

# Guangyu Robert Yang

---

*Computational Neuroscientist*

*"What I cannot create, I do not understand."  
– Richard Feynman*

Last updated on June 22, 2020

## Professional Position

- 2018- **Postdoctoral Research Scientist**, *Center for Theoretical Neuroscience*, Columbia University.
- 2019- **Co-organizer**, *Computational and Cognitive Neuroscience Summer School*.
- 2017 **Software Engineering Intern**, Google Brain, Mountain View, CA.  
Host: David Sussillo
- 2013–2017 **Research Assistant**, *Center for Neural Science*, New York University.
- 2011 **Visiting Student Researcher**, *Department of Neurobiology*, Yale University.

## Education

- 2013–2018 **Doctor of Philosophy**, *Center for Neural Science*, New York University.  
Thesis: Neural circuit mechanisms of cognitive flexibility  
Advisor: *Xiao-Jing Wang*
- 2012–2013 **Doctoral Study**, *Interdepartmental Neuroscience Program*, Yale University.  
Rotation Advisors: *Daeyeol Lee and Mark Laubach*
- 2008–2012 **Bachelor of Science**, *School of Physics*, Peking University.  
Thesis: Controlling Chaos in Random Recurrent Neural Networks  
Advisor: *Junren Shi*.
- 2010 **Computational and Cognitive Neurobiology Summer School**, *Cold Spring Harbor Asia*.

## Selected Awards

- 2018-2021 Junior Fellow, Simons Society of Fellows
- 2019 CCN 2019 Trainee Travel Award
- 2018 Dean's Outstanding Dissertation Award in the Sciences, New York University
- 2016 Samuel J. and Joan B. Williamson Fellowship, New York University
- 2013-2016 MacCracken Fellowship, New York University
- 2011 Benz Scholarship, Peking University
- 2010 National Scholarship of China, China

- 2009 University Scholarship, Peking University
- 2007 Silver Medal, Chinese Physics Olympiad, China

## Ongoing work presented at conferences

\*=equal contributions

- 2020 GR Yang\*, PY Wang\*, Y Sun, A Litwin-Kumar, R Axel, LF Abbott. Evolving the Olfactory System. *CCN 2019 Oral, Cosyne 2020*.
- 2020 S Minni\*, L Ji-An\*, T Moskovitz, G Lindsay, K Miller, M Dipoppa, GR Yang. Understanding the functional and structural differences across excitatory and inhibitory neurons. *Cosyne 2020*
- 2020 D Tyulmankov, GR Yang, LF Abbott. Meta-learning Hebbian plasticity for continual familiarity detection. *Cosyne 2020*.
- 2019 G Lindsay, T Moskovitz, GR Yang, K Miller. Do Biologically-Realistic Recurrent Architectures Produce Biologically-Realistic Models? *CCN 2019*
- 2019 M Molano-Mazon, GR Yang, A Hermoso-Mendizabal, J de la Rocha. RNNs develop history biases in an expectation-guided two-alternative forced choice task. *CCN 2019*.
- 2019 M Molano-Mazon, J Pastor-Ciurana, M Fradera, J de la Rocha, A Compte, GR Yang. NeuroGym: A framework for training any model on more than 50 neuroscience paradigms. *CNS 2019*
- 2019 T Ito, GR Yang, CV Cocuzza, DH Schultz, MW Cole. Predicting motor behavior using neural encoding models during complex cognitive tasks *OHBM 2019*
- 2019 L Driscoll, GR Yang, K Shenoy, D Sussillo. Recurrent neural networks as a model organism to study multi task decision making. *Cosyne 2019*

## Publications

[Google scholar page](#)

\*=equal contributions

- 2019 GR Yang, MW Cole, K Rajan. How to study the neural mechanisms of multiple tasks. *Current Opinion in Behavioral Sciences*. (2019) doi: 10.1016/j.cobeha.2019.07.001
- 2019 N Masse, GR Yang, HF Song, XJ Wang, DJ Freedman. A silent and hybrid mnemonic encoding in recurrent neural network models endowed with short-term synaptic plasticity. *Nature Neuroscience*. (2019) 22, 1159-1167
- 2019 GR Yang, M Joglekar, HF Song, WT Newsome, XJ Wang. Task representations in neural networks trained to perform many cognitive tasks. *Nature Neuroscience*. (2019) 22, 297-306
- 2018 GR Yang\*, I Ganichev\*, XJ Wang, J Shlens, D Sussillo. COG: A dataset and architecture for visual reasoning with a working memory. *European Conference on Computer Vision 2018*.
- 2018 XJ Wang, GR Yang. A disinhibitory circuit motif and flexible information routing in the brain. *Current Opinion in Neurobiology 2018*. doi: 10.1016/j.conb.2018.01.002.

