

# Scott W. Linderman

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CONTACT INFORMATION	Postdoctoral Fellow Department of Statistics Columbia University 1255 Amsterdam Avenue New York, NY 10027 USA	
	email: <a href="mailto:scott.linderman@columbia.edu">scott.linderman@columbia.edu</a> web: <a href="http://www.columbia.edu/~swl2133">http://www.columbia.edu/~swl2133</a>	
EDUCATION	Ph.D., Computer Science <b>Harvard University</b> Advisors: Ryan Adams and Leslie Valiant	2013-2016
	S.M., Computer Science <b>Harvard University</b> Advisor: Leslie Valiant	2011-2013
	B.S., Electrical and Computer Engineering <b>Cornell University</b> <i>Magna cum Laude</i> with Honors in Engineering Honors Advisor: David Delchamps	2004-2008
EMPLOYMENT	Postdoctoral Fellow, Department of Statistics <b>Columbia University</b> Advisors: Liam Paninski and David Blei	2016-present
	Software Development Engineer in Test <b>Microsoft Corporation</b>	2008-2011
GRANTS AND FELLOWSHIPS	Simons Collaboration on the Global Brain Postdoctoral Fellowship	2016
	National Defense Science and Engineering Graduate Fellowship	2011
HONORS AND AWARDS	Best Paper, 20th International Conference on Artificial Intelligence and Statistics (AISTATS) <i>with Christian Naesseth, Francisco Ruiz, and David Blei</i>	2017
	Leonard J. Savage Award, International Society for Bayesian Analysis <i>Outstanding Dissertation in Applied Methodology</i>	2017
	Siebel Scholarship	2015
	Cornell University John McMullen Dean's Merit Scholarship	2004
	CollegeBoard AP Scholar with Distinction	2004
	Rensselaer Medal	2003
PUBLICATIONS	THESIS	
	□ <b>Scott W. Linderman.</b> <i>Bayesian methods for discovering structure in neural spike trains.</i> PhD thesis, Harvard University, 2016. <b>Received the Savage Award from the International Society for Bayesian Analysis.</b>	

#### IN PREPARATION

- Jeffrey E. Markowitz, Winthrop Gillis, Minsuk Hyun, **Scott W. Linderman**, Paneed Jalili, Emalee Peterson, Bernardo L. Sabatini, and Sandeep Robert Datta. Complementary and context-specific encoding of sub-second 3D behavioral modules in striatum. *Cell (In Review)*.
- Robert E. Johnson\*, **Scott W. Linderman\***, Thomas Panier, Carole Wee, Erin Song, Andrew C. Miller, and Florian Engert. Revealing multiple timescales of structure in larval zebrafish behavior. *In Preparation*.
- **Scott W. Linderman**, Annika Nichols, David M. Blei, Manuel Zimmer, and Liam Paninski. Hierarchical recurrent models reveal latent states of neural activity in *C. elegans*. *In Preparation*

#### REFEREED JOURNAL ARTICLES

- **Scott W. Linderman** and David M. Blei. A discussion of “Nonparametric Bayes modeling of populations of networks”. *Journal of the American Statistical Association (In Press)*, 2017.
- **Scott W. Linderman** and Samuel J. Gershman. Using computational theory to constrain statistical models of neural data. *Current Opinion in Neurobiology*, 46:14 – 24, 2017.
- Huseyin Melih Elibol, Vincent Nguyen, **Scott W. Linderman**, Matthew J. Johnson, Amna Hashmi, and Finale Doshi-Velez. Cross-corpora unsupervised learning of trajectories in autism spectrum disorders. *Journal of Machine Learning Research*, 17(133):1–38, 2016.
- **Scott W. Linderman**, Matthew J. Johnson, Matthew A. Wilson, and Zhe Chen. A Bayesian nonparametric approach to uncovering rat hippocampal population codes during spatial navigation. *Journal of Neuroscience Methods*, 263:36–47, 2016.

#### REFEREED CONFERENCE ARTICLES

- **Scott W. Linderman**, Gonzalo E. Mena, Hal Cooper, Liam Paninski, and John P. Cunningham. Reparameterizing the Birkhoff polytope for variational permutation inference. In *Proceedings of the 21st International Conference on Artificial Intelligence and Statistics (AISTATS) (to appear)*, 2018.
- Christian A. Naesseth, **Scott W. Linderman**, Rajesh Ranganath, and David M. Blei. Variational Sequential Monte Carlo. In *Proceedings of the 21st International Conference on Artificial Intelligence and Statistics (AISTATS) (to appear)*, 2018.
- **Scott W. Linderman\***, Matthew J. Johnson\*, Andrew C. Miller, Ryan P. Adams, David M. Blei, and Liam Paninski. Recurrent switching linear dynamical systems. In *Proceedings of the 20th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2017.
- Christian A. Naesseth, Francisco J. R. Ruiz, **Scott W. Linderman**, and David M. Blei. Reparameterization gradients through acceptance-rejection sampling algorithms. In *Proceedings of the 20th International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2017. **Received Best Paper Award**.
- **Scott W. Linderman**, Ryan P. Adams, and Jonathan W. Pillow. Bayesian latent structure discovery from multi-neuron recordings. In *Advances in Neural Information Processing Systems (NIPS)*, 2016.

