DAN BIDERMAN, CURRICULUM VITAE

Postdoctoral Scholar
Linderman and Ré Labs
Stanford Statistics and Computer Science

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(last updated September 22, 2025)

INTERESTS

I build and study resource-efficient AI systems with applications in neuroscience. My recent work includes a weakly-supervised pose estimation package for biology ("Lightning Pose"), parameter-efficient finetuning for code and math ("LoRA Learns Less and Forgets Less"), local-remote LLM collaboration ("Minions"), and numerical linear algebra for fast AI. My software is widely used in both research and production.

EDUCATION

2018–2024 COLUMBIA UNIVERSITY (New York, NY, USA)
PhD, Neurobiology & Behavior (2024)
MSc, Neurobiology & Behavior (2020)
Advisor: John P. Cunningham
Committee: Daniel Wolpert (chair), Sasha Rush, Liam Paninski, Ashok Litwin-Kumar
Thesis: Resource-Efficient Machine Learning Systems: From Natural Behavior to Natural Language
Winner: Titus M. Cowan Dissertation Prize for Excellence in Biomedical Research
Selected as PhD Hooding Ceremony Speaker (Columbia University, 2025)

2013–2018 TEL AVIV UNIVERSITY (Israel)
The Adi Lautman Interdisciplinary Program for Outstanding Students (2013-2017)
The university's excellence program; leading directly to a Master's degree.
[See background and notable alumni]
Coursework: Math, neurobiology, cognitive science, history and philosophy of science
M.A., Cognitive Science (2018)
Advisor: Liad Mudrik
Thesis: Contextual effects on the perception of ambiguous objects (psychophysics and hierarchical Bayesian GLMs)

PROFESSIONAL EXPERIENCE

September 2024 – Present STANFORD STATISTICS AND COMPUTER SCIENCE DEPARTMENTS
Postdoctoral Scholar
Advisors: Christopher Ré and Scott Linderman

November 2023 – June 2024 MOSAIC ML / DATABRICKS
Part-time Student Researcher, NLP post-training team. Investigated parameter-efficient finetuning for code and math

May–August 2023 MOSAIC ML / DATABRICKS
Research Intern, NLP data team

PUBLICATIONS

* *denotes equal author contribution (shared first-authorship).*

[A1] Shuyun Alina Xiao, Che Cherry Chen, Patricia Horvath, Valerie Tsai, Vibiana Marie Cardenas, **Dan Biderman**, Fei Deng, Yulong Li, Scott W Linderman, Catherine Dulac, and Liqun Luo. Concerted actions of distinct serotonin neurons orchestrate female pup care behavior. *Submitted*, pages 2025–XX, 2025.

[A2] Avanika Narayan*, **Dan Biderman***, and Christopher Re. Mind the trust gap: Fast, private local-to-cloud LLM chat. In *ES-FoMo III: 3rd Workshop on Efficient Systems for Foundation Models*, 2025.

[A3] Federico Pedraja, Michael Genecin, Dillon Noone, **Dan Biderman**, Philip Cho, David E Ehrlich, and Nathaniel B Sawtell. Direct cerebellar control over motor production in a species with extreme cerebellar enlargement. *Current Biology*, pages 2025–03, 2025.

[A4] Avanika Narayan*, **Dan Biderman***, Sabri Eyuboglu*, Avner May, Scott Linderman, James Zou, and Christopher Re. Minions: Cost-efficient collaboration between on-device and cloud language models. *International Conference on Machine Learning*, 2025.

[A5] Avanika Narayan*, Sabri Eyuboglu*, **Dan Biderman***, Avner May, Scott Linderman, James Zou, and Christopher Re. Cost-efficient collaboration between on-device and cloud language models. In *ICLR 2025 Workshop on Foundation Models in the Wild*.

[A6] Aditya Nair, Rohan Kohle, Nestor Coria, Jadon Hale, Jineun Kim, Angel Wang, Amit Vinograd, **Dan Biderman**, Kelly Buchanan, Pietro Perona, Scott Linderman, and David Anderson. Batik: behavior discovery, interpretation and annotation directly from raw video using large vision-language models. *Under Review, Nature Methods*, 2025.

