DANIEL BEECHEY

Email ◇ Google Scholar ◇ Website

RESEARCH INTERESTS

Reinforcement learning, LLMs and reinforcement learning, explainable artificial intelligence, hierarchical reinforcement learning, bounded rationality, exploration, and continual learning.

EDUCATION

PhD in Reinforcement Learning *Expected December 2025*
University of Bath, United Kingdom.
Supervisors: Özgür Şimşek (Computer Science), Emma Carmel (Social Policy)
Dissertation: *Explaining Reinforcement Learning with Shapley Values: Theory and Algorithms*

MRes in Accountable, Responsible and Transparent AI *2022*
University of Bath, United Kingdom.
Supervisors: Özgür Şimşek (Computer Science), Emma Carmel (Social Policy)
Dissertation: *Explaining Reinforcement Learning with Shapley Values*
Grade: Distinction

MSc in Data Science *2021*
University of Bath, United Kingdom.
Supervisor: Özgür Şimşek
Dissertation: *Autonomous Routing of Printed Circuit Boards with Hierarchical Reinforcement Learning*
Grade: Distinction

BSc(Hons) in Mathematics *2020*
University of Bath, United Kingdom.
Grade: First Class

WORK EXPERIENCE

Research Scientist, *Huawei Noah's Ark Lab* *2025 - present*
Researching methods to fine-tune LLM Agents using reinforcement learning, mostly focusing on GUI and mobile domains.

Co-Manager of the Bath RL Lab, *University of Bath* *2023 - 2025*
Organising lab activities, including weekly lab meetings, research sessions, paper discussions, and social events.

Graduate Teaching Assistant, *University of Bath* *2020 - 2025*
Modules: Reinforcement Learning; Statistics for Data Science; Software Technologies for Data Science; Programming, Foundations and Connections; Programming and Discrete Mathematics; Mathematical Methods; Applications; and Supervised 10 MSc and 5 BSc students.

Fixed-Term Lecturer, *University of Bath* *2022 - 2023*
Reinforcement Learning (110 MSc students, 29 MSc students).
Supervised 5 MSc and 2 BSc students.

AWARDS

University of Bath, **Doctoral Recognition Award** *2024*
Bath Conference of Computer Science, **Best Overall Contribution** *2023*
Inter-CDT Conference on AI, **Best Poster** *2023*

SELECTED PAPERS

Daniel Beechey and Özgür Şimşek *NeurIPS, 2025*
Approximating Shapley Explanations in Reinforcement Learning

Daniel Beechey, Thomas M. S. Smith, and Özgür Şimşek *ArXiv, 2025*
A Theoretical Framework for Explaining Reinforcement Learning with Shapley Values

Toby Lewis-Atwell, **Daniel Beechey**, et al. *ACS Catalysis, 2023*
Reformulating Reactivity Design for Data-Efficient Machine Learning

Daniel Beechey, Thomas M. S. Smith, and Özgür Şimşek *ICML, 2023*
Explaining Reinforcement Learning with Shapley Values

SELECTED TALKS

Explaining Reinforcement Learning with Shapley Values: Theory and Algorithms
Edinburgh RL Group *2025*

A Theoretical Framework for Explaining Reinforcement Learning with Shapley Values
ART-AI Colloquium Series *2025*
Bath Doctoral Festival of Ideas *2024*

An Introduction to Explainable and Hierarchical Reinforcement Learning
Bath AI Society *2024*

Explaining Reinforcement Learning with Shapley Values
Bath Conference of Computer Science *2023*
Alan Turing Institute Student Presentations *2023*

TECHNICAL SKILLS

Conceptual	Mathematics, statistics, machine learning, and reinforcement learning.
Programming	Excellent Python skills. Experience with R, Matlab, and Git.
Libraries	PyTorch, Transformers, VeRL, Ray, NumPy, Matplotlib, and many others.
Algorithms	PPO, GRPO, DQN, DDPG, SAC, Options and many others.
Models	MLP, CNN, VAE, diffusion models, transformers and many others.

SERVICE

Reviewing
Reinforcement Learning Conference (RLC) *2025*
European Workshop on Reinforcement Learning (EWRL) *2024*