

# Benjamin James Lansdell

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URL: <http://benlansdell.github.io>

Nationality: Australian

## Current position

Postdoctoral Researcher  
Department of Bioengineering  
University of Pennsylvania, Philadelphia  
Advisor: Konrad Kording

## Areas of specialization

Computational neuroscience • Stochastic processes • Dynamical systems

## Education

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

### SUMMER SCHOOLS & WORKSHOPS

- 2018 **Visiting Scholar**  
MILA, University of Montreal, Montreal, CAN  
**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

## Positions held

- 2017-2018 University of Pennsylvania, Philadelphia, USA  
Postdoctoral Researcher  
*Kording lab, Department of Bioengineering*

2017	University of Washington, Seattle, USA Senior Fellow <i>Fairhall lab, Department of Physiology and Biophysics</i>
2009	Walter and Eliza Hall Institute for Medical Research, Australia Research Technician <i>Speed lab, Bioinformatics division</i>
2007	Walter and Eliza Hall Institute for Medical Research, Australia Undergraduate Research Opportunities Program Student <i>Speed lab, Bioinformatics division</i>

## Honors & awards

### MAJOR

2008	Dwight's Prize in Mathematical Statistics, University of Melbourne
2008	Alan W. Harris Scholarship, Walter and Eliza Hall Institute
2003	Australian Students Prize, Australian government
2003	Dux (Valedictorian), Ballarat Clarendon College

### SELECTED SMALLER

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
2006	Melbourne Abroad Scholarship (University of Nottingham)
2006	MacFarland Scholarship, Ormond College
2004-2006	Ormond College Scholar, Ormond College

## Publications & talks

### PREPRINTS & IN PREPARATION

	<b>Lansdell B</b> , Triantafillou S, Kording K, "Conservative bandits: exploration through extrapolation", <i>in preparation</i>
	<b>Lansdell B</b> , Kluck R, Hockings C, Fairlie D, Lee E, Landman K, Frasca F, Speed T, "Computational model of Bcl-2 family pro-apoptotic Bak activation through BH3-only stimulation: activation efficacies and dynamic regulation mechanisms", <i>in preparation</i>
2018	Farhoodi R, <b>Lansdell B</b> , Kording K, "Quantifying how staining methods bias measurements of neuron morphologies", <i>submitted</i>
	<b>Lansdell B</b> , Kording K, "Spiking allows neurons to estimate their causal effect", <i>bioRxiv</i> <a href="https://doi.org/10.1101/253351">https://doi.org/10.1101/253351</a>
	<b>Lansdell B</b> , Kording K, "We have to learn how to learn", <i>bioRxiv</i>
	Lagache T, <b>Lansdell B</b> , Tang J, Yuste R, Fairhall A, "Tracking Activity In A Deformable Nervous System With Motion Correction And Point-Set Registration", <i>bioRxiv</i> <a href="https://doi.org/10.1101/373035">https://doi.org/10.1101/373035</a>
2017	<b>Lansdell B</b> , Milovanovic I, Mellema C, Fetzi E, Fairhall A, Moritz C, "Reconfiguring motor circuits for a joint manual and BCI task", <i>arXiv</i> <a href="https://arxiv.org/abs/1702.07368">arXiv:1702.07368</a>

## JOURNAL ARTICLES

- 2016 Aljadeff Y, **Lansdell B**, Fairhall A, Kleinfeld D, “Analysis of neuronal spike trains, deconstructed,” *Neuron* 2016, 91(2), <http://dx.doi.org/10.1016/j.neuron.2016.05.039>
- 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. doi:10.1371/journal.pcbi.1003953
- 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, Pedetour 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, Lindsay J, Heider T, Belov K, Rens W, Waters PD, Pharo EA, Shaw G, Wong ES, Lefèvre CM, Nicholas KR, Kuroki Y, Wakefield MJ, Zenger KR, Wang C, Ferguson-Smith M, Nicholas FW, Hickford D, Yu H, Short KR, Siddle HV, Frankenberg SR, Chew KY, Menzies BR, Stringer JM, Suzuki S, Hore TA, Delbridge ML, Mohammadi A, Schneider NY, Hu Y, O’Hara W, Al Nadaf S, Wu C, Feng ZP, Cocks BG, Wang J, Flicek P, Searle SM, Fairley S, Beal K, Herrero J, Carone DM, Suzuki Y, Sugano S, Toyoda A, Sakaki Y, Kondo S, Nishida Y, Tatsumoto S, Mandiou I, Hsu A, McColl KA, **Lansdell B**, Weinstock G, Kuczek E, McGrath A, Wilson P, Men A, Hazar-Rethinam M, Hall A, Davis J, Wood D, Williams S, Sundaravadanam Y, Muzny DM, Jhangiani SN, Lewis LR, Morgan MB, Okwuonu GO, Ruiz SJ, Santibanez J, Nazareth L, Cree A, Fowler G, Kovar CL, Dinh HH, Joshi V, Jing C, Lara F, Thornton R, Chen L, Deng J, Liu Y, Shen JY, Song XZ, Edson J, Troon C, Thomas D, Stephens A, Yapa L, Levchenko T, Gibbs RA, Cooper DW, Speed TP, Fujiyama A, Graves JA, O’Neill RJ, Pask AJ, Forrest SM, Worley KC, “Genome sequence of an Australian kangaroo, *Macropus eugenii*, provides insight into the evolution of mammalian reproduction and development.”, *Genome Biology* 2011, 12:R81.

