

Siyuan Guo

Curriculum Vitae

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Education

- 2021–2025 **Ph.D. in Machine Learning**, *Max Planck Institute for Intelligent Systems & University of Cambridge & ELLIS*, Germany and United Kingdom
Thesis: Causal Machine Learning
Supervisors: Bernhard Schölkopf and Ferenc Huszár
Exchange at University of Cambridge: 2021.10.01 - 2022.10.01
- 2020–2021 **Msc in Machine Learning**, *University College London*, United Kingdom, Distinction
Supervisor: Ricardo Silva
Project: Causality and Fairness
- 2015–2019 **BA(Hons) and MMath in Mathematics**, *University of Cambridge*, United Kingdom, Distinction
Supervisor: Richard Samworth
Project: Variable Selection in High-dimensional statistics

Experience

- 2024 **Research Scientist Intern**, *Meta Fundamental AI Research*, New York
- 2019–2020 **Quantitative Strategist**, *Goldman Sachs International*, London

Mentoring

I take great pleasure in (co-)mentoring a few talented and highly motivated students. It has been a great privilege for me to constantly learn and get inspired by them. Here is a list of students in time-wise order:

- 2024–now **Anna Kerekes**, *Ph.D. student at ETH*
- 2024–now **Szilvia Ujváry**, *Ph.D. student at Cambridge and UCL*
- 2024–now **Bálint Mucsányi**, *Msc student at University of Tübingen*
- 2023 **Davin Xianjun Choo**, *Intern at Max Planck Institute for Intelligent Systems and Ph.D. student at National University of Singapore (NUS)*

Publications

- [1] ☎ **Siyuan Guo**, Chi Zhang, Karthika Mohan, Ferenc Huszár*, and Bernhard Schölkopf*. Do finetti: On causal effects for exchangeable data. In *Advances in Neural Information Processing Systems 37 (NeurIPS 2024)*, December 2024. *joint senior authors. **NeurIPS 2024 oral** with acceptance rate **0.46%**.
- [2] ☎ **Siyuan Guo***, Viktor Tóth*, Bernhard Schölkopf, and Ferenc Huszár. Causal de

- finetti: On the identification of invariant causal structure in exchangeable data. In *Advances in Neural Information Processing Systems 36 (NeurIPS 2023)*, volume 36, pages 36463–36475. Curran Associates, Inc., December 2023. *equal contribution.
- [3] ⊗ **Siyuan Guo**, Jonas Wildberger, and Bernhard Schölkopf. Out-of-variable generalization for discriminative models. In *The Twelfth International Conference on Learning Representations (ICLR)*, May 2024.
- [4] ⊗ Patrik Reizinger*, **Siyuan Guo***, Ferenc Huszár, Bernhard Schölkopf†, and Wieland Brendel†. Identifiable exchangeable mechanisms for causal structure and representation learning. *arXiv preprint arXiv:2406.14302*, 2024. *equal contribution. † equal supervision. Under review for ICLR 2025.
- [5] ⊗ **Siyuan Guo**, Aniket Didolkar, Nan Rosemary Ke, Anirudh Goyal, Ferenc Huszár†, and Bernhard Schölkopf†. Learning beyond pattern matching? assaying mathematical understanding in llms. *arXiv preprint arXiv:2405.15485*, 2024. † joint senior authors.
- [6] Aniket Didolkar, Anirudh Goyal, Nan Rosemary Ke, **Siyuan Guo**, Michael Valko, Timothy Lillicrap, Danilo Rezende, Yoshua Bengio, Michael Mozer, and Sanjeev Arora. Metacognitive capabilities of llms: An exploration in mathematical problem solving. In *Advances in Neural Information Processing Systems 37 (NeurIPS 2024)*, December 2024.
- [7] Ishan Kumar, Zhijing Jin, Ehsan Mokhtarian, **Siyuan Guo**, Yuen Chen, Mrinmaya Sachan, and Bernhard Schölkopf. CausalCite: A causal formulation of paper citations. In *Findings of the Association for Computational Linguistics (ACL)*. Association for Computational Linguistics, August 2024.
- [8] Jonas Wildberger, **Siyuan Guo**, Arnab Bhattacharyya, and Bernhard Schölkopf. On the interventional kullback-leibler divergence. In *Proceedings of the Second Conference on Causal Learning and Reasoning (CLear)*, volume 213 of *Proceedings of Machine Learning Research*, pages 328–349. PMLR, April 2023.
- [9] Andrei Paleyes*, **Siyuan Guo***, Bernhard Schölkopf, and Neil Lawrence. Dataflow graphs as complete causal graphs. In *2nd International Conference on AI Engineering - Software Engineering for AI (CAIN)*, pages 7–12. IEEE, April 2023. *joint first authors.
- [10] Limor Gultchin, **Siyuan Guo**, Alan Malek, Silvia Chiappa, and Ricardo Silva. Pragmatic fairness: Developing policies with outcome disparity control. In Francesco Locatello and Vanessa Didelez, editors, *Proceedings of the Third Conference on Causal Learning and Reasoning*, volume 236 of *Proceedings of Machine Learning Research*, pages 243–264. PMLR, 01–03 Apr 2024.
- [11] **Siyuan Guo**, Soo Ling Lim, and Peter J. Bentley. Teams frightened of failure fail more: Modelling reward sensitivity in teamwork. In *2020 IEEE Symposium Series on Computational Intelligence (SSCI)*, pages 109–116, 2020.

Invited Talks / Contributed Talks & Seminars

- July 2024 **Lecturer**, *Cambridge Ellis summer school on Probabilistic Machine Learning*, UK
Invited Talk on *Causal de Finetti & Do Finetti: Bridging causality and probabilistic models* for a distinguished course offered to graduate students, researchers and professionals. [Slides]
- May 2024 **Guest Lecturer**, *Causal Inference and AI Class*, Oregon State University
Invited Talk on *Causal de Finetti & Do Finetti: grounding causality in exchangeable data* for a course offered to graduate students.
- April 2023 **Contributed Speaker**, *Causal representation learning workshop at Max Planck Institute for Intelligent Systems*, Germany
Contributed Talk on *Moving beyond I.I.D.: Causal de Finetti and OOV Generalization*
- Jan 2023 **Invited Speaker**, *Causal Reading Group in Swarma*, China
Invited Talk on *Causal de Finetti* with more than 1000 attendees.
- Dec 2022 **Invited Speaker**, *1st Causal Methods in Environmental Science Workshop*, UK
Invited Talk on *Causal de Finetti: On the Identification of Invariant Causal Structure in Exchangeable Data*. [Link]
- Nov 2022 **Department Seminar**, *DeepMind ELLIS CSML Seminar Series*, UCL, UK
Invited Talk on *Causal de Finetti*. [Link]
- May 2022 **Department Seminar**, *Computational Statistics & Machine Learning Group (OxC-SML) in University of Oxford*, UK
Invited Talk on *Causal de Finetti*.

Professional Services

- Organizing: Causal Representation Learning workshop [Link]
Causal Digital Twins at Ellis unconference

Media, Awards and Fellowships

- Won 2024 MPI-IS Outstanding Female Doctoral Student Prize [News Article]
- Received Cambridge-Tübingen PhD Fellowship in Machine Learning [Link]
- Received Premium Research Studentship [Link]
- Awarded Dean's List at University College London
- Awarded Openshaw Prize, Exhibition & Foundation Scholarship at University of Cambridge for performances in mathematical Tripos [Link]