

# Sean R. Sinclair

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CONTACT	Northwestern University Industrial Engineering & Management Sciences Technological Institute 2145 Sheridan Road, Room D237, Evanston, IL 60208	<a href="mailto:sean.sinclair@northwestern.edu">sean.sinclair@northwestern.edu</a> <a href="https://github.com/seanrsinclair">seanrsinclair.github.io</a>
RESEARCH INTERESTS	<i>Machine learning algorithms for data-driven sequential decision-making</i> in the framework of reinforcement learning, with applications to societal systems and operations management	
ACADEMIC POSITIONS	<b>Northwestern University</b> Assistant Professor <a href="#">Industrial Engineering and Management Science</a>	<i>Evanston, IL</i> <i>August 2024 -</i>
	<b>Massachusetts Institute of Technology</b> Postdoctoral Associate <a href="#">Laboratory for Information and Decision Sciences</a> - Faculty Mentors: <a href="#">Devavrat Shah</a> and <a href="#">Ali Jadbabaie</a>	<i>Cambridge, MA</i> <i>July 2023 - July 2024</i>
EDUCATION	<b>Cornell University</b> Ph.D. in <a href="#">Operations Research and Information Engineering</a> M.S. in <a href="#">Operations Research and Information Engineering</a> - PhD Advisors: <a href="#">Christina Lee Yu</a> and <a href="#">Siddhartha Banerjee</a> - Thesis: <a href="#">Adaptivity, Structure, and Objectives in Sequential Decision-Making</a>	<i>Ithaca, NY</i> <i>May 2023</i> <i>May 2021</i>
	<b>McGill University</b> B.S. in <a href="#">Honours Mathematics and Computer Science</a>	<i>Montreal, QC</i> <i>April 2015</i>
PUBLICATIONS	<i>(If entry prefaced by * then authors are ordered alphabetically.)</i>	
	<b><a href="#">Multi-Objective LQR with Linear Scalarization</a></b> * <a href="#">Ali Jadbabaie</a> , <a href="#">Devavrat Shah</a> , <a href="#">Sean R. Sinclair</a> <i>Under Review</i>	
	<b><a href="#">Exploiting Exogenous Structure for Sample-Efficient Reinforcement Learning</a></b> <a href="#">Jia Wan</a> , <a href="#">Sean R. Sinclair</a> , <a href="#">Devavrat Shah</a> , <a href="#">Martin Wainwright</a> <i>Under Review</i> – Presented at ICML Workshop on Aligning Reinforcement Learning Experimentalists and Theorists (2024)	
	<b><a href="#">Artificial Replay: A Meta-Algorithm for Harnessing Historical Data in Bandits</a></b> * <a href="#">Siddhartha Banerjee</a> , <a href="#">Sean R. Sinclair</a> , <a href="#">Milind Tambe</a> , <a href="#">Lily Xu</a> , <a href="#">Christina Lee Yu</a> <i>Working Paper</i>	
	<b><a href="#">Online Fair Allocation of Perishable Resources</a></b> * <a href="#">Siddhartha Banerjee</a> , <a href="#">Chamsi Hssaine</a> , <a href="#">Sean R. Sinclair</a> <i>Under Review</i> – Presented at ACM SIGMETRICS (2023) – Presented at EAAMO (2022) – Presented at Simons Institute Data-Driven Decision Processes Program Workshop: Quantifying Uncertainty: Stochastic, Adversarial, and Beyond (2022)	
	<b><a href="#">Hindsight Learning for MDPs with Exogenous Inputs</a></b> <a href="#">Sean R. Sinclair</a> , <a href="#">Felipe Frujeri</a> , <a href="#">Ching-An Cheng</a> , <a href="#">Luke Marshall</a> , <a href="#">Hugo Barbalho</a> , <a href="#">Jingling Li</a> , <a href="#">Jennifer Neville</a> , <a href="#">Ishai Menache</a> , <a href="#">Adith Swaminathan</a> <i>International Conference on Machine Learning (2023)</i>	

### **Adaptive Discretization in Online Reinforcement Learning**

Sean R. Sinclair, Siddhartha Banerjee, Christina Lee Yu

*Operations Research* (2022)

