Sara Fish

Application for the NBER Digital Economics and AI Tutorial

Contact information

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Advisor: Yannai Gonczarowski
Dissertation Committee: Yannai Gonczarowski, Yiling Chen, David Parkes, Ariel Procaccia

Research interests and projects in process

I am a fifth-year PhD student in Applied Mathematics at Harvard University. My research interests broadly lie at the intersection of economics and AI. My PhD research so far has included work on **algorithmic collusion** of LLMs, **behavioral evaluations** of LLMs, and **economic applications** of LLMs. Another more recent research focus of mine has been **human-AI interaction**, including in-progress work on how the degree of an AI's personalization affects users' voting behavior in political elections.

A detailed list of my PhD research is attached on the next page, broken down by research field.

My last time attending a NBER Digital Economics and AI Meeting was in February 2025, when Ran Shorrer presented our joint work *Algorithmic Collusion by Large Language Models*. I found the experience enriching, so even though I am not enrolled in an economics PhD program, I would be very happy to have the opportunity to attend this tutorial and accompanying meeting.

Coursework

I took first-year microeconomic theory with the Harvard Economics PhD cohort. Otherwise, my graduate coursework has been in computer science and applied mathematics. In case it is relevant, a full list is below.

Economics

ECON 2010A: Economic Theory (Fall 2022)

EconCS

ECON 2070: A Computer Science Toolbox for Modern Economic Theory (Spring 2023)
COMPSCI 236R: Topics at the Interface between Computer Science and Economics (Fall 2023)

Computer science and applied mathematics

COMPSCI 229R: Topics in Theoretical Computer Science: Information Theory in CS (Fall 2022)
APMTH 220: Geometric Methods for Machine Learning (Spring 2023)
APMTH 299R: Special Topics in Applied Mathematics (Spring 2023)
COMPSCI 229BR: Topics in the Foundations of Machine Learning (Spring 2023)
COMPSCI 226R: Topics in Theory for Society: The Theory of Algorithmic Fairness (Spring 2024)
COMPSCI 2243: Algorithms for Data Science (Fall 2024)
APMTH 299R: Special Topics in Applied Mathematics (Spring 2025)

Sara Fish CV

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EDUCATION

Harvard University 2022–present
PhD Candidate in Applied Mathematics. Advised by Yannai Gonczarowski.
Supported by **NSF GRFP** and a **Kempner Institute Graduate Fellowship**.

California Institute of Technology 2017–2022
B.S. in Mathematics, 3.8 GPA.

ECONOMICS RESEARCH

Algorithmic Collusion by Large Language Models 2024
with Yannai Gonczarowski, Ran Shorrer
EC 2026, arXiv:2404.00806.
Coverage: Marginal Revolution, Zvi Mowshowitz, The Capitol Forum, CPI TechREG

ECONCS RESEARCH

Human-Like Generalization of Risk Preferences in LLMs 2026
Sara Fish, Felix Sosa, and Sonia Murthy
Working paper.

Steerability Skew: LLM Investment Advisors Defer Unequally to Risk Averse and Risk Tolerant Users 2026
Amita Shukla, Laura Messner, Claudio Mayrink Verdun, Sara Fish
Working paper.

EconEvals: Benchmarks and Litmus Tests for Economic Decision-Making by LLM Agents 2025
Sara Fish, Julia Shephard*, Minkai Li*, Ran Shorrer, and Yannai Gonczarowski
EC 2026, arXiv:2503.18825.

Stable Menus of Public Goods 2024
with Yannai Gonczarowski, Sergiu Hart
EC 2025, arXiv:2402.11370.

COMPUTER SCIENCE RESEARCH

Stable Menus of Public Goods: AI-Enabled Progress 2026
Sara Fish
EC 2026 Workshop on AI-Driven Research in EconCS, arXiv:2606.16989.

Tradeoffs in Privacy, Welfare, and Fairness for Facility Location 2026
with Yannai Gonczarowski, Jason Tang, Salil Vadhan
FORC 2026, arXiv:2604.10443.

Generative Social Choice: The Next Generation 2025
with Niclas Boehmer and Ariel Procaccia
ICML 2025 Oral (top 1%), arXiv:2505.22939.

