BINGNI WEN BRUNTON

Associate Professor
Dept. of Biology, University of Washington

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RESEARCH INTERESTS

▷ Data-driven dynamic models of large-scale neural data
▷ Neural computation underlying task-free, naturalistic behavior
▷ Sparse sensing and control in biological and engineered systems

EDUCATION

Princeton University   Princeton, NJ
  Ph.D. in Molecular Biology & Neuroscience, 2012
  Optimal accumulation of evidence for decision-making in rats and humans

California Institute of Technology (Caltech)   Pasadena, CA
  B.S. in Biology, with Honors, 2006

ACADEMIC POSITIONS

University of Washington (UW)   Seattle WA
▷ Associate Professor, Department of Biology   2019–present
  Data Science Fellow, eScience Institute   2014–present
  H. Stewart Parker Endowed Faculty Fellow   2020–present
  Adjunct Faculty, Paul G. Allen School of Computer Science & Eng.   2016–present
  Adjunct Faculty, Department of Applied Mathematics   2017–present
  Faculty of Graduate Program in Neuroscience   2015–present

▷ Washington Research Foundation Innovation Assistant Professor, Dept. of Biology   2014–2019

▷ Postdoctoral Researcher, Applied Math. and Neural Engineering   2012–2014

AWARDS AND HONORS

  H. Stewart Parker Endowed Faculty Fellowship (2020–23)
  Caltech, Moore Distinguished Scholar (2021)
  Weill Neurohub Investigator (2020)
  Air Force Office of Scientific Research Young Investigator Program (YIP) Award (2018–21)
  University of Washington Innovation Award (2017–19)
  Alfred P. Sloan Research Fellowship (2016–18)
  Washington Research Foundation Innovation Professor of Neuroengineering (2014–19)
  NSF Graduate Research Fellowship Honorable Mention (2007, 2008)
  Caltech, Richter Research Fellowship (2005)
  Caltech, Perpall Speaking Competition Semifinalist (2005)
  Caltech, McKinney Prize in Literature (2005)
  Caltech Summer Undergraduate Research Fellowship (2003, 2004)
  International Science and Engineering Fair (ISEF) Finalist (2002)
  Intel Science Talent Search Semifinalist (2002)

Publications

For a complete list of publications, including preprints, see also B. W. Brunton's Google Scholar profile at `https://scholar.google.com/citations?user=UftAYPkAAAAJ&hl=en`.

† co-first authors who contributed equally to the manuscript
‡ co-senior authors who jointly directed the work

► Preprints and Submitted Manuscripts:

Deora, T., Ahmed, M. A., **Brunton, B. W.** & Daniel, T. L.
  Learning to feed in the dark: how light level influences feeding in the hawkmoth *Manduca sexta*.
  invited article, Biology Letters.

Hirsh, S. M., Ichinaga, S. M., Brunton, S. L., Kutz, J. N. & **Brunton, B. W.**
  Structured time-delay models for dynamical systems with connections to Frenet-Serret frame.
  arXiv:2101.08344.

Linden, N. J., Tabuena, D. R., Steinmetz, N. A., Moody, W. J., Brunton, S. L. & **Brunton, B. W.**
  Go with the FLOW: Visualizing spatiotemporal dynamics in optical widefield calcium imaging.
  arXiv:2009.14283.

Caldart, C. S.†, Sanchez, R. E. A.†, Ben-Hamo, M., Beck, A. I., Weil, T. A., Perez, J. G., Kalume, F., **Brunton, B. W.** & de la Iglesia, H. O.
  Sleep Identification Enabled by Supervised Training Algorithms (SIESTA): An open-source platform for automatic sleep staging of rodent polysomnographic data.
  bioRxiv doi: https://doi.org/10.1101/2020.07.06.186940.

Karashchuk, P., Rupp, K. L., Dickinson, E. S., Sanders, E., Azim, E., **Brunton, B. W.**‡ & Tuthill, J. C.‡
  Anipose: a toolkit for robust markerless 3D pose estimation.
  bioRxiv doi: https://doi.org/10.1101/2020.05.26.117325.

Nair, A. G., Taira, K. **Brunton, B. W.,** & Brunton, S. L.
  Phase-based control of periodic fluid flows. *arXiv:2004.10561.*

Harris, K. D., Aravkin, A., Rao, R. P. N. & **Brunton, B. W.**
  Time-varying autoregression with low rank tensors. *arXiv:1905.08389*

Tabuena, D. R., Huynh, R., Metcalf, J., Richner, T., Stroh, A., **Brunton, B. W.,** Moody, W. J. & Easton, C. R.
  Pan-cortical waves in the neonatal mouse brain in vivo occur almost exclusively during sleep cycles.

► Peer-Reviewed Publications:

Weber, A. I., Daniel, T. L. & **Brunton, B. W.**
  Wing structure and neural encoding jointly determine sensing strategies in insect flight.
  to appear in PLoS Computational Biology; bioRxiv doi: https://doi.org/10.1101/2021.02.09.430476.

Aiello, B. R.†, Stanchak, K. E.†, Weber, A. I.†, Deora, T., Sponberg, S. & **Brunton, B. W.**
  Spatial distribution of wing mechanosensors: Form, function, and phylogeny.
  Current Opinion in Insect Science (2021), https://doi.org/10.1016/j.cois.2021.06.002.

