Joshua I. Glaser

Positions

2018–Present **Columbia University**, New York, NY
Postdoctoral Research Scientist
Center for Theoretical Neuroscience
Department of Statistics
Zuckerman Mind Brain Behavior Institute
Advisors: Liam Paninski and John Cunningham

2018 **University of Pennsylvania**, Philadelphia, PA
Postdoctoral Researcher
Department of Bioengineering
Advisor: Konrad Kording

Education

2012–2018 **Northwestern University**, Chicago, IL
Ph.D., Neuroscience
Advisor: Konrad Kording
Thesis: Machine learning approaches towards understanding movement planning in naturalistic settings

2007–2011 **University of Illinois**, Urbana-Champaign, IL
B.S., Mathematics
B.S., Physics
Minor in Computer Science
Magna Cum Laude
Campus Honors Program

Grant Support

2020-2025 NIH K99/R00 Pathway to Independence Award
Title: Interpretable machine learning for understanding the neural control of movement

Previous Grants, Awards and Scholarships

2015-2018 NIH NRSA F31 Predoctoral Fellowship

2014-2015 NIH T32 Training Grant in the Neurobiology of Movement and Rehabilitation Sciences

2014 NSF Graduate Research Fellowship Honorable Mention

2010 University of Illinois Christopher Wickens Undergraduate Award for Excellence in Scholarship and Research in Visual Cognitive Psychology

2009 NIDRR/MARS Grant for Summer Internship in Neural Engineering

2008 NASA Grant for Summer Research Program in Astrophysics

2007-2011 University of Illinois Chancellor's Scholar

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2007-2011 University of Illinois Rogers Scholar

2007-2011 University of Illinois Provost Scholarship

2007-2011 National Merit Scholarship

Publications

* Denotes shared first authorship.

2021 Marshall NJ, **Glaser JI**, Trautmann EM, Amemastro EA, Perkins SM, Shadlen MN, Abbott LF, Cunningham JP, Churchland MM. "Flexible neural control of motor units." *bioRxiv*. [PDF]

2020 **Glaser JI**, Whiteway MR, Cunningham JP, Paninski L, Linderman SW. "Recurrent switching dynamical systems models for multiple interacting neural populations." *Neural Information Processing Systems*. [PDF]

2020 Lizevey JA*, **Glaser JI***. "Deep learning approaches for neural decoding across architectures and recording modalities." *Briefings in Bioinformatics*: bbaa355. [PDF]

2020 **Glaser JI**, Benjamin AS, Chowdhury RH, Perich MG, Miller LE, Kording KP. "Machine learning for neural decoding." *eNeuro* 7: eneuro.0506-19.2020. [PDF]

2020 Chowdhury RH, **Glaser JI**, Miller LE. "Area 2 of primary somatosensory cortex encodes kinematics of the whole arm." *eLife*: 9: e48198. [PDF]

2019 **Glaser JI***, Benjamin AS*, Farhoodi R*, Kording KP. "The roles of supervised machine learning in systems neuroscience." *Progress in Neurobiology* 175: 126-137. [PDF]

2019 **Glaser JI**, Wood DK, Lawlor PN, Segraves MA, Kording KP. "From prior information to saccade selection: evolution of frontal eye field activity during natural scene search." *Cerebral Cortex*: bhz216. [PDF]

2019 Naufel S*, **Glaser JI***, Kording KP, Perreault EJ, Miller LE. "A muscle-activity-dependent gain between motor cortex and EMG." *Journal of Neurophysiology* 121.1: 61-73. [PDF]

2019 Bhan N, Strutz J, **Glaser JI**, Kalhor R, Boyden E, Church GM, Kording KP, Tyo KE. "Recording temporal data onto DNA with minutes resolution." *bioRxiv*: 634790. [PDF]

2018 **Glaser JI**, Perich MG, Ramkumar P, Miller LE, Kording KP. "Population coding of conditional probability distributions in dorsal premotor cortex." *Nature Communications* 9: 1788. [PDF]

2017 Kording KP, Benjamin AS, Farhoodi R, **Glaser JI**. "The roles of machine learning in biomedical science." *Bridge on Frontiers of Engineering* 47.4: 23-30. [PDF]

2016 Ramkumar P*, Lawlor PN*, **Glaser JI**, Wood DK, Segraves MA, Kording KP. "Feature-based attention and spatial selection in frontal eye fields during natural scene search." *Journal of Neurophysiology* 116.3: 1328-1343. [PDF]

2016 **Glaser JI***, Wood DK*, Lawlor PN, Ramkumar P, Kording KP, Segraves MA. "The role of expected reward in frontal eye field during natural scene search." *Journal of Neurophysiology* 116.2: 645-657. [PDF]

2016 **Glaser JI**, Kording KP. "The development and analysis of integrated neuroscience data." *Frontiers in Computational Neuroscience* 10: 11. [PDF]