Generative Social Choice 2024
with P. Gölz, D. Parkes, A. Procaccia, G. Rusak, I. Shapira, M. Wüthrich.
EC 2024, arXiv:2309.01291.
Project awarded a $100,000 OpenAI grant (“Democratic Inputs to AI”).

EXPERIENCE

Research Fellow at Anthropic 2026

Research Intern at Microsoft Research New England 2025
Conducted research on economic impacts of AI.

U.S. Department of State Intern (Office of the Science & Technology Adviser) 2022-23
Year-round part-time intern via Virtual Student Federal Service program. Informed staff

members about key developments in artificial intelligence (particularly large language models) by disseminating 1-pagers and preparing presentations.

Algo Developer Intern at **Hudson River Trading** 2022
Using python/numpy/pandas, analyzed large proprietary financial datasets.

TEACHING

(Harvard) Guest Lecturer for **CS 2360R** ("Emerging Topics in EconCS and AI") 2025
(Harvard) TF for **CS 37** / **ECON 1071** ("Incentives in the Wild") 2023 & 2025
(Caltech) Lead TA for **Math 0** ("Intro to Proofs") Summer 2021
(Caltech) TA for **Math 6** ("Discrete Mathematics") Fall 2019
(Caltech) TA for **Math 108a** ("Real Analysis") Fall 2019

REVIEWING

Journals: GEB, AER: Insights, JAAMAS
Conferences: FAccT 2025, EC 2025, ICLR 2026, WWW 2026, FAccT 2026, EC 2026, NeurIPS 2026, ICLR 2026
Workshops: AAAI 2025 Workshop on Markets, Incentives and Generative AI, ICML 2025 MAS Workshop, ICML 2025 MoFA Workshop, NeurIPS EconML Workshop

TALKS

Human-Like Generalization of Risk Preferences in LLMs
• (**Invited talk**) Symposium on Machine and Rational Thought October 2026

Stable Menus of Public Goods: AI-Enabled Progress
• EC 2026 Workshop on AI-Driven Research in EconCS July 2026

EconEvals: Benchmarks and Litmus Tests for Economic Decision-Making by LLM Agents
• (**Spotlight talk**) COLM 2026 Workshop on Agent Behavior October 2026
• EC 2026 July 2026
• (**Invited talk**) Penn State University AI and the Economy Initiative April 2026
• (**Invited keynote**) AAAI 2026 Foundations of Agentic Systems Workshop Jan 2026
• (**Invited talk**) INFORMS 2025 Oct 2025
• Kempner Institute Spring into Science Workshop Mar 2025

Algorithmic Collusion by Large Language Models
• (**Invited talk**) INFORMS 2026 November 2026
• EC 2026 July 2026
• (**Invited talk**) Berkman Klein Center Spring Speaker Series Apr 2025
• (**Oral**) AAAI 2025 Workshop on Markets, Incentives, and Generative AI Feb 2025
• (**Invited talk**) INFORMS 2024 Oct 2024
• 2024 ESIF Economics and AI+ML Meeting at Cornell Univeristy Aug 2024
• (**Oral**) EC 2024 Workshop on Foundation Models and Game Theory Jul 2024
• (**Spotlight talk**) EC 2024 Workshop on Frontiers of Online Advertising Jul 2024
• (Lightning talk) ACM Symposium on Computer Science and Law Mar 2024
• Harvard EconCS Seminar Feb 2024

Stable Menus of Public Goods
• EC 2025 July 2025
• 34th Stony Brook International Conference on Game Theory Jul 2023

CROWD SCIENCE

Listed below are "crowd science" papers I coauthored as a middle (i.e., minor) author.

The Prosocial Ranking Challenge: Reducing Polarization on Social Media without Sacrificing Engagement (preprint, arXiv:2603:19626) 2026

A benchmark of expert-level academic questions to assess AI capabilities 2026
Nature Vol. 649, pg. 1139–1146 (2026).

Comparing Human-Only, AI-Assisted, and AI-Led Teams on Assessing Research Reproducibility in Quantitative Social Science (preprint, EconPapers URL) 2025
PNAS Vol. 123, No. 22 (2026).