Alexander Y. Ku, Curriculum Vitae

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Overview

My research focuses on the computational principles underlying cognitive flexibility and long-term efficiency in humans, with the goal of translating these insights into building continually adaptive AI systems.

Education

PhD in Psychology & Neuroscience, Princeton University, 2028 (expected)
Doctoral advisors: Thomas L. Griffiths & Jonathan D. Cohen
MS in Electrical Engineering & Computer Science, UC Berkeley, 2018
BA in Computer Science, UC Berkeley, 2017

Research Appointments

Research Scientist, Google DeepMind, 2018–present
Research Intern, Google Brain, Summer 2018
Research Intern, Google Brain, Summer 2017

Publications

Peer-Reviewed Journal Articles

1. Yu, J., Xu, Y., Koh, J. Y., Luong, T., Baid, G., Wang, Z., ... others (2022). Scaling autoregressive models for content-rich text-to-image generation. *Transactions on Machine Learning Research*.

2. Poplin, R., Chang, P.-C., Alexander, D., Schwartz, S., Colthurst, T., Ku, A., ... others (2018). A universal snp and small-indel variant caller using deep neural networks. *Nature biotechnology*, *36*(10), 983–987.

Peer-Reviewed Conference Proceedings

1. Campbell, D., Rane, S., Giallanza, T., De Sabbata, N., Ghods, K., Joshi, A., ... others (2024). Understanding the limits of vision language models through the lens of the binding problem. In *The thirty-eighth annual conference on neural information processing systems.*

2. Onoe, Y., Rane, S., Berger, Z., Bitton, Y., Cho, J., Garg, R., ... others (2024). Docci: Descriptions of connected and contrasting images. In *The 18th european conference on computer vision eccv 2024.*

3. Rane, S., Ku, A., Baldridge, J., Tenney, I., Griffiths, T., & Kim, B. (2024). Can generative multimodal models count to ten? In *Proceedings of the annual meeting of the cognitive science society* (Vol. 46).

4. Datta, S., Ku, A., Ramachandran, D., & Anderson, P. (2023). Prompt expansion for adaptive text-to-image generation. In *Proceedings of the 62nd annual meeting of the association for computational linguistics (volume 1: Long papers).*

5. Wang, Z., Ku, A., Baldridge, J., Griffiths, T. L., & Kim, B. (2023). Gaussian process probes (gpp) for uncertainty-aware probing. In *Thirty-seventh conference on neural information processing systems.*

6. Kamath, A., Anderson, P., Wang, S., Koh, J. Y., Ku, A., Waters, A., ... Parekh, Z. (2022). A new path: Scaling vision-and-language navigation with synthetic instructions and imitation learning. In *The ieee/cvf conference on computer vision and pattern recognition 2023.*

7. Yu, J., Xu, Y., Koh, J. Y., Luong, T., Baid, G., Wang, Z., ... others (2022). Scaling autoregressive models for content-rich text-to-image generation. *Transactions on Machine Learning Research*.

8. Ku, A., Anderson, P., Pont-Tuset, J., & Baldridge, J. (2021). Pangea: The panoramic graph environment annotation toolkit. In *Proceedings of the second workshop on advances in language and vision research.*

9. Yu, J., Li, X., Koh, J. Y., Zhang, H., Pang, R., Qin, J., ... Wu, Y. (2021). Vector-quantized image modeling with improved vqgan. In *The tenth international conference on learning representations.*

10. Zhao, M., Anderson, P., Jain, V., Wang, S., Ku, A., Baldridge, J., & Ie, E. (2021). On the evaluation of vision-and-language navigation instructions. In *Proceedings of the 16th conference of the european chapter of the association for computational linguistics: Main volume.*

11. Ku, A., Anderson, P., Patel, R., Ie, E., & Baldridge, J. (2020). Room-across-room: Multilingual vision-and-language navigation with dense spatiotemporal grounding. In *Proceedings of the 2020 conference on empirical methods in natural language processing (emnlp).*

12. Jain, V., Magalhaes, G., Ku, A., Vaswani, A., Ie, E., & Baldridge, J. (2019). Stay on the path: Instruction fidelity in vision-and-language navigation. In *Proceedings of the 57th annual meeting of the association for computational linguistics.*

13. Magalhaes, G., Jain, V., Ku, A., Ie, E., & Baldridge, J. (2019). General evaluation for instruction conditioned navigation using dynamic time warping. In *Advances in neural information processing systems workshop on visually grounded interaction and language.*

14. Huang, H., Jain, V., Mehta, H., Ku, A., Magalhaes, G., Baldridge, J., & Ie, E. (2019). Transferable representation learning in vision-and-language navigation. In *Proceedings of the ieee/cvf international conference on computer vision* (pp. 7404–7413).

15. Poplin, R., Chang, P.-C., Alexander, D., Schwartz, S., Colthurst, T., Ku, A., ... others (2018). A universal snp and small-indel variant caller using deep neural networks. *Nature biotechnology*, *36*(10), 983–987.

16. Peterson, J. C., Suchow, J. W., Aghi, K., Ku, A. Y., & Griffiths, T. L. (2018). Capturing human category representations by sampling in deep feature spaces. In *Proceedings of the 40th annual meeting of the cognitive science society (cogsci 2018).*

17. Parmar, N., Vaswani, A., Uszkoreit, J., Kaiser, Ł., Shazeer, N., Ku, A., & Tran, D. (2018). Image transformer. In *Proceedings of the 35th international conference on machine learning.*

Preprints / Manuscripts Under Review

1. Ku, A. Y., Griffiths, T. L., & Chan, S. C. (2025). Predictability shapes adaptation: An evolutionary perspective on modes of learning in transformers. *arXiv preprint arXiv:2505.09855*.

2. Lampinen, A. K., Chaudhry, A., Chan, S. C., Wild, C., Wan, D., Ku, A., ... McClelland, J. L. (2025). On the generalization of language models from in-context learning and finetuning: a controlled study. *arXiv preprint arXiv:2505.00661*.

3. Ku, A., Campbell, D., Bai, X., Geng, J., Liu, R., Marjieh, R., ... others (2025). Using the tools of cognitive science to understand large language models at different levels of analysis. *arXiv preprint arXiv:2503.13401*.

Teaching & Mentorship

Teaching Assistant

PSY 360: Computational Models of Cognition, Princeton University, Fall 2025
NEU 502A: Cognitive Neuroscience, Princeton University, Spring 2025
PSY 254: Developmental Psychology Princeton University, Fall 2024
Data 8: Data Science, UC Berkeley, Fall 2017
CS 188: Artificial Intelligence, UC Berkeley, Spring 2017
Data 8: Data Science, UC Berkeley, Fall 2016

Mentorship

Host for 4 research interns at Google DeepMind.

Professional Service

Reviewing: NeurIPS, ICLR, ICML, ACL, EMNLP