Francesco Innocenti

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Experience

Nov 2025 - present **Postdoctoral Researcher**, *University of Oxford*, UK.
- Researching the training and scaling dynamics of artificial and biological neural networks.

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.

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.

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

Open-source contributions

- Developed JPC (★ 63), a JAX library for training neural networks with predictive coding.
- Maintaining a repository of papers on the Maximal Update Parameterisation (μP).
- Curated repositories of papers on Neuro-AI (★ 47) and the Hessian of neural networks (★ 2).

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).
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. *NeurIPS Workshop on What Can('t) Transformers Do?.*

[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.