

Akshay K. Jagadish

Ph.D. Student in Computer Science

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Education

Ph.D. in Computer Science

University of Tübingen · Max Planck Institute for Biological Cybernetics · Helmholtz Munich
Thesis: Meta-learned Models of Cognition

Tübingen, Germany

2021 - ongoing

M.Sc. in Computational Neuroscience

University of Tübingen · Max Planck Institute for Biological Cybernetics
Thesis: Compositional Reinforcement Learning in Minds and Machines

Tübingen, Germany

2018 - 2020

B.Tech. in Electrical and Electronics Engineering

National Institute of Technology Karnataka · Ecole Polytechnique Federale de Lausanne
Thesis: Structural and Functional Correlates of Personality

Surathkal, India

2013 - 2017

Research Experience

Ph.D. Thesis

University of Tübingen · Max Planck Institute for Biological Cybernetics · Helmholtz Munich
Computational Principles of Intelligence Lab · Advisors: Dr. Marcel Binz and Prof. Eric Schulz

Tübingen, Germany

Apr. 2021 - ongoing

Natural Minds

- Proposed a new framework for building computational cognitive models termed as “Meta-learned models of cognition” [PDF].
- Demonstrated that resource rational meta-learned inference explains zero-shot compositional reasoning in humans [PDF].
- Illustrated that ecologically rational meta-learned inference explains human category learning [PDF].
- Showed that humans and large-language models display symmetric belief updating [PDF].
- Contributed towards building the first foundation model of human cognition [PDF].
- Automating cognitive modeling with large language models [PDF].
- Developed bounded ecologically rational meta-learned inference to explore the role of bounded resources and ecological priors in human learning [In Preparation].

Artificial Minds

- Illustrated that Inducing anxiety in large language models increases exploration and bias [PDF].
- Demonstrated that narrative of traumatic experiences increases state anxiety in large language models, but using mindfulness-based techniques can help alleviate the same [PDF].
- Used sparse autoencoders to reveal temporal difference learning in large language models [PDF].

Masters Thesis

Max Planck Institute for Biological Cybernetics
Computational Principles of Intelligence Lab · Advisors: Dr. Marcel Binz and Prof. Eric Schulz

Tübingen, Germany

Jun. 2020 - Dec. 2020

- Built meta-reinforcement learning agents that can discover and compose latent structures underlying rewards of structured bandit tasks, and further, generalize to novel structures unseen during training.

Graduate Research Assistant

University of Tübingen
Sinz Lab · Advisors: Prof. Fabian Sinz and Prof. Edgar Walker

Tübingen, Germany

Nov. 2018 - Mar. 2021

- Built a factor analysis model on top of a convolutional neural network, which predicts stimulus-based neural activity, to recover non-stimulus-related latent brain states [PDF].
- Developed a novel parameter-efficient readout, called a Gaussian readout, that maps nonlinear features learned by the deep convolutional network to the response of each neuron [PDF].

Graduate Research Assistant

Max Planck Institute for Biological Cybernetics
Computational Neuroscience Lab · Advisor: Prof. Peter Dayan

Tübingen, Germany

Nov. 2019 - Feb. 2020

- Conducted a literature review on the role of Dopamine in reward-based learning [PDF].
- Analyzed behavior (choices and reaction times) of monkeys, whose dopamine receptors were pharmacologically stimulated, during a rule-based categorization task [PDF].

AI Researcher

Wadhwani Institute for Artificial Intelligence
AI for Social Impact · Advisor: Dr. Rahul Panicker

- Developed a model based on deep-learning that predicts weight of an object from its images [NDA].

Mumbai, India

May 2018 - Sep. 2018

Postbaccalaureate Research Assistant

University of Minnesota, Twin-cities
Computational Visual Neuroscience Lab · Advisor: Prof. Kendrick Kay

- Developed a generative model that factors in the bottom-up, stimulus-driven, and top-down, goal-driven attentional state to characterize cortical fMRI responses for various stimuli and attentional loci combinations.

Minnesota, USA

Jul. 2017 - Feb. 2018

Undergraduate Thesis

Ecole Polytechnique Federale de Lausanne
Medical Image Processing Lab · Advisors: Prof. D. van de Ville and Prof. P. Giannakopoulos

- Investigated the relationship between structural and functional connectivity measures derived from MRI, and Neuroticism Extroversion Openness Personality Inventory-Revised (NEOPI) personality traits [PDF].

