Nicholas Turner, Ph.D.

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Education

2014 - 2022 **Ph.D. Computer Science** - Princeton University

2014 - 2016 **M.A. Computer Science** - Princeton University

2007 - 2011 **B.A. Psychology** - Stanford University

Publications

"Reconstruction of neocortex: organelles, compartments, cells, circuits, and activity." * - equal contribution
Nicholas L. Turner*, Thomas Macrina*, J. Alexander Bae*, Runzhe Yang*, Alyssa M. Wilson*, Casey Schneider-Mizell*, Kisuk Lee*, Ran Lu*, Jingpeng Wu*, Agnes L. Bodor*, Adam A. Bleckert*, Derrick Brittain*, Emmanouil Froudarakis*, Sven Dorkenwald*, Forrest Collman*, Nico Kemnitz*, Dodam Ih, William M. Silversmith, Jonathan Zung, Aleksandar Zlateski, Ignacio Tartavull, Szi-chieh Yu, Sergiy Popovych, Shang Mu, William Wong, Chris S. Jordan, Manuel Castro, JoAnn Buchanan, Daniel J. Bumbarger, Mark Takeno, Russel Torres, Gayathri Mahalingam, Leila Elabbady, Yang Li, Erick Cobos, Pengcheng Zhou, Shelby Suckow, Lynne Becker, Liam Paninski, Franck Polleux, Jacob Reimer, Andreas S. Tolias, R. Clay Reid, Nuno Macarico da Costa, H. Sebastian Seung. *Cell. Mar, 2022.*

"3D reconstruction of cell nuclei in a full Drosophila brain"
Shang Mu, Szi-chieh Yu, **Nicholas L. Turner**, Claire E McKellar, Sven Dorkenwald, Forrest Collman, Selden Koolman, Merlin Moore, Sarah Morejohn, Ben Silverman, Kyle Willie, Ryan Willie, Doug Bland, Austin Burke, Zoe Ashwood, Kyle Luther, Manuel Castro, Oluwaseun Ogedengbe, William Silversmith, Jingpeng Wu, Akhilesh Halageri, Thomas Macrina, Nico Kemnitz, Mala Murthy, H. Sebastian Seung. *Biorxiv preprint. Nov, 2021.*

"Petascale neural circuit reconstruction: automated methods"
Thomas Macrina*, Kisuk Lee*, Ran Lu*, **Nicholas L. Turner***, Jingpeng Wu*, Sergiy Popovych*, William Silversmith*, Nico Kemnitz*, J Alexander Bae, Manuel A Castro, Sven Dorkenwald, Akhilesh Halageri, Zhen Jia, Chris Jordan, Kai Li, Eric Mitchell, Shanka Subhra Mondal, Shang Mu, Barak Nehoran, William Wong, Szi-chieh Yu, Agnes L Bodor, Derrick Brittain, JoAnn Buchanan, Daniel J Bumbarger, Erick Cobos, Forrest Collman, Leila Elabbady, Paul G Fahey, Emmanouil Froudarakis, Daniel Kapner, Sam Kinn, Gayathri Mahalingam, Stelios Papadopoulos, Saumil Patel, Casey M Schneider-Mizell, Fabian H Sinz, Marc Takeno, Russel Torres, Wenjing Yin, Xaq Pitkow, Jacob Reimer, Andreas S Tolias, R Clay Reid, Nuno Maçarico da Costa, H. Sebastian Seung. *Biorxiv preprint. Aug, 2021.*

"Functional connectomics spanning multiple areas of mouse visual cortex"
MICrONS Consortium, J Alexander Bae, Mahaly Baptiste, Agnes L Bodor, Derrick Brittain, JoAnn Buchanan, Daniel J Bumbarger, Manuel A Castro, Brendan Celii, Erick Cobos, Forrest Collman, Nuno Maçarico da Costa, Sven Dorkenwald, Leila Elabbady, Paul G Fahey, Tim Fliss, Emmanouil Froudakis, Jay Gager, Clare Gamlin, Akhilesh Halageri, James Hebditch, Zhen Jia, Chris Jordan, Daniel Kapner, Nico Kemnitz, Sam Kinn, Selden Koolman, Kai Kuehner, Kisuk Lee, Kai Li, Ran Lu, Thomas Macrina, Gayathri Mahalingam, Sarah McReynolds, Elanine Miranda, Eric Mitchell, Shanka Subhra Mondal, Merlin Moore, Shang Mu, Taliah Muhammad, Barak Nehoran, Oluwaseun Ogedengbe, Christos

