ALEX PEYSAKHOVICH, PH.D.

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Summary

I do basic and applied research in AI, data science, and economics. At Facebook I led or was a major contributor to projects including advanced counterfactual reasoning systems, large scale embedding systems, personalization, applications of deep learning, and bad actor detection. My research has been published in top journals/conferences (examples: *Nature, ICLR, ICML*). 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

Research scientist working on applied research in experimentation, personalization, and surveys. Responsible for setting projects and goals as technical lead of News Feed data science team.

Applied AI 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 mechanism design.** My work has been applied in ecosystem balancing for social media as well as revenue forecasting. Papers detailing these ideas have been published in venues such as *ACM-EC*, *AAAI-AI Ethics and Society*, and *Mechanism Design for Social Good*
- Helped build tools to **interpret black box machine learning models**
- 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*.

Basic Research

This includes some representative publications, see my website for full list of research papers

- Counterfactual Reasoning – 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)

· Mechanism Design – I have worked on large scale algorithms for fair allocation of items with scarcity as well as market equilibrium computation.
- Computing large scale market equilibria using abstraction *ACM-EC 2019 (*with Christian Kroer, Eric Sodomka, Nico Stier-Moses)
- Fair division without disparate impact *Mechanism Design for Social Good* (with Christian Kroer)

· Reinforcement Learning & Game Theory – Some of my work focuses 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).
- Prosocial learning agents solve generalized Stag Hunts better than selfish ones *AAMAS 2018* (with Adam Lerer)
- Multi-agent cooperation and the emergence of (natural) language *ICLR 2017* (with Angeliki Lazaridou, Marco Baroni)

· 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)
- Social heuristics shape intuitive cooperation *Nature Communications 2014* (with David Rand, Gordon Kraft-Todd, George Newman, Owen Wurzbacher, Martin Nowak, Joshua Greene)
- 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's Human Cooperation Lab
· 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
· Undergraduate Adviser: Adam Brandenburger

Information about grants/awards/honors received, presentations given, patents held, classes taught, program committee membership, etc… available upon request.