Michael Shvartsman

Research Scientist
Facebook Reality Labs
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Research Interests

Computational models of human behavior; inferring latent cognitive state from brain and behavior; statistics and machine learning for neuroscience; applications to sentence processing, memory, decision making, cognitive control.

Education and work experience

2018–CURR. **Research Scientist**
Facebook Reality Labs
Planning and executing research at the intersection of computational cognitive science, neuroscience, and machine learning with applications to AR/VR devices; coordinating and collaborating with external research partners; mentoring junior colleagues and interns; providing technical background and decision support to management; working on interdisciplinary teams with engineering, HCI and design.

2014–2018 **Postdoctoral Research Associate**
Princeton University
Advisor: J. D. Cohen
Developed a normative mathematical theory of the dynamics of multi-stimulus decision making; designed statistical methods for analysis of high-dimensional neural data; mentored undergraduate and graduate students; collaborated and published with applied mathematicians, statisticians, and engineers as part of industry-academic collaboration project.

2009-2014 **Ph.D., Psychology (Cognition & Cognitive Neuroscience),**
University of Michigan
Committee: R. L. Lewis & S. Singh (co-chairs), J. Boland, J. Brennan, J. Hale
Designed, performed and analyzed behavioral, eye-tracking, and high-performance computational experiments to drive theoretical developments in the understanding of eye movement control for reading; mentored undergraduate honors and master's research theses.

2008-2009 **Research Assistant, Cognitive Neuroscience of Language Lab,**
University of Maryland
Designed, performed and analyzed behavioral, EEG and MEG experiments; delivered an eye-tracking mini-course; implemented new lab-wide backup system; built a website to support a new university-wide language research initiative.

2007-2008 **Associate Product Manager**
Gartner, Inc.
Coordinated all aspects of a multimillion-dollar product for small technology vendors, including product development and roadmap, marketing, sales and other operations; performed and presented analyses of client usage patterns, retention and other issues to drive business decisions at senior levels (incl. business unit heads and executives).

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

Skills and Interests

Technical Skills: Scientific programming (R, C++, Python, basic MATLAB); high-performance computing; data analysis and statistics (mixed effects / hierarchical models, probabilistic programming, Bayesian data analysis).

Languages: English, Russian, Hebrew, basic French.

References: Available upon request.

Selected Publications & Talks

For complete list, see website.

Journal articles, book chapters, and refereed conference proceedings

2019 Spitzer, M., Musslick S., **Shvartsman, M.**, Shenhav A., and Cohen, J.D. (2019). Asymmetric switch costs as a function of task strength. To appear in Proceedings of the 41st Annual Conference of the Cognitive Science Society (CogSci 2019)

2018 **Shvartsman, M.**, Sundaram, N., Aoi, M., Charles, A., Willke, T and Cohen, J. D. (2018). Matrix-variate models for fMRI analysis. In Storkey, A., and Perez-Cruz, D., Proceedings of the Twenty-First International Conference on Artificial Intelligence and Statistics (AISTATS 2018). Extended version available at arXiv: 1711.03058.

2017 Parker, D., **Shvartsman, M.**, & Van Dyke, J. A. (2017). The cue-based retrieval theory of sentence comprehension: New findings and new challenges. In Escobar, L., Torrens, V., Parodi, T. (eds.) Language Processing and Disorders. Newcastle: Cambridge Scholars Publishing.

2016 Lositsky, O., Chen, J., Toker, D., Honey, C. J., **Shvartsman., M.**, Poppenk, J. L., Hasson, U., and Norman, K. A. (2016). Neural Pattern Change During Encoding of a Narrative Predicts Retrospective Duration Estimates. *eLife*, 5:e16070. DOI: 10.7554/eLife.16070

2016 **Shvartsman, M.**, Srivastava, V., Sundaram, N., and Cohen, J. D. (2016) Using behavior to decode allocation of attention in context dependent decision making. In Reitter, D., and Ritter, F., Proceedings of the 14th International Conference on Cognitive Modeling (ICCM 2016).

2015 **Shvartsman, M.**, Srivastava, V., and Cohen, J. D. (2015) A Theory of Decision Making Under Dynamically Changing Context. In Cortes C., Lawrence N.D., Lee D.D., Sugiyama M., and Garnett R., Proceedings of Advances in Neural Information Processing Systems 28 (NeurIPS 2015).

