







# Lukas Schäfer

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## EDUCATION

### PhD Data Science & Artificial Intelligence

12/2019 -- Present

UNIVERSITY OF EDINBURGH

EDINBURGH, UNITED KINGDOM

- › Supervisors: Stefano V. Albrecht (primary) and Amos Storkey (secondary) | Expected graduation: March 2024
- › Project: Sample Efficiency and Generalisation in Multi-Agent Reinforcement Learning
- › Receiving **Principal's Career Development Scholarship** from the University of Edinburgh
- › Organisation and hosting of **RL reading group** with speakers from leading industry (MSR, Google Brain, Deepmind, FAIR) and academic (Oxford University, McGill University, Georgia Institute of Technology, National University of Singapore) labs

### M.Sc. Informatics

09/2018 -- 08/2019

UNIVERSITY OF EDINBURGH

EDINBURGH, UNITED KINGDOM

- › Degree classification: **Distinction** (77.28%)
- › Received **DAAD** (German Academic Exchange Service) **graduate scholarship** and **Stevenson Exchange Scholarship**

### B.Sc. Computer Science, minor subject Japanese

10/2015 -- 09/2018

SAARLAND UNIVERSITY

SAARBRÜCKEN, GERMANY

- › Degree classification: grade of **1.2** (German scale) - within **top 5%**

## PUBLICATIONS

### Peer-Reviewed Publications

- [1] **Lukas Schäfer**, F. Christianos, J. P. Hanna, and S. V. Albrecht, "Decoupled reinforcement learning to stabilise intrinsically-motivated exploration," in *International Conference on Autonomous Agents and Multiagent Systems* (26% acceptance rate), 2022.
- [2] **Lukas Schäfer**, "Task generalisation in multi-agent reinforcement learning," in *International Conference on Autonomous Agents and Multiagent Systems, Doctoral Consortium*, 2022.
- [3] R. Zhong, D. Zhang, **Lukas Schäfer**, S. V. Albrecht, and J. Hanna, "Robust on-policy data collection for data efficient policy evaluation," in *Advances in Neural Information Processing Systems* (26% acceptance rate), 2022.
- [4] G. Papoudakis, F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Benchmarking multi-agent deep reinforcement learning algorithms in cooperative tasks," in *Neural Information Processing Systems* (26% acceptance rate), *Datasets and Benchmarks Track*, 2021.
- [5] **Lukas Schäfer**, F. Christianos, J. P. Hanna, and S. V. Albrecht, "Decoupling exploration and exploitation in reinforcement learning," in *ICML Workshop on Unsupervised Reinforcement Learning (URL)*, 2021.
- [6] F. Christianos, **Lukas Schäfer**, and S. V. Albrecht, "Shared experience actor-critic for multi-agent reinforcement learning," in *Neural Information Processing Systems* (20% acceptance rate), 2020.

### Selected Preprints

- [7] **Lukas Schäfer**, F. Christianos, A. Storkey, and S. V. Albrecht, "Learning task embeddings for teamwork adaptation in multi-agent reinforcement learning," *arXiv preprint arXiv:2207.02249*, 2022.

## SKILLS

### Programming

Python • C++ • SML • Bash

### Technologies and Tools

PyTorch • NumPy • UNIX • Git

### Languages

Native in German • Fluent in English • Beginner in Chinese

### Soft Skills

Teamwork • Teaching • Communication • Organisation

## EXPERIENCE

### Young Research Attendee

HEIDELBERG LAUREATE FORUM

09/2022

HEIDELBERG, GERMANY

- › Connect and discuss with researchers and laureates of the most prestigious awards in mathematics and computer science

### Research Intern

HUAWEI NOAH'S ARK LAB

07/2022 -- Present

LONDON, UNITED KINGDOM

- › Research multi-agent reinforcement learning algorithms capable of learning behaviour which transfers to new tasks

### Research Intern

DEMATIC - TECHNOLOGY AND INNOVATION

11/2020 -- 03/2021

REMOTE

- › Applying state-of-the-art AI technology to automate large-scale robotic warehouse logistics

## DISSERTATIONS

### M.Sc. Dissertation, Autonomous Agents Research Group

05/2019 -- 08/2019

CURIOSITY IN MULTI-AGENT REINFORCEMENT LEARNING (74%)

- › Applied count- and prediction-based intrinsic rewards as exploration bonuses to multi-agent reinforcement learning (MARL)
- › Evaluated MARL with curiosity under partial observability and sparse rewards in multi-agent particle environments
- › Proposed multi-agent curiosity led to improved stability and convergence of policy-gradient MARL in sparse-reward tasks

### B.Sc. Dissertation, Foundations of Artificial Intelligence (FAI) Group

04/2018 -- 07/2018

DOMAIN-DEPENDENT POLICY LEARNING USING NEURAL NETWORKS IN CLASSICAL PLANNING (1.0)

- › Transferred policy learning Action-Schema Networks to classical automated planning with adjusted training scheme, Keras implementation and extension of the FastDownward planning framework
- › Extensive evaluation and analysis on IPC domains identifying limitations in generalisation and scalability

## TEACHING EXPERIENCE

### Teaching Assistant, University of Edinburgh

10/2019 -- Present

REINFORCEMENT LEARNING, SCHOOL OF INFORMATICS

- › **Delivering lectures** and **designing RL coursework** covering wide range of topics from single- to multi-agent and deep RL
- › Marking project and exam for reinforcement learning course

### M.Sc. Student Supervision, University of Edinburgh

02/2021 -- 08/2021

- › Co-supervised two M.Sc. students through project proposal, refinement and execution towards final thesis
- › Assisted M.Sc. student from their thesis towards a **successful publication at NeurIPS 2022**

### Voluntary Lecturer and Coach, Saarland University

09/2017 -- 10/2017

MATHEMATICS PREPARATION COURSE

- › Explained formal languages and predicate logic to ~ 250 participants in daily lectures of the first week
- › Supervised two groups to provide feedback and further assistance in daily coaching-sessions
- › The course received **BESTE-award** for special student commitment 2017 of Saarland University

### Teaching Assistant, Saarland University

10/2016 -- 03/2017

PROGRAMMING 1, DEPENDABLE SYSTEMS AND SOFTWARE GROUP

## REVIEWING

- › **Conferences:** NeurIPS 2022, ICML 2022 (**top 10% outstanding reviewer award**), NeurIPS 2021 and 2022 Datasets and Benchmarks Track, AAMAS 2022
- › **Workshops:** Pre-Registration Experiment Workshop at NeurIPS 2020