Papadopoulos, Stelios Papadopoulos, Saumil Patel, Xaq Pitkow, Sergiy Popovych, Anthony Ramos, R Clay Reid, Jacob Reimer, Casey M Schneider-Mizell, H Sebastian Seung, Ben Silverman, William Silversmith, Amy Sterling, Fabian H Sinz, Cameron L Smith, Shelby Suckow, Zheng H Tan, Andreas S Tolias, Russel Torres, Nicholas L Turner, Edgar Y Walker, Tianyu Wang, Grace Williams, Sarah Williams, Kyle Willie, Ryan Willie, William Wong, Jingpeng Wu, Chris Xu, Runzhe Yang, Dimitri Yatsenko, Fei Ye, Wenjing Yin, Szi-chieh Yu. *Biorxiv preprint. Aug, 2021.*

"Modularity and neural coding from a brainstem synaptic wiring diagram"
Ashwin Vishwanathan, Alexandro Ramirez, Jingpeng Wu, Alex Sood, Runzhe Yang, Nico Kemnitz, Dodam Ih, **Nicholas Turner**, Kisuk Lee, Ignacio Tartavull, William M Silversmith, Chris S Jordan, Celia David, Doug Bland, Mark S Goldman, Emre Aksay, H. Sebastian Seung. *Biorxiv preprint. Oct, 2020.*

"Synaptic partner assignment using attentional voxel association networks."
Nicholas L. Turner, Kisuk Lee, Ran Lu, Jingpeng Wu, Dodam Ih, H. Sebastian Seung. *IEEE 17th International Symposium on Biomedical Imaging (ISBI). Apr, 2020.*

"Towards community-driven big open brain science."
Adam S. Charles, Benjamin Falk, **Nicholas Turner**, Talmo D. Pereira, Daniel Tward, Benjamin D. Pedigo, Jaewon Chung, Randal Burns, Satrajit S. Ghosh, Justus M.Kebschull, William Silversmith, Joshua T. Vogelstein. *Annual Review of Neuroscience. Vol. 43. Apr, 2020.*

"Chandelier cell anatomy and function reveal a variably distributed but common signal."
Casey M Schneider-Mizell*, Agnes L Bodor*, Forrest Collman*, Derrick Brittain*, Adam A Bleckert*, Sven Dorkenwald*, **Nicholas L Turner***, Thomas Macrina*, Kisuk Lee*, Ran Lu*, Jingpeng Wu*, Jun Zhuang, Anirban Nandi, Brian Hu, JoAnn Buchanan, Marc M Takeno, Russel Torres, Gayathri Mahalingam, Daniel J Bumbarger, Yang Li, Tom Chartrand, Nico Kemnitz, William Silversmith, Dodam Ih, Jonathan Zung, Aleksandar Zlateski, Ignacio Tartavull, Sergiy Popovych, William Wong, Manuel A Castro, Chris Jordan, Emmanouil Froudarakis, Lynne Becker, Shelby Suckow, Jacob Reimer, Andreas S Tolias, Costas Anastassiou, H Sebastian Seung, R Clay Reid, Nuno Macarico da Costa. *Biorxiv preprint. Jan, 2020.*

"Binary and analog variation of synapses between cortical pyramidal neurons."
Sven Dorkenwald*, **Nicholas L. Turner***, Thomas Macrina*, Kisuk Lee*, Ran Lu*, Jingpeng Wu*, Agnes L. Bodor*, Adam A. Bleckert*, Derrick Brittain*, Nico Kemnitz, William M. Silversmith, Dodam Ih, Jonathan Zung, Aleksandar Zlateski, Ignacio Tartavull, Szi-Chieh Yu, Sergiy Popovych, William Wong, Manuel Castro, Chris S. Jordan, Alyssa M. Wilson, Emmanouil Froudarakis, JoAnn Buchanan, Marc Takeno, Russel Torres, Gayathri Mahalingam, Forrest Collman, Casey Schneider-Mizell, Daniel J. Bumbarger, Yang Li, Lynne Becker, Shelby Suckow, Jacob Reimer, Andreas S. Tolias, Nuno Maçarico da Costa, R. Clay Reid, H. Sebastian Seung. *Biorxiv preprint. Dec, 2019.*

