Alexander Fung

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

Education

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

Professional Experience

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

2022 – 2023 Undergraduate Researcher — Berkeley Lab
Bouchard Lab | Lawrence Berkeley National Laboratory
- Learning frequency tuning properties in rat auditory cortex.

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

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

Honors & Awards

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

*Declined.

Publications

Papers

1. Kean, H., **Fung, A.**, Pramod, R.T., Chomik-Morales, J., Kanwisher, N., Fedorenko, E. (2024). Intuitive Physical Reasoning Is Not Mediated by Linguistic nor Exclusively Domain-General Abstract Representations. Under Review.

2. Kean, H., **Fung, A.***, Jaggers, P.*, Benn, Y., Tenenbaum, J., Piantadosi, S., Varley, R., Fedorenko, E. (2024). The Language of Thought is not Language: Evidence from Formal Logical Reasoning. Under Review.

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

4. 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*.

5. 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*.

Posters

6. **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*.

7. 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*.

*Equal contribution.