generalisation of the Implicit Dynamics of In-Context Learning. *(Under review for a NeurIPS 2025 Workshop).*

[2] **Innocenti, F.**, Achour, E. M., and Buckley, C. L. (2025). μPC: Scaling Predictive Coding to 100+ Layer Networks. *Advances in Neural Information Processing Systems 38.*

[3] **Innocenti, F.**, Achour, E. M., Singh, R., and Buckley, C. L. (2024). Only Strict Saddles in the Energy Landscape of Predictive Coding Networks? *Advances in Neural Information Processing Systems 37.*

[4] ***Innocenti, F.**, Singh, R., and Buckley, C. L. (2023). Understanding Predictive Coding as a Second-Order Trust-Region Method. *ICML Workshop on Localized Learning.*

Awards

- *Best Paper Award at the ICML 2023 Workshop on Localized Learning.
- †British Psychological Society (BPS) Award for highest performance in undergraduate degree.