

Benjamin James Lansdell

Curriculum Vitae

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Current position

Lead Machine Learning Engineer, *Sequelae (remote)*, based in Santa Fe, New Mexico.

Areas of specialization

Computational neuroscience, Bioinformatics, Deep learning, Causal inference

Education

- 2017 **PhD in Applied Mathematics**, *University of Washington*, Seattle, GPA: 3.84/4.0.
Advisor: Adrienne Fairhall
- 2012 **MPhil in Mathematics**, *University of Melbourne*, Australia, GPA: 84/100.
Advisors: Terence Speed, Kerry Landman
- 2008 **BSc (with honours)**, *University of Melbourne*, Australia, GPA: 89/100.
Major in Mathematics
Advisors: Anthony Papenfuss, Terence Speed

Experience

- 2023-present **Lead Machine Learning Engineer**, *Sequelae (remote)*, based in Santa Fe, New Mexico.
- 2023-present **Bioinformatics Research Scientist Consultant**, *St Jude Children's Research Hospital (remote)*, based in Santa Fe, New Mexico.
- 2022-2023 **Bioinformatics Research Scientist**, *St Jude Children's Research Hospital*, Memphis, Department of Developmental Neurobiology.
- 2021-2022 **Lead Bioinformatics Analyst**, *St Jude Children's Research Hospital*, Memphis, Department of Developmental Neurobiology.
- 2020-2021 **Bioinformatics Analyst III**, *St Jude Children's Research Hospital*, Memphis, Department of Developmental Neurobiology.
- 2017-2020 **Postdoctoral Researcher**, *University of Pennsylvania*, Philadelphia, Kording lab, Department of Bioengineering.
- 2017 **Senior Fellow**, *University of Washington*, Seattle, Fairhall lab, Department of Physiology and Biophysics.
- 2009 **Research Technician**, *Walter and Eliza Hall Institute for Medical Research*, Australia, Speed lab, Bioinformatics division.
- 2007 **Undergraduate Research Opportunities Program Student**, *Walter and Eliza Hall Institute for Medical Research*, Australia, Speed lab, Bioinformatics division.

Teaching

- 2020 **Teaching Assistant**, *University of Pennsylvania*, Philadelphia, Department of Computer and Information Science.
Deep Learning for Data Science

- 2017-2019 **Guest Lecturer**, *University of Pennsylvania*, Philadelphia, Department of Bioengineering.
Presented tutorials on variety of topics to Kording lab and the UPenn computational neuroscience community. Including causal inference, reinforcement learning, deep learning and CUDA
- 2013,2015 **Guest Lecturer**, *University of Washington*, Seattle, Department of Applied Mathematics.
Introduction to Nonlinear Dynamics and Chaos, Mathematics of Genome Analysis and Molecular Modeling
- 2010-2012 **Teaching Assistant**, *University of Washington*, Seattle, Departments of Mathematics and Applied Mathematics.
Fourier Analysis and Partial Differential Equations, Introduction to Nonlinear Dynamics and Chaos, Algebra in Business and Economics, Calculus with Analytic Geometry II
- 2006-2007 **Mathematics and physics tutor**, *University of Melbourne*, Australia, Queen's College, Ormond College.

Additional professional training

- 2022 **TensorFlow Developer Certificate**, *TensorFlow*.
NeuroDataReHack, *Allen Institute for Brain Science*, Seattle, Washington.
- 2018 **Visiting scholar**, *MILA*, Montreal, Canada.
Deep learning and reinforcement learning summer school, *University of Toronto*, Toronto, Canada.
- 2016 **Graduate Summer School – The Mathematics of Data**, *Park City Mathematics Institute/Institute for Advanced Study*, Utah.
- 2015 **Summer Institute in Statistics and Modeling in Infectious Diseases**, *Department of Biostatistics, University of Washington*, Seattle.
- 2014 **OIST Computational neuroscience course**, *Okinawa Institute of Science and Technology*, Okinawa, Japan.
- 2013 **Visiting scholar**, *Harvard University*, Boston, Massachusetts.

Publications & talks

Submitted

Ogg MC, Franks H, **Lansdell B**, Hughes A, Lee J, Shirinifard A, Schwarz L, “Locus Coeruleus Facilitates Cognitive Map Remodeling and Behavioral Flexibility in Orbitofrontal Cortex”

