Stanford



Scott W Linderman

Associate Professor of Statistics

Bio

BIO

Scott Linderman, PhD, is an Assistant Professor at Stanford University in the Statistics Department and the Wu Tsai Neurosciences Institute, as well as the Co-Director of the Stanford Center for Neural Data Science. His research focuses on machine learning, computational neuroscience, and the general question of how computational and statistical methods can help to decipher neural computation. His work combines novel methodological development in the areas of state space models, deep generative models, point processes, and approximate Bayesian inference with applied statistical analyses of large-scale neural and behavioral data. Previously, he was a postdoctoral fellow at Columbia University and a graduate student at Harvard University. His work has been recognized with a Savage Award from the International Society for Bayesian Analysis, an AISTATS Best Paper Award, an NSF CAREER Award, and fellowships from the McKnight, Sloan, and Simons Foundations.

ACADEMIC APPOINTMENTS

- Associate Professor, Statistics
- Member, Bio-X
- Member, Wu Tsai Human Performance Alliance
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- NSF CAREER Award, National Science Foundation (2025)
- McKnight Scholar Award, McKnight Foundation (2023)
- Sloan Research Fellowship, Sloan Foundation (2022)
- Next Generation Leader, Allen Institute for Brain Science (2019-2022)
- Best Paper, International Conference on Artificial Intelligence and Statistics (2017)
- Postdoctoral Fellow, Simons Collaboration on the Global Brain (2016-2019)
- Leonard J Savage Award for Outstanding Dissertation in Applied Methodology, International Society for Bayesian Analysis (2016)
- National Defense Science and Engineering Graduate Fellow, Department of Defense (2011-2014)

PROFESSIONAL EDUCATION

- PhD, Harvard University , Computer Science (2016)
- SM, Harvard University , Computer Science (2013)
- BS, Cornell University , Electrical and Computer Engineering (2008)

LINKS

- Linderman Lab Website: http://slinderman.web.stanford.edu

Teaching

COURSES

2025-26

- Applied Statistics III: STATS 305C (Spr)

2024-25

- Applied Statistics II: STATS 305B (Win)
- Machine Learning Methods for Neural Data Analysis: CS 339N, NBIO 220, STATS 220, STATS 320 (Spr)

2023-24

- Applied Statistics II: STATS 305B (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Valérie, Ngoc Phuc Ho, Elizabeth Jun, Rennie Kendrick, Lavonna Mark, Christopher Minasi

Postdoctoral Faculty Sponsor

Aditi Jha, Nicolas Zucchet

Doctoral Dissertation Advisor (AC)

Cole Citrenbaum, Noah Cowan, Etaash Katiyar, Hannah Lee, Jakub Smékal, Ian Christopher Tanoh

Doctoral Dissertation Co-Advisor (AC)

Henry Smith, Skyler Wu

Doctoral (Program)

Hyun Dong Lee, Alisa Levin

Publications

PUBLICATIONS

- **Spontaneous behavior is a succession of self-directed tasks.** *Neuron*
  Weinreb, C., Kannan, L. T., Newman-Boulle, A., Sainburg, T., Gillis, W. F., Plotnikoff, A., Makowska, S., Pearl, J. E., Osman, M. A., Linderman, S. W., Datta, S. R.
  2026
- **The neural computation of affective internal states in the hypothalamus: A dynamical systems perspective.** *Neuron*
  Nair, A., Vinograd, A., Liu, M., Mountoufaris, G., Linderman, S., Anderson, D. J.
  2025; 113 (23): 3887-3907
- **Life-long behavioral screen reveals an architecture of vertebrate aging.** *bioRxiv : the preprint server for biology*
  Bedbrook, C. N., Nath, R. D., Zhang, L., Linderman, S. W., Brunet, A., Deisseroth, K.
  2025
- **Competitive integration of time and reward explains value-sensitive foraging decisions and frontal cortex ramping dynamics.** *Neuron*
  Bukwich, M., Campbell, M. G., Zoltowski, D., Kingsbury, L., Tomov, M. S., Stern, J., Kim, H. R., Drugowitsch, J., Linderman, S. W., Uchida, N.
  2025