## CONFERENCE PROCEEDINGS

- 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)
- Lansdell B**, Kording K, “Spiking allows neurons to estimate their causal effect”, Cosyne Meeting 2018, Denver, CO, USA
- 2016 **Lansdell B**, Milovanovic I, Fairhall A, Fetz E, Moritz C, “Neural activity in a simultaneous BCI and manual task”, BCI Society Meeting 2016, CA, USA. doi:10.3217/978-3-85125-467-9-118

## CONFERENCE POSTERS

- 2018 Farhoodi R, **Lansdell B**, Kording K, “Quantifying the effect of staining methods on extracted neuron morphology”, INCF Meeting 2018, Montreal, QC, CA
- Lansdell B**, Kording K, “Spiking allows neurons to estimate their causal effect”, Deep Learning Reinforcement Learning Summer School 2018, CIFAR, Toronto, CAN
- 2016 **Lansdell B**, Milovanovic I, Fairhall A, Fetz E, Moritz C, “Neural activity in a simultaneous BCI and manual task”, Neurofutures Meeting 2016, Allen Institute for Brain Science, WA, USA.
- 2013 **Lansdell B**, Kutz JN (September, 2013), “The spatio-temporal dynamics of spontaneous activity in the developing retina”, *BMES* 2013, Seattle, USA.
- Lansdell B**, Kutz JN (September, 2013), “A computational model of Bcl-2 regulated apoptosis: bistability revisited”, *BMES* 2013, Seattle, USA.
- Lansdell B**, Kutz JN (September, 2013), “The spatio-temporal dynamics of spontaneous activity in

the developing retina”, *University of Washington Computational Neuroscience connection 2013*, Seattle, USA.

**Lansdell B**, Kutz JN (July, 2013), “Cholinergic Retinal Waves and Self-Organized Criticality”, *CNS 2013*, Paris, France.

2012 **Lansdell B**, Kutz JN, Ford K (September, 2012), “Modeling Retinal Waves in Starburst Amacrine Cells”, *Neuroinformatics 2012*, Munich, Germany.

2008 **Lansdell B**, Papenfuss AT, Speed TP, (December 2008) “Incorporating Tiling Array Expression Data into a Gene Predictor”, *Genome Informatics Workshop*, Gold Coast, Australia.

#### TALKS

2019 **Lansdell B** (March 22, 2019), “Causal inference in neural networks”, AMS Sectional Meeting, University of Hawaii. (Invited)

**Lansdell B** (August 21, 2018), “Causality and reinforcement learning: considerations for smarter agents”, Neuro+ML theory talk, MILA, University of Montreal.

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 24, 2017), “Unraveling principles of motor control: from nerve nets to neural prosthetics”, *Neurotheory group talk*, Columbia University, New York. (Invited)

**Lansdell B** (January 23, 2017), “Unraveling principles of motor control: from nerve nets to neural prosthetics”, *Special seminar*, Janelia Research Campus, Ashburn VA. (Invited)

2012 **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)

2012 **Lansdell B** (February 11, 2012), “Continuum Model of Retinal Waves in Starburst Amacrine Cells”, *Frontiers in Biophysics*, Simon Fraser University, Vancouver. (Contributed)

#### PRESENTATIONS

2010 **Lansdell B** (December 9, 2010), “The Hirota Method in Soliton Theory”, *Master’s completion seminar*, University of Washington, Seattle.

**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.

#### UNPUBLISHED WORKS

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.

## Teaching

2013, 2015	University of Washington Department of Applied Mathematics Guest Lecturer: <ul style="list-style-type: none"><li>• Winter 2015 – AMATH 402/502, Introduction to Nonlinear Dynamics and Chaos</li><li>• Fall 2013 – AMATH 532, Mathematics of genome analysis and molecular modeling</li></ul>
2012	University of Washington Department of Applied Mathematics Teaching Assistant: <ul style="list-style-type: none"><li>• Spring 2012 – AMATH 353, Fourier Analysis and Partial Differential Equations</li><li>• Winter 2012 – AMATH 402/502, Introduction to Nonlinear Dynamics and Chaos</li></ul>
2010-2011	University of Washington Department of Mathematics Teaching Assistant: <ul style="list-style-type: none"><li>• Fall 2011 – MATH 111, Algebra in Business and Economics</li><li>• Winter 2011 – Assistant in first year Math Study Center</li><li>• Fall 2010 – MATH 125, Calculus with Analytic Geometry II</li></ul>
2006-2007	University of Melbourne Queen's College Non-resident physics tutor
2006	University of Melbourne Ormond College Resident student tutor: <ul style="list-style-type: none"><li>• Semester 1 2006: 620-232 – Vector Calculus</li></ul>

## Affiliations & responsibilities

### AFFILIATIONS

2013 - present	OCNS member
2013 - present	BMES member
2011 - present	SIAM member
2011 - present	AMS member

### SERVICE & RESPONSIBILITIES

Refereed for: Nature Communications, Neuron

2015 - 2017	UAW Student Union Steward, Department of Applied Mathematics representative, University of Washington
2012 - 2016	Computer Systems Administrator, Department of Applied Mathematics, University of Washington
2011 - 2013	Graduate student representative for computing, Department of Applied Mathematics, University of Washington

## Volunteer & outreach

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

## Professional skills

### COMPUTING

Proficient in Python, MATLAB, Maple,  $\text{\LaTeX}$ , AUTO, git version control, WordPress CMS, MySQL  
Working knowledge of C, C++, R, HTML, shell script, PHP, OpenGL, OpenCV, CUDA

## References

Adrienne Fairhall	J. Nathan Kutz	Chet Moritz
Associate Professor	Professor	Associate Professor
Physiology and Biophysics	Applied Mathematics	Rehabilitation Medicine
University of Washington	University of Washington	University of Washington
Seattle	Seattle	Seattle
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fairhall@uw.edu	kutz@uw.edu	ctmoritz@uw.edu