Peterson, S. M.†, Singh, S. H.†, Wang, N. X. R., Rao, R. P. N. & **Brunton, B. W.**
  Behavioral and neural variability of naturalistic arm movements.
  eNeuro (2021), 0007-21.2021; DOI: https://doi.org/10.1523/ENEURO.0007-21.2021.

Singh, S. H., Peterson, S. M., Rao, R. P. N. & **Brunton, B. W.**
  Mining naturalistic human behaviors in long-term video and neural recordings.
  Journal of Neuroscience Methods (2021), https://doi.org/10.1016/j.jneumeth.2021.109199.

Dallmann, C. J.[†], Karashchuk, P.,[†] **Brunton, B. W.**[‡] & Tuthill, J. C.[‡]
A leg to stand on: computational models of proprioception.
Current Opinion in Physiology (2021), https://doi.org/10.1016/j.cophys.2021.03.001.

Deora, T., Ahmed, M. A., Daniel, T. L., & **Brunton, B. W.**
Tactile active sensing in insect-plant pollination.
Journal of Experimental Biology (2021), 224 no. 4, jeb239442.

de Silva, B. M., Manohar, K., Clark, E., **Brunton, B. W.,** Brunton, S. L. & Kutz, J. N.
PySensors: A Python package for sparse sensor placement.
Journal of Open Source Software (2021), 6(58), 2828.

Callaham, J. L., Kutz, J. N., **Brunton, B. W.,** & Brunton, S. L.
Learning dominant physical processes with data-driven balance models.
Nature Communications (2021), 12 (1), 1-10

Peterson, S. M., Steine-Hanson, Z., Davis, N., Rao, R. P. N. & **Brunton, B. W.**
Generalized neural decoders for transfer learning across participants and recording modalities.
Journal of Neural Engineering (2021), 18, 026014.

Stanchak, K. E., French, C., Perkel D. J.[‡], & **Brunton, B. W.**[‡]
The balance hypothesis for the avian lumbosacral organ and an exploration of its morphological variation.
Integrative Organismal Biology (2020), obaa024.

van Breugel, F., Kutz, J. N., & **Brunton, B. W.**
Numerical differentiation of noisy data: A unifying multi-objective optimization framework.
IEEE Access (2020), 8, 196865 - 196877.

Stepaniants, G., **Brunton, B. W.** & Kutz, J. N.
Inferring causal networks of dynamical systems through transient dynamics and perturbation.
Physical Review E (2020), 102 (4), 042309.

Hirsh, S. M., Harris, K. D., Kutz, J. N. & **Brunton, B. W.**
Centering data improves the Dynamic Mode Decomposition.
SIAM Journal on Dynamical Systems (2020) 19 (3), 1920-1955.

Hirsh, S.M., **Brunton, B. W.,** & Kutz, J. N.
Data-driven spatiotemporal modal decomposition for time frequency analysis.
Applied and Computational Harmonic Analysis (2020), 49 (3), 771-790.

Nair, A. G., Strom, B., **Brunton, B. W.,** & Brunton, S. L.
Phase-consistent dynamic mode decomposition from multiple overlapping spatial domains.
Physical Review Fluids (2020), 5 (7), 074702.

Caldwell, D. J., Cronin, J. A., Rao, R. P. N., Collins, K. L., Weaver, K. E., Ko, A. K., Ojemann, J. G., Kutz, J. N. & **Brunton, B. W.**
Signal recovery from stimulation artifacts in intracranial recordings with dictionary learning.
Journal of Neural Engineering (2020), 17 (2), 026023.

Brunton, B. W. & Beyeler, M.
Data-driven models for human neuroscience and neuroengineering.
Current Opin Neurobiol (2019), 58, 21-29.

Kunert-Graf, J. M., Eschenburg, K. M., Galas, D. J., Kutz, J. N., Rane, W. D., & **Brunton, B. W.**
Extracting reproducible time-resolved resting state networks using dynamic mode decomposition.
Frontiers in Comp. Neurosci. (2019).

Curtu, R., Wang, X., **Brunton, B. W.** & Nourski, K.
  Neural signatures of auditory perceptual bistability revealed by large-scale human intracranial recordings.
  J. Neurosci (2019).

Mohren, T. L., Daniel, T. L., Brunton, S. L., **Brunton, B. W.**
  Neural-inspired sensors enable sparse, efficient classification of spatiotemporal data.
  Proc Natl Acad Sci U.S.A (2018) 115 (42) 10564-10569.
  * Featured in a Commentary by Hale, M, *PNAS (2018) 115 (42) 10545-10547.*

Manohar, K., **Brunton, B. W.**, Kutz, J. N. & Brunton, S. L.
  Data-Driven Sparse Sensor Placement for Reconstruction: Demonstrating the Benefits of Exploiting Known Patterns.
  IEEE Control Systems Magazine (2018) 38 (3), 63–86.

Wang, N. X. R., Farhadi, A., Rao, R. P. N. & **Brunton, B. W.**
  AJILE movement prediction: Multimodal deep learning for natural human neural recordings and video.
  Proceedings of AAAI Conference (2018).

Kaiser, E., Morzynski, M., Daviller, G., Kutz, J. N., **Brunton, B. W.** & Brunton, S. L.
  Sparsity enabled cluster reduced-order models for control.
  Journal of Computational Physics (2018) 352, 388–409.

Brunton, S. L., **Brunton, B. W.**, Proctor, J. L., Kaiser, E. & Kutz, J. N.
  Chaos as an intermittently forced linear system.
  Nature Communications (2017) 8.

