

ALEX PEYSAKHOVICH, PH.D.

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Summary

I do basic and applied research in AI, data science, and behavioral economics. At Facebook I led or was a major contributor to projects including advanced experimentation systems, large scale embedding systems, personalization of Facebook News Feed, applications of deep learning, and bad actor detection. My research has been published in top journals/conferences (e.g. *Nature*, *NeurIPS*, *ICLR*, *WWW*). My popular writing has been published in the *New York Times* and *WIRED*. Way back in the day I was profiled in *Pacific Standard*.

Work Experience

FACEBOOK | ARTIFICIAL INTELLIGENCE RESEARCH (NEW YORK, NY) | 09/2016-CURRENT

Senior research scientist doing both basic and applied research in machine learning, reinforcement learning, algorithmic economics, and graph embeddings.

FACEBOOK | CORE DATA SCIENCE / NEWS FEED (MENLO PARK, CA) | 05/2014-09/2016

Technical lead for applied research in experimentation, personalization, and surveys.

Applied Machine Learning / Data Science Projects

- **Built advanced counterfactual reasoning tools.** These tools are used by engineers across the company to understand the impact of changes they make. Various novel methods from this research program are detailed in papers published at major computer science conferences including *WWW*, *Economics and Computation*, *ICML*
- Worked on **large scale market equilibrium computation.** My work has been applied in ecosystem balancing for social media, revenue forecasting, and fair division. Papers detailing these ideas have been published in venues such as *ACM-EC*, *AAAI-AI Ethics and Society*, and *Mechanism Design for Social Good*
- Major contributor to **PyTorch Big Graph (PBG)**, a state-of-the-art large scale graph embedding system. The system is used across the company for personalization, data science, and site integrity tasks. PBG is open-sourced on GitHub and an academic paper describing PBG was published in *SysML 2019*
- Helped **integrate survey data into evaluation of News Feed** ranking as well as ad delivery. Key parts of this project are described in popular press in the *New York Times* and *Slate*.
- Architected AI system for **detection of clickbait** on Facebook News Feed. The system is described in a public facing Facebook [blog post](#). It remains deployed in production. This was a big change to Facebook that was covered by outlets including *The New York Times*, *Forbes*, and *The Wall Street Journal*.

Representative Publications

See my website for full list of research papers/publications

- Advanced Experimentation – I have worked on using machine learning as a tool for improving experimentation in both industry and behavioral/social science.
 - Using methods from machine learning to evaluate behavioral models of choice under risk and ambiguity *Journal of Economic Behavior and Organizations* 2017 (with Jeff Naecker)

- Learning causal effects from many randomized experiments using regularized instrumental variables *WWW 2018* (with Dean Eckles)
- Observational Data for Heterogeneous Treatment Effects with Application to Recommender Systems *EC2019* (with Akos Lada, Michael Bailey, Diego Aparicio)
- Reinforcement Learning & Game Theory – My collaborators and I focus on using modern deep reinforcement learning to construct artificial agents that can cooperate, communicate, coordinate, and adapt to the norms of other agents (e.g. people).
 - Learning Existing Social Conventions in Markov Games *AAAI-AI Ethics and Society 2019* [Best Paper] (with Adam Lerer)
 - Multi-agent cooperation and the emergence of (natural) language *ICLR 2017* (with Angeliki Lazaridou, Marco Baroni)
- Market Design and Optimization – Collaborators in optimization and I have studied how to solve an important economic problem: computing the equilibrium prices of a large market. We have shown how to scale existing algorithms to much larger instances and how to apply these ideas to problems in mechanism design as well as fair division.
 - Computing Large Market Equilibria Using Abstractions *EC2019* (with Christian Kroer, Eric Sodomka, Nico Stier-Moses)
 - Robust Market Equilibria With Uncertain Preferences *AAAI2020* (with Riley Murray, Parikshit Shah, Christian Kroer)
 - Fair Division Without Disparate Impact *Mechanism Design for Social Good* (with Christian Kroer)
- Behavioral Economics – My older work focuses on basic science questions of understanding human cooperation and building mechanisms that can achieve more cooperative groups.
 - Cooperating with the Future *Nature 2014* (with Oliver Hauser, David Rand, Martin Nowak)
 - Habits of virtue: creating norms of cooperation and defection in the laboratory *Management Science 2015* (with David Rand)

Skills & Programming Languages

- Machine learning, statistics, deep learning, economics, game theory, psychology, experimental design, econometrics, network analysis, data science, R, Python, PyTorch, SQL/HQL

Education

POST DOC | 04/2013-05/2014 | YALE UNIVERSITY

- PI: Prof. David Rand

PHD IN ECONOMICS | 09/2009-03/2013 | HARVARD UNIVERSITY

- Committee: Alvin E. Roth & Drew Fudenberg (co-advisers), David Laibson, Uma Karmarkar

BS | 05/2009 | NEW YORK UNIVERSITY

- Double Major in Math and Economics