Daniel Russo

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🖰 http://djrusso.github.io/

Education

2011 - 2015 **Stanford University**, *Stanford, CA.*
PhD in Management Science and Engineering
Concentration area: Operations Research
Advisor: Benjamin Van Roy

2007 - 2011 **University of Michigan**, *Ann Arbor, MI.*
Bachelor of Science in Economics (*with highest honors*) and Mathematics (*with honors*)

Employment

Since 2017 **Columbia Business School**, *New York, NY.*
Current title: Philip H. Geier Jr. Associate Professor – Decision Sciences, Risk and Operations Division

Since 2020 **Spotify**, *New York, NY.*
Consultant, Staff Machine Learning Engineer.

2016-2017 **Kellogg School of Management, Northwestern University**, *Evanston, IL.*
Assistant Professor – Department of Managerial Economics, Decision Sciences, and Operations

2015-2016 **Microsoft Research**, *Cambridge, MA.*
Postdoctoral Research Scientist

2013 **oDesk (now Upwork)**, *Redwood City, CA.*
Research Intern
Worked on automated skills testing system to evaluate hundreds of thousands of candidates in oDesk's internet labor market. Developed algorithm for adaptively serving questions to users and a method for scoring tests.

2011 **Charles River Associates**, *Boston, MA.*
Summer Analyst – Competition and Antitrust practice

Research Interests

Sequential decision making under uncertainty, Reinforcement learning, Multi-armed bandits, Stochastic Control, Recommender systems.

Preprints.

- C. Qin and D. Russo, *Adaptive Experimentation in the Presence of Exogenous Nonstationary Variation.*

- L. Maystre, D. Russo, and Y. Zhao, *Optimizing Audio Recommendations for the Long-Term: A Reinforcement Learning Perspective.*

- S. Min, C. Moallemi, D. Russo, *Policy gradient optimization of Thompson sampling policies.*

Published Journal Papers

- J. Bhandari and D. Russo, *Global Convergence Guarantees for Policy Gradient Methods.* Operations Research (to appear).

- D. Russo, *Approximation Benefits of Policy Gradient Methods with Aggregated States.* Management Science, 2023.

- D. Russo and B. Van Roy, *Satisficing in Time Sensitive Bandit Learning.* Mathematics of Operations Research, Vol. 47, No. 4, pp. 2815–2839, 2022.

- A. Kim, S. Balserio, D. Russo, *On the Futility of Dynamics in Robust Mechanism Design.* Operations Research, Vol. 69, No. 6, pp. 1767-1783, 2021

- J. Bhandari, D. Russo, and R. Singal, *A Finite Time Analysis of Temporal Difference Learning with Linear Function Approximation.* Operations Research, Vol. 69, No. 3, pp. 950-973, 2021.

- D. Russo, *A Note on the Equivalence of Upper Confidence Bounds and Gittins Indices for Patient Agents.* Operations Research, Vol. 69, No. 1, pp. 273–278, 2021.

- D. Russo, *Simple Bayesian Algorithms for Best Arm Identification.* Operations Research, Vol. 68, No. 6, pp. 1625–1647, 2020.
  - First place, INFORMS 2016 JFIG paper competition.

- D. Russo and J. Zou, *How Much Does Your Data Exploration Overfit? Controlling Bias via Information Usage.* IEEE Transactions on Information Theory, Vol. 66, No. 1, pp. 302–323, 2020.

- I. Osband, B. Van Roy, D. Russo, and Z. Wen, *Deep Exploration via Randomized Value Functions.* Journal of Machine Learning Research, Vol. 20, No. 124, pp. 1-62, 2019

- D. Russo, B. Van Roy, A. Kazerouni, I. Osband, and Z. Wen, *A Tutorial on Thompson Sampling.* Foundations and Trends in Machine Learning, Vol. 11, No. 1, pp. 1-96, 2018.

- D. Russo and B. Van Roy, *Learning to Optimize via Information-Directed Sampling.* Operations Research, Vol. 66, No. 1, pp. 230-252, 2018.
  - First place, INFORMS George Nicholson 2014 student paper competition.

- D. Russo and B. Van Roy, *An Information Theoretic Analysis of Thompson Sampling.* Journal of Machine Learning Research Vol. 17, pp. 1-30, 2016.

- D. Russo and B. Van Roy, *Learning to Optimize via Posterior Sampling.* Mathematics of Operations Research. Vol. 39, No. 4, pp. 1221-1243, 2014.

Published Conference Papers

*Papers displayed in gray are superseded by journal papers listed elsewhere.

- D. Cheikhi, and D. Russo, *On The Statistical Benefits of Temporal Difference Learning.* International Conference on Machine Learning (ICML), 2023
  - Full oral presentation; top 2.2% of submissions.
  - Finalist for the INFORMS Applied Probability Society best student paper award.