Brunton, B. W., Brunton, S. L., Proctor, J. L. & Kutz, J. N.
  Sparse sensor placement optimization for classification.
  SIAM Journal on Applied Mathematics (2016) 76 (5), 2099-2122.

Wang, N. X. R., Olson, J. D., Ojemann, J. G., Rao, R. P. N. & **Brunton, B. W.**
  Unsupervised decoding of long-term, naturalistic human neural recordings with automated video and audio annotations.
  Frontiers in Human Neuroscience (2016) 10, 165.

Brunton, S. L., **Brunton, B. W.**, Proctor, J. L. & Kutz, J. N.
  Koopman observable subspaces and finite linear representations of nonlinear dynamical systems for control.
  PLoS ONE (2016) 11(2): e0150171.

Brunton, B. W., Johnson, L. A., Ojemann, J. G. & Kutz, J. N.
  Extracting spatial-temporal coherent patterns in large-scale neural recordings using dynamic mode decomposition.
  J Neuroscience Methods (2016) 258, 1–15.

Kopec, C. D., Erlich, J. C., **Brunton, B. W.**, Deisseroth, K. & Brody, C. D.
  Cortical and subcortical contributions to short-term memory for orienting movements.
  Neuron (2015) 88 (2), 367–377.

Erlich, J. C., **Brunton, B. W.**, Duan, C. A., Hanks, T. D., & Brody, C. D.
  Distinct behavioral effects of prefrontal and parietal cortex inactivations on an accumulation of evidence task in the rat.
  eLife (2015) 4:e05457.

Hanks, T., Kopec, C. D., **Brunton, B. W.**, Duan, C. A., Erlich, J. C. & Brody, C. D.
  Distinct relationships of parietal and prefrontal cortices to evidence accumulation.

Nature (2015) 520, 220–223.

Proctor, J. L., Brunton, S. L., **Brunton, B. W.** & Kutz, J. N.
Exploiting sparsity and equation-free architecture in complex systems.
European Physical Journal Special Topics (2014) 223, 1–20.

Brunton, B. W., Botvinick, M. M. & Brody, C. D.
Rats and humans can optimally accumulate evidence for decision-making.
Science (2013) 340:95–98.
* Featured in News & Views by Kauffman, M. T. & Churchland, A. K, *Nature (2013) 496:172–173.*

Granstedt, A. E., **Brunton, B. W**. & Enquist, L. W.
Imaging the transport dynamics of single alphaherpesvirus particles in intact peripheral nervous system explants from infected mice.
mBio (2013) 4:e00358.

Kubanek, J., Snyder, L. H., **Brunton, B. W.**, Brody, C. D. & Schalk, G.
A low-frequency oscillatory neural signal in humans encodes a developing decision variable.
NeuroImage (2013) 83:795–808.

Huang, K. C., Mukhopadhyay, R., **Wen, B.**, Gitai, Z. & Wingreen, N. S.
Cell shape and cell-wall organization in Gram-negative bacteria.
Proc Natl Acad Sci U.S.A. (2008) 105:19282–19287.

▶ BOOKS AND BOOK CHAPTERS:

Kutz, J. N, Brunton, S. L., **Brunton, B. W.**, & Proctor, J. L.
Dynamic Mode Decomposition: Data-Driven Modeling of Complex Systems.
Society for Industrial and Applied Mathematics (2016) ISBN: 9781611974492.

Bai, Z., Brunton, S. L., **Brunton, B. W.**, Kutz, J. N., Kaiser, E., Spohn, A., & Noack, B. R.
Data-Driven Methods in Fluid Dynamics: Sparse Classification from Experimental Data.
Whither Turbulence and Big Data in the 21st Century?, 2017, pp323–342.

▶ PEER-REVIEWED CONFERENCE PROCEEDINGS:

Azadian, E., Velchuru, G., Wang, N. X. R., Peterson, S. M., Staneva, V. & **Brunton, B. W.**
Decoding happiness from neural and video recordings.
NeurIPS 2020, workshop on Learning Meaningful Representations of Life.

Singh, S. H., van Breugel, F., Rao, R. P. N. & **Brunton, B. W.**
Understanding biological plume tracking behavior using deep reinforcement-learning.
2020 Artificial Life Conference Proceedings, 750-752.

Singh, S. H., Peterson, S. M., Rao, R. P. N. & **Brunton, B. W.**
Enabling naturalistic neuroscience through behavior mining: Analysis of long-term human brain and video recordings
2019 Conference on Cognitive Computational Neuroscience (2019).

Wu, J., Shuman, B. R., **Brunton, B. W.**, Steele, K. M., Olson, J. D., Rao, R. P. N. & Ojemann, J. G.
Multistep model for predicting upper-Limb 3D isometric force application from pre-movement electro-corticographic features.
IEEE Engineering in Medicine and Biology Society Conference (EMBC 2016).

▶ DATASETS:

Wang, N. X. R., Farhadi, A., Rao, R. P. N. & **Brunton, B. W.**
The Annotated Joints in Long-term ECoG (AJILE) Dataset.

