

Raghav Singal

100 Tuck Hall, Chase 304, Hanover, NH 03755
singal@dartmouth.edu

Appointment

Tuck School of Business at Dartmouth College

Assistant Professor of Business Administration

2021 -

Wei-Chung Bradford Hu T'89 Faculty Fellow (2023)

Harvey H. Bundy III T'68 Faculty Fellow (2022)

Education

Columbia University

PhD, Operations Research

2015 - 2020

Advisors: Omar Besbes, Vineet Goyal, and Garud Iyengar

Cheung-Kong Graduate School of Business Fellow

University of Toronto

BASc, Industrial Engineering

2010 - 2015

Ranked 1 (out of 100 students)

Journal Publications (Peer-Reviewed)

Workforce Scheduling with Heterogeneous Time Preferences: Effective Wages and Workers' Supply

Omar Besbes, Vineet Goyal, Garud Iyengar, and Raghav Singal

Manufacturing & Service Operations Management, 26(5):1768-1786, 2024

Axiomatic Effect Propagation in Structural Causal Models

Raghav Singal and George Michailidis

Journal of Machine Learning Research, 25(52):1-71, 2024

Model-Free Approximate Bayesian Learning for Large-Scale Conversion Funnel Optimization

Garud Iyengar and Raghav Singal

Production and Operations Management, 33(3):775-794, 2024

Shapley Meets Uniform: An Axiomatic Framework for Attribution in Online Advertising

Raghav Singal, Omar Besbes, Antoine Desir, Vineet Goyal, and Garud Iyengar

Management Science, 68(10):7457-7479, 2022

How to Play Fantasy Sports Strategically (and Win)

Martin Haugh and Raghav Singal

Management Science, 67(1):72-92, 2021

A Finite Time Analysis of Temporal Difference Learning with Linear Function Approximation

Jalaj Bhandari, Daniel Russo, and Raghav Singal

Operations Research, 69(3):950-973, 2021

A Bayesian Regression Approach to Handicapping Tennis Players Based on a Rating System

Timothy Chan and Raghav Singal

Journal of Quantitative Analysis in Sports, 14(3):131-141, 2018

A Markov Decision Process-Based Handicap System for Tennis

Timothy Chan and Raghav Singal

Journal of Quantitative Analysis in Sports, 12(4):179-189, 2016

Conference Proceedings (Peer-Reviewed)¹

(acceptance rate)

Churning While Experimenting: Maximizing User Engagement in Recommendation Platforms

Michael Hamilton and Raghav Singal

Web and Internet Economics (WINE), accepted

(34%)

Counterfactual Analysis in Dynamic Latent State Models

Martin Haugh and Raghav Singal

International Conference on Machine Learning (ICML), 202:12647-12677, 2023

(28%)

Flow-Based Attribution in Graphical Models: A Recursive Shapley Approach

Raghav Singal, George Michailidis, and Hoiyi Ng

International Conference on Machine Learning (ICML) (spotlight), 139:9733-9743, 2021

(22%)

Shapley Meets Uniform: An Axiomatic Framework for Attribution in Online Advertising

Raghav Singal, Omar Besbes, Antoine Desir, Vineet Goyal, and Garud Iyengar

The World Wide Web Conference (WWW), 1713-1723, 2019

(18%)

A Finite Time Analysis of Temporal Difference Learning with Linear Function Approximation

Jalaj Bhandari, Daniel Russo, and Raghav Singal

Conference on Learning Theory (COLT) (extended abstract), 75:1691-1692, 2018

(27%)

Contributions to Other Research Projects

Reproducibility in Management Science

Fisar, Greiner, Huber, Katok, Ozkes, and the Management Science Reproducibility Collaboration

Management Science, 70(3):1343-1356, 2024

Note: Member of the Management Science Reproducibility Collaboration

Working Papers

Peer Review Market Design: Effort-Based Matching and Admission Control

Craig Fernandes, James Siderius, and Raghav Singal

Under review

Online Matching with Heterogeneous Supply and Minimum Allocation Guarantees

Garud Iyengar and Raghav Singal

Under revision

Churning While Experimenting: Maximizing User Engagement in Recommendation Platforms

Michael Hamilton and Raghav Singal

Under revision

¹All listed conferences include a formal double-blind review process, with multiple reviewers. Except for *WINE*, they also include a rebuttal round and have a CORE rank of *A** and a Wooldridge rank of *A*, the highest possible. In computer science and machine learning, these top-tier conferences are considered terminal publication outlets.

