Contact:
Zuckerman Institute
Columbia University
New York, NY 10027
✉ m.whiteway@columbia.edu
www.github.com/themattinthehatt

Matthew Whiteway

Academic Positions

The International Brain Laboratory 2019-present
Postdoctoral Research Scientist

Columbia University, New York, NY 2018-present
Postdoctoral Research Scientist
Zuckerman Mind Brain Behavior Institute
Advisor: Dr. Liam Paninski

University of Maryland, College Park, MD 2014-2018
PhD in applied mathematics
Dissertation: *A latent variable modeling framework for analyzing neural population activity*
Advisor: Dr. Daniel Butts

University of Maryland, College Park, MD 2010
Undergraduate research in network science
Advisors: Drs. Michelle Girvan and Ed Ott

University of Oklahoma, Norman, OK 2006-2011
B.Sc. in Physics, B.A. in Mathematics

Publications

Wu A, Buchanan K, **Whiteway MR**, Schartner M, Meijer G, Noel JP, Rodriguez E, Everett C, Norovich A, Schaffer E, Mishra N, Salzman CD, Angelaki D, Bendesky A, The International Brain Lab, Cunningham J & Paninski L
Deep Graph Pose: a semi-supervised deep graphical model for improved animal pose tracking
Advances in Neural Information Processing Systems 2020

Glaser JI, **Whiteway MR**, Cunningham JP, Paninski L & Linderman SW
Recurrent switching dynamical systems models for multiple interacting neural populations
Advances in Neural Information Processing Systems 2020

Batty E*, **Whiteway MR***, Saxena S, Biderman B, Abe T, Musall S, Gillis W, Markowitz JE, Churchland AK, Cunningham J, Datta SR, Linderman S & Paninski L
BehaveNet: nonlinear embedding and Bayesian neural decoding of behavioral videos
Advances in Neural Information Processing Systems 2019

Whiteway MR & Butts DA
The quest for interpretable models of neural population activity
Current Opinion in Neurobiology 2019

Whiteway MR, Socha K, Bonin V & Butts DA
Characterizing the nonlinear structure of shared variability in cortical neuron populations using latent variable models
Neurons, Behavior, Data analysis, and Theory 2019

Liu J, **Whiteway MR**, Sheikhattar A, Butts DA, Babadi B & Kanold PO
Parallel processing of sound dynamics across mouse auditory cortex via spatially patterned thalamic inputs and distinct areal intracortical circuits
Cell Reports 2019

Whiteway MR & Butts DA
Revealing unobserved factors underlying cortical activity using a rectified latent variable model applied to neural population recordings
Journal of Neurophysiology 2017

Stout J, **Whiteway MR**, Ott E, Girvan M & Antonsen TM
Local synchronization in complex networks of coupled oscillators
Chaos 2011

Preprints

Whiteway MR, Biderman D, Friedman Y, Dipoppa M, Buchanan EK, Wu A, Zhou J, Noel JP, The International Brain Lab, Cunningham JP & Paninski L
Partitioning variability in animal behavioral videos using semi-supervised variational autoencoders
bioRxiv 2021

Whiteway MR, Averbeck B & Butts DA
A latent variable approach to decoding neural population activity
bioRxiv 2020

Socha K, **Whiteway MR**, Butts DA & Bonin V
Behavioral response to visual motion impacts population coding in the mouse visual thalamus
bioRxiv 2018

Invited Talks

Neuromatch 3.0 October 2020
Minisymposium on "Modern computational techniques for tracking behavior"
Exploiting unlabeled frames to build better models for behavioral video analysis
With Anqi Wu, Kelly Buchanan & Liam Paninski

Zuckerman Institute Motor Club, Columbia University May 2020
BehaveNet: methods for extracting information from behavioral videos

Neurotheory Workshop Series (NeWS), Columbia University January 2020
BehaveNet: nonlinear embedding and Bayesian neural decoding of behavioral videos

JC++ Journal Club, National Eye Institute (NEI) April 2018
Latent variable decoding

Horowitz Lab Meeting, NIDCD October 2016
Rectified latent variable modeling for neural population recordings

CCEBH/NIDCD Joint Workshop, University of Maryland October 2016
Revealing unobserved sources of variability in populations of sensory cortical neurons

