

# Marvin Schmitt

PHD RESEARCHER · BAYESIAN STATISTICS & DEEP LEARNING

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## EDUCATION

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since 2021

### PhD in Computer Science

CLUSTER OF EXCELLENCE SIMTECH, UNIVERSITY OF STUTTGART

- Junior Research Group for Bayesian Statistics, supervised by Dr. Paul-Christian Bürkner
- Focus: Bayesian model comparison, probabilistic machine learning, simulation-based inference
- Tools: R, Python, Stan

2022

### M.Sc. in Data and Computer Science

HEIDELBERG UNIVERSITY

- grade 1.0 / 4.0 (best: 1.0)
- Master thesis: *Visualization of Distribution and Uncertainty of Posterior Model Probabilities*
- Tools: Python, C++, Java, OpenGL

2018 – 2021

### M.Sc. in Psychology

HEIDELBERG UNIVERSITY

- grade 1.0 / 4.0 (best: 1.0)
- Master thesis: *Did you Miss Me? Model Misspecification in Bayesian Parameter Estimation Tasks with Invertible Neural Networks*
- Tools: R, Python

2014 – 2018

### B.Sc. in Psychology

HEIDELBERG UNIVERSITY

- grade 1.2 / 4.0 (best: 1.0)
- Bachelor thesis: *Influence of suggestive questions on usability tests*
- Tools: R, SPSS

2006 – 2014

### Abitur (A-levels)

AUGUSTE-VIKTORIA-GYMNASIUM, TRIER

- grade 1.1 / 4.0 (best: 1.0)
- Stayed in southern India to foster the school's humanitarian UNESCO project with local representatives.
- Stayed in Illinois, US, for a CertiLingua research project on the impact of the religious education system in the US.

## WORK EXPERIENCE

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since 2021

### Research Associate

SIMTECH CLUSTER OF EXCELLENCE, UNIVERSITY OF STUTTGART

- Supervised by Dr. Paul-Christian Bürkner.
- Cyber Valley project *Meta-Uncertainty in Bayesian Model Comparison*.
- Researching methods to improve current Bayesian model comparison workflows through extensive simulations.

2017 – 2019

### Workshop Assistant and Business Consultant

FREELANCE

- Assisted with conception and realization of business workshops on communication, leadership development, group coaching, conflict, change, and personality.
- Developed a manuscript generation software to create custom training material with Python, Flask and LaTeX.

2017 – 2019

### Network Officer

MARSILIUS-KOLLEG CENTER FOR ADVANCED STUDY

- Organized and coordinated IT-tasks and due diligence.
- Implemented a live streaming solution for live events based on UDP multicast (internal) and RTMP (external).
- Established a network-wide media center based on Samba.
- Maintained the center's website and digital knowledge base in Imperia CMS with HTML, CSS, PHP, JavaScript.
- Assisted in organizing and hosting symposia, conferences, and talks.

2018

### Research Intern

QUANTITATIVE RESEARCH METHODS, INSTITUTE FOR PSYCHOLOGY

- Supervised by Dr. Veronika Lerche
- Developed an algorithm to derive expectation measures from eye-tracking data.
- Gained first on-hands experience with Machine Learning techniques in R.

2017

### Consultant Intern

MC HISCHE UNTERNEHMENSBERATUNG

- Assisted in the preparation and realization of business workshops.
- Facilitated a book publication with focus on content, style guidelines, and typesetting.