- **Scott W. Linderman\***, Matthew J. Johnson\*, and Ryan P. Adams. Dependent multinomial models made easy: Stick-breaking with the Pólya-gamma augmentation. In *Advances in Neural Information Processing Systems (NIPS)*, pages 3438–3446, 2015.
- **Scott W. Linderman**, Christopher H. Stock, and Ryan P. Adams. A framework for studying synaptic plasticity with neural spike train data. In *Advances in Neural Information Processing Systems (NIPS)*, pages 2330–2338, 2014.
- **Scott W. Linderman** and Ryan P. Adams. Discovering latent network structure in point process data. In *Proceedings of the International Conference on Machine Learning (ICML)*, pages 1413–1421, 2014.

#### NON-REFEREED ARTICLES

- **Scott W. Linderman** and Ryan P. Adams. Scalable Bayesian inference for excitatory point process networks. *arXiv preprint arXiv:1507.03228*, 2015.

#### WORKSHOP PAPERS AND ABSTRACTS

- **Scott W. Linderman**, Yixin Wang, and David M. Blei. Bayesian inference for latent Hawkes processes. *Advances in Approximate Bayesian Inference Workshop at the 31st Conference on Neural Information Processing Systems*, 2017.
- Gonzalo E. Mena, **Scott W. Linderman**, David Belanger, Jasper Snoek, John P. Cunningham, and Liam Paninski. Toward Bayesian permutation inference for identifying neurons in *C. elegans*. *Workshop on Worm’s Neural Information Processing at the 31st Conference on Neural Information Processing Systems*, 2017.
- E. Kelly Buchanan, Akiva Lipschitz, **Scott W. Linderman**, and Liam Paninski. Quantifying the behavioral dynamics of *C. elegans* with autoregressive hidden Markov models. *Workshop on Worm’s Neural Information Processing at the 31st Conference on Neural Information Processing Systems*, 2017.
- **Scott W. Linderman** and Matthew J. Johnson. Structure-exploiting variational inference for recurrent switching linear dynamical systems. *IEEE International Workshop on Computational Advances in Multi-Sensor Adaptive Processing*, 2017.
- **Scott W. Linderman**, Andrew C. Miller, Ryan P. Adams, David M. Blei, Matthew J. Johnson, and Liam Paninski. Neuro-behavioral analysis with recurrent switching linear dynamical systems. *Computational and Systems Neuroscience (Cosyne) Abstracts*, 2017.
- Christian A. Naesseth, Francisco J. R. Ruiz, **Scott W. Linderman**, and David M. Blei. Rejection sampling variational inference. *Advances in Approximate Bayesian Inference Workshop at the 30th Conference on Neural Information Processing Systems*, 2016.
- Zhe Chen, **Scott W. Linderman**, and Matthew A. Wilson. Bayesian nonparametric methods for discovering latent structures of rat hippocampal ensemble spikes. *IEEE Workshop on Machine Learning for Signal Processing*, 2016.
- **Scott W. Linderman**, Aaron Tucker, and Matthew J. Johnson. Bayesian latent state space models of neural activity. *Computational and Systems Neuroscience (Cosyne) Abstracts*, 2016.
- **Scott W. Linderman**, Ryan P. Adams, and Jonathan W. Pillow. Inferring structured connectivity from spike trains under negative-binomial generalized linear models. *Computational and Systems Neuroscience (Cosyne) Abstracts*, 2015.

- Matthew J. Johnson, **Scott W. Linderman**, Sandeep R. Datta, and Ryan P. Adams. Discovering switching autoregressive dynamics in neural spike train recordings. *Computational and Systems Neuroscience (Cosyne) Abstracts*, 2015.
- **Scott W. Linderman**. Discovering latent states of the hippocampus with Bayesian hidden Markov models. *CBMM Memo 024: Abstracts of the Brains, Minds, and Machines Summer School*, 2014.
- **Scott W. Linderman**, Christopher H. Stock, and Ryan P. Adams. A framework for studying synaptic plasticity with neural spike train data. *Annual Meeting of the Society for Neuroscience*, 2014.
- Shamim Nemati, **Scott W. Linderman**, and Zhe Chen. A probabilistic modeling approach for uncovering neural population rotational dynamics. *Computational and Systems Neuroscience (Cosyne) Abstracts*, 2014.
- **Scott W. Linderman** and Ryan P. Adams. Fully-Bayesian inference of structured functional networks in GLMs. *Acquiring and Analyzing the Activity of Large Neural Ensembles Workshop at Neural Information Processing Systems (NIPS)*, 2013.
- **Scott W. Linderman** and Ryan P. Adams. Inferring functional connectivity with priors on network topology. *Computational and Systems Neuroscience (Cosyne) Abstracts*, 2013.