Selected Conference Abstracts

Kashalikar A*, Glaser J*, **Whiteway MR*** & Paninski L
Coupled state space models of multi-population recordings
Computational and Systems Neuroscience 2021

Whiteway MR*, Batty E*, Saxena S, Biderman B, Abe T, Musall S, Gillis W, Markowitz JE, Churchland AK, Datta SR, Linderman S & Paninski L.
BehaveNet: behavioral video embedding and neural analysis toolbox
Computational and Systems Neuroscience, Denver, CO 2020

Whiteway MR*, Batty E*, Saxena S, Biderman B, Abe T, Musall S, Gillis W, Markowitz JE, Churchland AK, Datta SR, Linderman S & Paninski L.
BehaveNet: behavioral video embedding and neural analysis toolbox
Society for Neuroscience, Chicago, IL 2019

Glaser J, Linderman S, **Whiteway MR**, Perich M, Dekleva B, Miller L, Paninski L & Cunningham J
State space models for multiple interacting neural populations
Computational and Systems Neuroscience, Lisbon, Portugal 2019

Whiteway MR, Bartolo R, Averbeck BB & Butts DA
Decoding neural population activity within a latent variable framework
Computational and Systems Neuroscience, Denver, CO 2018

Whiteway MR, Bartolo R, Averbeck BB & Butts DA
Unsupervised nonlinear dimensionality reduction of large-scale neural recordings in prefrontal cortex
Society for Neuroscience, Washington, DC 2017

Whiteway MR, Socha K, Bonin V & Butts DA
Nonlinear latent variable approaches for understanding population activity in sensory cortex
Computational and Systems Neuroscience, Salt Lake City, UT 2017

Whiteway MR & Butts DA
Hidden sources of variability modulate populations of sensory neurons
Society for Neuroscience, San Diego, CA 2016

Stout J, **Whiteway MR**, Ott E, Girvan M & Antonsen TM
The effect of network structure on the path to synchronization in large systems of coupled oscillators
SIAM Conference on Applications of Dynamical Systems, Snowbird, UT 2011

Teaching Experience

Columbia University

Guest Lecturer, Advanced Topics in Theoretical Neuroscience — Spring 2020
Methods for Static and Sequential Clustering

Guest Lecturer, Advanced Topics in Theoretical Neuroscience — Spring 2019
Static Dimensionality Reduction Methods

University of Maryland

Teaching Assistant, Introductory Statistics — Spring 2015
Teaching Assistant, Multivariable Calculus — Fall 2014
Lecturer, Integral Calculus — Summer 2014
Teaching Assistant, Multivariable Calculus — Spring 2014
Teaching Assistant, Linear Algebra — Fall 2013
Lecturer, Introductory Statistics — Spring 2013

Teaching Assistant, Integral Calculus — Fall 2012

Mentoring

Columbia University

Hierarchical neural decoding of behavior across multiple experimental sessions — Fall 2020
Masters student research project

Model checking an ARHMM for behavioral syllable identification — Fall 2020
Graduate student rotation project

Linking neural activity and behavior using variational autoencoders — Fall 2018
Graduate student rotation project (resulted in Neurips 2019 paper)

University of Maryland

Deep generative models for understanding natural images — Spring 2017
Undergraduate student semester research project

An introduction to neural networks for image classification — Fall 2016
Undergraduate student semester research project

Theory and applications of the generalized linear model — Summer 2015
Undergraduate student semester research project

Linear programming and its applications to economics — Spring 2015
Undergraduate student semester research project

Reviewing and Service

Computational and Systems Neuroscience (Cosyne) workshop co-organizer — 2020
Workshop on Interpretable Computational Neuroscience

Reviewer — 2019-present
Neural Information Processing Systems (NeurIPS) Workshops, Cosyne

Honors and Awards

Center for Comparative and Evolutionary Biology of Hearing — 2015-2016
Trainee Grant

University of Maryland Department of Mathematics — 2013
Excellence in Teaching Award

University of Oklahoma Department of Physics and Astronomy — 2009-2011
J. Clarence Karcher Scholarship

National Merit Scholarship — 2006-2011