MARVIN SCHMITT

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Academic Degrees

PhD Machine Learning
Stuttgart, Germany
ELLIS (PhD program), SimTech (graduate school), IMPRS-IS (associated) December 2021 – March 2025
ELLIS Co-Supervisors: Prof. Paul Bürkner (TU Dortmund), Prof. Aki Vehtari (Aalto University)
Title: Towards Trustworthy Amortized Bayesian Inference with Deep Learning.
Grade: Summa cum laude (with highest honors).

MSc Data and Computer Science
Heidelberg, Germany
Heidelberg University, Grade: 1.0/4.0 (A+, lower is better, best: 1.0) 2020 – 2022

MSc Psychology
Heidelberg, Germany
Heidelberg University, Grade: 1.0/4.0 (A+, lower is better, best: 1.0) 2018 – 2021

BSc Psychology
Heidelberg, Germany
Heidelberg University, Grade: 1.2/4.0 (A, lower is better, best: 1.0) 2014 – 2018

Language Skills

German (native language)
English (C2 CEFR; CertiLingua)
French (B2 CEFR; DELF and CertiLingua)
Finnish (Pre-A1 CEFR, studying towards A1)
Norwegian (Pre-A1 CEFR, studying towards A1)

Selected Experience

Doctoral Research Associate
Stuttgart, Germany
Cluster of Excellence 'Data-Integrated Simulation Science' December 2021 – November 2024
Improved the trustworthiness of generative deep neural networks for solving inverse problems in science.

Visiting Researcher
Espoo, Finland
Aalto University, Probabilistic Machine Learning Group March 2024 – August 2024
Conceptualized a Bayesian workflow for trustworthy amortized inference with deep neural networks and MCMC.

Research Intern
Heidelberg, Germany
Heidelberg University, Quantitative Methods in Psychology June 2018
Developed an unsupervised machine learning algorithm to analyze human eye-tracking data.

Career Breaks

Parental Leave
November 2024 – August 2025

Research Funding and Grants

- **Mobility grant (5 000 EUR)** from the European Network of Excellence Centers (ELISE; Horizon Europe).
- **Mobility grant (3 000 EUR)** from the European Lighthouse on Secure and Safe AI (ELSA; Horizon Europe).
- **Academic Research Grant (1 000 EUR)** from the Google Cloud Program.
- Contributed to a successful proposal for 353 000 EUR, principal investigators: Paul Bürkner, Stefan Radev.

Research Output

Output Metrics
- **Number of peer-reviewed papers: 9** (+ 3 peer-reviewed workshop papers and 5 pre-prints under review)
- **Number of citations: 180** (source: Google Scholar, 16.04.2025)
- **h-index: 7** (source: Google Scholar, 16.04.2025)

Highlighted Papers

* indicates equal contribution. The publication list is also available via Google Scholar (Link).

[1] **Marvin Schmitt***, Valentin Pratz*, Ullrich Köthe, Paul Bürkner, and Stefan Radev.
Consistency Models for Scalable and Fast Simulation-Based Inference.
In: *Neural Information Processing Systems (NeurIPS)*, 2024.

[2] **Marvin Schmitt**, Desi Ivanova, Daniel Habermann, Ullrich Köthe, Paul Bürkner, and Stefan Radev.
Leveraging Self-Consistency for Data-Efficient Amortized Bayesian Inference.
In: *International Conference on Machine Learning (ICML)*, 2024.

[3] **Marvin Schmitt**, Paul Bürkner, Ullrich Köthe, and Stefan Radev.
Detecting Model Misspecification in Amortized Bayesian Inference with Neural Networks.
Oral and **Best Paper Honorable Mention** at the *German Conference on Pattern Recognition*, 2024.

[4] Stefan Radev, **Marvin Schmitt**, Valentin Pratz, Umberto Picchini, Ullrich Köthe, and Paul Bürkner.
JANA: Jointly Amortized Neural Approximation of Complex Bayesian Models.
Spotlight at the *Conference on Uncertainty in Artificial Intelligence (UAI)*, 2023.

[5] Stefan Radev*, **Marvin Schmitt***, Lukas Schumacher, Lasse Elsemüller, Valentin Pratz, Yannik Schälte, Ullrich Köthe, and Paul Bürkner.
BayesFlow: Amortized Bayesian Workflows with Neural Networks.
In: *Journal of Open Source Software*, 2023.

[6] **Marvin Schmitt**, Stefan Radev, and Paul Bürkner.
Meta-Uncertainty in Bayesian Model Comparison.
In: Artificial Intelligence and Statistics (AISTATS), 2023.

[7] Daniel Habermann, **Marvin Schmitt**, Lars Kühmichel, Andreas Bulling, Stefan Radev, and Paul Bürkner.
Amortized Bayesian Multilevel Models.
arXiv:2408.13230, 2024.