2015 **Glaser JI**, Zamft BM, Church GM, Kording KP. "Puzzle imaging: Using large-scale dimensionality reduction algorithms for localization." *PLoS ONE* 10.7: e0131593. [PDF]

2015 Cybulski TR*, **Glaser JI***, Marblestone AH, Zamft BM, Church G, Boyden ES, Kording KP. "Spatial information in large-scale neural recordings." *Frontiers in Computational Neuroscience* 8: 172. [PDF]

2014 Wei K, **Glaser JI**, Deng L, Thompson CK, Stevenson IH, Wang Q, Hornby TG, Heckman CJ, Kording KP. "Serotonin affects movement gain control in the spinal cord." *The Journal of Neuroscience* 34.38: 12690-12700. [PDF]

2014 Weiss CH, Poncela-Casanovas J, **Glaser JI**, Pah AR, Persell SD, Baker DW, Wunderink RG, Amaral LAN. "Adoption of a high-impact innovation in a homogeneous population." *Physical Review X* 4.4: 041008. [PDF]

2014 Tseng YC, **Glaser JI**, Caddigan E, Lleras A. "Modeling the effect of selection history on pop-out visual search." *PloS ONE* 9.3: e89996. [PDF]

2013 **Glaser JI**, Marblestone AH, Zamft BM, Moffitt JR, Tyo K, Boyden ES, Church G, Kording K. "Statistical analysis of molecular signal recording." *PLoS Computational Biology*. 9.7: e1003145. [PDF]

2013 Marblestone AH*, Zamft BM*, Maguire YG, Shapiro MG, Cybulski TR, **Glaser JI**, Stranges B, Kalhor R, Dalrymple DA, Seo D, Alon E, Maharbiz MM, Carmena J, Rabaey J, Boyden ES, Church GM, Kording KP. "Physical principles for scalable neural recording." *Frontiers in Computational Neuroscience* 7: 137. [PDF]

Invited Talks

2021 *Sparse subspace analysis: a dimensionality reduction tool to find interpretable neural subspaces within and between populations*
Neural Control of Movement Meeting

2020 *Interpretable Machine Learning for Neuroscience*
Northwestern University, Neurobiology Seminar Series

2019 *State Space Models for Multiple Interacting Neural Populations*
Society for Neuroscience Meeting

2019 *Machine Learning for Neural Decoding*
Flatiron Institute, Numerical Analysis Seminar Series

2018 *Population Coding of Conditional Probability Distributions of Upcoming Movements*
University of Illinois at Chicago, Berniker Lab Meeting

2017 *Population Coding of Conditional Probability Distributions for Upcoming Movements*
Princeton Neuroscience Institute

2017 *Population Coding of Conditional Probability Distributions for Upcoming Movements*
Carnegie Mellon University, Yu Lab Meeting

2017 *Population Coding of Conditional Probability Distributions for Upcoming Movements*
Columbia Center for Theoretical Neuroscience

2016 *Puzzle Imaging and Its Applications*
Computational and Systems Neuroscience (Cosyne) Workshop

2015 *Frontal Eye Field Activity Reflects Movement Expectation Prior to Movement Selection*
Northwestern Movement and Rehabilitation Sciences Training Day

Selected Conference Abstracts

2021 Kashalikar A*, **Glaser JI***, Whiteway M*, Paninski L. "Coupled state space models for multi-population neural recordings." *Computational and Systems Neuroscience (Cosyne).*

2020 Marshall N, **Glaser JI**, Perkins S, Abbott L, Cunningham JP, Churchland M. "Flexible neural control of motor units revealed via latent factor models." *Computational and Systems Neuroscience (Cosyne).*

2019 **Glaser JI**, Linderman S, Whiteway M, Dekleva B, Perich M, Miller LE, Paninski L, Cunningham JP. "State space models for multiple interacting neural populations." *Statistical Analysis of Neural Data.*

2019 **Glaser JI**, Linderman S, Whiteway M, Cunningham JP, Paninski L. "Switching dynamical systems models for multiple interacting neural populations." *Simons Collaboration on the Global Brain Annual Meeting.*

2019 **Glaser JI**, Linderman S, Whiteway M, Perich M, Dekleva B, Miller LE, Paninski L, Cunningham JP. "State space models for multiple interacting neural populations." *Computational and Systems Neuroscience (Cosyne).*

2018 **Glaser JI***, Naufel SN*, Perreault EJ, Kording KP, Miller LE. "Gain control in the motor system." *Computational and Systems Neuroscience (Cosyne).*

2017 **Glaser JI**, Chowdhury RH, Perich MG, Miller LE, Kording KP. "Machine learning tools for neural decoding." *Janelia Conference: Emerging Tools for Acquisition and Interpretation of Whole-Brain Functional Data.*

2017 **Glaser JI**, Chowdhury RH, Perich MG, Miller LE, Kording KP. "Machine learning tools for neural decoding." *Statistical Analysis of Neural Data.*