2014 **Shvartsman, M.**, Lewis, R. L., and Singh, S. Computationally Rational Saccadic Control: An Explanation of Spillover Effects Based on Sampling from Noisy Perception and Memory. Proceedings of the 5th Workshop on Cognitive Modeling and Computational Linguistics (CMCL at ACL 2014). **Best student paper award**.

2013 Lewis, R. L., **Shvartsman, M.**, & Singh, S. (2013). The adaptive nature of eye movements in linguistic tasks: how payoff and architecture shape speed-accuracy trade-offs. *Topics in Cognitive Science*, 5(3), 581–610. DOI:10.1111/tops.12032

2013 Bergelson, E., **Shvartsman, M.**, & Idsardi, W. J. (2013). Differences in mismatch responses to vowels and musical intervals: MEG evidence. *PLoS One*, 8(10). DOI:10.1371/journal.pone.0076758

2010 *Bratman, J., ***Shvartsman, M.***., Lewis, R. L., & Singh, S. (2010). A new approach to exploring language emergence as boundedly optimal control in the face of environmental and cognitive constraints. In Salvucci, D. and Gunzelmann, G., editors, Proceedings of the 10th International Conference on Cognitive Modeling. (*equal

contribution) **Best Student Paper honorable mention**.

Posters and Oral Presentations (without proceedings)

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

2017 **Shvartsman, M.**, Srivastava, V., Sundaram, N., and Cohen, J. D. (2017) A theory of decision making under changing context. **Invited talk**, IBM Research Yorktown Heights.

2017 **Shvartsman, M.**, Srivastava, V., Sundaram, N., and Cohen, J. D. (2017) A theory of decision making under changing context. **Invited talk**, Koditschek Lab, Dept. of Eletrical and Systems Engineering, University of Pennsylvannia.

2017 **Shvartsman, M.**, Srivastava, V., and Cohen, J. D. (2017) Exploring fixed-threshold and optimal policies in multi-alternative decision making. Poster presented at the Multi-disciplinary Conference on Reinforcement Learning and Decision Making (RLDM), Ann Arbor, MI.

2017 **Shvartsman, M.**, Srivastava, V., Sundaram, N., and Cohen, J. D. (2017) A theory of decision making from multiple stimuli. **Invited talk**, Frank Lab, Dept. of Cognitive, Linguistic and Psychological Sciences, Brown University .

2014 **Shvartsman, M.**, Lewis, R. L., & Singh, S. (2014) Spillover frequency effects in a sequential sampling model of reading. Talk given at the 27th annual CUNY conference on human sentence processing. <10% talk acceptance rate.

2012 **Shvartsman, M.**, Lewis, R. L., & Singh, S. (2012) The adaptive nature of eye-movement control in linguistic tasks. Talk given at the 25th annual CUNY conference on human sentence processing. <10% talk acceptance rate.

2011 **Shvartsman, M.**, Lewis, R., Singh, S., Smith, M., & Bartek, B. (2011). Predicting Task Performance from Individual Variation in Eye-Movement Control Strategies. Poster presented at the 24th annual CUNY conference on human sentence processing.

Professional Activities & Awards

2015- Reviewing: Psychological Review, Journal of Experimental Psychology: General, Journal of Memory and Language, Frontiers in Psychology, Quarterly Journal of Experimental Psychology, Cognitive Science conference, NeurIPS.

2018–19 Organizing committee, DeepMath Conference on Mathematical Theory of Deep Neural Networks 2018 and 2019.

2015 Organizing committee, workshop on Random Walks across Decision Making Domains, Computational and Systems Neuroscience (COSYNE) 2015.

2014 Best Student Paper, Cognitive Modeling and Computational Linguistics (CMCL) 2014.

2008 Organizing committee, Formal Approaches to Slavic Linguistics (FASL 17).

Mentoring and Teaching

2010–16 Four honors undergraduate theses (B. Berend, C. Sanders, M. Shyam, E. Wilcox) and one accelerated masters thesis (Y. Kazerooni) co-mentored with faculty. Mentoring additional undergraduate research assistants.

2010–12 Graduate Student Instructor, Introduction to Linguistics and Introduction to Cognitive Psychology. Grader, Introduction to Psycholinguistics.