- 2018 M Joglekar, J Mejias, GR Yang, XJ Wang. Inter-areal balanced amplification enhances signal propagation in a large-scale circuit model of the primate cortex. *Neuron* 2018. doi: 10.1016/j.neuron.2018.02.031
- 2017 LC Garcia del Molino, GR Yang, J Mejias, XJ Wang. Paradoxical response reversal during top-down modulation in cortical circuits with multiple interneuron types. *eLife* 2017; doi: 10.7554/eLife.29742
- 2017 Y Kim\*, GR Yang\*, K Pradhan, KU Venkataraju, M Bota, LC García del Molino, G Fitzgerald, K Ram, M He, J Levine, P Mitra, ZJ Huang, XJ Wang, P Osten. Brain-wide maps reveal stereotyped cell type-based cortical architecture and subcortical sexual dimorphism. *Cell* 2017. doi:10.1016/j.cell.2018.09.020.
- 2017 HF Song, GR Yang, XJ Wang. Reward-based training of recurrent neural networks for cognitive and value-based tasks. *eLife* 2017; doi: 10.7554/eLife.21492
- 2016 GR Yang, JD Murray, and XJ Wang. A dendritic disinhibitory circuit mechanism for pathway-specific gating. *Nature Communications*. 7 (2016). doi: 10.1038/ncomms12815
- 2016 HF Song\*, GR Yang\*, and XJ Wang. Training excitatory-inhibitory recurrent neural networks for cognitive tasks: a simple and flexible framework. *PLoS Comput Biol* 12(2) (2016): e1004792. doi:10.1371/journal.pcbi.1004792

## Selected Talks

- 2020 Neurochat, Chinese Association for Psychological & Brain Science (virtual)
- 2020 ZIPS seminar, Zuckerman Institute, Columbia University (virtual)
- 2020 Sainsbury Wellcome Centre and Gatsby Unit, University College London, UK (virtual)
- 2020 Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology
- 2020 Emerging Neuroscience Symposium, California Institute of Technology
- 2019 SCGB NY-area Postdoc Meeting, Flatiron Institute, New York, NY
- 2018 Gatsby Tri-Center Meeting, New York, NY
- 2018 State-Dependent Neuromodulation of Information Processing, Cosyne workshop, Breckenridge, CO
- 2018 RNNs: What are we doing and why?, Cosyne workshop, Breckenridge, CO
- 2017 PDP meeting, Princeton University, Princeton, NJ
- 2017 Swartz meeting, Janelia Farm, Ashburn, VA
- 2017 Center for Theoretical Neuroscience, Columbia University, New York, NY
- 2017 Cosyne, Salt Lake City, UT
- 2015 Center for Neural Science, New York University, New York, NY
- 2013 Center for Neural Science, New York University, New York, NY
- 2013 Department of Neurobiology, Yale University, New Haven, CT

## Teaching

- 2018 Methods in Computational Neuroscience, Marine Biological Laboratory, Woods Hole, MA, USA  
Teaching assistant.
- 2016 Mathematical Tools for Cognitive and Neural Science, NYU  
Teaching assistant.
- 2014, 2016 Computational and Cognitive Neuroscience Summer School, China  
Teaching assistant. Developed various tutorials, and advised student projects.

## Research Mentorship

- 2019- Danil Tyulmankov, graduate student in the group of Larry Abbott.
- 2018 Sun Minni, undergraduate student at Peking University, through an internship at Columbia University,
- 2017 Li Ji-An, graduate student at University of Science and Technology of China, through an internship in the group of Xiao-Jing Wang.
- 2015 Siyuan Li, undergraduate student at East China Normal University, through an internship in the group of Xiao-Jing Wang.

## Reviewer

Nature Neuroscience, Journal of Neuroscience, eLife, PLOS Computational Biology, Chaos, Frontiers in Neuroscience, Cosyne (Computational and Systems Neuroscience), NeurIPS (Conference on Neural Information Processing Systems), CCN (Conference on Cognitive Computational Neuroscience), CNS (Organization for Computational Neurosciences)

## Science outreach

- 2019 Late Night Science presentation to non-scientist audience. Organized by Columbia University Neuroscience Outreach
- 2018 BRAINYAC (Brain Research Apprenticeships in New York at Columbia) mentor. Co-mentored Jerel Vazquez, high school student

## University/Departmental Service

- 2018- Co-organizer of *Recent Advances in Neural Networks* Journal Club, Zuckerman Institute, Columbia University
- 2018 Co-initiator of Axon GPU cluster, Zuckerman Institute, Columbia University
- 2015 Co-chair of Retreat Planning Committee, Center for Neural Science, New York University