`https://www.bingbrunton.com/data.`

▶ ADDITIONAL PUBLICATIONS:

Karashchuk, P., Tuthill, J. C. & **Brunton, B. W.**
   The DANNCE of the rats: a new toolkit for 3D tracking of animal behavior.
   Nat Methods (2021). https://doi.org/10.1038/s41592-021-01110-w

RESEARCH SUPPORT

DOD/AFOSR, 09/01/2019–08/31/2024, $7.5M
   PI: B. W. Brunton
   Co-PIs: S. E. Bergbreiter, S. L. Brunton, T. L. Daniel, J. N. Kutz, J. P. How
   MURI: Neural inspired sparse sensing and control for agile flight

Weill Neurohub, 2020, $700K
   PI: K. Bouchard, Co-PIs: B. W. Brunton, T. Grabowski, R. Henry, G. Manley, S. Sundaram, B. Yu
   Weill Neurohub Data and Analytics Center (NDAC)

Burroughs-Wellcome Fund, 10/15/2018–10/14/2020, $150K
   PI: B. W. Brunton, Co-PI: B. Kerr
   Transforming biology graduate training through quantitative experimental dialectics (QED)

DOD/AFOSR, 1/29/2018–1/28/2021, $445K
   PI: B. W. Brunton
   Sparse sensing with wing mechanosensory neurons for estimation of body rotation in flying insects

NSF, 9/1/2016–8/31/2021, $899K
   PI: B. W. Brunton, Co-PI: R. P. N. Rao
   NCS-FO: Understanding neural processing in long-term, naturalistic human brain recordings using data-intensive approaches

NIH/NIMH, 8/14/2018–5/31/2023, $3.8M
   PI: E. Buffalo, Co-Inv: B. W. Brunton
   Temporally coordinated activity in the primate hippocampus supporting memory formation

▶ COMPLETED RESEARCH SUPPORT, SELECTED

DOD/DARPA, 11/16/2017–11/15/2020, $527K
   PI: B. W. Brunton, Co-PI: R. P. N. Rao
   Multimodal neural decoding: Data-intensive approaches to understanding long-term, unlabeled human brain data

DOD/AFRL, 1/4/2016–1/3/2020, $395K
   PI: B. W. Brunton, Co-PI: S. L. Brunton
   Integrating compressive sensing and classification for dynamic target tracking

NSF, CRCNS, 9/1/2015–8/31/2019, $519K total with $145K to UW
   PI: R. Curtu, Co-PIs: B. W. Brunton and K Nourski
   Collaborative Research: Dynamic models of human auditory perceptual switching informed by large-scale ECoG recordings

INVITED TALKS AND PRESENTATIONS   † **denotes keynote and plenary talks**

2021 May.	Janelia Research Campus, Computation & Theory Seminar (Ashburn VA, remote)
2021 Mar.	† Interdisciplinary College (IK), Evening Lecture (Mhnesee-Günne, Germany, remote)
2021 Mar.	Allen Institute for Brain Science, online symposium on Open for (neuro)science

2020 Nov.	Johns Hopkins University, Zanvyl Krieger Mind/Brain Institute, David Bodian Seminar (Baltimore MD, remote)
2020 Oct.	University of Chicago, Neuroscience Seminar (Chicago IL, remote)
2020 Oct.	Columbia University, Center for Theoretical Neuroscience Seminar (New York NY, remote)
2020 Oct.	University of Virginia, Quantitative Psychology Colloquium (Charlottesvilla VA, remote)
2020 Sept.	University of Pennsylvania, Mahoney Institute for Neurosciences Colloquium (Philadelphia PA, remote)
2019 Nov.	Georgia Institute of Technology, Department of Biomedical Eng. (Atlanta GA)
2019 Nov.	University of Washington, Machine Learning Colloquium (Seattle WA)
2019 Nov.	Institute for Pure and Applied Mathematics (IPAM) at UCLA, Workshop on Machine Learning for Physics and the Physic of Machine Learning (Los Angeles CA)
2019 Oct.	University of Southern California, Department Aerospace and Mechanical Engineering (Los Angeles CA)
2019 Sept.	University of Washington, Graduate Program in Neuroscience Retreat (Seattle WA)
2019 Sept.	Harvard University, QBio Workshop on Making Sense of Turbulence (Cambridge MA)
2019 July	Sainsbury Wellcome Centre (London, UK)
2019 July	Telluride Neuromorphic Cognition Engineering Workshop (Telluride CO)
2019 June	Workshop on Multisensory Integration in Insect Flight Dynamics (Bangalore, India)
2019 May.	The Copenhagen Initiative Workshop: Developing a theory on how brains work (Copenhagen, Denmark)
2019 Feb.	Georgia Institute of Technology, School of Life Sciences (Atlanta GA)
2019 Jan.	† Dynamics Days, International Conference on Nonlinear Dynamics (Evanston IL)
2018 Oct.	Eglin Air Force Base (Destin FL)
2018 May	University of Washington Center for Integrative Neuroscience Spring Symposium (Seattle WA)
2018 May	Boeing Data Science Executive Workshop (Washington DC)
2018 May	American Psychiatric Association Annual Meeting, session on Big Data in Mental Health (New York NY)
2018 Mar.	University of Oregon, Institute of Neuroscience (Eugene OR)
2018 Mar.	American Physical Society (APS) March Meeting, focus session on Neural Control of Behavior (Los Angeles CA)
2018 Mar.	Computational and Systems Neuroscience (COSYNE), Workshop on Recent Computational Advances in Neuroengineering: From Theory to Applications (Breckenridge CO)
2018 Jan.	Boeing Data Science Executive Workshop (Seattle WA)
2017 Dec.	Neural Information Processing Systems (NIPS) Conference Workshop: Big Neuro (Long Beach CA)
2017 Nov.	École Normale Superieure, Center for Neural Theory (Paris, France)
2017 Oct.	University of California Los Angeles (UCLA), Dept. of Mathematics, Applied Math Colloquium (Los Angles CA)
2017 Aug.	Workshop on Data-Driven Methods for Multi-Scale Physics and Complex Systems (Rome, Italy)
2017 July	Johns Hopkins University, Dept. of Psychology (Baltimore MD)
2017 July	Naval Surface Warfare Center, Carderock Division (Bethesda MD)
2017 July	8th Bio-inspired Unmanned Autonomous Systems (BioUAS) State Of the Art Review (Oxford, UK)
2017 June	University of Washington Database (UWDB) Affiliates Workshop (Seattle WA)
2017 May	Society for Industrial and Applied Mathematics (SIAM) Conference on Applications of Dynamical Systems (Snow Bird UT)
2017 Jan.	Workshop on Data-Driven Methods for Reduced-Order Modeling and Stochastic Partial Differential Equations, Banff International Research Station (Banff Alberta, Canada)
2017 Jan.	Frontiers of Science and Engineering (Seattle WA)
2016 Nov.	University of Washington, Graduate Program in Neuroscience Seminar (Seattle WA)

