Alexander Fung

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Pre-doctoral researcher interested in mathematical principles of computation in neural circuits.

EDUCATION

B.S. in Electrical Engineering & Computer Science — University of California, Berkeley
B.A. in Molecular & Cellular Biology — 2019 – 2023
GPA: 3.99

POSITIONS

Research Assistant — The University of Chicago
Nogueira Lab | Grossman Center for Quantitative Biology and Human Behavior — 2025 – present
- Geometry of representations in biological and artificial neural networks.

Research Assistant — Massachusetts Institute of Technology
Fedorenko Lab | McGovern Institute for Brain Research — 2023 – 2025
- Language model architectures for efficient syntax learning.
- Computational and neuroimaging approaches investigating the neural basis of language and reasoning.

Undergraduate Researcher — University of California, Berkeley
Song Lab | Department of Electrical Engineering & Computer Science — 2021 – 2023
- Statistical properties of protein geometry and microsecond dynamics.
- Unsupervised protein structure prediction.

Research Intern — NASA Glenn Research Center
Space Communications and Navigation Program — 2021
- Learning signal reliability metrics for delay-tolerant networks.

HONORS & AWARDS

School of Science QoL Grant	Massachusetts Institute of Technology	2024
SPOT Award	McGovern Institute for Brain Research	2024
NSF Graduate Research Fellowship*	National Science Foundation	2023
Leslie Lipson Essay Prize	University of California, Berkeley	2021
HealthHack $10,000 Grand Prize	Sacramento School of AI	2019

*Declined.

PAPERS

Preprints

1. Kean, H., **Fung, A.***, Jaggers, P.*, Benn, Y., Tenenbaum, J., Piantadosi, S., Varley, R., Fedorenko, E. (2024). Evidence from Formal Logical Reasoning Reveals that the Language of Thought is not Natural Language. In revision at *PNAS*.

2. **Fung, A.***, Koehl, A.*, Jagota, M., Song, Y. (2022). The Impact of Protein Dynamics on Residue-Residue Co-evolution and Contact Prediction. Preprint.

Peer-Reviewed Publications

3. Ryskina, M., Tuckute, G., **Fung, A.**, Malkin, A., Fedorenko, E. (2025). Language Models Align With Brain Regions That Represent Concepts Across Modalities. *COLM 2025* (**Spotlight presentation**).

4. Kean, H., **Fung, A.**, Pramod, R.T., Chomik-Morales, J., Kanwisher, N., Fedorenko, E. (2025). Intuitive Physical Reasoning Is Not Mediated by Linguistic nor Exclusively Domain-General Abstract Representations. *Neuropsychologia*.

5. Dudukovich, R., Gormley, D., Kancharla, S., Wagner, K., Short, R., Brooks, D., Fantl, J., Janardhanan, S., **Fung, A.** (2022). Towards the Development of a Multi-Agent Cognitive Networking System for the Lunar Environment. *IEEE Journal of Radio Frequency Identification*.

6. Koehl, A.*, Jagota, M.*, Erdmann-Pham, D.*, **Fung, A.**, Song, Y. (2021). Transferability of Geometric Patterns from Protein Self-Interactions to Protein-Ligand Interactions. *Pacific Symposium on Biocomputing*.

In Preparation

7. **Fung, A.**, Hosseini, E., Tuckute, G., Casto, C., Fedorenko, E. Stimulus Repetitions Lead to More Reliable Neural Responses in fMRI Language Studies. In prep.

8. Kean, H., **Fung, A.**, Ohams, C., Chen, J., Rule, J., Tenenbaum, J., Piantadosi, S., Fedorenko, E. A Human Brain Network Specialized for Abstract Formal Reasoning. In prep.

*Equal contribution.

INVITED TALKS

Mechanistic Models of Biophysical Processes — The University of Chicago
Special Seminar | *Grossman Center for Quantitative Biology and Human Behavior* — 2025

POSTERS

1. **Fung, A.***, Robles-Razzaq, I.*, Nogueira, R. (2025). The Geometry of Internal States of Behavior Across the Cortical Hierarchy of the Mouse Brain. Under review at *COSYNE 2026*.

2. Xu, R., Takahashi, A., Bush, A., Sisterson, N., Walton, A., Hutchinson, S., Neudorfer, C., Kammen, A., Kokkinos, V., Jhingan, N., **Fung, A.**, Marvi, A., Valenzuela, C., Kean, H., Pramod, R., McMahon, E., Yee, S., Kirsch, J., Kanwisher, N., Fedorenko, E., Desimone, R., Richardson, M. (2025). Mapping the Mesoscale Human Cortical Connectome. Poster presentation, to be presented at the *Annual Meeting of the Society for Neuroscience (SfN)*.

3. **Fung, A.***, Zhuang, C.*, Piantadosi, S., Andreas, J., Fedorenko, E. (2024). Word-Order Error Detection Helps Data-Efficient Language Models Learn Syntax. Poster presentation, *Cognitive Computational Neuroscience 2024*.

4. Kean, H., **Fung, A.**, Rule, J., Tenenbaum, J., Piantadosi, S., Fedorenko, E. (2024). Deductive and Inductive Processing Dissociate in the Human Brain. Poster presentation, *Cognitive Computational Neuroscience 2024*.