#### INVITED TALKS

#### RESEARCH TALKS

- *Bayesian Learning and Inference with Recurrent Switching Linear Dynamical Systems* Machine Learning and Friends Seminar, UMass Amherst. May 4, 2017.
- *Bayesian Learning and Inference with Recurrent Switching Linear Dynamical Systems* Models, Inference, and Algorithms (MIA) Seminar, The Broad Institute. April 12, 2017.
- *Neuro-Behavioral Analysis with Recurrent Switching Linear Dynamical Systems* Workshop on High-Dimensional Neuro-Behavioral Analysis, Cosyne. February 28, 2017.
- *Neuro-Behavioral Analysis with Recurrent Switching Linear Dynamical Systems* Statistical Analysis of Neural Data Seminar, Stanford University. February 22, 2017.
- *Bayesian Methods for Discovering Network Structure in Neural Spike Trains*. Connectomics II Workshop, Neural Information Processing Systems (NIPS). December 10, 2016.
- *Discrete Models with Continuous Latent Structure*. Statistics and Math Reading Club, The Broad Institute. October 19, 2015.
- *Discovering Latent Structure in Neural Spike Trains with Negative Binomial Generalized Linear Models* Computational Statistics and Neuroscience Seminar, Columbia University. March 18, 2015.
- *Discovering Latent Network Structure in Neural Spike Trains*. Machine Learning and Friends, University of Massachusetts at Amherst. February 12, 2015.
- *Discovering Interpretable Structure in Neural Spike Trains with Negative Binomial GLMs*. Applied Statistics Seminar, University of Washington. January 8th, 2015.

- *Discovering Interpretable Structure in Neural Spike Trains with Negative Binomial GLMs.*  
Harvard Center for Brain Science (CBS) Neurolunch, December 3rd, 2014.
- *Discovering Latent Network Structure in Point Process Data.*  
Lazer Lab Meeting, Northeastern University. September 4th, 2014.
- *Discovering Latent Network Structure in Point Process Data.*  
Harvard Computer Science Colloquium. July 24th, 2014.
- *Discovering Latent Networks in Neural Spike Train Recordings.*  
David Cox Lab Meeting, Harvard University. July 10th, 2014.
- *Fitting Biophysical Models to Optical Fluorescence Traces.*  
Adam Cohen Lab Meeting, Harvard University. May 5th, 2014.
- *Discovering Latent Network Structure in Spiking Data.*  
Boston Data Mining Meetup. May 1st, 2014.
- *Discovering Latent Network Structure in Spiking Data.*  
Applied Statistics Workshop, Harvard University. September 4th, 2013.

RESEARCH EXPERIENCE	<p><b>Brains, Minds, and Machines</b>, Woods Hole, MA 2014 <i>Marine Biological Laboratory, Woods Hole Oceanographic Institute</i> Coordinators: Tomaso Poggio and L. Mahadevan</p> <p><b>Mining and Modeling Neural Data</b>, Berkeley, CA 2013 <i>Redwood Center for Theoretical Neuroscience, U.C. Berkeley</i> Coordinators: Friedrich Sommers and Jeff Teeters</p> <p><b>Biophysics and Computation in Neurons and Networks</b>, Princeton, NJ 2012 <i>Princeton University</i> Coordinators: David Tank and Michael Berry</p> <p><b>Air Force Research Laboratory</b>, Rome, NY 2003-2006 <i>Research and Development Intern</i> Knowledge Systems, Information Directorate</p>
TEACHING	<p>TEACHING FELLOW</p> <p><b>CS229: Biology and Complexity</b>, Harvard University 2015 Instructor: Leslie Valiant</p> <p><b>CS228: Computational Learning Theory</b>, Harvard University 2014 Instructor: Leslie Valiant</p> <p><b>CS281: Advanced Machine Learning</b>, Harvard University 2013 Instructor: Ryan Adams</p> <p>READING GROUP ORGANIZER</p> <p><b>Columbia Advanced Machine Learning Seminar</b> 2016-2017 web: <a href="https://casmls.github.io">https://casmls.github.io</a></p>
REVIEWING AND SERVICE	<p><b>Co-organizer, Workshop on Automated Neuro-behavioral Analysis</b>, 2017 Computational and Systems Neuroscience (Cosyne) Conference</p> <p><b>Co-organizer, Workshop on Discovering Structure in Neural Data</b>, 2014 Computational and Systems Neuroscience (Cosyne) Conference</p>

Reviewer for Neural Information Processing Systems (NIPS), International Conference on Machine Learning (ICML), Neural Computation, PLoS Computational Biology, Journal of Computational Neuroscience, Conference on Artificial Intelligence (AAAI), Artificial Intelligence and Statistics (AISTATS).

NIPS Top-100 Reviewer Award

2013