Bounding Counterfactual Outcomes of Health Insurance Delay-and-Deny Practices

Martin Haugh and Raghav Singal

Under revision

A Counterfactual Analysis of the Dishonest Casino

Martin Haugh and Raghav Singal

Under review

Teaching

Instructor

Analytics, MBA core (Dartmouth), Rated² 5.71/6

2021 -

Data, Models, and Decisions, MBA elective (Dartmouth)

2025 (planned)

Independent Study, 8 MBA students (Dartmouth)

2022 -

Optimization Models and Methods, MS (Columbia), Rated 4.50/5

Spring 2019

Co-instructor

Introduction to Algorithms, Science Honors Program (Columbia)

Fall 2018

Graph Theory by Example, Science Honors Program (Columbia)

Spring 2018

Case Writing

Analytics in American Football: A New Frontier

Daniel Guetta, Raghav Singal, and John Wolfe

Columbia CaseWorks, 2020

Used in the Business Analytics II elective at Columbia Business School

Awards

Academic and Research

2nd place, Rothkopf Junior Researcher Paper Prize (INFORMS Auctions and Market Design) 2022

Finalist, Data-Driven Research Challenge (INFORMS Revenue Management and Pricing) 2020

2nd place, Jeff McGill Student Paper Award (INFORMS Revenue Management and Pricing) 2019

Finalist, Sloan Sports Analytics Conference Research Paper Competition (MIT Sloan) 2018

Highly Commended, The Undergraduate Awards 2015

Best Poster Award at MIE Research Symposium (University of Toronto) 2015

MIE Summer Award (University of Toronto) 2015

Dan Cornacchia/Ernst and Young Scholarship (University of Toronto) 2013

University of Toronto Excellence Award 2013

Teaching

Outstanding Teaching Assistant Award (IEOR, Columbia) 2018

Industry

Amazon, Data Scientist Intern (Supply Chain Optimization Technologies) 2020 - 2021

Adobe, Data Scientist Intern (Media and Advertising Solutions) Summer 2017

Ontario Teachers' Pension Plan, Quantitative Research Co-op (Asset Mix and Risk) 2013 - 2014

²Student-weighted average instructor rating for the most recent iteration (2024). Average over the years: 5.43/6.

