BRIAN DEPASQUALE

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Department of Biomedical Engineering
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ACADEMIC APPOINTMENTS

Boston University — Boston, MA
Assistant Professor, Department of Biomedical Engineering — 2023 - present

Princeton University — Princeton, NJ
Postdoctoral Research Associate, Princeton Neuroscience Institute — 2016 – 2022

Columbia University — New York, NY
PhD, Neurobiology & Behavior; Center for Theoretical Neuroscience — 2009 - 2016

Massachusetts Institute of Technology — Cambridge, MA
Research Assistant, Brain and Cognitive Sciences — 2005 – 2009

Fordham University — Bronx, NY
B.Sc., Physics, *cum laude* — 2005

MANUSCRIPTS & PREPRINTS

Luo, T, Kim, T, **DePasquale, B**, Brody, CD (2023). Distinct mechanisms for evidence accumulation and choice memory explain diverse neuronal dynamics. In preparation.

Gupta, D, **DePasquale, B**, Kopec, C, & Brody, CD (2023). Trial-history biases in evidence accumulation can give rise to apparent lapses. bioRxiv, DOI: 10.1101/2023.01.18.524599. Submitted to Nature Communications.

*Insanally MN**,** *Albanna BF, Toth J, **DePasquale B,** Fadaei S, Gupta T, Kuchibhotla K, Rajan K & Froemke RC (2022). Contributions and synaptic basis of diverse cortical neuron responses to task performance. bioRxiv, DOI: 10.1101/2022.05.04.490676. In revision.

DePasquale, B, Brody, CD, & Pillow, J (2022). Neural population dynamics underlying evidence accumulation in multiple rat brain regions. bioRxiv, DOI: 10.1101/2021.10.28.465122. In revision at eLife.

Cohen, Z, **DePasquale, B**, Aoi, M, & Pillow, J (2020). Recurrent dynamics of prefrontal cortex during context-dependent decision-making. bioRxiv, DOI: 10.1101/2020.11.27.40153

PUBLICATIONS [google scholar]

DePasquale, B, Sussillo, D, Abbott, LF, & Churchland, MM (2023). The centrality of population-level factors to network computation is demonstrated by a versatile approach for training spiking networks. In press at Neuron. DOI: 10.1016/j.neuron.2022.12.007

Pinto L, Rajan K, **DePasquale B**, Thiberge SY, Tank DW*, & Brody CD* (2019) Task-dependent changes in the large-scale dynamics and necessity of cortical regions. Neuron, 104(4), 810-824. e9. DOI: 10.1016/j.neuron.2019.08.025

Panichello, MF, **DePasquale, B**, Pillow, JW & Buschman, TJ (2019). Error-correcting dynamics in visual working memory. Nature Communications 10, Article number: 3366 July 2019. DOI: 10.1038/s41467-019-11298-3

Insanally, MN, Carcea, I, Field, RE, Rodgers, C, **DePasquale, B**, Rajan, K, DeWeese, MR, Albanna, BF & Froemke, RC (2018). Spike-timing-dependent ensemble encoding by non-classically responsive cortical neurons. eLife 8, e42409. DOI: 10.7554/eLife.42409

DePasquale, B, Cueva, CJ, Rajan, K, Escola, GS & Abbott, LF (2018). full-FORCE: A target-based method for training recurrent networks. PLoS ONE 13(2): e0191527. DOI: 10.1371/journal.pone.0191527

Abbott, LF, **DePasquale, B** & Memmesheimer, R-M (2016). Building functional networks of spiking model neurons. Nature Neuroscience 19:350-355. DOI: 10.1038/nn.4241

DePasquale, B, Churchland, MM & Abbott, LF (2016). Using firing-rate dynamics to train recurrent networks of spiking model neurons. arXiv, 1601.07620

DePasquale, B (2016). Methods for Building Network Models of Neural Circuits. Doctoral thesis. Link

Feingold, J, Gibson, DJ, **DePasquale, B** & Graybiel, AM (2015). Bursts of beta oscillation differentiate postperformance activity in the striatum and motor cortex of monkeys performing movement tasks. PNAS 112(44):13687-13692. DOI: 10.1073/pnas.1517629112

