# Bryn Elesedy

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## Education

10/18 – 06/23 **DPhil Machine Learning** Department of Computer Science, University of Oxford

Thesis: *Symmetry and Generalisation in Machine Learning*

Supervised by Varun Kanade and Yee Whye Teh. Worked on equivariance in machine learning, the lottery ticket hypothesis, SGD, ML theory and applications to science. Member of EPSRC CDT in Autonomous Intelligent Machines and Systems. Integrated master's 2018-19. Passed without corrections.

10/11 – 06/15 **MSc. Mathematics with Astrophysics** Jesus College, University of Cambridge, 1st

Courses in mathematics and theoretical physics including probability, algebra, analysis, (differential) geometry, integrable systems, quantum field theory and general relativity.

Master's Thesis: *Timescales of Galaxy Mergers and Satellite Stripping*, 1st

Computational investigation of galaxy merger time scales and rates of mass accretion.

## Experience

11/23 – 01/25 **Senior Machine Learning Researcher (contract), Samsung**

Research in LLM safety (prompt injection, jailbreaks, guardrails) and differentially private, federated estimation.

08/22 – 12/22 **Research Scientist Intern, DeepMind**

Research on (adaptive) clipping methods for SGD with applications to deep learning and online learning. Supervised by Marcus Hutter. See preprint 7. The code I wrote for this project is used internally.

06/21 – 12/21 **AI Resident, X** (formerly Google [x])

Deep learning and graph neural networks for biology. Supervised by David Duvenaud.

04/20 – 12/20 **Action Team, Royal Society DELVE Initiative**

Multi-disciplinary team convened by Royal Society to provide data-driven assistance in confronting the COVID pandemic. Results instrumental to policy decisions at top levels of UK government (SAGE, Cabinet Office, PM). See publications 2 and 3.

01/18 – 05/18 **Quantitative Analyst, Tudor Investment Corporation**

Worked in the highest performing discretionary team. Automated analytics and machine learning for time series forecasting. Built successful Gaussian process model of US CPI with predictions traded live.

05/16 – 01/18 **Quantitative Researcher, Tudor Investment Corporation**

Research and signal construction for systematic macro trading. Additionally: built a custom stack for developing and backtesting trading strategies, portfolio optimisation infrastructure and event driven automations including real time election prediction and live text analysis of central bank releases.

## Publications & Preprints

8. *Symmetry and Generalisation in Machine Learning*. **Bryn Elesedy**. PhD Thesis, 2023. link

7. *U-Clip: On-Average Unbiased Stochastic Gradient Clipping*. **Bryn Elesedy**, Marcus Hutter. Preprint, 2023. link
6. *Group Symmetry in PAC Learning*. **Bryn Elesedy**. Geometrical and Topological Representation Learning Workshop, ICLR 2022 (Spotlight). link
5. *Provably Strict Generalisation Benefit for Invariance in Kernel Methods*. **Bryn Elesedy**. NeurIPS 2021. link
4. *Provably Strict Generalisation Benefit for Equivariant Models*. **Bryn Elesedy** and Sheheryar Zaidi. ICML 2021. link
3. *Efficient Bayesian Inference of Instantaneous Reproduction Numbers at Fine Spatial Scales, with an Application to Mapping and Nowcasting the COVID-19 Epidemic in British Local Authorities*. Yee Whye Teh, Avishkar Bhoopchand, Peter Diggle, **Bryn Elesedy**, Bobby He, Michael Hutchinson, Ulrich Paquet, Jonathan Read, Nenad Tomasev, Sheheryar Zaidi (YWT then alphabetical ordering). Royal Society Special Topic Meeting on R, Local R and Transmission of COVID-19. Website: localcovid.info. link
2. *Effectiveness and resource requirements of test, trace and isolate strategies for COVID in the UK*. Bobby He[*], Sheheryar Zaidi[*], **Bryn Elesedy**[*], Michael Hutchinson[*], Andrei Paleyes, Guy Harling, Anne Johnson, Yee Whye Teh on behalf of Royal Society DELVE group (* equal contribution). Royal Society Open Science, 2021. link
1. *Lottery Tickets in Linear Models: An Analysis of Iterative Magnitude Pruning*. **Bryn Elesedy**, Varun Kanade, Yee Whye Teh. Sparsity in Neural Networks Workshop, 2021. link

## Skills & Awards

- Experience in deep learning with `PyTorch` and `JAX` on large clusters with many experiments.
- Fluent in `Python` and its data/ML ecosystem (`NumPy`, `pandas`, `matplotlib`, `scikit-learn`, ...). Experience with Unix environment (`Bash`), test driven development, continuous integration and using version control collaboratively (`Git`, `Mercurial`). Basic skills in `C++`, `MATLAB`, `VBA` and `R`.
- Broad and transferable understanding of machine learning with diverse research experience, both fundamental and applied. Keen to learn, fast to pick up new concepts and able produce rigorous and novel research in new areas.
- Experienced at working to deadlines and on mission-critical projects. Commercial experience applying machine learning to real world problems and challenging datasets.
- **Awards**: G-Research PhD Prize, 2nd Place, 2022, £5000. Alan Turing Institute Enrichment Scheme Scholarship, 2020, £7000 (cancelled due to pandemic). Jesus College Educational Board Prize, 2015, £150.

## Community

- Practicals Committee, Deep Learning Indaba 2023.
- Reviewer: AISTATS 2020, Neural Networks (Elsevier) 2023.
- TA for B8.4 Information Theory at the Mathematical Institute, University of Oxford, Hilary Term 2021.
- Guest speaker for the course Machine Learning and the Physical World, University of Cambridge, 2020. Joint with Andrei Paleyes.
- Organiser of OxCSML Deep and Probabilistic Learning Reading Group, 2019-2020.
- Tuition and Oxbridge entrance assistance for disadvantaged students, 2015-2018.