"Reconstructing neuronal anatomy from whole-brain images."
James Gornet, Kannan Umadevi Venkataraju, Arun Narasimhan, **Nicholas Turner**, Kisuk Lee, H. Sebastian Seung, Pavel Osten, Uygar Sümbül. *IEEE 16th International Symposium on Biomedical Imaging (ISBI). Apr, 2019.*

"Convolutional nets for reconstructing neural circuits from brain images acquired by serial section electron microscopy."
Kisuk Lee*, **Nicholas L. Turner***, Thomas Macrina, Jingpeng Wu, Ran Lu, H. Sebastian Seung. *Current Opinion in Neurobiology. Sept, 2018.*

"Digital museum of retinal ganglion cells with dense anatomy and physiology."
J. Alexander Bae*, Shang Mu*, Jinseop S. Kim*, **Nicholas L. Turner***, Ignacio Tartavull, Nico Kemnitz, Chris S. Jordan, Alex D. Norton, William M. Silversmith, Rachel Prentki, Marissa Sorek, Celia David, Devon L. Jones, Doug Bland, Amy L. R. Sterling, Jungman Park, Kevin L. Briggman, H. Sebastian Seung, and the Eyewirers. *Cell. May, 2018*.

"Variations in the Williams syndrome GTF2i gene and anxiety-proneness interactively predict DLPFC response to aversive social stimuli in humans."
Mbemba Jabbi, Qiang Chen, **Nicholas Turner**, Michael White, Jonathan S. Kippenhan, Philip Kohn, Dwight Dickinson, Bhaskar Kolachana, Venkata Mattay, Daniel R. Weinberger, Karen F. Berman. *Translational Psychiatry. Aug, 2015*.

Presentations

"Towards a parts list for a whole mouse brain." The National Institutes of Health (NIH) BRAIN Initiative and the Department of Energy (DOE) Brain Connectivity Workshop Series. *Mar, 2021*.

"EM circuit reconstruction with functional data and segmented organelles." Allen Institute for Brain Science - Open for (neuro)science tutorials and symposium. *Mar, 2021*.

"Connectivity inference for petascale neural circuit reconstruction." Samsung AI Center NY. *Jan, 2020*.

"Inference and analysis of synaptic connectivity in mouse visual cortex." HHMI Janelia Research Campus. *Jan, 2020*.

"Binary mixture of recurrent synapses between cortical pyramidal neurons." UW CNC-Allen Institute for Brain Science Connectomics Workshop. *Oct, 2019*.

Poster Presentations

"Synaptic partner assignment using attentional voxel association networks."
Nicholas L. Turner, Kisuk Lee, Ran Lu, Jingpeng Wu, Dodam Ih, H.Sebastian Seung. *IEEE 17th International Symposium on Biomedical Imaging (ISBI). Apr, 2020*.

"Synaptic partner assignment using attentional voxel association networks."
Nicholas L. Turner, Kisuk Lee, Ran Lu, Jingpeng Wu, Dodam Ih, Nico Kemnitz, William Silversmith, William Wong, Ashwin Vishwanathan, Agnes Bodor, Adam Bleckert, Dan Bumbarger, Nuno da Costa, R. Clay Reid, H.Sebastian Seung. HHMI Connectomics Conference. *Apr, 2019*.

"RealNeuralNetworks.jl: A julia package for neuron skeletonization, morphological and connectivity analysis in large scale 3D image segmentation dataset using cloud computing"
Jingpeng Wu, **Nicholas Turner**, Alexander Bae, Ashwin Vishwanathan, H. Sebastian Seung. *5th Annual BRAIN Investigators Meeting. April, 2019*.

"Automated circuit reconstruction for functional connectomics."