[A7] Jakub Smékal, Jimmy Smith, Michael Kleinman, **Dan Biderman**, and Scott W. Linderman. Towards a theory of learning dynamics in deep state space models. In *ICML 2024 Workshop on Next Generation of Sequence Modeling Architectures*, 2024. Selected for Spotlight Presentation.

[A8] **Dan Biderman**, Jacob Portes, Jose Javier Gonzalez Ortiz, Mansheej Paul, Philip Greengard, Connor Jennings, Daniel King, Sam Havens, Vitaliy Chiley, Jonathan Frankle, Cody Blakeney, and John Patrick Cunningham. LoRA learns less and forgets less. *Transactions on Machine Learning Research*, 2024. Featured Certification (ICLR 2025).

[A9] Kush Banga, Julius Benson, Jai Bhagat, **Dan Biderman**, Daniel Birman, Niccolò Bonacchi, Sebastian A Bruijns, Kelly Buchanan, Robert AA Campbell, Matteo Carandini, Gaëlle A Chapuis, Anne K Churchland, M Felicia Davatolhagh, Hyun Dong Lee, Mayo Faulkner, Berk Gerçek, Fei Hu, Julia Huntenburg, Cole Hurwitz, Anup Khanal, Christopher Krasniak, Christopher Langfield, Guido T Meijer, Nathaniel J Miska, Zeinab Mohammadi, Jean-Paul Noel, Liam Paninski, Alejandro Pan-Vazquez, Noam Roth, Michael Schartner, Karolina Socha, Nicholas A Steinmetz, Karel Svoboda, Marsa Taheri, Anne E Urai, Miles Wells, Steven J West, Matthew R Whiteway, Olivier Winter, and Ilana B Witten. Reproducibility of in vivo electrophysiological measurements in mice. *eLife*, October 2024.

[A10] **Dan Biderman***, Matthew R Whiteway*, Cole Hurwitz, Nicholas Greenspan, Robert S Lee, Ankit Vishnubhotla, Richard Warren, Federico Pedraja, Dillon Noone, Michael M Schartner, and others. Lightning pose: improved animal pose estimation via semi-supervised learning, bayesian ensembling and cloud-native open-source tools. *Nature Methods*, 21(7):1316–1328, 2024.

[A11] Matthew R Whiteway, **Dan Biderman**, Yoni Friedman, Mario Dipoppa, E Kelly Buchanan, Anqi Wu, John Zhou, Niccolò Bonacchi, Nathaniel J Miska, Jean-Paul Noel, and others. Partitioning variability in animal behavioral videos using semi-supervised variational autoencoders. *PLoS computational biology*, 17(9):e1009439, 2021.

[A12] Andres Potapczynski*, Luhuan Wu*, **Dan Biderman***, Geoff Pleiss, and John P. Cunningham. Bias-free scalable Gaussian processes via randomized truncations. In *International Conference on Machine Learning*, 2021.

[A13] **Dan Biderman**, Christian A Naesseth, Luhuan Wu, Taiga Abe, Alice C Mosberger, Leslie J Sibener, Rui Costa, James Murray, and John P Cunningham. Inverse articulated-body dynamics from video via variational sequential Monte Carlo. In *Neural Information Processing Systems Workshop on Differentiable Computer Vision, Graphics, and Physics in Machine Learning* ***(Oral)***, 2020.

[A14] **Dan Biderman**, Yarden Shir, and Liad Mudrik. B or 13? Unconscious top-down contextual effects at the categorical but not the lexical level. *Psychological science*, 31(6):663–677, 2020.

[A15] Eleanor Batty, Matthew Whiteway, Shreya Saxena, **Dan Biderman**, Taiga Abe, Simon Musall, Winthrop Gillis, Jeffrey Markowitz, Anne Churchland, John P Cunningham, and others. Behavenet: nonlinear embedding and Bayesian neural decoding of behavioral videos. *Advances in Neural Information Processing Systems*, 32, 2019.

[A16] **Dan Biderman***, Natalie Biderman*, Alon Zivony, and Dominique Lamy. Contingent capture is weakened in search for multiple features from different dimensions. *Journal of Experimental Psychology: Human Perception and Performance*, 43(12):1974, 2017.

[A17] Rony Hirschorn, **Dan Biderman**, Natalie Biderman, Itai Yaron, Rotem Bennet, Meir Plotnik, and Liad Mudrik. Multi-trial intattenrional blindness in virtual reality. *Under Revision, Behavior Research Methods*, 2023.

