

Beren Millidge

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LinkedIn:

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EDUCATION

University of Edinburgh

Ph.D. in Machine Learning and Computational Neuroscience, supervised by Richard Shillcock

Edinburgh

2017–Current

University of Edinburgh

MSc. in Artificial Intelligence, **Distinction**

Edinburgh

2016–2017

University of Oxford

BSc. in Psychology, Philosophy, and Linguistics, **First Class Honours**

Oxford

2013–2016

EXPERIENCE

University of Sussex

Visiting Fellow

Brighton

January 2020 –Current

Payara Services Limited

Software Development Intern

Malvern

June –September 2016

Oxford Centre for Theoretical Neuroscience and Artificial Intelligence

Student Researcher

Oxford

May –August 2015

AREAS OF EXPERTISE

- **Machine Learning** Model-Based and Model-Free Reinforcement Learning, Object Recognition
- **Machine Learning Libraries** Pytorch, Tensorflow, Keras, Flux.jl
- **Bayesian Inference** Variational Inference, Graphical Models, MCMC, (Stan, Edward, Turing.jl)
- **Statistical Analysis** ANOVA, LMER
- **Web Development** Django, Flask, Nodejs, Express.js, React, Vue.js, Shiny (R)

LANGUAGES

- **Highly Experienced** Python, Javascript, Julia
- **Proficient** C++, C, Java, Rust, HTML, CSS, R
- **Conversant** CUDA, Ruby, Haskell, Elm, Bash, PHP, Typescript, MATLAB

PUBLICATIONS

- [1] **B. Millidge**, A. Tschantz, and C. L. Buckley, “Predictive coding approximates backprop along arbitrary computation graphs”, *arXiv preprint arXiv:2006.04182; Submitted to ICLR 2021*, 2020.
- [2] **B. Millidge**, A. Tschantz, and C. L. Buckley, “Whence the expected free energy?”, *Neural Computation*, 2020.
- [3] **B. Millidge**, A. Tschantz, C. L. Buckley, and A. Seth, “Activation relaxation: A local dynamical approximation to backpropagation in the brain”, *arXiv preprint arXiv:2009.05359; submitted to ICLR 2021*, 2020.

- [4] **B. Millidge**, A. Tschantz, C. L. Buckley, and A. Seth, “Investigating the scalability and biological plausibility of the activation relaxation algorithm”, *arXiv preprint arXiv:2009.05359; submitted to NeurIPS 2020 workshop, Beyond Backpropagation in the Brain*, 2020.
- [5] **B. Millidge**, A. Tschantz, A. Seth, and C. L. Buckley, “Relaxing the constraints on predictive coding models”, *arXiv preprint arXiv:2010.01047; submitted to Neural Networks*, 2020.
- [6] **B. Millidge**, A. Tschantz, A. K. Seth, and C. L. Buckley, “On the relationship between active inference and control as inference”, *IEEE IWAI Workshop on Active Inference*, 2020.
- [7] **B. Millidge**, A. Tschantz, A. K. Seth, and C. L. Buckley, “Reinforcement learning as iterative and amortised inference”, *arXiv preprint arXiv:2006.10524*, 2020.
- [8] A. Seth, **B. Millidge**, C. L. Buckley, and A. Tschantz, “Curious inferences: Reply to sun & firestone on the dark room problem”, *Trends in Cognitive Science*, 2020.
- [9] A. Tschantz, **B. Millidge**, A. K. Seth, and C. L. Buckley, “Control as hybrid inference”, *ICML 2020 Workshop on Theoretical Foundations of RL*, 2020.
- [10] A. Tschantz*, **B. Millidge***, A. K. Seth, and C. L. Buckley, “Reinforcement learning through active inference”, *ICML 2020 Workshop Bridging AI and Cognitive Science*, 2020.
- [11] **B. Millidge**, “Combining active inference and hierarchical predictive coding: A tutorial introduction and case study”, *PsyArxiv; Submitted to Cognition*, 2019.
- [12] **B. Millidge**, “Deep active inference as variational policy gradients”, *Journal of Mathematical Psychology*, vol. 96, p. 102348, 2019.
- [13] **B. Millidge**, “Fixational eye movements: Data augmentation for the brain?”, *PsyArxiv*, 2019.
- [14] **B. Millidge**, “Implementing predictive processing and active inference: Preliminary steps and results”, *PsyArxiv*, 2019.
- [15] R. Shillcock, **B. Millidge**, and A. Ravignani, “Exploring infant vocal imitation in *tadarida brasiliensis mexicana*”, in *Neurobiology of Speech and Language*, 2019, pp. 36–37.
- [16] **B. Millidge** and R. Shillcock, “A predictive processing account of bottom-up visual saliency using cross-predicting autoencoders”, *PsyArxiv*, 2018.

INVITED TALKS

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| • Particular Physics Reading Group | 2020 |
| • Sackler Centre Seminar Series, University of Sussex | 2020 |
| • Institute for Adaptive Neural Computation, University of Edinburgh | 2020 |
| • Adaptive and Evolutionary Systems Group, University of Sussex | 2019 |
| • Nature Inspired Machine Learning Group, Oak Ridge National Laboratory, USA | 2019 |
| • Institute for Adaptive Neural Computation, University of Edinburgh | 2019 |
| • Chancellor’s Presentation, University of Edinburgh | 2019 |
| • Neurons and Systems Seminar, University of Edinburgh | 2019 |
| • Institute for Adaptive Neural Computation, University of Edinburgh | 2018 |

AWARDS

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| • Best Dissertation in Artificial Intelligence Award, University of Edinburgh | 2017 |
| • Highest Performance in Prelims Linguistics, University of Oxford | 2014 |

ACADEMIC SERVICES

- *NeurIPS* Conference Reviewer
- *ICML* Conference Reviewer
- *ICLR* Conference Reviewer
- *Cognition* Journal Reviewer
- *Journal Of Mathematical Psychology* Reviewer
- *Neural Computation* Journal Reviewer