CHING FANG

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EDUCATION

Columbia University Aug 2019-present
PhD candidate in Neuroscience, at the Theoretical Neuroscience Center
Advisors: Larry Abbott, Dmitriy Aronov

University of California, Berkeley December 2018
B.A. in Computer Science, B.A. in Molecular & Cell Biology (Honors)

AWARDS

2019 National Science Foundation Graduate Research Fellow
2018 IL Chaikoff Award for excellence in U.C. Berkeley's neuroscience program
2018 Best presentation award at Molecular & Cell Biology undergraduate symposium
2018 Dean's Honors List in recognition of academic performance

PAPERS

Fang, C.*, Shook, E.*, Buck, J.*, and Horga, G. Predictive Coding Dynamics Improve Noise Robustness in A Deep Neural Network of the Human Auditory System. *Cognitive Computational Neuroscience*, 2022 (* equal contribution).

Fang, C., Aronov, D., Abbott, L., and Mackevicius, E. Biological Mechanisms for Learning Predictive Models of the World and Generating Flexible Predictions. *ICML Beyond Bayes Workshop*, 2022.

Fang, C., Aronov, D., Abbott, L. F., Mackevicius, E. Neural learning rules for generating flexible predictions and computing the successor representation. *under revision at eLife*, 2022.

Vendrell-Llopis, N., **Fang, C.**, Qu, A., Costa, R., Carmena, J. Diverse operant control of different motor cortex populations. *Current Biology*, 2022.

Tyulmankov, D.*, **Fang, C.***, Vadaparty, A., and Yang, G.R. Biological key-value memory networks. *NeurIPS*, 2022 (* equal contribution).

TALKS

Cognitive Computational Neuroscience (CCN)
San Francisco, Aug 2022 *(contributed)*

Flatiron Institute Center for Computational Neuroscience
New York, Aug 2022 *(invited)*

International Conference in Machine Learning (ICML), Beyond Bayes Workshop
Baltimore, July 2022 *(contributed)*

Gatsby Tri-Center Meeting for Theoretical Neuroscience
Jerusalem, June 2022 *(invited)*

Columbia Hippocampus Club seminars
New York, April 2022 *(invited)*

POSTERS

Shook, E., **Fang, C.**, Buck, J., and Horga, G., "Predictive Coding Dynamics Improve Noise Robustness in A Deep Neural Network of the Human Auditory System". *Advances and Perspectives in Auditory Neuroscience (APAN)*, 2022.

Mackevicius, E., **Fang, C.**, Chettih, S., Hale, S., and Aronov, D., "Representations of one-shot and consistent information in the hippocampus of memory-expert birds". *Society for Neuroscience Annual Meeting (SfN)*, 2022.

Tyulmankov, D., **Fang, C.**, Dong, Ling L., Vadaparty, A., and Yang, G.R., "Biological learning in key-value memory networks". *Computational and Systems Neuroscience (CoSyNe)*, 2022.

Das, A., ..., **Fang, C.**, ... "A three-pronged initiative for enhancing diversity in Columbia's neuroscience training programs". *Brain Initiative Investigator's Meeting*, 2021.

Vendrell-Llopis, N., **Fang, C.**, Qu, A., Kitano, M., Costa, R., Carmena, J. "Isolating cell-type specific subpopulations of motor cortex neurons during neuroprosthetic learning". *Society for Neuroscience Annual Meeting (SfN)*, 2019.

Fang, C., Laboy-Juarez, K., Feldman, D. Neural Coding of Whisker Timing in Multi-Whisker Sensation. *California Cognitive Science Conference*, 2018

RESEARCH GROUPS

Collaborators:

- Guangyu Robert Yang (MIT Brain & Cognitive Science). Topic: biological learning in transformer neural networks.
- Guillermo Horga (Columbia Department of Psychiatry). Topic: deep neural network models of auditory/speech comprehension.

Advisors:

Larry Abbott | Columbia Theoretical Neuro. Center Jan 2020 - present

PhD student. Topic: biological learning algorithms, predictive coding in deep learning models.

Dmitriy Aronov | Columbia University Jan 2020 - present

PhD student. Topic: reinforcement learning models of neural activity, neural network models of long-term memory in hippocampus.

Liam Paninski | Columbia Theoretical Neuro. Center Aug 2019 - Dec 2019

PhD rotation student. Topic: probabilistic graphical models to identify latent behavioral states in animal decision making.

Jose Carmena | UC Berkeley Electrical Engineering May 2018 - Aug 2019

Research technician. Topic: motor learning in brain-machine interfaces (BMI), interpretable machine learning models to explain learning performance in BMI.

Dan Feldman | Helen Wills Neuroscience Institute Jan 2015 - May 2018

Undergraduate researcher. Topic: building models of neural population tuning in somatosensory cortex.

Anne Collins | UC Berkeley Cognitive Science June 2016 - Aug 2016

Undergraduate researcher. Topic: hierarchical reinforcement learning in human decision making.

TEACHING

Lecturer, *Math Tools for Neuroscience* at Columbia University Jan 2022 - May 2022

· Taught linear algebra for a course on fundamental math topics for PhD students in neuroscience.

TA, *Synthetic Biology* at UC Berkeley Aug 2018 - Dec 2018

· Managed a hybrid online/in-person class between UC Berkeley & MIT and led discussion sections.
· Topic: metabolic engineering, genome engineering, protein and RNA circuits.

TA, *Algorithms & Intractable Problems* at UC Berkeley Aug 2017 - Dec 2017

· Developed new course project for 700+ students on approximate solutions to NP-hard problems.
· Led discussion sessions for 60+ students.
· Topic: asymptotics, graph theory, linear and dynamic programming, approximation algorithms.

TA, *Data Structures* at UC Berkeley Aug 2016 - Aug 2017

· Developed course materials and tests, managed 300+ student course, ran discussion sessions.
· Topic: Java programming, data search structures, graph algorithms, etc.

MENTORING, OUTREACH, & ORGANIZATION

Zuckerman Institute Climbing Group Aug 2022 - present
Co-founded a rock climbing group for the Columbia neuroscience institute.

Columbia Access Neuroscience Aug 2020 - present
Co-organized diversity initiatives for underrepresented minorities on the undergraduate level. Received an internal department award for service in diversity, equity, and inclusion.

Zuckerman Institute Gender Inclusion (ZIGI) Group June 2021 - present
Co-organized a seminar series on topics related to gender inclusivity in science.

Leadership Alliance Summer Research Mentor June 2021 - Aug 2021
Mentored an undergraduate student (Desiree Ramirez) on a summer research project.

Columbia Neuroscience Outreach's *Scientist on the Subway* Aug 2020 - Dec 2020
Writer and editor of profile articles about the diverse stories of neuroscientists for non-science audiences.