[A18] Amir Tal, May Sar-Shalom, Tzahi Krawitz, **Dan Biderman**, and Liad Mudrik. Awareness is needed for contextual effects in ambiguous object recognition. *Cortex*, 173:49–60, 2024.

BLOG POSTS AND MEDIA

Minions

2025 Minions: On-Device and Cloud Language Model Collaboration on AMD Ryzen AI
AMD Blogpost

2025 Secure Minions: private collaboration between Ollama and frontier models
Ollama Blogpost

2025 Minions: where local and cloud LLMs meet
Ollama Blogpost

2025 Minions: the rise of small, on-device LMs
Hazy Research Blogpost

LoRA Learns Less and Forgets Less

2025 Paper taught at DeepLearning.ai online course

2025 Noteworthy AI Research Papers of 2024 (Part One), Sebastian Raschka
Blog

2024 Ahead of AI Blogpost, Sebastian Raschka
Blog

Lightning Pose

2023 Research Unveils Breakthrough Deep Learning Tool for Understanding Neural Activity and Movement Control
NVIDIA Technical Blog

SELECTED OPEN SOURCE SOFTWARE

NLP

2024 **Minions: A popular package enabling communication between on-device and cloud LLMs** (1.1K stars and 117 forks)
GitHub Repository

2024 **Finetuned LLM checkpoints**
Open-source weights for tens of 7B-parameter LLMs finetuned for code generation and math, with full finetuning and LoRA (from Biderman et al., TMLR, 2024).
HuggingFace Project

Lightning Pose Ecosystem

2021– **Lightning Pose** (266 stars and 44 forks)
A widely-used package for animal pose estimation from video.
Major users include International Brain Lab, Allen Institute for Brain Science, Sainsbury-Wellcome Center at UCL.
Github Repository
Documentation
Cloud-hosted interactive development environment

2022– **Lightning Pose App**
a cloud-deployed application supporting image annotation, accelerated training and evaluation. Builds on Lightning.ai.
Development repository
Cloud-hosted GUI endpoint

Scalable Gaussian Processes (GPs) and numerical linear algebra

2025 **gp-quadrature**
Fast GP inference using non-uniform FFTs, convolutions, etc, based on trapezoidal quadrature rules.
GitHub Repository

2022 **Cyclic GPs**
a PyTorch implementation of cyclic reduction for accelerated GP learning and inference.
GitHub Repository

2021 **Randomized Telescoped GPs**
Performs Unbiased Randomized Truncation of scalable GP algorithms in GPyTorch.
GitHub Repository

INVITED TALKS

Resource-constrained machine learning systems for neuroscience and beyond

Jan. 2024	Presentation at the Center for Computational Mathematics, Flatiron Institute
Oct. 2023	Presentation at the Linderman and Ré Labs, Stanford University

Behavioral video analysis: a new frontier for systems neuroscience

Nov. 2023	NSF AI Institute for Artificial and Natural Intelligence (ARNI) kickoff meeting, Columbia University

Inverse Articulated-Body Dynamics from Video via Variational Sequential Monte Carlo

Sep. 2021	Zuckerman Institute Open House for Simons-Emory Motor Control Consortium, (virtual)
Oct. 2020	Theoretical Neuroscience Seminar, University of Oregon (virtual)
Sep. 2020	Neurotheory meeting, Columbia University (virtual)

Lightning Pose: better, faster and easier animal pose estimation via semi-supervised learning

October 2023	Presentation at Flatiron Institute's Center for Computational Neuroscience (New York, NY, USA)
June 2023	Presentation at NIH U19 BRAIN site-visit at Columbia University (New York, NY, USA)
June 2022	Featured Developer at Lightning.ai's first developers conference (New York, NY, USA)
June 2022	Gatsby Computational Neuroscience Tri-Center Meeting, Hebrew University (Jerusalem, Israel)
May 2022	AiCure (virtual)
Apr. 2022	Neurotheory meeting, Columbia University
Dec. 2021	Lightning.ai (New York, NY, USA)
Nov. 2021	Special Seminar on Pose Estimation, Siegelbaum Lab, Columbia University (virtual)

The Elephant in the room: Cerbellar Motor Control of the Mormyrid Fish's Elephant Nose