[8] **Marvin Schmitt***, Chengkun Li*, Aki Vehtari, Luigi Acerbi, Paul Bürkner, and Stefan Radev.
Amortized Bayesian Workflow (Extended Abstract).
In: NeurIPS Workshop on Bayesian Decision-Making and Uncertainty (BDU), 2024.

[9] **Marvin Schmitt**, Leona Odole, Stefan Radev, and Paul Bürkner.
Fuse It or Lose It: Deep Fusion for Multimodal Simulation-Based Inference.
arXiv:2311.10671, 2023.

[10] Lasse Elsemüller, Hans Olischläger, **Marvin Schmitt**, Paul Bürkner, Ullrich Köthe, and Stefan Radev.
Sensitivity-Aware Amortized Bayesian Inference.
In: Transactions on Machine Learning Research (TMLR), 2024. **Selected for Presentation** at ICLR 2025.

Research Supervision and Leadership

- Yuga Hikida, MSc thesis, co-supervisor with Desi Ivanova (Oxford, UK) and Paul Bürkner (Dortmund, GER)
- Adya Maheshwari, student assistant for research (MSc), principal supervisor
- Yuga Hikida, student assistant for research (MSc), principal supervisor
- Pritom Gogoi, student assistant for research (MSc), principal supervisor
- Leona Odole, student assistant for research (MSc), principal supervisor
- Rebecca Kohlhaas, MSc project, co-supervisor

Teaching Merits

Pedagogical Training

- **Teaching certificate** from a 90-hour training program at Heidelberg University, Germany (3 ECTS).
- **University-level education** from lectures and seminars at Heidelberg University, Germany:
  - communication techniques (4 ECTS)
  - leadership training (8 ECTS)
  - study assessment tests (4 ECTS)

  - educational psychology (8 ECTS)
- **Practical training** as an intern for psychological consulting on communication, leadership, coaching, feedback, change, and personality.

Experience as Lead Instructor

- **Statistical Inference**
  Lecture and Exercise (BSc level), Fresenius University of Applied Sciences, Heidelberg,
  winter 2020 – summer 2022 (4×), 5 ECTS each, total of 20 ECTS.
  Created all materials, conceptualized and graded all exams, approx. 30–100 students per semester.
- **Scientific Python**
  Workshop (2 days, PhD level), RTG Statistical Modeling in Psychology, Mannheim, 2023.
  Created all materials and exercises, approx. 15 students.
- **Bayesian statistics with R and brms**
  Workshop (1 day, PhD level), FGME conference of the German Psychological Association, Konstanz, 2022.
  Created all materials and exercises, approx. 15 students.
- **Introduction to Statistics with R**
  Seminar (Full semester, PhD level), Heidelberg University, Heidelberg, winter 2021/2022, 4 ECTS.
  Created all materials, approx. 10 students.
- **Descriptive Statistics and Probability Theory**
  Exercise (BSc level), Fresenius University of Applied Sciences, Heidelberg, summer 2021, 2 ECTS.
  Created new homework assignments based on material from previous instructor, approx. 50 students.
- **Communication Techniques**
  Seminar (MSc level, co-lead), Fresenius University of Applied Sciences, Wiesbaden, 2020, 2 ECTS.
  Created approx. 50% of materials, approx. 30 students.
- **Group Coaching**
  Workshop (1 day, MSc level, co-lead), Fresenius University of Applied Sciences, Frankfurt, 2017, 2 ECTS.
  Created all materials, approx. 30 students.

Experience as Teaching Assistant

- **Applied Bayesian Data Analysis**
  Exercise (MSc level), TU Dortmund University, summer 2023, 2 ECTS (+4 ECTS by professor).
  Created approx. 30% of materials and weekly homework assignments with solutions.
- **Bayesian Statistics and Probabilistic Machine Learning**
  Exercise (MSc level), University of Stuttgart, summer 2022, 2 ECTS (+4 ECTS by professor).
  Created approx. 30% of materials and weekly homework assignments with solutions.
- **Statistics with R**
  Seminar (MSc level), Heidelberg University, Heidelberg, winter 2020/2021, 2 ECTS (+2 ECTS by professor).
  Created all materials and weekly homework assignments with solutions.
- **Programming with R**
  Seminar (MSc level), Heidelberg University, Heidelberg, summer 2020, 2 ECTS (+2 ECTS by professor).
  Created all materials and weekly homework assignments with solutions.

Experience as Tutor

- **Statistical Inference**
  Exercise, Heidelberg University, Heidelberg, summer 2016–2019 (4×), 2 ECTS each (+2 ECTS by professor).
  Created all tutorial materials based on the professor's lecture slides.
- **Descriptive Statistics and Probability Theory**
  Exercise, Heidelberg University, Heidelberg, winter 2016–2019 (3×), 2 ECTS each (+2 ECTS by professor).
  Created all tutorial materials based on the professor's lecture slides.