Refereed articles

- 2024 **Lansdell B**, Shirinifard A, “ethome: machine learning for animal behavior”, *Journal of Open Source Software*, 2024
- 2023 **Lansdell B**, Kording K, “Neural spiking for causal inference and learning”, *PLOS Computational Biology* 2023, 19(4)
- 2022 Baker B, **Lansdell B**, Kording K, “Three Aspects of Representation in Neuroscience”, *Trends in Cognitive Sciences*. arXiv:2102.06592
Davenport C, Teubner B, Han S, Patton M, Eom T, Garic D, **Lansdell B**, Shirinifard A, Chang T, Klein J, Pruett-Miller S, Blundon J, Zakharenko S, “Innate Frequency-discrimination hyperacuity in Williams-Beuren syndrome mice”, *Cell* 2022; <https://doi.org/10.1016/j.cell.2022.08.022>
- 2021 Yang S, Wang J, Gao T, Hu Z, Deng B, **Lansdell B**, Linares-Barranco B, “Efficient Neuromorphic Learning with Dendritic Event-driven Processing" *Front. Neurosci.* 2021, 15, 1-15

- 2020 **Lansdell B**, Milovanovic I, Mellema C, Fairhall A, Fetz E, Moritz C, “Reconfiguring motor circuits for a joint manual and BCI task” *IEEE Trans. Neural Systems and Rehabilitation Engineering*, 28(1); <http://dx.doi.org/10.1109/TNSRE.2019.2944347>
- 2019 **Lansdell B**, Kording K, “Towards learning-to-learn” *Current Opinion in Behavioral Science*, 29, 45-50
- Farhoodi R*, **Lansdell B***, Kording K, “Quantifying how staining methods bias measurements of neuron morphologies” (equal first author), *Frontiers in Neuroinformatics* <http://dx.doi.org/10.3389/fninf.2019.00036>
- 2016 Aljadeff Y, **Lansdell B**, Fairhall A, Kleinfeld D, “Analysis of neuronal spike trains, deconstructed,” *Neuron* 2016, 91(2)
- Pang R, **Lansdell B**, Fairhall A, “Dimensionality Reduction in Neuroscience”, *Current Biology* 2016, 26: R1-R5
- 2014 **Lansdell B**, Ford K, Kutz J N, “A reaction-diffusion model of cholinergic retinal waves”, *PLoS Computational Biology* 2014, 10(12): e1003953
- Garsed DW, Marshall OJ, Corbin VDA, Hsu A, Stefano LD, Schröder J, Li J, Feng Z, Kim BW, Kowarsky M, **Lansdell B**, Brookwell R, Myklebost O, Meza-Zepeda L, Holloway AJ, Pedoutour F, Choo KH, Damore MA, Deans AJ, Papenfuss AT, Thomas DM, “The Architecture and Evolution of Cancer Neochromosomes,” *Cancer Cell* 2014, 26:653-667
- 2011 Renfree MB, Papenfuss AT, Deakin JE, [and 100 other authors, including **Lansdell B**], “Genome sequence of an Australian kangaroo, *Macropus eugenii*, provides insight into the evolution of mammalian reproduction and development.”, *Genome Biology* 2011, 12:R81.
- [Refereed conference & workshop presentations](#)
- 2023 Gout A, et al. including, **Lansdell B**, “Ontology-guided navigation of somatic variants, mutational signatures, gene expression and histology images for pediatric cancer”, AACR 2023, New Orleans, Louisiana. (poster)
- 2022 Ogg C, Franks H, Nolen H, **Lansdell B**, Shirinifard A, Schwarz L, “Defining the role of a locus coeruleus-orbitofrontal cortex circuit in behavioral flexibility”, Cosyne 2022, Lisbon, Portugal. (poster)
- 2020 **Lansdell B**, “Towards intervention-centric causal reasoning in learning agents” ICLR 2020 workshop on Causal Learning and Decision Making, Addis Ababa, Ethiopia (virtual; poster)
- Lansdell B**, Prakash P, Kording K, “Learning to solving the credit assignment problem” ICLR 2020, Addis Ababa, Ethiopia (virtual; poster)
- 2019 **Lansdell B**, Prakash P, Kording K, “Learning to solve the credit assignment problem”, NeurIPS Neuro+AI workshop 2019, Vancouver, BC, CAN. (poster)
- Cheng J, Benjamin A, **Lansdell B**, Kording K, “Augmenting Supervised Learning by Meta-learning Unsupervised Local Rules”, NeurIPS Neuro+AI workshop 2019, Vancouver, BC, CAN. (poster)
- Lansdell B**, Prakash P, Kording K, “Do neurons learn how to learn?”, Cosyne Meeting 2019, Lisbon, Portugal. (poster)
- 2018 Farhoodi R*, **Lansdell B***, Kording K, “Quantifying the effect of staining methods on extracted neuron morphology”, CCN Meeting 2018, Philadelphia, PA, USA. (equal first author) (poster)
- Lansdell B**, Kording K, “Spiking allows neurons to estimate their causal effect”, Cosyne Meeting 2018, Denver, CO, USA. (poster)

- 2016 **Lansdell B**, Milovanovic I, Fairhall A, Fetz E, Moritz C, “Neural activity in a simultaneous BCI and manual task”, Proc. of 6th Int. BCI Society Meeting 2016. DOI: 10.3217/978-3-85125-467-9-118 (poster)

