

# Daniel Russo

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📄 <http://djrusso.github.io/>

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## 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*)

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## Employment

- Since 2017 **Columbia Business School**, *New York, NY*.  
Current title: 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

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## Research Interests

Topics in sequential decision-making under uncertainty and statistical machine learning, including theory and applications of online optimization, sequential design of experiments, multi-armed bandits, and reinforcement learning.

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## Journal Papers Under Review

- C. Qin and D. Russo, *Adaptivity and Confounding in Multi-Armed Bandit Experiments*.
- D. Russo, *Approximation Benefits of Policy Gradient Methods with Aggregated States*. Major revision at Management Science.
- J. Bhandari and D. Russo, *Global Convergence Guarantees for Policy Gradient Methods*. Minor revision at Operations Research.

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## Published Journal Papers

- 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 and B. Van Roy, *Satisficing in Time Sensitive Bandit Learning*. Mathematics of Operations Research (to appear).
- D. Russo, *A Note on the Equivalence of Upper Confidence Bounds and Gittins Indices for Patient Agents*. Operations Research, 2020.
- D. Russo, *Simple Bayesian Algorithms for Best Arm Identification*. Operations Research, 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, 2019.
- I. Osband, B. Van Roy, D. Russo, and Z. Wen, *Deep Exploration via Randomized Value Functions*. Journal of Machine Learning Research, 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.

## Conference Papers

\*Papers displayed in gray are superseded by journal papers listed elsewhere.

- 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.

## Selected working papers

- L. Maystre, D. Russo, and Y. Zhao, *Optimizing Audio Recommendations for the Long-Term*.
- T. Zhang, D. Russo, A. Zeevi, *Learning to Stop with Surprisingly Few Samples*.
- S. Min, C. Moallemi, D. Russo, *Policy gradient optimization of Thompson sampling policies*.

## Honors and Awards

- First place in INFORMS 2016 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

- 2017-2019 **Columbia Business School, Columbia University**.  
 Managerial Statistics (MBA Core)  
 Dynamic Programming and Reinforcement Learning (PhD).
- 2016-2017 **Kellogg School of Management, Northwestern University**.  
 Operations Management (MBA Core)  
 Statistical Learning in Sequential Decision Making (PhD).

## Invited Talks

- 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;
- 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;

## 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.*