Awards and Honors

- **Highest Honor's Distinction** for the doctoral degree (summa cum laude), 2025.
- **Best Paper Honorable Mention** at the German Conference on Pattern Recognition, 2023.
- **Honor's Distinction** MSc in Data and Computer Science (German grade 1.0 "mit Auszeichnung"), 2022.
- **Scholarship** from the German Academic Scholarship Foundation (Studienstiftung), 2019–2021.

Other Key Academic Merits

Memberships

- **Member** of the European Laboratory for Learning and Intelligent Systems (ELLIS), starting 20.03.2025.
- **Associated Student** at the International Max Planck Research School for Intelligent Systems (IMPRS-IS).
- **Member** of the Society of SimTech, University of Stuttgart.
- **Member** of the Alumni of the German Academic Scholarship Foundation.

Reviewing

- **Scientific Reviewer** for NeurIPS (2024), ICML (2022), AISTATS (2023, 2024, 2025), DGM4H (NeurIPS; 2023), UniReps (NeurIPS; 2023), AABI (2022, 2024, 2025), PNAS (2024).
- **Ethics Reviewer** for NeurIPS (2024).
- **PhD Application Reviewer** for the European Laboratory for Learning and Intelligent Systems (ELLIS).

Academic Workshops and Tutorials

- **Amortized Bayesian Inference**
  Conference Workshop (Co-Lead), Bayes on the Beach conference, 2024.
- **Amortized Simulation-Based Inference**
  Tutorial Lead, ELLIS Doctoral Symposium, 2023.
- **Journal Club: Probabilistic Machine Learning**
  Moderator, ELLIS Doctoral Symposium, 2023.

Talks

- **Data-Efficient Amortized Bayesian Inference with Self-Consistency Losses**
  Invited Research Talk, Probabilistic Machine Learning Group, Aalto University, 2024.
- **Towards Reliable Amortized Bayesian Inference**
  Contributed Talk, Bayes on the Beach conference, 2024.
- **Jointly Amortized Bayesian Inference**
  Invited Research Talk, Machine and Human Intelligence group, University of Helsinki, 2023.
- **Leveraging Self-Consistency for Data-Efficient Amortized Bayesian Inference**
  Video Short Presentation, NeurIPS workshop for Unifying Representations in Neural Models, 2023.
- **Detecting Model Misspecification in Amortized Bayesian Inference with Neural Networks**
  Oral Presentation, German Conference on Pattern Recognition, 2023.
- **Detecting Model Misspecification in Amortized Bayesian Inference with Neural Networks**
  Invited Lightning Talk, BayesComp conference, 2023.
- **Validating Synthetic Training Data in Probabilistic Machine Learning**
  Invited talk at Blue Yonder Group Inc., 2022.

Poster Presentations

- **Leveraging Self-Consistency for Data-Efficient Amortized Bayesian Inference**
  ELLIS Robust Machine Learning Workshop (also presented at ICML by co-authors), 2024.
- **Self-Consistency Losses in Amortized Inference**
  SimTech status seminar, 2024.
- **Meta-Uncertainty in Bayesian Model Comparison**
  SimTech status seminar, 2023.
- **Meta-Uncertainty in Bayesian Model Comparison**
  International Conference on Artificial Intelligence and Statistics (AISTATS), 2023.
- **Detecting Model Misspecification in Amortized Bayesian Inference with Neural Networks**
  BayesComp conference, 2023.
- **Detecting Model Misspecification in Simulation-Based Inference**
  ELLIS Unit Stuttgart kick-off event, 2022.
- **Model Misspecification in Simulation-Based Inference**
  SimTech status seminar, 2022.

Scientific and Societal Impact

Academic Service

- **Examination Board** student representative (MSc), Psychology, Heidelberg University, 2016–2021.
- **Institute Council** elected student representative, Psychology, Heidelberg University, 2016–2020.
- **Student Council** member, Psychology, Heidelberg University, 2016–2020.

Open Source Software Development

- **BayesFlow** (Core Developer)
  Description: Amortized Bayesian workflows with deep neural networks in Python.
  Metrics: 427 stars on GitHub, 15.7k downloads (as of 24.02.2025)
  Users: Applied scientists (aka. AI4Science) and machine learning developers

Science Communication and Media Appearances

- **Featured Article** on the ELLIS website and newsletter (2024)
  Topic: ELLIS exchange in Finland (article and video)
  Audience: General audience, early career researchers, current and prospective ELLIS students
- **Podcast Guest** on the Learning Bayesian Statistics podcast (2024)
  Topic: Bayesian inference with deep neural networks
  Audience: Data science practitioners and scientists, international audience
- **AI Expert** for the Cyber Valley consortium (2022)
  Topic: Briefing journalists on current trends in AI
  Audience: Individuals in the *Journalist in Residence* program of Cyber Valley
- **Invited Speaker** at the Cyber Valley AI Short Stories Workshop (2022)
  Topic: What is artificial intelligence (AI)?
  Audience: German pupils, age 12–16
- **Invited Speaker** at the Cyber Valley Office Hours (2022)
  Topic: Where does artificial intelligence (AI) begin?
  Audience: German public audience, open and free science communication series