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

Sean R. Sinclair, Gauri Jain, Siddhartha Banerjee, Christina Lee Yu

*Operations Research* (2022)

- **Finalist for the 2022 INFORMS Diversity, Equity, and Inclusion Best Student Paper Award**
- Presented at ACM FORC (2022)

### **ORSuite: Benchmarking Suite for Sequential Operations Models**

\* Christopher Archer, Siddhartha Banerjee, Mayleen Cortez, Carrie Rucker, Sean R. Sinclair, Max Solberg, Qiaomin Xie and Christina Lee Yu

*ACM Sigmetrics Performance Evaluation Review* (2021)

- Presented at ACM SIGMETRICS Reinforcement Learning for Networks and Queues (2021)

### **Sequential Fair Allocation of Limited Resources under Stochastic Demands**

Sean R. Sinclair, Gauri Jain, Siddhartha Banerjee, Christina Lee Yu

*Workshop Paper* (2020)

- Presented at Harvard CRCS Workshop on AI for Social Good (2020)
- Presented at Mechanism Design for Social Good Workshop (2020)

### **Adaptive Discretization for Model-Based Reinforcement Learning**

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)

### **Adaptive Discretization for Episodic Reinforcement Learning in Metric Spaces**

Sean R. Sinclair, Siddhartha Banerjee, Christina Lee Yu

*Proceedings of the ACM on Measurement and Analysis of Computing Systems* (2019)

- Presented at ACM SIGMETRICS (2020)
- Presented at NeurIPS Workshop on Optimization in Reinforcement Learning (2019)

### **Normal and pathological dynamics of platelets in humans**

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* (2017)

ACADEMIC  
PRESENTATIONS

### **Online Fair Allocation of Perishable Resources**

- 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**

- 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: Cary 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*
- ICJAI 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 System (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 EXPERIENCE

- Teaching Assistant** ORIE 6590: Approximate Dynamic Programming and Reinforcement Learning, *Spring 2021 - Cornell University*
- Teaching Assistant** ORIE 3300: Optimization, *Fall 2019 - Cornell University*
- Teaching Assistant** ORIE 1380: Data Science for All, *Spring 2019 - Cornell University*
- Classroom Teacher** Secondary School Mathematics Teacher with Peace Corps Ghana, *2015-2017 - Amankwakrom Junior High School*

### HONOURS

- Honorable Mention, ACM Sigmetrics Dissertation Award *2023*
- Honorable Mention, George Dantzig Dissertation Award *2023*
- Cornell ORIE Young Researchers Workshop Selected Attendee *2022*

Finalist for the INFORMS Diversity, Equity, and Inclusion Best Student Paper Award	2022
EAAMO Doctoral Consortium Selected Attendee	2022
FAccT Doctoral Consortium Selected Attendee	2022
Michigan Institute for Data Science Future Leaders Summit Selected Attendee	2022
Top Reviewer ICML	2022
Top Reviewer AISTATS	2022
Outstanding Reviewer Award NeurIPS	2021
Jane Street Symposium Selected Attendee	2020
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

## SERVICE

### 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-)
- *Technical Program Committee*: SIGMETRICS (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 (2022-), Operations Research (2021-), Management Science (2022-), Manufacturing and Service Operations (2023-), IEE Transactions on Information Theory (2024-), Computers and Operations Research (2022-)

### In Outreach

- 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 EXPERIENCE

<b>Research Intern</b>	Microsoft Research Reinforcement Learning Group, <i>Summer 2021</i>
<b>Financial Analyst</b>	National Life Group, <i>2017 - 2018</i>

## ADVISING

### ◇ **Current Advisees**

#### **Haiqing Gao**

Jointly supervised with Seyed Iravani  
Northwestern IEMS, 2022 -

### ◇ **Undergraduate and High-School Collaborators**

**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. Graduate Student at EECS, UC Berkeley

**Carrie Rucker**, 2021, ORIE Undergraduate. Business Analyst at Capital One

**Max Solberg**, 2021, Cornell CS Undergraduate. Technology Associate at Morgan Stanley

**Shashank Pathak**, 2021, Cornell ORIE MEng.

**Gauri Jain**, 2020, Cornell CS Undergraduate. Graduate Student at EECS, Harvard

## 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>