2016 Nov.	Society for Mathematical Psychology and Psychonomics, Workshop on Rethinking Biological Plausibility (Boston MA)
2016 Nov.	Harvard University, Center for Brain Science (Cambridge MA)
2016 Oct.	University of Washington Institute for Neuroengineering Seminar (Seattle WA)
2016 Oct.	† BrainKDD: The 3nd International Workshop on Data Mining and Visualization for Brain Science (Seattle WA)
2016 July	University of Maryland, Brain and Behavior Initiative Seminar (College Park MD)
2016 June	NeuroFutures Conference (Seattle WA)
2016 April	Institute for Disease Modeling Annual Symposium (Bellevue WA)
2016 April	Society for Industrial and Applied Mathematics (SIAM) Conference on Uncertainty Quantification (Lausanne, Switzerland)
2016 Mar.	DARPA/ISAT Workshop on Bio-Integrated Processing, Sensing, and Storage (Seattle WA)
2016 Feb.	Computational and Systems Neuroscience (COSYNE), Workshop on Dimensionality Reduction in High-Dimensional Neural Datasets (Snowbird UT)
2016 Feb.	University of Washington, Neuroengineering and Computational Neuroscience Connection (Seattle WA)
2016 Feb.	University of Washington, Behavioral Neuroscience Research Seminar (Seattle WA)
2016 Jan.	Workshop on Neuromechanics & Dynamics of Locomotion (New Orleans LA)
2015 Dec.	DARPA/ISAT Workshop on Making-Sense (Washington DC)
2015 Oct.	Columbia University, Center for Theoretical Neuroscience (NYC NY)
2015 Oct.	New York University, Center for Data Science (NYC NY)
2015 Oct.	University of Washington, Dept. of Electrical Engineering Colloquium (Seattle WA)
2015 Oct.	† Moore-Sloan Data Science Environment Annual Summit (Suncadia WA)
2015 May	Society for Industrial and Applied Mathematics (SIAM) Conference on Applications of Dynamical Systems (Snow Bird UT)
2014 Dec.	University of Washington, Department of Statistics Seminar (Seattle WA)
2014 Nov.	New Perspectives on Neuroengineering and Neurotechnologies, DFG-NSF Research Conference (Washington DC)
2014 Aug.	University of Iowa, Department of Neurosurgery Research Seminar (Iowa City IA)
2014 June	Sloan-Swartz Center for Theoretical Neurobiology Annual Meeting (Seattle WA)
2014 June	NeuroFutures Conference (Seattle WA)
2014 May	University of Washington Institute for Neuroengineering (UWIN) and Department of Biology (Seattle WA)
2014 May	Allen Institute for Brain Science (Seattle WA)
2014 Apr.	Harvard University, Center for Brain Science (Cambridge MA)
2013 Dec.	University of Washington, Center for Sensorimotor Neural Engineering (CSNE), Kavli Seminar (Seattle WA)
2013 Oct.	Allen Institute for Brain Science (Seattle WA)
2011 Dec.	Brandeis University, Decision-making Seminar (Waltham MA)
2011 Oct.	University of Washington, Computational Neuroscience Seminar (Seattle WA)
2011 July	Sloan-Swartz Centers for Theoretical Neurobiology Annual Meeting (Ashburn VA)

MENTORING † **current group members in bold**

POST GRADUATE

2017–	**Tanvi Deora, Ph.D. in Biology**, co-advised with Tom Daniel, *Postdoctoral Research Associate in Biology, Human Frontiers Science Program (HFSP) Postdoctoral Fellow*
2018–	**Chris Dallman, Ph.D. in Neuroscience**, co-advised with John Tuthill, *Postdoctoral Research Associate in Physiology & Biophysics, Sackler Postdoctoral Scholar*
2018–	**Steven Peterson, Ph.D. in Biomedical Engineering**, co-advised with Raj Rao, *Data Science Postdoctoral Research Associate in Biology*