2017 **Glaser JI**, Chowdhury RH, Perich MG, Miller LE, Kording KP. "Modern machine learning tools for neural decoding." *Computational and Systems Neuroscience (Cosyne).*

2016 **Glaser JI**, Naufel SN, Chowdhury RH, Perich MG, Miller LE, Kording KP. "Modern machine learning tools for neural decoding." *Neural Information Processing Systems (NeurIPS) Brains and Bits Workshop.*

2016 **Glaser JI**, Perich MG, Wood DK, Ramkumar P, Lawlor PN, Segraves MA, Miller LE, Kording KP. "Probabilistic coding of prior information in the movement system." *Society for Neuroscience.*

2016 **Glaser JI**, Wood DK, Perich MG, Lawlor PN, Ramkumar P, Miller LE, Segraves MA, Kording KP. "Option coding in the movement system." *Computational and Systems Neuroscience (Cosyne).*

2015 **Glaser JI**, Wood DK, Lawlor PN, Ramkumar P, Kording KP, Segraves MA. "Early frontal eye field activity reflects saccade expectation prior to saccade selection." *Society for Neuroscience.*

2015 **Glaser JI**, Wood DK, Lawlor PN, Ramkumar P, Kording KP, Segraves MA. "Early frontal eye field activity reflects saccade expectation prior to saccade selection." *Gordon Research Conference.*

2015 **Glaser JI**, Wood DK, Ramkumar P, Lawlor PN, Segraves MA, Kording KP. "Using generalized linear models to understand neural correlates of saccade planning in natural scenes." *Statistical Analysis of Neural Data.*

2015 **Glaser JI***, Wood DK*, Lawlor PN, Ramkumar P, Caddigan S, Phillips AN, Kording KP, Segraves MA. "Enhanced activity for search targets in frontal eye field depends on target awareness." *Chicago Chapter of Society for Neuroscience.*

2015 **Glaser JI**, Kording KP. "Puzzle imaging the brain: Using large-scale dimensionality reduction algorithms for localization." *Computational and Systems Neuroscience (Cosyne).*

2014 **Glaser JI***, Lawlor PN*, Ramkumar P*, Wood DW*, Phillips A, Caddigan S, Kording KP, Segraves MA. "Reward expectation modulates frontal eye field activity during natural scene search." *Society for Neuroscience.*

2014 Wood DK*, Ramkumar P*, Lawlor PN*, **Glaser JI***, Phillips A, Caddigan S, Kording KP, Segraves MA. "Task-relevant features predict gaze behavior but not neural activity in FEF during natural scene search." *Society for Neuroscience.*

2008 **Glaser JI**, Hoffman L. "Discreteness effects due to SCF expansions" *NASA's Future Forum.*

Teaching Experience

2019-2020 **Guest Lecturer**, *Columbia University*, New York, NY
For the Graduate course "Advanced Topics in Theoretical Neuroscience"

2018 **Co-instructor**, *Northwestern University*, Chicago, IL
For the Graduate course "Statistics and Data Analysis for Neuroscience"

2016-2017 **Guest Lecturer**, *Niles North High School*, Skokie, IL
For the high school course "Linear Algebra"

2015-2016 **Guest Lecturer**, *Walter Payton High School*, Chicago, IL
For the Walter Payton neuroscience seminar series

2013-2014 **Teaching Assistant**, *Northwestern University*, Chicago, IL
For the Graduate course "Quantitative Methods in Neuroscience"

2011 **Teaching Assistant**, *Northwestern University Center for Talent Development Summer Program*, Evanston, IL
For the high school courses "Introductory Physics Honors" and "Architecture: A Study in Math and Physics, Honors"

Leadership and Outreach

2019-Present Center for Theoretical Neuroscience Inclusion and Diversity Committee Member

2019-Present Co-organizer of Columbia's Inference of Dynamical Systems Reading Group

2020-Present Columbia Volunteer Tutor Corps

2020 Mentor for Neuromatch Academy

2019-2020 Co-organizer of Columbia Center for Theoretical Neuroscience's Seminar Series

2014-2018 Northwestern University Student Hosted Seminar Series Committee Member

2012-2018 Northwestern University Brain Awareness Outreach Member

Professional Service

2019-Present Conference Reviewer for: Computational and Systems Neuroscience (Cosyne), Neural Information Processing Systems (NeurIPS), International Conference on Machine Learning (ICML)

2018-Present Journal Reviewer for: Neuron, eLife, PLoS Computational Biology, Current Opinion in Neurobiology, Journal of Computational Neuroscience, npJ Digital Medicine, STAR Protocols

2020 Co-organizer of Computational and Systems Neuroscience (Cosyne) Workshop, entitled "Interpretable computational neuroscience: What are we modeling and what does it have to do with the brain?"

2016 Co-organizer of Cosyne Workshop, entitled "Towards the Real World: Naturalistic Experiments and Analysis"