

Sean R. Sinclair

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RESEARCH INTERESTS

Machine learning algorithms for data-driven sequential decision-making in the framework of reinforcement learning, with applications to societal systems and operations management

ACADEMIC EMPLOYMENT

Assistant Professor, Industrial Engineering and Management Sciences Northwestern University	2024 - Present
Postdoctoral Associate Massachusetts Institute of Technology Laboratory for Information and Decision Sciences, and Institute for Data, Systems, and Society Mentors: Ali Jadbabaie and Devavrat Shah	2023 - 2024

EDUCATION

Cornell University <i>MS/PhD, Operations Research and Information Engineering</i> Thesis: <i>Adaptivity, Structure, and Objectives in Sequential Decision-Making</i> Advisors: Christina Lee Yu and Sid Banerjee	2018 - 2023
McGill University <i>Honours BSc, Mathematics and Computer Science</i> Advisor: Tony Humphries	2012 - 2014

SELECTED AWARDS

- Northwestern Searle Fellow (2025)
- (On behalf of Zhongjun Zhang) Finalist, INFORMS George Nicholson Student Paper Competition (2025)
- Runner-up for the INFORMS Service Science Best DEIJ Paper Competition (2024)
- Best Presentation, LIDS Student Conference (2024)
- Honorable Mention, ACM SIGMETRICS Dissertation Award (2023)
- Honorable Mention, George Dantzig Dissertation Award (2023)
- Finalist, INFORMS Diversity, Equity, and Inclusion Best Student Paper Award (2022)
- *Doctoral Consortium Selected Attendance*: Cornell ORIE Young Researchers Workshop (2022), EAAMO (2022), FAccT (2022), Michigan Institute for Data Science Future Leaders Summit (2022), Jane Street Symposium (2020)
- *Top Reviewer*: ICML (2022), AISTATS (2022), NeurIPS (2021)
- Honourable Mention, National Science Foundation Graduate Research Fellowship (2020)
- Honourable Mention, Ford Predoctoral Fellowship (2020)
- First Year Fellowship, School of Operations Research, Cornell University (2018)
- First Class Honours, McGill University (2015)

- Dean's Honour List, McGill University (2014–2015)
- Student Undergraduate Research Award, McGill University (2014)

PUBLICATIONS

If authors prefaced by $(\alpha - \beta)$ then remaining authors are ordered alphabetically; \dagger denotes PhD students / committee members.

Working Papers

8. “Network and Risk Analysis of Surety Bounds”. $(\alpha - \beta)$ Tamara Broderick, Ali Jadbabaie, Vanessa Lin, Manuel Quintero, Arnab Sarker, Sean R. Sinclair.
7. “Sequential Fair Allocation With Replenishments: A Little Envy Goes An Exponentially Long Way”. Chido Onyeze, Sean R. Sinclair, Chamsi Hssaine, Sid Banerjee.
 - Conference version published in ACM SIGMETRICS (2026)
 - Presented at EC Workshop on New Directions in Social Choice (2025)
6. “Reinforcement Learning in MDPs with Information-Ordered Policies”. Zhongjun Zhang ^{\dagger} , $(\alpha - \beta)$ Shipra Agrawal, Ilan Lobel, Sean R. Sinclair, Christina Lee Yu.
 - Finalist for the 2025 INFORMS George Nicholson Student Paper Competition
5. “The Data-Driven Censored Newsvendor Problem”. $(\alpha - \beta)$ Chamsi Hssaine, Sean R. Sinclair.
 - Accepted to Durham Early Career Scholars Workshop (2025)
4. “Multi-Objective LQR with Linear Scalarization”. $(\alpha - \beta)$ Ali Jadbabaie, Devavrat Shah, Sean R. Sinclair.
3. “Exploiting Exogenous Structure for Sample-Efficient Reinforcement Learning”. Jia Wan, Sean R. Sinclair, Devavrat Shah, Martin Wainwright.
 - Presented at SIGMETRICS Workshop on Causal Inference (2025)
 - Presented at ICML Workshop on Aligning Reinforcement Learning Experimentalists and Theorists (2024)
2. “Artificial Replay: A Meta-Algorithm for Harnessing Historical Data in Bandits”. $(\alpha - \beta)$ Siddhartha Banerjee, Sean R. Sinclair, Milind Tambe, Lily Xu, Christina Lee Yu.
1. “Online Fair Allocation of Perishable Resources”. $(\alpha - \beta)$ Siddhartha Banerjee, Chamsi Hssaine, Sean R. Sinclair.
 - Runner-up for the 2024 INFORMS Service Science Best DEIJ Paper Competition
 - *Media: Examining Algorithmic Fairness and Accountability*
 - Conference version published in ACM SIGMETRICS (2023)
 - Conference version published in EAAMO (2022)
 - Presented at Simons Institute Data-Driven Decision Processes Program Workshop: Quantifying Uncertainty: Stochastic, Adversarial, and Beyond (2022)