Talks

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| Peer Review Market Design: Effort-Based Matching and Admission Control ISB (Hyderabad) | 2025 |
| Churning While Experimenting: Maximizing User Engagement in Recommendation Platforms MSOM (Minneapolis) | 2024 |
| Bounding Counterfactual in Hidden Markov Models (Previously titled “Counterfactual Analysis in Dynamic Latent State Models”) Berkeley IEOR, Theory Reading Group (Dartmouth CS), POMS (Minneapolis) ICML (virtual), Operations and Management Science Workshop (Tuck) | 2024 2023 |
| Online Matching under Heterogeneous Supply with Minimum Allocation Guarantees INFORMS (Seattle), MSOM (Minneapolis) Wharton (Pennsylvania), RMP (Los Angeles), POMS (Minneapolis) RMP (London), MSOM (Montreal), Marketplace Innovation Workshop (virtual) Conference on Artificial Intelligence, Machine Learning, and Business Analytics (Harvard) Theory Reading Group (Dartmouth CS) Operations and Management Science Workshop (Tuck) | 2024 2024 2023 2022 2022 2022 |
| Workforce Scheduling with Heterogeneous Time Preferences (Previously titled “On-Demand Transportation: Driver Wages Versus Platform Profit”) Applied & Computational Mathematics Seminar (Dartmouth Math) Theory Reading Group (Dartmouth CS) INFORMS Rothkopf Prize Session (Indianapolis) Operations and Management Science Workshop (Tuck) Financial Analyst Forum (Dartmouth) MSOM Service Management SIG (Munich), RMP Spotlight (virtual) Rapid Research Seminar (Tuck), CORS (Vancouver) INFORMS (virtual), MSOM (virtual), RMP (virtual), CORS (virtual) Data Science Day (Columbia) | 2023 2022 2022 2022 2022 2022 2021 2021 |
| Flow-Based Attribution in Graphical Models: A Recursive Shapley Approach Dartmouth Interdisciplinary Network Research Group (DINR) ICML Spotlight (virtual), CORS (virtual) | 2022 2021 |
| Model-Free Approximate Bayesian Learning for Conversion Funnel Optimization Conference on AI, ML, and Business Analytics (Harvard), CORS (Vancouver) MARBLE workshop at KDD (virtual), Marketing Science (virtual) | 2022 2021 |
| Shapley Meets Uniform: An Axiomatic Framework for Attribution in Online Advertising Lyft Marketplace Labs (NYC), Tuck (Dartmouth), London Business School Marshall (USC), Kellogg (Northwestern), Leeds (Boulder), Krannert (Purdue) Rotman (Toronto), Alberta School of Business, USydney Business School Darden (Virginia), Zicklin (Baruch), Smith (Queen’s), Schulich (York) INFORMS (Seattle), MSOM (Singapore), RMP (Stanford), WWW (SF) POMS (DC), CORS (Saskatoon), NYC Ops Day (Columbia), YinzOR (CMU) Data Science Day (Columbia), Condé Nast (NYC), Yahoo Research (NYC) | 2020 2020 2020 2019 2019 2019 2019 |
| How to Play Fantasy Sports Strategically (and Win) Financial Analyst Forum (Dartmouth), CORS (Vancouver) TADC (LBS), INFORMS (Phoenix), POMS (DC) Data Science Day (Columbia), CORS (Halifax), SSAC (MIT) | 2022 2018, 2019 2018 |

A Bayesian Regression Approach to Handicapping Tennis Players Based on a Rating System
 NESSIS (Harvard), CORS (Halifax) 2017, 2018

A Markov Decision Process-Based Handicap System for Tennis
 UTOrg (UToronto), Data Science Social (Columbia) 2015, 2016

Service

Reviewer

Management Science
 Manufacturing & Service Operations Management
 Operations Research
 Production and Operations Management
 Transportation Science

Organizer

Monthly Seminar Series (Operations and Management Science, Tuck) 2024 -
 Fall and Spring Research Workshops (Operations and Management Science, Tuck) 2023 -
 Session: Learning and Optimization for Revenue Management (INFORMS) 2022
 Session: Applied Learning and Optimization (CORS) 2022
 Session: Analytics in Sports and Video Games (CORS) 2022
 Session: Modeling and Analytics in On-Demand Transportation (INFORMS) 2021

Judge

Public Sector OR (PSOR) Best Paper Award Competition (INFORMS) 2023
 Poster Competition (INFORMS) 2022

Committee Member

ACM Conference on Economics and Computation (EC) Program Committee 2024, 2025
 Jeff McGill Student Paper Award (INFORMS Revenue Management and Pricing) 2024
 Honors Thesis Committee Reader (Quantitative Social Science, Dartmouth) 2023
 Faculty Search Committee (Operations and Management Science, Tuck) 2022
 Postdoc Search Committee (Operations and Management Science, Tuck) 2022, 2023, 2025

Press Articles and Media Mentions

Using Science to Imagine an Alternative Reality 2023
 Tuck School of Business at Dartmouth

Making Sense of Attribution in Online Advertising 2022
 INSEAD Knowledge

Putting Models into Practice 2022
 Tuck School of Business at Dartmouth

Better Decisions Through Science: Analytics and Digital Operations 2022
 Tuck School of Business at Dartmouth

Tweet by Professor Judea Pearl (Turing Award Recipient) 2021
 Twitter

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| The Story of How Two Researchers Made a 350 Percent Return on a Single NFL Season Imperial College Business School | 2020 |
| Raghav Singal Comes Second in the INFORMS RMP Student Paper Award Columbia University | 2019 |
| Columbia Engineering Announces the First Cohort of CKGSB Doctoral Fellowship Awardees Columbia University | 2018 |
| Three Engineering Alumni Recognized by Global Undergraduate Awards University of Toronto | 2015 |