July. 2021	Neurotheory meeting, Columbia University

SELECTED ABSTRACTS

Mar. 2023	**Biderman, D., Whiteway, M, et al.,** Lightning Pose— Pose estimation made better, faster and easier via video semi-supervised learning on the cloud. *COSYNE 2023: Computational and Systems Neuroscience* (Montréal, Canada)
Apr. 2022	**Biderman, D. et al.,** Lightning Pose—A suite of semi-supervised networks for robust video tracking with minimal manual annotation. *From Neuroscience to Artificially Intelligent Systems* (Cold Spring Harbor Laboratory, NY, USA)
May 2017	**Biderman, D. et al.,** Context modulation of ambiguous object perception in the absence of awareness *Vision Sciences Society conference (VSS)* (Tampa, Florida, USA)

Mar. 2020	Batty*, E., Whiteway*, M., Saxena, S., **Biderman, D.**, ... , Linderman, s., Paninski, L. (2020). BehaveNet: Nonlinear embedding and Bayesian neural decoding of behavioral videos. *Computational and Systems Neuroscience* (COSYNE).
Nov. 2019	Batty*, E., Whiteway*, M., Saxena, S., **Biderman, D.**, ... , Linderman, s., Paninski, L. (2019). BehaveNet: Nonlinear embedding and Bayesian neural decoding of behavioral videos. *Conference of the Society for Neuroscience* (SFN).

HONORS AND AWARDS

2025	Selected as Student Speaker for PhD Hooding ceremony, Columbia University Irving Medical Center
2025	Titus M Coan Prize for Excellence in Biomedical Research (Dissertation Award in Basic Cell and Molecular Biology), Columbia University
2024	*LoRA Learns Less and Forgets Less* is featured in the widely-read "12 Noteworthy AI Research Papers of 2024", in Ahead of AI by Sebastian Raschka.
	2024 Flatiron Research Fellowship, Center for Computational Mathematics, Simons Foundation (declined)
2022–Present	Lightning AI Academic Ambassador
2017	Oustanding Graduate Student Award (Social Sciences Department, Tel Aviv University)
2017	Student Travel Award, for the *Vision Sciences Society Conference (VSS)* (Tampa, Florida, USA, May 2017), Sagol School of Neuroscience, Tel Aviv University.
2016	Student Travel Award, for an advanced course on *Consciousness: from Theory to Practice* (Brassenone, Italy, August 2016). The Adi Lautman Interdisciplinary program for outstanding students.
2015	Outstanding Achievements Award, the Adi Lautman Interdisciplinary Program for Outstanding Students
2013–2017	Adi Lautman Interdisciplinary Program Merit Scholarship (full-tuition recipient)

TEACHING

Columbia University

Fall 2022/2023	GR6103 — Statistical Analysis of Neural Data (Prof. Liam Paninski). Guest lecture on modeling animal behavior.
Spring 2020	NBHVG4360 — Introduction to Theoretical Neuroscience (Asst. for Prof. Ashok Litwin-Kumar)

STUDENT MENTORSHIP

07/21 – 07/22	Nicholas Greenspan, Columbia College Computer Science (Pose Estimation, Gaussian Processes)
07/20 – 07/21	Sunand Raghupathi, Columbia College Applied Physics (3D Reconstruction, Pose Estimation)

PROFESSIONAL SERVICE

Workshop Organizer

Fourth Workshop for Efficient Systems for Foundation Models (ES-FoMo), ICML 2025

Conference Reviewer

Computational and Systems Neuroscience (COSYNE, 2025)
NeurIPS workshop: Gaussian Processes, Spatiotemporal Modeling, and Decision-making Systems (2022)
Artificial Intelligence and Statistics (2022)
NeurIPS workshop: Differentiable Computer Vision, Graphics and Physics for Machine Learning (2020)
Computational Cognitive Neuroscience (2018–2019)

Journal Reviewer

iScience

Organizing Committee Member

Zuckerman Institute Open House for Simons-Emory Motor Control Consortium (virtual, Sep. 2021)
Zuckerman Institute Motor Control Club, Columbia University (2020–)
Student Moderator for NeuroNex Extrenal Advisory Committee meeting (May 2020)
Zuckerman Institute Scientific Writing Workshop, Colubmia University (Oct. 2019)
Center for Theoretical Neuroscience Retreat (Palisades, New Jersey, USA, Sep. 2019)