Select talks & seminars

- 2023 **Lansdell B** (May 23, 2023), “Self-supervised learning for improved histopathology search”, NVIDIA MONAI developers working group lecture series (virtual)
- Lansdell B** (May 16, 2023), “Trio: integrating jupyter, ChatGPT, and Napari for adaptive image analysis in a browser environment”, KIDS23 Data Science Symposium, St Jude, Memphis, TN. (Invited)
- Lansdell B** (May 15, 2023), “COMET: Self-supervised learning and vision transformers improve tumor classification of histopathological images”, KIDS23 Data Science Symposium, St Jude, Memphis, TN. (Invited)
- Lansdell B** (April 7, 2023), “St Jude data science infrastructure round table discussion”, Mid-South DATA conference, University of Memphis, Memphis, TN. (Invited)
- 2022 **Lansdell B** (April 7, 2022), “Applied mathematics career panelist”, (Virtual) Applied mathematics seminar, University of Washington, Seattle, WA. (Invited)
- 2021 Baker B, **Lansdell B**, Kording K (March 15, 2021), “Representation in neuroscience”, (Virtual) Computational neuroscience discussion group, Northwestern University, Evanston, IL. (Invited)
- 2020 **Lansdell B** (July 22, 2020), “The neuronal credit assignment problem as causal inference”, (Virtual) Bioinformatics seminar, St Jude Children’s Research Hospital, Memphis, TN. (Invited)
- Lansdell B** (April 28, 2020), “The neuronal credit assignment problem as causal inference”, (Virtual) Mahoney Institute for Neurosciences (MINS) UnRetreat Symposium Year of Brain Science Technology.
- Lansdell B** (February 27, 2020), “Causal considerations in deep and reinforcement learning”, Applied mathematics seminar, Drexel University. (Invited)
- Lansdell B** (February 13, 2020), “Is the brain a computer?”, Physics undergraduate seminar, Western University, London, ON.
- Lansdell B** (February 13, 2020), “The neuronal credit assignment problem as causal inference”, Physics colloquium, Western University, London, ON. (Invited)
- Lansdell B** (February 6, 2020), “The neuronal credit assignment problem as causal inference”, Rutgers-Newark Department of Mathematics & Computer Science, Newark, NJ. (Invited)
- Lansdell B** (January 24, 2020), “The neuronal credit assignment problem as causal inference”, CNI seminar, Department of Neuroscience, University of Pennsylvania.
- 2019 **Lansdell B** (July 1, 2019), “The neuronal credit assignment problem as causal inference”, MIT-IBM AI Watson lab, Boston.
- Lansdell B** (May 1, 2019), “Causality and reinforcement learning: considerations for smarter agents”, CNI +/- seminar, Department of Neuroscience, University of Pennsylvania.
- Lansdell B** (March 22, 2019), “Optimizing policies with thresholds in neuroscience and medicine”, AMS Sectional Meeting, University of Hawaii. (Invited)
- 2018 **Lansdell B** (August 21, 2018), “Causality and reinforcement learning: considerations for smarter agents”, Neuro+ML theory talk, MILA, University of Montreal.
- Lansdell B**, Kording K, “Spiking allows neurons to estimate their causal effect”, Deep Learning Reinforcement Learning Summer School 2018, CIFAR, Toronto, CAN. (poster)

