

Bonan Zhao

Postdoctoral Researcher, Princeton University

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Academic Appointment

2023-now **Postdoctoral Research Associate**, Princeton University, NJ, USA
Advisors: Tom Griffiths (Computer Science & Psychology), Natalia Vélez (Psychology)

Education

2019-2023 **PhD Psychology**, University of Edinburgh, Edinburgh, Scotland
Advisors: Neil Bramley (Psychology), Chris Lucas (Informatics)

2015-2017 **MSc Logic**, University of Amsterdam, Amsterdam, The Netherlands

2011-2015 **BA Philosophy**, Tsinghua University, Beijing, China

Industrial Experience

2017-2019 **Data Scientist**, Screen 6 (acquired by Samba TV), Amsterdam, The Netherlands

Awards

2022 Chinese Students Award, Great Britain–China Educational Trust
£3,000 for PhD write-up period

2022 Good Research Practice Awards (Open Research Award), Edinburgh Research Office

2020-2022 Research Support Grants, Department of Psychology, University of Edinburgh
Total £2,125 applied and approved for running online experiments

2019-2022 Postgraduate Research Award, College of Arts, Humanities & Social Science, University of Edinburgh
£14,533 annual stipend & tuition fees at overseas rate for three years

2016 Springer Best Paper Award, European Summer School in Logic, Language and Information

2015-2017 Amsterdam Excellence Scholarship, University of Amsterdam
€12,000 annual stipend & tuition fees at overseas rate for two years

2014 Dean's Award, School of Humanities, Tsinghua University
Top 2 students in the school, GPA & service

Publications

Asterisk * marks equal contribution.

PREPRINT & IN PREP

- 2024 **Zhao, B.**, Vélez, N., Griffiths, T. G. (2024). A rational model of innovation by recombination. To appear in *Proceedings of the 46th Annual Meeting of the Cognitive Science Society*.
- 2024 Sucholutsky, I., **Zhao, B.**, Griffiths, T. G. (2024). Using compositionality to learn many categories from few examples. To appear in *Proceedings of the 46th Annual Meeting of the Cognitive Science Society*.
- 2024 Fascendini, B., **Zhao, B.**, Vélez, N. (2024). Are toddlers intrinsically motivated to explore their own competence? *In prep*.
- 2024 Huang, H., **Zhao, B.**, Griffiths, T. G., Vélez, N. (2024). Teaching and learning generalizable

abstractions. *In prep.*

PEER-REVIEWED JOURNAL ARTICLES

- 2023 Bramley, N. R., **Zhao, B.**, Quillien, T., Lucas, C. G. (2023). Local search and the evolution of world models. *Topics in Cognitive Science*, 1-32.
- 2023 **Zhao, B.**, Lucas, C. G., Bramley, N. R. (2023). A model of conceptual bootstrapping in human cognition. *Nature Human Behaviour*, 1-12.
- 2022 **Zhao, B.**, Lucas, C. G., Bramley, N. R. (2022). How do people generalize causal relations over objects? A non-parametric Bayesian account. *Computational Brain & Behavior*, 5(1), 22-44.
- 2018 Capraro, V., Sippel, J., **Zhao, B.**, Hornischer, L., Savary, M., Terzopoulou, Z., Faucher, P., Griffioen, S. F. (2018). People making deontological judgments in the Trapdoor dilemma are perceived to be more prosocial in economic games than they actually are. *PLoS One*, 13(10), e0205066.

PEER-REVIEWED CONFERENCE PROCEEDINGS

- 2023 Gong, T., **Zhao, B.**, McIntosh, R. D., Lucas, C. G. (2023). A rational model of spatial neglect. In *Proceedings of the 45th Annual Meeting of the Cognitive Science Society*.
- 2023 Gong, T., **Zhao, B.**, McIntosh, R. D., Lucas, C. G. (2023). Understanding spatial neglect: A Bayesian perspective. In *Proceedings of the Computational Cognitive Neuroscience Society Meeting*.
- 2023 **Zhao, B.**, Lucas, C. G., Bramley, N. R. (2023). Bootstrapping compositional generalization with cache-and-reuse. (2023). In *Proceedings of the Computational Cognitive Neuroscience Society Meeting*.
- 2022 **Zhao, B.**, Bramley, N. R., Lucas, C. (2022). Powering up causal generalization: A model of human conceptual bootstrapping with adaptor grammars. In *Proceedings of the 44th Annual Meeting of the Cognitive Science Society*.
- 2022 Xia, Z*, **Zhao, B.***, Quillien, T., Lucas, C. (2022). Dissecting causal asymmetries in inductive generalization. In *Proceedings of the 44th Annual Meeting of the Cognitive Science Society*.
- 2022 Marchant, N., **Zhao, B.**, Bramley, N. R., Morales, D., Chaigneau, S. E. (2022). Categorizing perceived causal events. In *Proceedings of the Annual Meeting of the 44th Cognitive Science Society*.
- 2021 **Zhao, B.**, Lucas, C. G., Bramley, N. R. (2021). Building object-based causal programs for human-like generalization. In *Causal Inference & Machine Learning Workshop, NeurIPS*.
- 2021 Valentin, S., **Zhao, B.**, Jiang, C., Bramley, N. R., Lucas, C. (2021). Symbolic and sub-symbolic systems in people and machines. In *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society*.
- 2020 **Zhao, B.**, Bramley, N. (2020). Order Effects in One-shot Causal Generalization. In *Proceedings of the 42nd Annual Meeting of the Cognitive Science Society*.
- 2018 **Zhao, B.***, van de Pol, I.*, Raijmakers, M. E., Szymanik, J. (2018). Predicting cognitive difficulty of the deductive mastermind game with dynamic epistemic logic models. In *Proceedings of the 40th Annual Meeting of the Cognitive Science Society*.