Paninski, L, Vidne, M, **DePasquale, B** & Ferreira, DG (2012). Inferring synaptic inputs given a noisy voltage trace. Journal of Computational Neuroscience 33:1-19. DOI: 10.1007/s10827-011-0371-7

TEACHING & MENTORSHIP

Boston University Boston, MA

Foundations of Biomedical Data Analysis & Machine Learning (grad) Spring 2023

Rotation student advised

2023-present

- Grant Mcconachie
- Collin Maley

COSYNE Tutorial

Teaching Assistant (w/ K Rajan, 2021 & D Goodman, 2022) Winter 2021 & 2022

Princeton University Princeton, NJ

Math Tools for Neuroscience (undergrad; w/ C Brody) Fall 2019

Undergraduate research co-advisor (with J. Pillow) 2016 - 2022

- Camille Rullán Buxó (currently PhD student @ NYU CNS)
- Zach Cohen (currently PhD student @ Harvard PIN)

Columbia University New York, NY

Introduction to Theoretical Neuroscience (grad; w/ LF Abbott, KD Miller, & S Fusi) 2011 & 2013

INVITED TALKS

MIT, Lab of Robert Yang, 2023
Boston University, Department of Biomedical Engineering, 2022
Cold Spring Harbor Laboratory, 2021
Champalimaud Centre for the Unknown, 2021
Columbia Center for Theoretical Neuroscience, 2019
Princeton University, Princeton Neuroscience Institute Seminar Series, 2018
Princeton University, Department of Neuroscience, Spring 2015
New York University, Center for Neural Science, Spring 2015
Janelia Research Campus, Spring 2015
Cosyne Workshop, Recurrent Spiking Neural Networks—Dynamics, Learning, Computation, 2016.
Columbia University, Annual Tri-Center Gatsby Meeting, 2015
Janelia Research Campus, HHMI, Techniques and Approaches in Theoretical Neuroscience, 2014

SERVICE & ORGANIZING

Boston University Boston, MA

BME PhD admissions 2023

Simons Foundation Collaboration on the Global Brain New York, NY

Science writer (invited) 2018 - present

Princeton Neuroscience Institute Princeton, NJ

Seminar series committee 2019 - 2020
PhD Admissions Spring 2020

***Ad hoc* reviewer**: Nature Machine Intelligence; NeurIPS; eLife; Neural Computation; PNAS; Computational Cognitive Neuroscience Conference (CCN); PLoS Computational Biology; Science Advances; ICLR; Neurons, Behavior, Data analysis and Theory; Cosyne (Conference)

COSYNE Workshop Organizer, Recurrent Spiking Neural Networks---Dynamics, Learning, Computation, Salt Lake City, UT, 2016.

AWARDS & HONORS

National Science Foundation Graduate Research Fellow, 2010-2013

OPEN SOURCE SOFTWARE CONTRIBUTIONS

AbstractMH.jl (numerical methods for MCMC in Julia)

SCIENCE WRITING

A New Era for the Neuroscience of Social Behavior, (news and commentary on Willmore et al Nature 2022, Pereira et al Nature Methods 2022, & Nair et al BioRxiv 2022), Simons Collaboration on the Global Brain, 2022

Searching for Shapes in Neural Activity, (news and commentary on Gardner et al Nature 2022 & Nieh, Schottdorf et al Nature 2021), Simons Collaboration on the Global Brain, 2022

Hippocampal Replay: Reflection on the Past or Planning for the Future?, (news and commentary on Gillespie et al Neuron 2021), Simons Collaboration on the Global Brain, 2021

Scoring the Brain: How Benchmark Datasets and Other Tools are Solving Key Challenges in Neuroscience, Simons Collaboration on the Global Brain, 2021

Geometrical Thinking Offers a Window Into Computation, (news and commentary on Bernardi, Benna et al. Cell 2020 & Russo et al. Neuron 2020), Simons Collaboration on the Global Brain, 2021

In Olfactory System, a Balance of Randomness and Order, (news and commentary on Pashkovski et. al. Nature 2020), Simons Collaboration on the Global Brain, 2020

Imitate Your Way to the Top, Simons Collaboration on the Global Brain, 2018

SELECTED CONFERENCE PRESENTATIONS

Thomas Luo, Timothy Kim, **Brian DePasquale**, Carlos D. Brody (2022). Distinct mechanisms for evidence accumulation and choice memory explain diverse neuronal dynamics. Cosyne Abstracts 2023, Montreal, Canada.