Journal Papers

4. “Adaptive Discretization in Online Reinforcement Learning” (2022). Sean R. Sinclair, Siddhartha Banerjee, Christina Lee Yu. *Operations Research*.
3. “Sequential Fair Allocation: Achieving the Optimal Envy-Efficiency Tradeoff Curve” (2022). Sean R. Sinclair, Gauri Jain, Siddhartha Banerjee, Christina Lee Yu. *Operations Research*.
 - Finalist for the 2022 INFORMS Diversity, Equity, and Inclusion Best Student Paper Award
 - Presented at ACM FORC (2022)
2. “Adaptive Discretization for Episodic Reinforcement Learning in Metric Spaces” (2019). Sean R. Sinclair, Siddhartha Banerjee, Christina Lee Yu. *Proceedings of the ACM on Measurement and Analysis of Computing Systems*.
 - Conference version published in ACM SIGMETRICS (2020)
 - Presented at NeurIPS Workshop on Optimization in Reinforcement Learning (2019)
1. “Normal and pathological dynamics of platelets in humans” (2017). Gabriel P. Langlois, Morgan Craig, Antony R. Humphries, Michael C. Mackey, Joseph M. Mahaffy, Jacques Bélair, Thibault Moulin, Sean R. Sinclair, Liangliang Wang. *Journal of Mathematical Biology*.

Peer Reviewed Conference Proceedings

3. “Hindsight Learning for MDPs with Exogenous Inputs” (2023). Sean R. Sinclair, Felipe Frujeri, Ching-An Cheng, Luke Marshall, Hugo Barbalho, Jingling Li, Jennifer Neville, Ishai Menache, Adith Swaminathan. *International Conference on Machine Learning*
2. “ORSuite: Benchmarking Suite for Sequential Operations Models” (2021). ($\alpha - \beta$) Christopher Archer, Siddhartha Banerjee, Mayleen Cortez, Carrie Rucker, Sean R. Sinclair, Max Solberg, Qiaomin Xie and Christina Lee Yu. *ACM Sigmetrics Performance Evaluation Review*.
 - Presented at ACM SIGMETRICS Reinforcement Learning for Networks and Queues (2021)
1. “Adaptive Discretization for Model-Based Reinforcement Learning” (2020). Sean R. Sinclair, Tianyu Wang, Gauri Jain, Siddhartha Banerjee, Christina Lee Yu. *Advances in Neural Information Processing Systems* (2020)
 - Presented at ICML Workshop on Theoretical Foundations of Reinforcement Learning (2020)

Workshop Papers

1. “Sequential Fair Allocation of Limited Resources under Stochastic Demands” (2020). Sean R. Sinclair, Gauri Jain, Siddhartha Banerjee, Christina Lee Yu.
 - Presented at Harvard CRCS Workshop on AI for Social Good (2020)
 - Presented at Mechanism Design for Social Good Workshop (2020)

Theses

2. “[Adaptivity, Structure, and Objectives in Sequential Decision-Making](#)” (2023). Sean R. Sinclair. *PhD Dissertation*, Cornell University.
 - Honorable Mention, ACM Sigmetrics Dissertation Award (2023)
 - Honorable Mention, George Dantzig Dissertation Award (2023)
1. “[Numerical Methods for State-Dependent Distributed Delay Differential Equations](#)” (2014). Sean R. Sinclair. *Honours Research Project*, McGill University.