Lausanne, Switzerland

Aug. 2016 - May 2017

Undergraduate Research Assistant

Indian Institute of Science
Computational Tomography Lab · Advisor: Prof. Kasi Rajgopal

- Developed an algorithm, called k-ABC, based on the artificial bee colony algorithm to come up with an optimal variable density sampling scheme for the compressed sensing-based reconstruction of Magnetic Resonance (MR) images [PDF].

Bangalore, India

May 2015 - May 2017

Selected Publications

* equal contribution, # alphabetical ordering

Jagadish, A. K., Binz, M., Schulz, E. (2025). Ecological priors drive human in-context learning. *In Preparation*.

Rmus, M., **Jagadish, A. K.**, Mathony, M., Schulz, E. (2025). Towards Automation of Cognitive Modeling using Large Language Models. *Under review* [PDF]

Binz, M., ..., **Jagadish, A. K.** #, ..., Schulz, E. (2024). Building a foundation model of human cognition. *Under Review* [PDF]

Demircan, C. *, Saanum, T. *, **Jagadish, A. K.**, Binz, M., Schulz, E. (2025). Sparse Autoencoders Reveal Temporal Difference Learning in Large Language Models. *In the 13th International Conference on Learning Representations (ICLR)* [PDF]

Jagadish, A. K., Thalmann, M., Coda-Forno, J., Schulz, E., Binz, M. (2024). Human-like Category Learning by Injecting Ecological Priors from Large Language Models into Neural Networks. *Proceedings of the 41st International Conference on Machine Learning (ICML)* [PDF]

Schubert, J., **Jagadish, A. K.**, Binz, M., Schulz, E. (2024). In-context learning agents are asymmetric belief updaters. *Proceedings of the 41st International Conference on Machine Learning (ICML)* [PDF]

Jagadish, A. K., Binz, M., Saanum, T., Wang, J. X., Schulz, E. (2024). Zero-shot compositional reasoning in a reinforcement learning setting. *Under review* [PDF]

Ben-Zion, Z., Witte, K. *, **Jagadish, A. K.** *, Duek, O., Harpaz-Rotem, I., Khorsandian, M., ... Spiller, T. R. (2024). "Chat-GPT on the Couch": Assessing and Alleviating State Anxiety in Large Language Models. *npj Digital Medicine* [PDF]

Coda-Forno, J. *, Witte, K. *, **Jagadish, A. K.** *, Binz, M., Akata, Z., Schulz, E. (2023). Inducing anxiety in large language models increases exploration and bias. *Under review* [PDF];

Binz, M., Dasgupta, I., **Jagadish, A. K.**, Botvinick, M., Wang, J.X., Schulz, E. (2023). Meta-learned models of cognition. *Behavioral and Brain Sciences*, 1-38. [PDF]

Bashiri, M. *, Walker, E. *, Lurz, K. K., **Jagadish, A. K.**, Muhammad, T., Ding, Z., ... Sinz, F. (2021). A flow-based latent state generative model of neural population responses to natural images. *In Advances in Neural Information Processing Systems (NeurIPS)*, 34, 15801-15815. [PDF]

Lurz, K. K., Bashiri, M., Willeke, K. F., **Jagadish, A. K.**, Wang, E., Walker, E. Y., ... Sinz, F. (2021). Generalization in data-driven models of primary visual cortex. *In International Conference on Learning Representations (ICLR)* [PDF]

Rodriguez, C. *, **Jagadish, A. K.** *, Meskaldji, D. E., Haller, S., Herrmann, F., Van De Ville, D., Giannakopoulos, P. (2019). Structural correlates of personality dimensions in healthy aging and MCI. *Frontiers in psychology*, 9, 2652. [PDF]

