ALEX PEYSAKHOVICH

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Research Interests

I am interested in topics at the border of computer science and behavioral/social science. I use tools from game theory to answer questions in AI (building smarter agents) and tools from computer science to answer questions in behavioral science and market design (machine learning for experiments, deep learning for market design).

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.

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

Joint appointment between Program for Evolutionary Dynamics and Yale's Human Cooperation Lab
PI: Prof. Martin Nowak and 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

Research

"Maintaining cooperation in complex social dilemmas using deep reinforcement learning" (with Adam Lerer) [Under review]

"Learning existing social conventions in Markov games" (with Adam Lerer) [Under review]

"In-Group favoritism caused by Pokemon Go and the use of machine learning for principled investigation of potential moderators" (with David Rand) [Revise and Resubmit Nature Scientific Reports]

"Improving pairwise comparison models using Empirical Bayes" (with Stephen Ragain, Johan Ugander) [Under review]

"Backplay: 'Man Muss Immer Umkeheren'" (with Cinjon Resnick, Roberta Raileanu, Sanyan Kapoor, Kyunghyun Cho, Joan Bruna) [Under review]

"Paying (for) Attention: The Impact of Information Processing Costs on Bayesian Inference" (with Xiaosheng Mu, Scott Kominers) [Under review]

2018 Publications

"Prosocial learning agents solve generalized Stag Hunts better than selfish ones" (with Adam Lerer) [AAMAS2018]

"Consequentialist conditional cooperation in social dilemmas with imperfect information" (with Adam Lerer) [ICLR2018]

"Learning causal effects from many randomized experiments using regularized instrumental variables" (with Dean Eckles) [WWW2018]

"Towards AI that can solve social dilemmas" (with Adam Lerer) [AAAI2018 Spring Symposium Series]

2017 Publications

Multi-Agent Cooperation and the Emergence of (Natural) Language" (with Angeliki Lazaridou and Marco Baroni) [ICLR2017]

"Using methods from machine learning to evaluate models of human choice under uncertainty" (with Jeff Naecker) [Journal of Economic Behavior and Organization]

"Detecting heterogeneous treatment effects by combining observational and experimental data" (with Akos Lada) [CODE@MIT]

2016 Publications

"The Good, the Bad, and the Unflinchingly Selfish: Cooperative Decision-Making Can Be Predicted with High Accuracy Using Only Three Behavioral Types" (with Ziv Epstein and Dave Rand) [EC2016]

"Recency, Records and Recaps: Learning and Non-equilibrium Behavior in a Simple Decision Problem" (with Drew Fudenberg) [EC2014, reprinted in Transactions on Economics and Computation 2016]

2015 Publications

"When Punishment Doesn't Pay: 'Cold Glow' and Decisions to Punish" (with Aurelie Ouss) [Journal of Law and Economics]

"Asymmetric Impacts of Favorable and Unfavorable Information on Decisions Under Ambiguity" (with Uma Karmarkar) [Management Science]

"Habits of Virtue: creating norms of cooperation and defection in the laboratory" (with David Rand) [Management Science]

2014 Publications

"Cooperating with the future" (with Oliver Hauser, David Rand and Martin Nowak) [Nature]

"Humans display a 'cooperative phenotype' that is domain general and temporally stable" (with Martin Nowak and David Rand) [Nature Comms]

"Why We Cooperate" (with Jillian Jordan and David Rand) [Chapter in "The Moral Brain: Multidisciplinary Perspectives"]

"Social Heuristics Shape Intuitive Cooperation" (with David Rand, Gordon Kraft-Todd, George Newman, Owen Wurzbacher, Martin Nowak and Joshua Greene) [Nature Comms]

"How to Commit (If You Must): Commitment Contracts and the Dual-Self Model" [Journal of Economic Behavior and Organization]

2012 Publications

"A Note on Proper Scoring Rules and Risk Aversion" (with Mikkel Plagborg-Moller) [Economics Letters]

Applied Machine Learning / Data Science Projects

· **Led team** that built **advanced experimentation tools** for Facebook News Feed. These tools are used by engineers across the company to understand the impact of changes they make. Some of these tools required novel methods and were later published in a top computer science conference (WWW). Multiple shorter papers from our group on this topic were accepted to MIT's annual Conference for Digital Experimentation over the years, they are available upon request.
· Helped build tools to **interpret black box machine learning models**
· Major contributor to **large scale graph embedding system** that creates vector representations of users/pages/groups/domains using entire Facebook interaction graph (trillions of edges, billions of entities). The system is used across the company for personalization, data science, and site integrity tasks.
· Helped **integrate survey data into evaluation of News Feed** ranking as well as ad delivery. Among other applications, these surveys were used to evaluate changes to ranking algorithms at Facebook. Key parts of this project are described 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*.
· Built key systems to **apply computer vision and natural language processing to the evaluation of ad creative**

Classes Taught
HARVARD UNIVERSITY
Sophomore Tutorial on Behavioral, Experimental, and Neuroeconomics
Designed and led full semester class for a dozen undergraduates on recent research.

Undergraduate Market Design (TA for Susan Athey)

Refereeing/Program Committee Membership

· *Proceedings of the National Academy of Sciences, PLoS, Quarterly Journal of Economics, Experimental Economics, Journal of Economic Behavior and Organization, ICML, NIPS, ICLR, AAAI, Management Science, Journal of Public Economics, Social, Cognitive and Affective Neuroscience*