Michael Shvartsman

Research Scientist
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Overview

I currently lead the human data research program for FAIR's AI Research Agents (NeurIPS 2025), focusing on autonomous systems for ML research. I have driven multiple ML research projects across different research domains (e.g. active learning, foundation models) from conception to publication and open-source release (AEPsych) or industry application. By bridging the gap from theory and methods development to application, I have enabled orders-of-magnitude improvements in data efficiency in academic (JoV 2025) and industry (SIGGRAPH 2022) settings. I take applied problems as motivation for development of techniques that push AI forward more broadly.

Education and work experience

Meta (FAIR & Reality Labs)
Research Scientist, Tech Lead / Manager 2018–present
HUMAN DATA & TRAINING LEAD, AI RESEARCH AGENTS (2025–PRESENT)

- **Lead the human data strategy** for FAIR's AI Research Agents project, including defining protocols, establishing quality gates, and guiding human data post-training (SFT/DPO).

- **Scaled data acquisition** from zero to a multi-million-dollar delivery in under 6 months by engaging with 5+ vendors and 4+ annotation protocols (45+ distinct vendor engagements).

- **Direct a workstream of 3+** technical and non-technical staff.

NEURAL INTERFACES & FOUNDATION MODELS FOR EMG (2019, 2023–2025)

- **Performed technical due diligence** on modeling and training infrastructure for the **$500M+ acquisition** of CTRL-Labs, the technology behind Meta's Neural Wristband.

- **Developed the modeling and experimentation** strategy for FAIR's surface electromyography (sEMG) foundation model based on thousands of hours of high-frequency electrophysiology recordings and trained on industry-scale compute infrastructure.

- **Demonstrated neural scaling laws** for biological signals and drafted a manuscript (under internal review).

- **Transferred the foundation model** to Meta's EMG product organization, where it underpins next-generation interface research.

HUMAN-IN-THE-LOOP PERCEPTION AND PREFERENCES (2020-2023)

- **Pioneered ML-driven human-in-the-loop experimentation** in Reality Labs, and created the team that developed AEPsych, an open-source platform enabling SOTA results in this domain (AISTATS 2022; AAAI 2023; UAI 2024).

- **Drove adoption of AEPsych to 3+ internal teams and 2+ external labs**, where it accelerates experiments by orders of magnitude and thereby enables studies not previously possible in both applied (e.g. SIGGRAPH 2022), and academic (e.g. JoV 2025) settings.

- Hired 1 FTE and secured budget for 3 contractors, **drove a direct report's promotion to L5 (senior) level**, and ran planning and goal-setting for a team of 5+ scientists, engineers and prototypers.

Org impact and service (2018–present)

- **Co-authored a charter** to consolidate research efforts into a new AI team focused on human-machine collaboration, an initiative that has since grown to a 20+ person organization.

- Formally **mentored 5+ engineers and scientists** from junior to senior levels (L3-L5) outside my direct reporting chain.

- **Created and led an org-wide diversity, equity and inclusion** champions initiative.

- **Mentored 9+ PhD interns** on topics including multi-scale memory systems, adaptive experimentation, theory of deep learning, brain-computer interfaces (EEG, DOT) and action recognition.

Princeton University
Postdoctoral Research Associate 2014–2018
Advisor: J. D. Cohen

- Built a theory and model of the dynamics of multi-stimulus decision making, extending the diffusion decision model and sequential probability ratio test. **Predicted human behavior patterns zero-shot** in a new task.

- Unified multiple neuroimaging analysis methods under a common statistical framework based on matrix-variate Gaussian models with Kronecker-separable covariance, resulting in both new theoretical understanding and improved performance. **Open-sourced as part of the brainIAK package**, in collaboration with Intel labs.

University of Michigan
Ph.D., Psychology (Cognition & Cognitive Neuroscience) 2009-2014
Committee: R. L. Lewis & S. Singh Baveja (co-chairs), J. Boland, J. Brennan, J. Hale

- Designed, performed and analyzed eye-tracking and computational experiments to understand human eye movement behavior as bounded-optimal control. **Implemented and optimized high-throughput simulations on government-scale (AFRL) compute clusters**.

- **Co-advised 4 undergraduate senior theses and one accelerated master's thesis**, and mentored additional undergraduates.

Cognitive Neuroscience of Language Lab, University of Maryland
Research Assistant 2008-2009

- Designed and executed behavioral and neuroimaging experiments, resulting in a publication, and drove infrastructure upgrades.

Gartner, Inc
Associate Product Manager 2007-2008

- Managed the full product lifecycle for a new research offering, driving its expansion from pilot to a worldwide launch that significantly exceeded revenue and adoption targets; presented analyses to guide strategy at the executive level.

Yale University
B.A., Linguistics 2007
Senior thesis advisor: Maria Piñango

Professional Activities, Service, & Awards

- **Founding organizer**, Conference on the Mathematical Theory of Deep Neural Networks (DeepMath), 2018–2022

- **Reviewing**: AISTATS **(Area Chair since 2022)**, ICLR, ICML, NeurIPS, AAAI, UAI, TMLR, Cognitive Science, Psychological Review, Journal of Experimental Psychology: General, Journal of Memory and Language, NeuroImage, Frontiers in Psychology, Quarterly Journal of Experimental Psychology, Computational Brain and Behavior, Open Mind.