2019–	**Alison Weber, Ph.D. in Neuroscience**, co-advised with Tom Daniel, *Postdoctoral Research Associate in Biology, Washington Research Foundation (WRF) Postdoctoral Fellow*
2019–	**Alice Schwarze, D.Phil. in Mathematics**, *Data Science Postdoctoral Research Associate in Biology*
2020–	**Katie Stanchak, Ph.D. in Biology**, co-advised with David Perkel, *Postdoctoral Research Associate in Biology*
2021–	**Urban Fasel, Dr.Sc. in Mechanical Engineering**, co-advised with Steve Brunton, *Postdoctoral Research Associate in Mechanical Engineering*
2018–2020	Karmeron Decker Harris, Ph.D. in Applied Mathematics, co-advised with Raj Rao, *Postdoctoral Research Associate in Computer Science & Engineering, Washington Research Foundation (WRF) Postdoctoral Fellow*
2018–2020	Aditya Nair, Ph.D. in Mechanical Engineering, co-advised with Steve Brunton, *Postdoctoral Research Associate in Mechanical Engineering*
2016–2018	C. Liz Gass, M.D., M.P.H., *Resident at UW Medicine, Psychiatry*
2016–2018	Bethany Lusch, Ph.D., co-advised with Steve Brunton and Nathan Kutz, *Postdoctoral Research Associate in Applied Mathematics*
2016	Eurika Kaiser, Ph.D., co-advised with Steve Brunton and Nathan Kutz, *Moore-Sloan-WRF Data Science Postdoctoral Fellow*

GRADUATE

2017–	**Aaron D. Garcia**, co-advised with Beth Buffalo, *Ph.D. student in UW Neuroscience*, National Science Foundation (NSF) Graduate Research Fellow, Washington Research Foundation (WRF) Innovation in Neuroengineering Graduate Fellow
2017–	**Pierre Karashchuk**, co-advised with John Tuthill, *Ph.D. student in UW Neuroscience*, National Science Foundation (NSF) Graduate Research Fellow
2018–	**Satpreet Singh**, co-advised with Rajesh Rao, *Ph.D. student in UW Elec, & Comp. Eng.*
2019–	**Michelle Hickner**, co-advised with Steve Brunton, *Ph.D. student in UW Mech. Eng.*
2019–	**Gabrielle Strandquist**, co-advised with Rajesh Rao, *Ph.D. student in UW Computer Sci. & Eng.*, National Science Foundation (NSF) Graduate Research Fellow
2019–	**Zoe Steine-Hanson**, co-advised with Rajesh Rao, *Ph.D. student in UW Computer Sci. & Eng.*, National Science Foundation (NSF) Graduate Research Fellow
2019–	**Biraj Pandey**, *Ph.D. student in UW Applied Math.*, National Science Foundation (NSF) Graduate Research Fellow
2019–	**Maxwell Gray**, *Ph.D. student in UW Computer Sci. & Eng.*
2017–2020	Seth Hirsh, Ph.D. in Physics, co-advised with Nathan Kutz
2015–2018	Nancy X. R. Wang, Ph.D. in Computer Science & Engineering, co-advised with Rajesh Rao, Washington Research Foundation Innovation in Neuroengineering and Data Science Graduate Fellow, National Science and Engineering Research Council (NSERC) of Canada Graduate Fellow

UNDERGRADUATE AND POST-BACCALAUREATE

2019–	**Sara Ichinaga**, undergraduate researcher, *Applied Computational and Mathematical Sciences (ACMS) major at UW*
2019–	**Nathan Davis**, undergraduate researcher, *Computer Science major at UW*
2020–	**Zeynep Toprakbasti**, undergraduate researcher, *Computer Science major at UW*, Mary Gates Scholar
2021–	**Abna Moalin**, undergraduate ENDURE scholar, *Biology major at Highline College*
2019–2020	Nathaniel Linden, undergraduate researcher, *Bioengineering graduate at UW*
2018–2019	Yuchen Wang, undergraduate researcher, *Computer Sci and Psychology graduate at UW*
2017–2019	George Stepaniants, undergraduate researcher, co-advised with Nathan Kutz, *Mathematics and Computer Science garduate at UW*, Mary Gates Scholar
2018	Frances Ingram-Bate, undergraduate researcher, *Bioengineering major at UW*

2018	AJ Krouse, undergraduate researcher, *Neurobiology major at UW*
2017–2018	Gautham Velchuru, undergraduate researcher, UWIN fellow, *Computer Sci major at UW*
2017–2018	Joe Christianson, undergraduate researcher, *Mathematics major at UW*
2017–2018	Jeffery Ni, undergraduate researcher, *Bioengineering major at UW*
2017	Nhi Ngo, undergraduate researcher, *Applied Comp & Mathematical Sci major at UW*
2016–2017	Ryan Shean, undergraduate researcher and UWIN fellow, *Microbiology major at UW*
2016	Wilven Smoody, undergraduate researcher, *Physics gradate at UW*
2016	Mathi Manavalan, undergraduate researcher, *Psychology major at UW*
2016	Sam Kinn, undergraduate researcher and UWIN fellow, *Eletrical Engineering graduate at UW*
2016	Mycole Brown, undergraduate researcher, *Biology graduate at UW*
2015–2016	Karl Marrett, post-baccalaureate researcher and UWIN Fellow, *Neurobiology/Computational Neuroscience graduate at UW*
2015	Christine McCreary, undergraduate researcher sponsored by UWIN and the Center for Sensorimotor Neural Engineering (CSNE), *Computer Science and Neurobiology major at UW*
2015	Monica Lamirand, undergrad researcher, CSNE UR, *Math/Psych major at Hanover College*
2013–2014	Justin Thompson, *post-baccalaureate researcher* at UW, Center for Sensorimotor Neural Engineering (CSNE) Research Experience for Veterans–University Projects (REV-UP)

