

The Hertz Chair for Artificial Intelligence and Neuroscience <bachlab.org> at University of Bonn <www.uni-bonn.de/en> is looking to recruit postdoctoral fellows for an interdisciplinary neuroscience research program coordinated and supervised by Professor Dominik Bach. This program brings together researchers with expertise in cognitive(-computational) science, movement science, machine-learning, and software development. This provides an exciting opportunity for postdoctoral candidates to work at the cutting edge of human cognitive science and neuroscience research. Collaboration partners in this endeavour are based at Max-Planck-Institute for Biological Cybernetics in Tübingen (Germany), University of Tübingen (Germany), Max-Planck UCL Centre for Computational Psychiatry (UK) and Wellcome Centre for Human Neuroimaging (UK).

The aim of the research is to understand the *cognitive neurobiology of human threat avoidance*, in terms of acute escape behaviour as well as medium- and long-term threat forecasting. Our research strongly builds on computational modelling of behaviour and neural systems, theories of artificial agents, machine-learning methods such as pose estimation and motion sequencing, and research automation by software design and by self-learning data analysis methods. Our team culture is collaborative, agile, and shaped by technical sophistication. We believe in open, reproducible, and sustainable precision science. We host a state-of-the-art virtual reality and motion capture lab, and have access to human neuroimaging facilities (3 T and 7 T MRI, OPM-MEG).

The successful candidates will be based at the *University of Bonn, Campus Endenich*, in direct vicinity to natural and computer science departments and other interdisciplinary Hertz Chairs. The University of Bonn is an internationally leading research university, providing an intellectually stimulating environment. At University of Bonn, postdoctoral salaries start at around 55'000 €/year depending on prior post-doctoral experience. The positions are available on or after 1 April 2022. An initial appointment for a two-year period will be made with potential for extension depending on successful performance of research and publications. University of Bonn is committed to diversity and encourages applications from underrepresented groups.

Qualified postdoctoral applicants should submit a current CV including publication list, a personal statement describing their experience and interests, and contact information for three references to d.bach@uni-bonn.de.

Post doc positions are initially based in the following fields. We welcome enquiries from candidates in related fields of cognitive-computational neuroscience.

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**Post doc Motion Capture*

The goal is to understand human motor behaviour under acute, immediate threat. We investigate this in an immersive virtual reality (VR) environment, in which people can move to avoid various threats. The candidate will conduct full-body markerless and marker-based motion capture, pose estimation, recover kinematics, and structure the recorded movement trajectories with statistical and machine-learning models.

Applicants should have (or be close to obtaining) a PhD in machine-learning, robotics, computer science, motor science, biomechanics, computational neuroscience, or a related area, by the agreed start date of the position. Experience with motion capture, pose estimation, inverse kinematics (in humans or robots), movement trajectory analysis and structuring/sequencing are essential. Strong background in contemporary machine-learning and applied statistics is essential, as are solid mathematical skills and good general IT and software development knowledge. Familiarity with virtual reality and/or human/animal defensive behaviour would be desirable.

Post doc VR

The goal is to develop a cognitive-computational understanding of human decision-making under acute, immediate threat. We investigate this in an immersive virtual reality (VR) environment, in which people can move to avoid various threats. The candidate's role will be to maintain and advance an existing Unity-based research platform, build specific suitable scenarios, conduct experimental studies with this setup, and analyse the data.

Applicants should have (or be close to obtaining) a PhD in cognitive-computational (neuro)science, applied machine-learning, biomechanics, motor science, a quantitative field of psychology (e.g. decision-making, perception), or a related area by the agreed start date of the position. Experience with Unity and C# are essential, familiarity with R would be desirable. The successful candidate will have experience in programming is essential, solid knowledge of decision science, applied statistics and a good publication record.

Post doc learning theory

The goal is to understand the computational algorithms by which humans learn to predict and avoid threat. Experimentally, we investigate this using human fear conditioning and VR-based avoidance learning. The candidate will build and test computational learning models using existing experimental data, and design new experiments to disambiguate candidate models. They will maintain and advance software frameworks for model benchmarking and Bayesian experimental design optimisation, and model-based data analysis.

Applicants should have (or be close to obtaining) a PhD in cognitive-computational (neuro)science, computer science, machine learning, mathematics, a quantitative field of psychology (e.g. decision-making, perception), or a related area by the agreed start date of the position. Experience with learning theory in biological or artificial agents is essential; familiarity with analysis of biological/psychological data would be desirable. The successful candidate will have solid knowledge of mathematical statistics and experience with modern software development techniques.

Post doc software development

Our goal is to develop open, reproducible and sustainable, precision methods in the field of human cognitive neuroscience. To this end, we develop and maintain several software frameworks for computational model benchmarking, model-based data analysis, Bayesian experimental design optimisation, and collaborative data bases. The candidate will build on contemporary methods theory and metrology to advance and integrate these tools into an autonomous, continuously integrating, and self-learning software ecosystem.

Applicants should have (or be close to obtaining) a PhD in computer science, cognitive-computational (neuro)science, software engineering, machine learning, mathematics, a quantitative field of psychology (e.g. decision-making, perception), or a related area by the agreed start date of the position. Experience with modern software development techniques is essential. A good understanding of cognitive-computational modelling and data sharing practices would be desirable. The successful candidate will have solid knowledge of applied statistics and machine learning, and experience with managing biological/psychological data.