- **Open-source contributions**: creator of the AEPsych package for adaptive experimentation in psychophysics; primary developer of brainiak.matnormal prototyping toolkit for kronecker-separable covariance models for neuroscience; contributor to botorch, gpytorch, pymanopt.

- **Career development talks**: University of Puget Sound Neuroscience Dept., Princeton Neuroscience Institute, International Brain Lab, University of Michigan Psychology Dept.

Skills and Languages

- **Research focus**: agentic LLMs; foundation models for biosignals; AI for science (AI for AI, neuroscience, cognitive science); Gaussian Processes for sample-efficient learning.

- **Technical skills**: scientific programming: expert Python (NumPy, SciPy, etc) & R (data.table, lme4, rstan), familiarity with C++, Unity/C#, and MATLAB; High-throughput and high-performance computing; Deep learning frameworks (PyTorch, HuggingFace Accelerate, fairseq2); Neuroimaging methods (fMRI, EEG/MEG/EMG, DOT).

- **Leadership & Execution**: research planning, alignment, and roadmapping; people management (hiring, performance, career growth); project management; vendor management.

- **Languages**: English, Russian, Hebrew, basic French.

Selected Publications & Talks

For a complete list, see https://scholar.google.com/citations?user=DFmkeEQAAAAJ

JOURNAL ARTICLES, BOOK CHAPTERS, AND PROCEEDINGS

Toledo, E., Hambardzumyan, K., Josifoski, M., Hazra, R., ..., **Shvartsman, M.**, et al. (2025). AI Research Agents for Machine Learning: Search, Exploration, and Generalization in MLE-bench. NeurIPS 2025. [pdf]

Zhao, B., Magka, D., Jiang, M., Li, X., ..., **Shvartsman, M.**, et al. (2025). The Automated LLM Speedrunning Benchmark: Reproducing NanoGPT Improvements. NeurIPS 2025. [pdf]

Mehlman, N., Gagnon-Audet, J., **Shvartsman, M.**, Niu, K., Miller, A. H., and Sodhani, S. (2025). Scaling and Distilling Transformer Models for sEMG. *TMLR*. [pdf]

Williams, A., Hong, F., Sanders, C., **Shvartsman, M.**, Guan, P., and Brainard, D. (2025). A Wishart Process model combined with adaptive sampling for efficiently capturing discrimination thresholds in high-dimensional stimulus spaces. *Journal of Vision.* DOI:10.1167/jov.25.9.2641

Shvartsman, M., Letham, B., Bakshy, E., and Keeley, S. (2024). Response Time Improves Gaussian Process Models for Perception and Preferences. UAI 2024. [pdf]

Keeley, S., Letham, B., Tymms, C., Sanders, C., and **Shvartsman, M**. A Semi-Parametric Model for Decision Making in High-Dimensional Sensory Discrimination Tasks. AAAI 2023. [pdf]

Letham, B., Guan, P., Tymms, C., Bakshy, E., and **Shvartsman, M**. Look-Ahead Acquisition Functions for Bernoulli Level Set Estimation. AISTATS 2022. [pdf]

Shvartsman, M., Sundaram, N., Aoi, M., Charles, A., Willke, T., and Cohen, J. D. (2018). Matrix-variate models for fMRI analysis. AISTATS 2018. [pdf]

Shvartsman, M., Srivastava, V., and Cohen, J. D. (2015) A Theory of Decision Making Under Dynamically Changing Context. NeurIPS 2015. [pdf]

WORKING PAPERS, PREPRINTS, AND COMMENTARIES

Shvartsman, M., et al. (in prep.). A foundation model for surface electromyography. Under internal review.

Shvartsman, M., Srivastava, V., Sundaram, N. and Cohen, J. D. (in prep.). A theory of decision making from multiple stimuli. Draft available upon request.

POSTERS AND ORAL PRESENTATIONS (WITHOUT PROCEEDINGS)

Kalra, D., Gagnon-Audet, J., Gromov, A., Mediratta, I., Niu, K., Miller, A. H., and **Shvartsman, M.** A Scalable Measure of Loss Landscape Curvature for Analyzing the Training Dynamics of LLMs. DeepMath 2025 (oral).

Shvartsman, M. (2023) AEPsych: a platform for human-in-the-loop experimentation. **Invited talk** given at STE||AR Colloquium on Artificial Intelligence Research and Optimization @ LSU, and Perceptual Reality Lab @ Berkeley.

Shvartsman, M. (2019). Gaussian processes and cognitive models for joint modeling of brain and behavior. **Invited talk**, Joint Modeling Workshop, Midwest Cognitive Science Conference.

Shvartsman, M., Srivastava, V., Sundaram, N., and Cohen, J. D. (2017) A theory of decision making under changing context. **Invited talk** given at IBM Research; Koditschek Lab, Dept. of Electrical and Systems Engineering, University of Pennsylvania; Frank Lab, Dept. of Cognitive, Linguistic and Psychological Sciences, Brown University.