HIGH SCHOOL STUDENTS

2017–2018	Saijel Verma, Interlake High School

PH.D. GRADUATE COMMITTEES

Yoni Browning	Neuroscience (Co-advisors: Beth Buffalo & Adrienne Fairhall), thesis committee member
Suzanne Lewis	Psychology (Advisor: David Gire), graduate school representative
Jesse Miles	Neuroscience (Advisors: David Gire & Sheri Mizumori), thesis committee member
Dennis Tabuena	Neuroscience (Advisor: Bill Moody), thesis committee member
Meghana Velegar	Applied Mathematics (Advisor: Nathan Kutz), graduate school representative
Brandon Pratt	Physiology & Biophysics (Advisor: John Tuthill), thesis committee member
Samantha Sun	Bioengineering (Co-advisors: Raj Rao & Jeff Ojemann), thesis committee member
Si Jia Li	Bioengineering (Advisor: Amy Orsborn), thesis committee member
John Huddleston, Ph.D.	Molecular and Cell Biology (Advisor: Trevor Bedford), graduate school representative
Callie Bee, Ph.D.	Computer Science & Engineering (Advisor: Luis Ceze), graduate school representative
Claire Rusch, Ph.D.	Biology (Advisor: Jeff Riffell), thesis committee member
Eleanor Lutz, Ph.D	Biology (Advisor: Jeff Riffell), thesis committee member
Gideon Dunster, Ph.D.	Biology 2019 (Advisor: Horacio de la Iglesia), thesis committee member
Nile Wilson, Ph.D.	Bioengineering 2019 (Co-advisors: Raj Rao, Jeff Ojemann & Eric Chudler), thesis committee member
David Caldwell, Ph.D.	Bioengineering MD/PhD program 2019 (Co-advisors: Raj Rao, Jeff Ojemann & Eric Chudler), thesis committee member
Jing James Wu, Ph.D.	Bioengineering 2019 (Co-advisors: Raj Rao, Jeff Ojemann & Eric Chudler), thesis committee member
David Bjanes, Ph.D.	Electrical Engineering 2019 (Advisor: Chet Moritz), graduate school representative

Vaishnavi Ranganathan, Ph.D.	Electrical Engineering 2018 (Advisor: Josh Smith), graduate school representative
Alex Tank, Ph.D.	Statistics 2018 (Advisor: Emily Fox), graduate school representative
Maggie Thompson, Ph.D.	Electrical Engineering 2018 (Advisor: Howard Chiczek), graduate school representative
Jingjing Wang, Ph.D.	Computer Science & Engineering 2018 (Advisor: Magda Balazinska), graduate school representative
Andrew Haddock, Ph.D.	Electrical Engineering 2017 (Advisor: Howard Chiczek), thesis committee member
James Kunert, Ph.D.	Physics 2016, (Advisor: Nathan Kutz), graduate school representative
Vamsi Talla, Ph.D.	Electrical Engineering 2016, (Advisor: Josh Smith), graduate school representative
Brad Dickerson, Ph.D.	Biology 2015, (Advisor: Tom Daniel), thesis committee member

TEACHING

2021 Spring	UW, BIOL 511C, **High-dimensional Data Analysis**
2021 Winter	UW, BIOL 461, **Neurobiology**
2020 Spring	UW, BIOL 511B, **Mathematical Biology**, with B. Kerr
2020 Winter	UW, BIOL 419/519, **Data Science for Biologists**
2019 Spring	UW, BIOL 511B, **Mathematical Biology**, with B. Kerr
2019 Winter	UW, BIOL 419/519, **Data Science for Biologists**, with K. D. Harris
2018 Spring	UW, BIOL 511B, **Mathematical Biology**, with B. Kerr
2018 Spring	UW, BIOL 130, **Introduction to Neuroscience**, with T. Daniel & W. Moody
2018 Winter	UW, BIOL 419/519, **Data Science for Biologists**
2017 Winter	UW, BIOL 419/519, **Data Science for Biologists**
2016 Spring	UW, BIOL 300, **Introduction to Neuroscience**, with W. Moody
2016	Video Course **Data Science for Biologists**, lectures available on YouTube
2016 Winter	UW, BIOL 419/519, **Data Science for Biologists**
2015 Spring	UW, BIOL 419/519, **Data Science for Biologists**

SUMMER SCHOOLS

2020, 21	**Neuromatch Academy**, an online school for computational neuroscience, lecturer, tutorial creator, and day chief on *Linear Systems*

GUEST LECTURES

2021	UCSD, **Cognitive Neuroscience Colloquium**
2014, 15, 16, 17, 20	UW, NBIO 490 **Seminars in Computational Neuroscience**
2019, 20	UW, MATH 498 **Undergraduate Mathematical Sciences Seminar**
2017	UW, CSE 491 **Data Science and Society**
2017	UW, CSE/Neuro 528 **Computational Neuroscience**
2016	UW, PSYCH 502 **Core Concepts in Behavioral Neuroscience**
2014	UW, GEN ST 391B **Different Ways of Knowing**

ADVISORY AND EDITORIAL ROLES

Board of Directors, Neuromatch Conference (NMC), 2021–present

Executive Board, Neurodata Without Borders (NWB), 2020–present

Editorial Board, Neurons, Behavior, Data analysis, and Theory (NBDT), 2018–present