Honors, Awards, & Fellowships

2024	Top Reviewer , Top 10 % reviewer (main track) for Neural Information Processing Systems (NeurIPS)	Canada
2024	ELLIS Winter School on Foundation Models , Top 40 students selected from 607 to present their research	Netherlands
2023	Analytical Connectionism , Top 35 students selected to attend the summer course at the Gatsby Computational Neuroscience Unit in University College London	UK
2020	SMARTSTART Fellowship in Computational Neuroscience , Top 15 students awarded a travel budget of 1000 euros and mentorship from Prof. Peter Dayan and Prof. Fabian Sinz	Germany
2019	Dean's List , Top 3 performers in the summer semester for M.Sc. program in Computational Neuroscience	Germany
2018	Dean's List , Top 3 performers in the winter semester for M.Sc. program in Computational Neuroscience	Germany
2018	Max Planck Society Scholarship , Top 5 students selected to undertake M.Sc in Computational Neuroscience at the University of Tübingen	Germany
2017	Harvard Young Scientist Development Program , Top 25 students selected for training in neuroscience	USA India
2016	Summer Research Program , Top 20 students funded to conduct research at EPFL	Switzerland
2016	Summer Research Fellowship Program , Top 10 % students funded to conduct research at the Indian Institute of Science	India
2013	Ranked Top 0.1% , Karnataka Common Entrance Test among 150,000 students	India
2013	Ranked Top 0.1% , COMED-K among 200,000 students	India
2011	Most Consistent Performer of the Batch , High school at Presidency School	India

Press

2025	Fortune Magazine , Interview to discuss our article “Chat-GPT on the Couch”: Assessing and Alleviating State Anxiety in Large Language Models [URL]	AoE
2025	ScienceDaily , Accessible take on our article “Chat-GPT on the Couch”: Assessing and Alleviating State Anxiety in Large Language Models [URL]	AoE

Invited talks

2024	Annual Meeting of the Cognitive Science Society (CogSci) , Workshop on “In-context learning in natural and artificial intelligence”	Netherlands
2024	Annual Meeting of the Cognitive Science Society (CogSci) , Workshop on “Compositionality in minds, brains and machines: A unifying goal that cuts across cognitive sciences”	Netherlands
2024	Indian Institute of Science , Seminar talk at the Center for Neuroscience	India
2024	Princeton University , Lab meeting at Computational Cognitive Science Lab	USA
2023	Helmholtz Center in Munich , Joint lab retreat with Explainable Machine Learning Lab	Germany
2023	University of Oxford , Lab meeting at the Human Information Processing Lab	United Kingdom
2022	Max Planck Institute for Human Cognitive and Brain Sciences , Joint lab retreat with Doeller Lab	Germany
2021	Stanford University , Joint lab retreat with Human Information Processing and Causality in Cognition Lab	USA
2019	University of Tübingen , Workshop on “Causality in Neuroscience” at Neuroscience Conference for Young Scientists	Germany

Organization

2024	Co-organizer , “Connecting Minds and Machines a Foundation Model Approach to Learning” symposium at Helmholtz Pioneer Campus, Munich	Germany
2024	Co-organizer , “In-context learning in natural and artificial intelligence” workshop at CogSci-2024	Netherlands
2023	Co-organizer , Laboratory Retreat of Computational Principles of Intelligence Lab	Germany
2022	Co-organizer , Computation and Cognitive Tübingen Summer School (CaCTüS) aimed specifically at young scientists held back by personal, financial, regional or societal constraints.	Germany
2019	Co-organizer , “Causality in Neuroscience” Workshop at Neuroscience Conference for Young Scientists	Germany
2020	Volunteer , Machine Learning Summer School (MLSS) held at MPI for Intelligent Systems, Tübingen	Germany

Supervision

- 2024 **Co-supervisor (Research Assistant)**, Elif Kara on “Human decision-making in the wild” at the University of Munich Germany
- 2023 **Co-supervisor (Master Thesis)**, Johannes Schubert on “Rational Analysis of Optimism Bias” at the University of Tübingen. Converted to a publication at the *International Conference on Machine Learning (ICML)* [PDF] Germany

Teaching

- 2023 **Teaching Assistant**, “Computational Cognitive Science” course at the Graduate Training Center for Neuroscience, University of Tübingen Germany
- 2022 **Tutor**, Tutorial on “Meta-Reinforcement Learning” at the Max Planck Institute for Biological Cybernetics Germany

Service

- 2024- **Reviewer**, Neural Information Processing Systems (NeurIPS) AoE
- 2023- **Reviewer**, International Conference on Learning Representations (ICLR) AoE
- 2022- **Reviewer**, Annual Meeting of the Cognitive Science Society (CogSci) AoE
- 2023- **Reviewer**, Cognitive Computational Neuroscience (CCN) AoE