- S. Min, D. Russo, *An Information-Theoretic Analysis of Nonstationary Bandit Learning.* International Conference on Machine Learning (ICML), 2023

- T. McDonald, L. Maystre, M. Lalmas, D. Russo, and K. Ciosek, *Impatient Bandits: Optimizing Recommendations for the Long-Term Without Delay.* Conference on Knowledge Discovery and Data Mining (KDD), 2023

- L. Maystre and D. Russo, *Temporally-Consistent Survival Analysis*, Advances in Neural Information Proecssing Systems (NeurIPS), 2022
- T. Zhang, D. Russo, A. Zeevi, *Learning to Stop with Surprisingly Few Samples*, Conference on Learning Theory (COLT), 2021
- J. Bhandari and D. Russo, *On the Linear Convergence of Policy Gradient Methods for Finite MDPs.* Artificial Intelligence and Statistics (AISTATS), 2021
- D. Russo, *Worst-Case Regret Bounds for Exploration via Randomized Value Functions.* Advances in Neural Information Processing Systems (NeurIPS), 2019
- J. Bhandari, D. Russo, and R. Singal, *A Finite Time Analysis of Temporal Difference Learning with Linear Function Approximation.* Conference on Learning Theory (COLT), 2018.
- C. Qin, D. Klabjan and D. Russo, *Improving the Expected-Improvement Algorithm.* Advances in Neural Information Processing Systems (NeurIPS), 2017.
- D. Russo and J. Zou, *Controlling Bias from Data Exploration via Information Usage.* Artificial Intelligence and Statistics (AISTATS), 2016.
  - Full oral presentation; top 7% of submissions
- D. Russo, *Simple Bayesian Algorithms for Best Arm Identification.* Conference on Learning Theory (COLT), 2016.
- D. Russo and B. Van Roy, *Eluder Dimension and the Sample Complexity of Optimistic Exploration.* Advances in Neural Information Processing Systems (NeurIPS), 2013.
  - Full oral presentation; top 1.4% of submissions.
- I. Osband, D. Russo and B. Van Roy, *(More) Efficient Reinforcement Learning Via Posterior Sampling.* Advances in Neural Information Processing Systems (NeurIPS), 2013.
- N. Arnosti and D. Russo, *Welfare-Improving Cascades and the Effect of Noisy Reviews.* Workshop on Internet & Network Economics (WINE), 2013.

Honors and Awards

- Frederick W. Lanchester Prize, 2022 :
  - *Awarded to ' a paper, a book, or a group of books or papers that represent the "best contribution to operations research and the management sciences published in English in the past five years"*
- First place in INFORMS 2016 Junior Faculty Interest Group (JFIG) paper competition
- First place in INFORMS George Nicholson 2014 student paper competition
- Accel Fellowship 2014-2015
- Stanford Graduate Fellowship 2011-2014
- University of Michigan 2011 Ferrando Honors Prize:
  - "*Awarded annually to the best senior pursuing honors in Economics*".

Teaching Experience

2017-2022 **Columbia Business School**, *Columbia University*.
Managerial Statistics (MBA Core)
Dynamic Programming and Reinforcement Learning (PhD).

2016-2017 **Kellogg School of Management**, *Northwestern University*.
Operations Mangement (MBA Core)
Statistical Learning in Sequential Decision Making (PhD).

Invited Talks

2022-2023 Simons Institute for the Theory of Computing at UC Berkeley; ACM Conference on Recommender Systems - RecSys; MIT Conference on Digital Experimentation; Hong Kong University of Science and Technology; Carnegie Mellon Operations Research; Columbia Data Science Institute; Winter Operations Conference; McCombs School of Business, UT Austin; University of Chicago Booth School of Business; University of Southern California Marshal School of Business; MIT Data Science Lab;

2021-2022 INSEAD Technology and Operations Management; Penn State Operations Research; National University of Singapore Young Mathematicians Lecture Series; University of Minnesota ISyE; Stanford Information Systems Laboratory; Stochastic Networks, Applied Probability, and Performance (SNAPP) Virtual Seminar; Cornell Tech; Stanford GSB (OIT group); Reinforcement Learning Theory Seminar; University of Washington; Linkedin

2020-2021 UC Berkeley Simons Institute for the Theory of Computing — Workshop on Mathematics of Online Decision Making; University of Illinois Institute for Data Science and Dynamical Systems; MIT Operation Research Center Colloquium; Data Science Lab; Georgia Tech Machine Learning Seminar; Cornell Tech; Reinforcement Learning Theory Seminar

2019-2020 Cornell ORIE; University of Washington ADSI Workshop on Learning and Control; Mostly OM workshop; Microsoft Research New York; Spring talks canceled due to COVID-19 Pandemic

2018-2019 Columbia Economics; Two Sigma; Michigan EECS; Institute for Mathematics and its Applications; Princeton ECE;

2017-2018 MIT LIDS; Columbia DRO; Netflix;

2016-2017 National University of Singapore - Decision Sciences department; Google Deep Mind; Uber Data Science; Stanford RL Forum;

2015-2016 Duke Decision Sciences; Microsoft Research New York; Chulalongkorn University; Stanford GSB; Harvard SEAS; Michigan IOE; Georgia Tech ISYE; Chicago Booth; USC Marshall; UT Austin ECE; Microsoft Research New England; Columbia IEOR; Columbia DRO; NYU Stern;

2014-2015 Kellogg School of Management; Microsoft Research Redmond; Stanford Information Theory Forum; Allerton Conference–invited session showcasing the "Class of 2014"; NIPS Bayesian Optimization Workshop - speaker and panelist;

2013-2014 NIPS Oral Presentation

Professional Service

○ Associate Editor for: *Management Science* and *Stochastic Systems*.

- Ad-hoc Reviewer for:
  - *Academic Journals*: Operations Research; Management Science; Journal of Machine Learning Research; Stochastic Systems; Electronic Journal of Statistics; Journal of Applied Probability; Computational Optimization and Applications; Production and Operations Management; IEEE Transaction on Information Theory;
  - *Machine Learning Conferences:* NEURIPS; ICML; COLT; ALT; AISTATS; ICLR (area chair in 2023)

Outside Activities

Columbia Business School requires faculty members to disclose any activities that might present a real or apparent conflict of interest. I currently consult for Spotify.