- **Concerted actions of distinct serotonin neurons orchestrate female pup care behavior.** *Research square*
  Xiao, S. A., Chen, C. C., Horvath, P., Tsai, V., Cardenas, V. M., Biderman, D., Deng, F., Li, Y., Linderman, S. W., Dulac, C., Luo, L.
  2025
- **Concerted actions of distinct serotonin neurons orchestrate female pup care behavior.** *bioRxiv : the preprint server for biology*
  Xiao, S. A., Chen, C. C., Horvath, P., Tsai, V., Cardenas, V. M., Biderman, D., Deng, F., Li, Y., Linderman, S. W., Dulac, C., Luo, L.
  2025
- **A Bayesian hierarchical model of trial-to-trial fluctuations in decision criterion.** *PLoS computational biology*
  Vloeberghs, R., Urai, A. E., Desender, K., Linderman, S. W.
  2025; 21 (7): e1013291
- **Computation-through-Dynamics Benchmark: Simulated datasets and quality metrics for dynamical models of neural activity.** *bioRxiv : the preprint server for biology*
  Versteeg, C., McCart, J. D., Ostrow, M., Zoltowski, D. M., Washington, C. B., Driscoll, L., Codol, O., Michaels, J. A., Linderman, S. W., Sussillo, D., Pandarinath, C.
  2025
- **Modeling Latent Neural Dynamics with Gaussian Process Switching Linear Dynamical Systems.** *ArXiv*
  Hu, A., Zoltowski, D., Nair, A., Anderson, D., Duncker, L., Linderman, S.
  2025
- **Structured flexibility in recurrent neural networks via neuromodulation.** *Advances in neural information processing systems*
  Costacurta, J. C., Zoltowski, D., Bhandarkar, S., Linderman, S. W.
  2024; 2024: 1954-1972
- **Spatiotemporal Clustering with Neyman-Scott Processes via Connections to Bayesian Nonparametric Mixture Models.** *Journal of the American Statistical Association*
  Wang, Y., Degleris, A., Williams, A., Linderman, S. W.
  2024; 119 (547): 2382-2395
- **A Bayesian Hierarchical Model of Trial-To-Trial Fluctuations in Decision Criterion.** *bioRxiv : the preprint server for biology*
  Vloeberghs, R., Urai, A. E., Desender, K., Linderman, S. W.
  2024
- **A line attractor encoding a persistent internal state requires neuropeptide signaling.** *Cell*
  Mountoufaris, G., Nair, A., Yang, B., Kim, D. W., Vinograd, A., Kim, S., Linderman, S. W., Anderson, D. J.
  2024
- **Encoding of female mating dynamics by a hypothalamic line attractor.** *Nature*
  Liu, M., Nair, A., Coria, N., Linderman, S. W., Anderson, D. J.
  2024
- **Causal evidence of a line attractor encoding an affective state.** *Nature*
  Vinograd, A., Nair, A., Kim, J., Linderman, S. W., Anderson, D. J.
  2024
- **Structured flexibility in recurrent neural networks via neuromodulation.** *bioRxiv : the preprint server for biology*
  Costacurta, J. C., Bhandarkar, S., Zoltowski, D. M., Linderman, S. W.
  2024
- **Explaining dopamine through prediction errors and beyond.** *Nature neuroscience*
  Gershman, S. J., Assad, J. A., Datta, S. R., Linderman, S. W., Sabatini, B. L., Uchida, N., Wilbrecht, L.
  2024
- **Keypoint-MoSeq: parsing behavior by linking point tracking to pose dynamics.** *Nature methods*
  Weinreb, C., Pearl, J. E., Lin, S., Osman, M. A., Zhang, L., Annapragada, S., Conlin, E., Hoffmann, R., Makowska, S., Gillis, W. F., Jay, M., Ye, S., Mathis, et al
  2024; 21 (7): 1329-1339

- **Intrinsic Dynamics and Neural Implementation of a Hypothalamic Line Attractor Encoding an Internal Behavioral State.** *bioRxiv : the preprint server for biology*
  Vinograd, A., Nair, A., Linderman, S. W., Anderson, D. J.
  2024
- **Spatiotemporal Clustering with Neyman-Scott Processes via Connections to Bayesian Nonparametric Mixture Models** *JOURNAL OF THE AMERICAN STATISTICAL ASSOCIATION*
  Wang, Y., Degleris, A., Williams, A., Linderman, S. W.
  2023
- **Emergence of belief-like representations through reinforcement learning.** *PLoS computational biology*
  Hennig, J. A., Romero Pinto, S. A., Yamaguchi, T., Linderman, S. W., Uchida, N., Gershman, S. J.
  2023; 19 (9): e1011067
- **Competitive integration of time and reward explains value-sensitive foraging decisions and frontal cortex ramping dynamics.** *bioRxiv : the preprint server for biology*
  Bukwich, M., Campbell, M. G., Zoltowski, D., Kingsbury, L., Tomov, M. S., Stern, J., Kim, H. R., Drugowitsch, J., Linderman, S. W., Uchida, N.
  2023
- **Keypoint-MoSeq: parsing behavior by linking point tracking to pose dynamics.** *bioRxiv : the preprint server for biology*
  Weinreb, C., Osman, M. A., Zhang, L., Lin, S., Pearl, J., Annapragada, S., Conlin, E., Gillis, W. F., Jay, M., Shaokai, Y., Mathis, A., Mathis, M. W., Pereira, et al
  2023
- **Emergence of belief-like representations through reinforcement learning.** *bioRxiv : the preprint server for biology*
  Hennig, J. A., Pinto, S. A., Yamaguchi, T., Linderman, S. W., Uchida, N., Gershman, S. J.
  2023
- **Spontaneous behaviour is structured by reinforcement without explicit reward.** *Nature*
  Markowitz, J. E., Gillis, W. F., Jay, M., Wood, J., Harris, R. W., Cieszkowski, R., Scott, R., Brann, D., Koveal, D., Kula, T., Weinreb, C., Osman, M. A., Pinto, et al
  2023
- **An approximate line attractor in the hypothalamus encodes an aggressive state.** *Cell*
  Nair, A., Karigo, T., Yang, B., Ganguli, S., Schnitzer, M. J., Linderman, S. W., Anderson, D. J., Kennedy, A.
  2023; 186 (1): 178
- **NAS-X: Neural Adaptive Smoothing via Twisting**
  Lawson, D., Li, M. Y., Linderman, S. W.
  edited by Oh, A., Neumann, T., Globerson, A., Saenko, K., Hardt, M., Levine, S.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2023
- **Switching Autoregressive Low-rank Tensor Models**
  Lee, H., Warrington, A., Glaser, J. I., Linderman, S. W.
  edited by Oh, A., Neumann, T., Globerson, A., Saenko, K., Hardt, M., Levine, S.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2023
- **Convolutional State Space Models for Long-Range Spatiotemporal Modeling**
  Smith, J. T. H., De Mello, S., Kautz, J., Linderman, S. W., Byeon, W.
  edited by Oh, A., Neumann, T., Globerson, A., Saenko, K., Hardt, M., Levine, S.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2023
- **Imaging whole-brain activity to understand behavior.** *Nature reviews. Physics*
  Lin, A., Witvliet, D., Hernandez-Nunez, L., Linderman, S. W., Samuel, A. D., Venkatachalam, V.
  2022; 4 (5): 292-305
- **Mice exhibit stochastic and efficient action switching during probabilistic decision making.** *Proceedings of the National Academy of Sciences of the United States of America*
  Beron, C. C., Neufeld, S. Q., Linderman, S. W., Sabatini, B. L.
  2022; 119 (15): e2113961119