# TEACHING

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Summer 2022	<b>Lecture &amp; Exercise</b> , Statistical Inference at Fresenius UAS, Heidelberg
Summer 2022	<b>Exercise</b> , Bayesian Statistics and Probabilistic Machine Learning at University of Stuttgart
Winter 2021/22	<b>Lecture &amp; Exercise</b> , Statistical Inference at Fresenius UAS, Heidelberg
Winter 2021/22	<b>Seminar</b> , Introduction to Statistics with R for PhD researchers at Heidelberg University
Summer 2021	<b>Exercise</b> , Descriptive Statistics & Probability Theory at Fresenius UAS, Heidelberg
Summer 2021	<b>Lecture &amp; Exercise</b> , Statistical Inference at Fresenius UAS, Heidelberg
Winter 2020/21	<b>Seminar (TA)</b> , Statistics with R at Heidelberg University
Winter 2020/21	<b>Lecture &amp; Exercise</b> , Statistical Inference at Fresenius UAS, Heidelberg
Summer 2020	<b>Seminar (TA)</b> , Programming with R at Heidelberg University
2020	<b>Seminar</b> , Communication Techniques at Fresenius UAS, Wiesbaden
2017	<b>Workshop</b> , Group Coaching at Fresenius UAS, Frankfurt
2016–2019	<b>Tutorial</b> , Descriptive Statistics, Probability Theory & Statistical Inference at Heidelberg University

# EXTRACURRICULAR ACTIVITIES & AWARDS

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2019 – 2021	<b>Scholarship holder</b> , German Academic Scholarship Foundation (Studienstiftung d. dt. Volkes)
2018	<b>Didactic certificate for tutors</b> , Heidelberg University
2016 – 2021	<b>Elected representative</b> , Examination board M.Sc. & Diploma Psychology (break 10/2016 – 09/2017)
2016 – 2021	<b>Elected representative</b> , Institute Council (Fachrat) Psychology
2016 – 2020	<b>Member</b> , Student Council (Fachschaft) Psychology
2014	<b>Award for remarkable social commitment</b> , Auguste-Viktoria-Gymnasium Trier

# SELECTED INVOLVEMENT

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<b>Consultant</b>	Academic consultant in industry for Axem Neurotechnology (since 2022)
<b>Reviewer</b>	Reviewer for international scientific conferences (since 2022): ICML, AISTATS

# SKILLS

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<b>Languages</b>	German (native), English (fluent), French (basic), Latin (basic), Norwegian (basic)
<b>Programming</b>	Python, R, occasionally: C++, JavaScript, HTML, CSS
<b>Data Science</b>	Python (Tensorflow/keras, PyTorch, sklearn, scipy, numpy, pandas), R (brms, lme4, afex, tidyverse), Stan
<b>Visualization</b>	Python (matplotlib, seaborn), R (ggplot2, plotly, rgl, shiny, gganimate)
<b>Documentation</b>	LaTeX (KOMA, tikZ), git, Imperia, Markdown, RMarkdown, Jupyter, sphinx, roxygen, Quarto

# EVENTS

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2022	<b>Invited talk</b> , Cyber Valley: Writing workshop, consulting on students' AI short stories
2022	<b>Contributed poster</b> , ELLIS Unit Stuttgart Kickoff: <i>Model misspecification in simulation-based inference</i>
2022	<b>Invited talk</b> , Cyber Valley: Office hours, <i>Where does AI begin?</i>
2022	<b>Invited talk</b> , Blue Yonder Group Inc.: <i>Validating synthetic training data in probabilistic machine learning</i>
2022	<b>Participant</b> , 1 <sup>st</sup> SimTech summer school: Knowledge-driven machine learning and its applications

# PUBLICATIONS

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- [1] S. T. Radev, **M. Schmitt**, V. Pratz, U. Picchini, U. Köthe, and P.-C. Bürkner. JANA: Jointly amortized neural approximation of complex Bayesian models. 2023. arXiv:2302.09125.
- [2] **M. Schmitt**, S. T. Radev, and P.-C. Bürkner. Meta-uncertainty in Bayesian model comparison. 2023. Artificial Intelligence and Statistics (AISTATS) conference proceedings.
- [3] **M. Schmitt**, P.-C. Bürkner, U. Köthe, and S. T. Radev. Detecting model misspecification in amortized Bayesian inference with neural networks. 2021. arXiv:2112.08866.