- 2017 **Lansdell B** (June 5, 2017), “Neural population dynamics in motor control and development”, Geffen lab talk, University of Pennsylvania. (Invited)
- Lansdell B** (May 30, 2017), “Neural population dynamics in motor control and development”, Shirley Ryan Ability lab, Chicago. (Invited)
- Lansdell B** (March 24, 2017), “Moving models of motor control forward, in theory and application”, *Special seminar*, Flatiron Institute, Simons Foundation, New York. (Invited)
- Lansdell B** (January 25, 2017), “Neuron tracking in hydra”, *Yuste lab meeting*, Columbia University, New York.
- Lansdell B** (January 24, 2017), “Unraveling principles of motor control: from nerve nets to neural prosthetics”, *Special seminar*, Janelia Research Campus, Ashburn VA. (Invited)
- Lansdell B** (January 23, 2017), “Unraveling principles of motor control: from nerve nets to neural prosthetics”, *Neurotheory group talk*, Columbia University, New York. (Invited)
- 2013 **Lansdell B**, Kutz JN (July, 2013), “Cholinergic Retinal Waves and Self-Organized Criticality”, *CNS 2013*, Paris, France. (poster)
- 2012 **Lansdell B**, Kutz JN, Ford K (September, 2012), “Modeling Retinal Waves in Starburst Amacrine Cells”, *Neuroinformatics 2012*, Munich, Germany. (poster)
- Lansdell B** (June 12, 2012), “Modeling Retinal Waves in Starburst Amacrine Cells”, *SIAM Conference on Non-linear Waves and Coherent Structures*, University of Washington, Seattle. (Invited)
- Lansdell B** (February 11, 2012), “Continuum Models of Retinal Waves in Starburst Amacrine Cells”, *Frontiers in Biophysics*, Simon Fraser University, Vancouver. (Contributed)
- Lansdell B** (July 13, 2010), “Understanding the Bcl2 family through computational modelling”, *Bioinformatics seminar*, Walter and Eliza Hall Institute, Melbourne, Australia.
- 2009 **Lansdell B** (May 26, 2009), “Improving the Mosquito Genome Annotation”, *Bioinformatics seminar*, Walter and Eliza Hall Institute, Melbourne, Australia
- 2008 **Lansdell B**, Papenfuss AT, Speed TP, (December 2008) “Incorporating Tiling Array Expression Data into a Gene Predictor”, *Genome Informatics Workshop*, Gold Coast, Australia. (poster)
- Theses & unpublished work**
- 2018 Lagache T, **Lansdell B**, Tang J, Yuste R, Fairhall A, “Tracking Activity In A Deformable Nervous System With Motion Correction And Point-Set Registration”, *bioRxiv* <https://doi.org/10.1101/373035>
- 2012 **Lansdell B**, *Understanding the Bcl-2 family through computational modelling*, Masters thesis, Department of Mathematics and Statistics, University of Melbourne, 2012.
- 2008 **Lansdell B**, *Computational gene prediction using generalised hidden Markov models and tiling arrays*, Honours thesis, Department of Mathematics and Statistics, University of Melbourne, December 2008.

Honors & awards

- 2023 Most Innovative Project award in KIDS23 Biohackathon (out of 15 teams), St Jude Children’s Research Hospital, Memphis

- 2022 Travel grant to attend NeuroDataReHack hackathon, Allen Institute for Brain Science, Seattle
- 2021 Third place in MABE online machine learning competition for animal behavior classification (run on aicrowd.com)
- 2016 Travel grant to attend Graduate Summer School, Park City Mathematics Institute
- 2014 Travel grant to attend Okinawa Computational neuroscience course, OIST
- 2010 Top Scholar Award, University of Washington, Department of Applied Mathematics
- 2008 Dwight's Prize in Mathematical Statistics, University of Melbourne – awarded to top statistics thesis in honours year
- 2008 Alan W. Harris Scholarship, Walter and Eliza Hall Institute
- 2006 Melbourne Abroad Scholarship (University of Nottingham)
- 2006 MacFarland Scholarship, Ormond College
- 2004-2006 Ormond College Scholar, Ormond College
- 2003 Australian Students Prize, Australian government
- 2003 Dux (Valedictorian), Ballarat Clarendon College

Affiliations

- 2013 - present OCNS member
 - 2011 - '17; SIAM member
 - '21-present
- 2019 - 2020 UPenn MindCore affiliate
- 2011 - 2017 AMS member
- 2013 - 2014 BMES member

Service & responsibilities

- Referee for IEEE Computational Intelligence Magazine, Cosyne, Cognitive Computation, Nature Machine Intelligence, PLOS Computational Biology, Nature Communications, Neuron, Journal of Open Source Software
- 2022 **Project mentor**, *Neuromatch Academy 2022*, Computational neuroscience school, (virtual).
- 2020 **Workshop organizer**, *Cosyne 2020*, Memory, Modularity & Attention: efficient information dispatching in neural computations, Breckenridge, CO.
- 2015 - 2017 **UAW Student Union Steward**, *University of Washington*, Department of Applied Mathematics representative.
- 2012 - 2016 **Computer Systems Administrator**, *University of Washington*, Department of Applied Mathematics.
Built and maintained Applied Mathematics department website (WordPress), maintained inhouse software *scorelator* (automated grading software), applied and secured funding for department computing resources (GPU servers).
- 2011 - 2013 **Graduate student representative for computing**, *University of Washington*, Department of Applied Mathematics.

Mentoring

- 2018-2020 Prashanth Prakash, Masters student, University of Pennsylvania
- 2018-2019 Jeffrey Cheng, Masters student, University of Pennsylvania
- 2015-2017 Cooper Mellema, Post-bac student, University of Washington

Volunteer & outreach

- 2014 Fossil technician, Burke Museum of Natural History, University of Washington
- 2013-2014 Co-organizer of SIAM UW chapter math fair at Lockwood Elementary School
- 2013 Volunteer for UW Bridge program for incoming STEM students

Computer skills

- Proficient Python, MATLAB, \LaTeX , AUTO, git version control, WordPress CMS, MySQL, TensorFlow, pytorch
- Working knowledge C, C++, R, HTML, javascript, css, OpenCV, CUDA, Docker, Kubernetes