UNIVERSITY OF WASHINGTON

2019–	eScience Institute, Member of Executive Committee
2020–	Data Science Minor, Member of Curriculum Committee
2020–	Dept of Biology & eScience Institute, Data Science Minor advisor
2019–	Dept of Biology & eScience Institute, Data Science Ph.D. Option advisor
2021–	eScience Institute & Computational Neuroscience Center, Member of Selection Committee for the Shanahan Foundation Fellowship at the Interface of Data and Neuroscience
2018–2021	Dept of Biology, Member of Undergraduate Program Committee
2019	Search Committee for the Director of the eScience Institute
2017–2019	eScience Institute & UW Institute of Neuroenginering, Neuroinformatics Working Group
2015–2018	Neuroscience Graduate Program, Member of Admissions Committee
2017–2018	eScience Institute, Co-Chair of Education Working Group
2017–2018	eScience Institute, Program Chair of UW Data Science Summit
2017–2018	Dept of Biology, Member of Faculty Search Committee
2014–2017	eScience Institute, Member of Education Working Group
2016–2017	Dept of Biology, Member of Graduate & Postdoc Committee
2016–2017	Dept of Biology, Member of Seminar Committee
2015–2016	Dept of Biology, Co-Chair of Seminar Committee

Ad Hoc Reviewer for: Mary Gates Merit Scholarship, Royal Research Fund, Innovation in Neuroengineering Postdoctoral Fellowship, Washington Research Foundation Data Science Postdoctoral Fellowship, Institute for Translational and Health Sciences Pilot Awards, Weill Neurohub.

CONFERENCE AND WORKSHOP ORGANIZING

2017–2018	Computational and Systems Neuroscience Conference, co-organizer for Workshop on Recent Computational Advances in Neuroengineering: From Theory to Applications
2015–2018	Computational and Systems Neuroscience Conference (COSYNE 2016, 2017, 2018), Member of Program Committee
2016–2017	Organization for Human Brain Mapping (OHBM) Annual Meeting, Vancouver BC, Symposium Organizer for *Uncovering complexity with long-term naturalistic recordings*
2016–2017	Society for Industrial and Applied Mathematics (SIAM) Conference on Dynamical Systems, Snowbird UT, Mini-Symposium Organizer for *Equation-free modeling of biological systems*
2015–2016	International Conference on Brain Informatics & Health (BIH 2016), Co-Chair of Workshops and Tutorials

INVITED WORKSHOPS, PANELS, AND EVENTS

2019 Fall	Institute for Pure and Applied Mathematics (IPAM), Long Workshop on Machine Learning for Physics, UCLA (Westwood CA)
2017 Sept.	Plenary Speaker at the University of Washington Annual TA Conference (Seattle WA)
2016 Dec.	BRAIN Initiative Annual PI Meeting (Bethesda MD)
2016 Nov.	Society for Mathematical Psychology and Psychonomics, Workshop on Rethinking Biological Plausibility (Boston MA)

2016 Oct.	NSF CRCNS Annual PI Meeting (Paris, France)
2016 Oct.	BrainKDD: The 3nd International Workshop on Data Mining and Visualization for Brain Science (Seattle WA)
2016 Sept.	Plenary Speaker at the University of Washington Annual TA/RA Conference (Seattle WA)
2016 Sept.	NeuroHack Week (Seattle WA)
2016 Mar.	DARPA/ISAT Workshop, Bio-Integrate Processing, Sensing and Storage (Seattle WA)
2016 Feb.	Computational and Systems Neuroscience (COSYNE), Workshop on Dimensionality Reduction in High-Dimensional Neural Datasets (Snowbird UT)
2015 Dec.	DARPA/ISAT Workshop, Making Sense (Washington DC)
2015 Oct.	Moore-Sloan Data Science Environment Annual Summit (Suncadia WA)
2015 Mar.	DARPA/ISAT Workshop, Silicon Meets Biotechnology (Seattle WA)
2014 Oct.	Moore-Sloan Data Science Environment Annual Summit (Asilomar CA)

OTHER PROFESSIONAL ACTIVITIES

Proposal review for: NSF CRCNS, NSF CNS, HFSP.

Manuscript reviewer for: Proceedings of the National Academy of Science, Nature Neuroscience, Science Advances, Nature Communications, eLife, Nature Methods, Current Biology, Trans Biomedical Engineering, IEEE Trans Image Processing, IEEE Trans Signal Processing, Cell Reports, PLoS Computational Biology, PLoS One, NeurIPS, ICLR, SIAM Journal on Applied Dynamical Systems (SIADS), Journal of the American Statistical Association, Entropy, Neuroscience, Pattern Recognition Letters, Bioinformatics, J Neurosci Methods, J Experimental Biology, Neuroimage.

COMMUNITY AND OUTREACH ACTIVITIES

2015–18	*Girls in Science* volunteer instructor, Burke Museum of Natural History and Culture
2017	Neurobiology Club and SynapTech presenting *Neuroscience for Everyone*, Panelist leading discussion on consciousness, artificial intelligence, and ethics
2017	Grey Matters Journal presenting *Evening with Neuroscience*, Panelist
2017	UW Neurobiology Club, Guest Speaker
2012	Women in Science and Engineering (WISC) panel discussion on grad school, panelist
2009	Science Expo at Princeton University, volunteer
2009	Trenton Area Science Fair, volunteer
2007, 08, 09	New Jersey Science Olympiad, event coordinator and judge