BOOK

- 2022 van Emde Boas, P., van Emde Boas, G., Xie, K., **Zhao, B.** (2022). *Analyzing the Logic of Sun Tzu in "The Art of War", Using Mind Maps*. Springer.

Conference and Workshop Presentations

- Mar 2024 Constructing deep concepts through shallow search
Talk at AAAI Spring Symposium on Human-Like Learning, Stanford University, CA, USA
- Mar 2024 Comparing human behavior to an optimal policy for innovation

- Poster at AAAI Spring Symposium on Human-Like Learning, Stanford University, CA, USA*
- Aug 2023* Bootstrapping compositional generalization with cache-and-reuse
Poster at Computational Cognitive Neuroscience Society Meeting (CCN), Oxford, UK
- Jul 2022* Bootstrap learning complex causal concepts with adaptor grammars
Talk at Edinburgh Computational CogSci Workshop, University of Edinburgh
- Jun 2022* Bootstrap learning of complex causal concepts
Talk at Reasoning Workshop, Edinburgh Laboratory for Integrated Intelligence
- Dec 2021* Building object-based causal programs for human-like generalization
Poster at Causal Inference & Machine Learning: Why now?, NeurIPS, remote
- Jul 2021* Causal programs in generalizations
Talk at Symbolic and sub-symbolic systems in people and machines, CogSci, remote
- Jun 2021* How do people generalize causal relations over objects? A Bayesian non-parametric account
Talk at International Conference of Thinking (ICT), remote
- Aug 2020* Order effects in one-shot causal generalization
Poster at Annual Meeting of the Cognitive Science Society (CogSci), remote
- Aug 2020* Predicting cognitive difficulty of the deductive mastermind game with dynamic epistemic logic models
Poster at Annual Meeting of the Cognitive Science Society (CogSci), Madison, WI, USA
- Jul 2016* Revising social networks with stubborn agents
Talk at North American Summer School on Logic, Language, and Information (NASSLLI), Rutgers, NJ, USA
- Jul 2016* Logic of closeness revision
Poster at Logic and the Foundations of Game and Decision Theory (LOFT), Maastricht, The Netherlands
- Nov 2015* Why my sugar is your poison? Type-based rationality in backward induction
Talk at LABEX CIMI Pluridisciplinary Workshop on Game Theory, Toulouse, France

Invited Talks

- Apr 2024* **PDP Seminar Series**, Princeton University, USA
- Feb 2024* **Cognitive Science Colloquium**, University of California, Irvine, USA
- Nov 2023* **OpenTalks**, Chinese Open Science Network (COSN), remote
- Oct 2023* **NYUConcats**, New York University, USA
- Oct 2022* **Max Planck Institute for Biological Cybernetics**, Tübingen, Germany
- Oct 2022* **Human Cognitive Neuroscience seminar**, University of Edinburgh, UK
- Sep 2022* **Computational Cognitive Science Lab**, Princeton University, remote
- Sep 2022* **Computation & Cognition Lab**, Stanford University, remote
- May 2022* **Computational Cognitive Science Lab**, University of Melbourne, remote
- Mar 2022* **Logic and Interactive Rationality**, University of Amsterdam, remote
- Mar 2022* **London Judgment and Decision Making Seminar**, UCL, London, UK
- Feb 2022* **Causality in Cognition Lab**, Stanford University, remote
- Jul 2021* **Computational Principles of Intelligence Lab**, MPI Tübingen, remote
- Oct 2017* **DTU Compute**, Technical University of Denmark, Copenhagen, Denmark
- May 2017* **Donders Institute for Brain, Cognition and Behaviour**, Nijmegen, The Netherlands

Apr 2016 **Cool Logic**, Institute for Logic, Language and Computation, Amsterdam, The Netherlands

Teaching

- 2022-2023 **Centre for Data, Culture & Society**, University of Edinburgh, UK
 Data Carpentry (instructor)
 Introduction to Descriptive Statistics (instructor)
 Version Control with git and GitHub (instructor + course design)
 Data Visualization with R (co-instructor)
 Open Research Practices (co-instructor)
- 2020-2023 **School of Philosophy, Psychology and Language Sciences**, University of Edinburgh, UK
 Causal Cognition (tutorial, TA)
 Logic 1 (tutorial, TA)
 Introduction to Cognitive Science (Python lab, TA)
 Univariate Statistics and Methodology using R (R lab, TA)
 Data Analysis for Psychology in R (R lab, TA)
- 2018-2019 **HackYourFuture** (free coding school for refugees), Amsterdam, The Netherlands
 Git and command line interface (lead lecturer)
 SQL and Database (co-lead lecturer)
 JavaScript (TA)

Service

AD-HOC REVIEWER

- Conferences* Annual Meeting of the Cognitive Science Society (CogSci) 2020–2024
 Conference on Cognitive Computational Neuroscience (CCN) 2023

- Journals* Artificial Intelligence
 Journal of Cognition
 Journal of Experimental Psychology: Applied
 Journal of Experimental Psychology: Learning, Memory, and Cognition
 Open Mind (2)
 Scientific Reports

ORGANIZER

- 2019-2022 EdinCoCoSci lab meetings, University of Edinburgh
 2016-2017 Logic Tea seminar series, University of Amsterdam

OUTREACH

- 2023 Outreach volunteer, Chinese Open Science Network (COSN)
 2021-2022 Open Research Facilitator, University of Edinburgh
 Organized 12 workshops and tutorials about open research practices
 Built and maintained school-wise open research information hub

Mentoring

- 2023 Ham Huang, PhD Psychology, Princeton University
 2023 Lucas Linzmeier, BS Computer Science, Princeton University
 2021 Zeyu Xia, MSc Informatics, University of Edinburgh

References

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