Diksha Gupta, **Brian DePasquale**, Carlos D. Brody (2022). An explanatory link between history biases and lapses. Multi-disciplinary Conference on Reinforcement Learning and Decision Making Abstracts, Providence, RI, USA.

Brian DePasquale, Carlos D. Brody, Jonathan Pillow (2022). Identifying changes in behavioral strategy from neural responses during evidence accumulation. Cosyne Abstracts 2022, Lisbon, Portugal.

Thomas Luo, Timothy Kim, **Brian DePasquale**, Carlos D. Brody (2022). Inference of the time-varying relationship between spike trains and a latent decision variable. Cosyne Abstracts 2022, Lisbon, Portugal.

Jack Toth, Michele Insanally, Robert Froemke, Badr Albanna, **Brian DePasquale**, Saba Fadaei, Trisha Gupta, Kanaka Rajan (2022). The synaptic origins and functional role of diverse cortical responses during behavior. Cosyne Abstracts 2022, Lisbon, Portugal.

Michele Insanally, Badr Albanna, **Brian DePasquale**, Saba Fadaei, Kanaka Rajan, Robert Froemke (2021). Distinct synaptic plasticity mechanisms determine the diversity of cortical responses during behavior. Cosyne Abstracts 2021, virtual

Diksha Gupta, **Brian DePasquale**, Carlos D. Brody (2020). A common cause for multiple suboptimalities in perceptual decision-making. Cosyne Abstracts 2020, Denver, CO

Thomas Luo, Carlos D. Brody, Adrian Bondy, **Brian DePasquale** (2020). The anterior dorsomedial frontal cortex is causally involved in regulating the time constant of evidence accumulation. Cosyne Abstracts 2020, Denver, CO

Pinto L, Rajan K, **DePasquale B**, Thiberge SY, Tank DW, Brody CD (2019). Task-dependent changes in the large-scale dynamics and necessity of cortical regions. SfN Abstracts 2019.

Brian DePasquale, Carlos D. Brody, Jonathan Pillow (2019). An efficient, maximum likelihood based method for inferring latent variable models of evidence accumulation from neural activity. Simons Collaboration on the Global Brain annual meeting, NYC, NY

Brian DePasquale, Carlos D. Brody, Jonathan Pillow (2019). Accumulated evidence inferred from neural activity accurately predicts behavioral choice. Cosyne Abstracts 2019, Lisbon, Portugal.

Matthew Panichello, **Brian DePasquale**, Jonathan Pillow, Timothy Buschman (2018). Memory load modulates the dynamics of visual working memory. Vision Sciences Society 18th Annual Meeting, St. Pete Beach, FL

Brian DePasquale, Christopher J. Cueva, Raoul-Martin Memmesheimer, LF Abbott, G. Sean Escola (2016). Full-rank regularized learning in recurrently connected firing rate networks. Cosyne Abstracts 2016, Salt Lake City, UT

Brian DePasquale, Mark M. Churchland, LF Abbott (2014). Firing rate dynamics from spiking networks. Cosyne Abstracts 2015, Salt Lake City, UT

Brian DePasquale, Mark M. Churchland, LF Abbott (2013). Low-rank connectivity induces firing rate fluctuations in a chaotic spiking model. Temporal Dynamics in Learning: Networks and Neural Data, Janelia Farms Research Campus, HHMI, Ashburn, VA

Brian DePasquale, Mark M. Churchland, LF Abbott (2013). Low-rank connectivity induces firing rate fluctuations in a chaotic spiking model. Cosyne Abstracts 2013, Salt Lake City, UT

J Feingold, **Brian DePasquale,** AM Graybiel (2009). Modulation of beta power in the prefrontal cortex and Caudate Nucleus of monkeys during self-timed sequential arm movements. SfN Abstracts 2009, Chicago, IL

J Feingold, **Brian DePasquale**, AM Graybiel (2007). Cortical 8-20 Hz oscillations in supplementary motor areas during self-timed sequential arm movements in monkey. SfN Abstracts 2007, San Diego, CA

REFERENCES

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