- **Imaging whole-brain activity to understand behaviour** *NATURE REVIEWS PHYSICS*
  Lin, A., Witvliet, D., Hernandez-Nunez, L., Linderman, S. W., Samuel, A. D. T., Venkatachalam, V.
  2022
- **Weighing the evidence in sharp-wave ripples.** *Neuron*
  Linderman, S. W.
  2022; 110 (4): 568-570
- **Generalized Shape Metrics on Neural Representations.** *Advances in neural information processing systems*
  Williams, A. H., Kunz, E., Kornblith, S., Linderman, S. W.
  2021; 34: 4738-4750
- **Statistical neuroscience in the single trial limit.** *Current opinion in neurobiology*
  Williams, A. H., Linderman, S. W.
  2021; 70: 193-205
- **Fast deep neural correspondence for tracking and identifying neurons in C. elegans using semi-synthetic training.** *eLife*
  Yu, X., Creamer, M. S., Randi, F., Sharma, A. K., Linderman, S. W., Leifer, A. M.
  2021; 10
- **Animal pose estimation from video data with a hierarchical von Mises-Fisher-Gaussian model**
  Zhang, L., Dunn, T., Marshall, J., Olveczky, B., Linderman, S.
  edited by Banerjee, A., Fukumizu, K.
  MICROTOME PUBLISHING.2021
- **Dynamic and reversible remapping of network representations in an unchanging environment.** *Neuron*
  Low, I. I., Williams, A. H., Campbell, M. G., Linderman, S. W., Giocomo, L. M.
  2021
- **Point process models for sequence detection in high-dimensional neural spike trains.** *Advances in neural information processing systems*
  Williams, A. H., Degleris, A., Wang, Y., Linderman, S. W.
  2020; 33: 14350-14361
- **Probabilistic Models of Larval Zebrafish Behavior Reveal Structure on Many Scales.** *Current biology : CB*
  Johnson, R. E., Linderman, S. n., Panier, T. n., Wee, C. L., Song, E. n., Herrera, K. J., Miller, A. n., Engert, F. n.
  2019
- **BehaveNet: nonlinear embedding and Bayesian neural decoding of behavioral videos**
  Batty, E., Whiteway, M. R., Saxena, S., Biderman, D., Abe, T., Musall, S., Gillis, W., Markowitz, J. E., Churchland, A., Cunningham, J., Datta, S., Linderman, S. W., Paninski, et al
  edited by Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019
- **Scalable Bayesian inference of dendritic voltage via spatiotemporal recurrent state space models**
  Sun, R., Linderman, S. W., Kinsella, I., Paninski, L.
  edited by Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019
- **Mutually Regressive Point Processes**
  Apostolopoulou, I., Linderman, S., Miller, K., Dubrawski, A.
  edited by Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019
- **Poisson-Randomized Gamma Dynamical Systems**
  Schein, A., Linderman, S. W., Zhou, M., Blei, D. M., Wallach, H.
  edited by Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.
  NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019
- **Using computational theory to constrain statistical models of neural data** *CURRENT OPINION IN NEUROBIOLOGY*
  Linderman, S. W., Gershman, S. J.

2017; 46: 14-24