INVITED TALKS & SELECTED PRESENTATIONS

The Data-Driven Censored Newsvendor Problem

- INFORMS Annual Meeting October 2025
- INFORMS Applied Probability Society Conference July 2025
- Durham Early Career Scholars Workshop June 2025
- INFORMS MSOM Conference June 2025

A Network Analysis of Surety Bonds

- Liberty Mutual February 2025

Reinforcement Learning in MDPs with Exogenous Inputs

- INFORMS Annual Meeting October 2024

Online Fair Allocation of Perishable Resources

- Simons Collaboration on the Theory of Algorithmic Fairness Seminar November 2025
- Allerton Conference September 2025
- IDEAL Workshop: Foundations of Fairness and Accountability November 2024
- INFORMS Annual Meeting October 2024
- TTIC Workshop August 2024
- MIT Sloan School of Management February 2024
- LIDS Student Conference January 2024
- INFORMS Annual Meeting October 2023

Hindsight Learning for MDPs with Exogenous Inputs

- NYU Stern PhD Seminar October 2024
- International Symposium on Mathematical Programming July 2024
- INFORMS Optimization Society March 2024
- Université de Montréal February 2024
- ICML (*Poster*) July 2023

Online Reinforcement Learning and Regret

- Simons Institute, Data-Driven Decision Processes Bootcamp August 2022

Summer School: Reinforcement Learning for Operations

- Kellogg School of Management, Northwestern University (*Talks, Code Demos*) August 2022

Sequential Fair Allocation: Achieving the Optimal Envy-Efficiency Tradeoff Curve

- Northwestern University: Industrial Engineering and Management Science February 2023
- Dartmouth College: Tuck School of Business January 2023
- Johns Hopkins University: Carey Business School January 2023
- University of Chicago: Booth School of Business January 2023

- University of Toronto: Rotman School of Management January 2023
- University of Illinois, Chicago: Liautaud Business School January 2023
- Northwestern University: Kellogg School of Management December 2022
- École Polytechnique Fédérale de Lausanne: Management of Technology December 2022
- Frankfurt School of Finance & Management December 2022
- University of Michigan: Industrial and Operations Engineering December 2022
- University of Texas, Austin: McCombs School of Business November 2022
- University of Pennsylvania: Wharton School November 2022
- Cornell ORIE Young Researchers Workshop October 2022
- INFORMS Annual Meeting, DEI Best Student Paper Award Session October 2022
- Workshop on Algorithms for Learning and Economics (*Talk, Panel*) June 2022
- ACM SIGMETRICS June 2022
- University of Michigan Future Leaders Summit April 2022
- Devavrat Shah's Group Meeting at MIT February 2022
- Rigorous Systems Research Group at Caltech January 2022
- INFORMS Annual Meeting October 2021
- IJCAI Workshop on AI for Social Good August 2021
- EC Workshop on Operations of People-Centric Systems (*Talk, Poster*) July 2021
- Microsoft Research Reinforcement Learning Reading Group June 2021

ORSuite: Benchmarking Suite for Sequential Operations Models

- ACM SIGMETRICS Reinforcement Learning for Networks and Queues Workshop June 2021

Sequential Fair Allocation of Limited Resources under Stochastic Demands

- Mechanism Design for Social Good Workshop (*Poster*) August 2020
- Harvard CRCS AI for Social Good Workshop July 2020

Adaptive Discretization for Model-Based Reinforcement Learning

- Neural Information Processing Systems (NeurIPS) (*Poster*) December 2020
- ICML Theoretical Foundations of Reinforcement Learning Workshop July 2020

Adaptive Discretization for Episodic Reinforcement Learning in Metric Spaces

- ACM SIGMETRICS July 2020
- Jane Street Symposium January 2020
- NeurIPS Workshop on Optimization in Reinforcement Learning December 2019
- Cornell ORIE Young Researchers Workshop October 2019
- Cornell Operations Research Advances through Collaboration October 2019
- Cornell Celebration of Statistics and Data Science (*Poster*) September 2019

TEACHING

Northwestern University (All as primary faculty and course designer)

- IEMS 488 (PhD). Economics and Decision Analysis Spring 2026
- IEMS 496 (PhD, zero credit). Academic Street Smarts Winter 2026
- IEMS 365 (Undergrad). Analytics for Social Good Winter 2025, 2026, Spring 2026
- IEMS 408 (PhD). Decision Making in Dynamic Learning Environments Spring 2025

Cornell University (Teaching Assistant)

- ORIE 6590 (PhD). Approximate Dynamic Programming and Reinforcement Learning Spring 2021
- ORIE 3300 (Undergrad). Optimization Fall 2019

- ORIE 1380 (Undergrad). Data Science for All Spring 2019
- Amankwakrom Junior High School** (with Peace Corps Ghana)