Nicholas L. Turner, J. Alexander Bae, Davit Buniatyan, Sven Dorkenwald, Dodam Ih, Nico Kemnitz, Kisuk Lee, Ran Lu, Thomas Macrina, Sergiy Popovych, William Silversmith, Ignacio Tartavull, Jingpeng Wu, William Wong, Jonathan Zung, Emmanouil Froudarakis, Paul Fahey, Jacob Reimer, Agnes Bodor, Adam Bleckert, Dan Bumbarger, Nuno da Costa, Andreas S. Tolias, R. Clay Reid, H. Sebastian Seung. *Society for Neuroscience (SfN, Poster 219.12). Nov, 2018.*

"Mitochondrial size gradients in cortical neurons suggested by 3D electron microscopy."
Nicholas L. Turner, Runzhe Yang, Agata Foryciarz, Kisuk Lee, William Silversmith, William Wong, Jingpeng Wu, Sven Dorkenwald, T. L. Lewis, Yusuke Hirabayashi, Franck Polleux, Nuno da Costa, R. Clay Reid, H. Sebastian Seung. *Society for Neuroscience (SfN, Poster 430.04). Nov, 2018.*

"Comparing the connectivity fraction for axo-dendritic contacts with pyramidal neuron spiny dendrites and interneuron nonspiny dendrites in mouse V1."
Thomas Macrina, **Nicholas L. Turner**, Ran Lu, Kisuk Lee, Jingpeng Wu, William Wong, William Silversmith, Nico Kemnitz, Ignacio Tartavull, Jonathan Zung, Davit Buniatyan, Sergiy Popovych, Nuno da Costa, R. Clay Reid, H. Sebastian Seung. *Society for Neuroscience (SfN, Poster 219.13). Nov, 2018.*

"Connectivity patterns of starburst amacrine cells in the mouse retina."
Shang Mu, **Nicholas L. Turner**, William Silversmith, H. Sebastian Seung, and the Eyewirers. *Society for Neuroscience (SfN, Poster 395.20). Nov, 2018.*

"Digital museum of retinal ganglion cells with dense anatomy and physiology."
J. Alexander Bae, Shang Mu, Jinseop S. Kim, **Nicholas L. Turner**, Ignacio Tartavull, Nico Kemnitz, Chris S. Jordan, Alex D. Norton, William M. Silversmith, Rachel Prentki, Marissa Sorek, Celia David, Devon L. Jones, Doug Bland, Amy L. R. Sterling, Jungman Park, Kevin L. Briggman, H. Sebastian Seung, and the Eyewirers. *Society for Neuroscience (SfN, Poster 395.13). Nov, 2018.*

"Findings from a mouse retina: starburst amacrine cell contact patterns, ganglion cell On-Off response ratios."
Shang Mu, **Nicholas L. Turner**, William M. Silversmith, H. Sebastian Seung, and the Eyewirers. *FASEB Conference on Retinal Neurobiology and Visual Processing. June, 2018.*

"Gray matter clustering associated with genetic variation within the intraparietal sulcus."
Nicholas Turner, J. Shane Kippenhan, Ellis Hershkowitz, Philip Kohn, Michael D. Gregory, Vankata Mattay, Bhaskar Kolachana, Daniel Weinberger, Karen F. Berman. *Organization for Human Brain Mapping (OHBM, Poster 3587). June, 2014.*

"Correlation-based parcellation of human intraparietal sulcus with multimodal MRI."
D. Ellis Hershkowitz, **Nicholas Turner**, J. Shane Kippenhan, Michael D. Gregory, Philip Kohn, Karen F. Berman. *NIH Summer Poster Day. Aug, 2013.*
"White matter microstructure in children with Williams syndrome compared to matched controls,"
Nicholas L. Turner, Katherine Roe, Dharshan Chandramohan, Melanie Sottile, Daniel Rubinstein, Joelle Sarlls, Carolyn Mervis, Joseph Masdeu, Daniel Eisenberg, Jeffrey Bloch, Katherine Damme, Jonathan Kippenhan, Stefano Marenco, Karen F. Berman. *Organization for Human Brain Mapping (OHBM, Poster 3543). Jun, 2013.*

Teaching Experience

2020	Assistant in Instruction	**Advanced Programming Techniques** - Princeton University
2016	Assistant in Instruction	**Advanced Programming Techniques** - Princeton University
2015	Assistant in Instruction	**Functional Programming** - Princeton University
2011	Teaching Assistant	**Introduction to Statistical Methods** - Stanford University
2010	Teaching Assistant	**Intro to Psychology** - Stanford University

Honors and Awards

2011 - 2014 **NIH Post-baccalaureate Intramural Research Training Award Fellow**