Internships, B.Sc./M.Sc. theses, and research assistantships

The Rationality Enhancement Group has several openings for (paid) internships, bachelor/master theses (in cognitive science, computer science, psychology, and other related disciplines) and research assistants. If you are interested please take a look at the projects described below. To apply for one of these projects please send your CV, transcripts, previous publications or thesis (if any), and a cover letter explaining your motivation and why you think you are a great fit for the project to re-jobs@tuebingen.mpg.de. Please put the title of the project you are applying for in the subject header. Furthermore, please arrange for 2 letters of recommendation to be emailed to the same address.

1. **Optimal Goal Setting.** Goals are essential to human effectiveness. But which goals should we set, and how should we go about setting them? The goal of this project is to develop a formal theory of optimal goal setting and computational methods for deriving optimal subgoals. We will perform computational explorations of the effectiveness of different types of goals and different types of goal setting strategies. We will evaluate the resulting hypotheses in behavioral experiments on human problem-solving. Applicants should have strong programming skills and have basic knowledge of artificial intelligence (planning as search, and Markov decision processes). The ideal applicant would also be familiar with cognitive psychology, programming, running, and analyzing behavioral experiments, and reinforcement learning.

2. **Development and validation of psychometric measures of cognitive growth:** The goal of this project is to develop valid and reliable self-report measures of cognitive growth that can be used to evaluate interventions for helping people learn how to make better decisions in the real world. Applicants should have solid knowledge in questionnaire development and psychometrics, an interest in cognitive growth. Experience with publishing psychometric research and familiarity with research on decision-making, rationality, and cognitive biases would be a plus.

3. **Promoting metacognitive learning with reflection prompts:** We make thousands of decisions every day but we don't always learn from our mistakes. This project investigates whether reflection prompts can help people to learn more effectively from their daily successes and failures and which types of reflection prompts are most effective. To answer these questions we will conduct controlled online experiments in which participants make a series of decisions and may be prompted to reflect on them and field experiments with reflection apps. Applicants should be familiar with experimental psychology and statistical data analysis and have solid programming skills. Previous experience with HTML and JavaScript would be very

helpful. Familiarity with research on decision-making and learning and running online experiments using PsiTurk and previous publications in related areas are desirable but not required.

4. **Reverse-engineering the mechanisms of metacognitive learning:** How do we learn how to decide? In this project we combine process-tracing experiments and computational modeling to identify the learning mechanisms that shape how we make our decisions. Applicants should have strong programming skills and be familiar with experimental psychology, statistical data analysis, and machine learning or computational models of decision-making and learning. Previous experience with HTML and JavaScript would be very helpful. Familiarity with research on decision-making and learning and running online experiments and previous publications in related areas are desirable but not required.

5. **Discovering decision strategies using meta-level reinforcement learning:** In this project, we apply a recently developed meta-level reinforcement learning algorithm to discover optimal decision strategies for people. Applicants should have strong programming skills (preferably in Python) and experience with reinforcement learning or research on human decision-making.

6. **Inducing decision-strategies from examples:** In this project, we induce simple heuristics from demonstrations of optimal decision-making. Applicants should have a solid background in Bayesian machine learning, program induction, or inductive programming. Additional familiarity with decision heuristics would be a plus.

7. **To-Do List gamification:** In this project, we develop an app that optimally incentivizes the items on the user's to-do list. You can apply for this project if you are a) strong in web-development or b) interested in MDP-based methods for decision-support and familiar with exact and approximate methods for solving MDPs.

8. **Helping people learn from delayed outcomes:** In this project we investigate biases in how people learn from delayed versus immediate rewards and how these biases can be mitigated by using technology to help people remember and re-evaluate the decisions that led to a given outcome. Applicants should have strong programming skills and be familiar with experimental psychology and statistical data analysis. Previous experience with HTML and JavaScript would be very helpful. Familiarity with research on decision-making, reinforcement learning, and running online experiments would be a plus.