 - Secondary School Mathematics Teacher 2015 - 2017

ACADEMIC ADVISING

Current Advisees

Zhongjun Zhang

Northwestern IEMS, 2024 -

Thesis Committees

Haiqing Gao, Northwestern (2027 expected)

Nele Amiri, KU Leuven (2026 expected)

Dinglin Xia, Northwestern (2027 expected)

Jeffrey Wang, Northwestern (2026 expected)

Undergraduate and High-School Collaborators

Christopher Martin, 2024-2025, Cornell ORIE Undergraduate

Dawson Ren, 2023-2024, Northwestern IEMS Undergraduate

Yijia Dai, 2022, Cornell CS Undergraduate

Juntao Ren, 2022, Cornell CS Undergraduate

Logan Kraver, 2022, Cornell CS Undergraduate

Dave Jung, 2022, Cornell CS Undergraduate

David Wolfers, 2021, Cornell CS Undergraduate

Jaoli Bowden, 2021, High School Student

Christopher Archer, 2021, Cornell ORIE Undergraduate

Carrie Rucker, 2021, ORIE Undergraduate

Max Solberg, 2021, Cornell CS Undergraduate

Shashank Pathak, 2021, Cornell ORIE MEng

Gauri Jain, 2020, Cornell CS Undergraduate

ACADEMIC SERVICE & OTHER ACTIVITIES

In Northwestern:

- *Research Project Advisor*: Client Project Challenge (2025-)

In Cornell:

- *Mentoring*: Graduate Student Mentor with Operations Research Graduate Association (2019-2022) and Office of Academic Diversity Initiatives (2019-2022)
- *Operations Research Graduate Association*: First Year Colloquium Organizer (2018-2019), Secretary (2019-2021), Co-President (2021-2022), URM PhD Application Support Program Officer (2022 - 2023)

In Professional Organizations:

- *Application Support*: Queer in AI (2020-2022)
- *Conference Organization*: Local Organizer for Stochastic Networks Conference (2022)
- *Award Committee*: Public Sector Operations Research Best Paper Award (2023)

In Conferences:

- *Session Chair*: INFORMS Annual Meeting (2021-), INFORMS Applied Probability Conference (2025-)
- *Technical Program Committee*: SIGMETRICS (2025-), SIGMETRICS Student Research Competition (SRC) (2025-)
- *Referee*: EAAMO (2022), AISTATS (2019- 2022), NeurIPS (2020-2022), ICLR (2021-2022), ICML (2021-2023), Harvard CRCS Workshop on AI for Social Good (2020), Cornell University Mathematical Contest in Modeling (2020), EC (2023)

In Journals:

- *Referee*: Transactions of Machine Learning Research, Operations Research, Management Science, Manufacturing and Service Operations, Mathematics of Operations Research, IEEE Transactions on Information Theory, Computers and Operations Research (2022-), Manufacturing and Service Operations, Journal of Humanitarian Logistics and Supply Chain Management, Journal of Optimization Theory and Applications

In Outreach:

- Speaker at [2025 IDEAL Get Ready for Research Workshop](#) (2025)
- MD4SG Advice for Applying to PhD Programs Social (2022)
- Undergraduate Research Night, Cornell Computing and Information Science (2021)
- STEM Preview Day, Cornell Diversity Programs in Engineering (2020, 2021)
- Graduate Student Mentoring Undergraduates Dinner, Office of Diversity Initiatives (2019)
- Leadership Camp for the Deaf, Peace Corps Ghana (2017)
- GLOW + BRO Camp Organizer, YPES Ghana (2017)
- Let Girls Learn Laboratory for Secondary School Education, Peace Corps (2016)
- STARS and GLOW Camp Organizer, Peace Corps Ghana (2016)

INDUSTRY & OTHER EXPERIENCE

Microsoft Research

Reinforcement Learning Group

Summer 2021

National Life Group

Financial Analyst

2017 - 2018

Peace Corps Ghana

Secondary School Education Volunteer

2015 - 2017

Let Girls Learn Literacy Coordinator

2016 - 2017

OPEN SOURCE SOFTWARE

ORSuite: Collection of OpenAI Gym interfaces for studied models in the operations research community, implementation of domain-specific algorithms, and instrumentation for running experiments and comparing performance on multi-criteria objectives, <https://github.com/cornell-orie/ORSuite>