Joel Dapello

AI/ML - Biology - Neuroscience

SUMMARY

Joel Dapello is a scientist and engineer with a cross-functional background in AI and biology and over ten years of experience focused on accelerating bio and neuro research with AI/ML methods. Joel prioritizes impact, follow through, clear communication, and responsible development of AI/ML methods.

EXPERIENCE

Graepel & Bianco Labs, Altos Labs | *Machine Learning Scientist* | **October 2022 - present**

- Currently leading a cross functional team to develop an agentic AI platform for therapeutic target assessment and prioritization
- Founded and scaled the unimodality and multimodality foundation model program
- Led a cross functional team of wet lab biologists, bioinformaticians, and ML engineers to develop and scale RNAseq, Imaging, and multimodality foundation models for therapeutic discovery

DiCarlo Lab, MIT | *PhD Researcher* | **August 2018 - December 2022**

- Adversarial vulnerability in artificial and biological neural systems [1,2,3,5]
- Geometric analysis of information processing in artificial and biological neural systems [4,6]

MIT IBM Watson AI Lab, IBM | *Research Intern* | **June 2021 - August 2021**

- Out of domain generalization using Invariant Risk Minimization and Model Agnostic Meta Learning

Cox Lab, Harvard University | *PhD Researcher* | **August 2017 - August 2018**

- Convolutional neural networks for decoding information from biological neural systems [7]
- Information theoretic analysis of generalization in artificial neural networks [8]

BioBright, LLC | *Founding Engineer* | **July 2014 - April 2017**

- Developed an integrated platform for improving efficiency and reproducibility in biology research
- Prototyped an NLP voice based note taking and action triggering systems for wet lab scientists and a convolutional neural network based method for automated experiment tracking

Boyden Lab, MIT | *Research Affiliate* | **March 2015 - March 2017**

- Novel optical device design for recording and stimulation of neural activity [10]

Robinson Lab, Rice University | *Research Assistant* | **June 2013 - December 2013**

- Controlling multiple presynaptic inputs with optogenetics and spatial light manipulation [11]

EDUCATION

Harvard University, Cambridge MA - *PhD, Applied Math,* **August 2017 - September 2022**
Hampshire College, Amherst MA - *BA, Cellular and Molecular Biology,* **August 2011 - May 2014**

SELECTED PUBLICATIONS, TALKS, AND POSTERS

[1] **Dapello, J.*,** Kar, K.*, Schrimpf, M., Geary, R., Ferguson, M., Cox, D. D., DiCarlo, J. (2023) **Aligning model and macaque inferior temporal cortex representations improves model-to-human behavioral alignment and adversarial robustness**, ICLR 2023 (Oral)

[2] **Dapello, J.,** (2022) **What can the Primate Brain Teach Us about Robust Object Recognition?** Keynote Talk, New Frontiers in Adversarial Machine Learning Workshop, ICML, 2022

[3] Guo, C., Lee, M., Leclerc, G., **Dapello, J.,** Rao, R., Madry, A., Dicarlo, J. (2022) **Adversarially trained neural representations are already as robust as biological neural representations,** ICML**,** 2022

[4] **Dapello, J.***, Feather, J.*, Le, H.*, Marques, T., Cox, D., McDermott, J., DiCarlo, J., Chung, S. (2021) **Neural Population Geometry Reveals the Role of Stochasticity in Robust Perception**, NeurIPS, 2021

[5] **Dapello, J.***, Marques, T.*, Schrimpf, M., Geiger, F., Cox, D., DiCarlo, J. (2020), **Simulating a Primary Visual Cortex at the Front of CNNs Improves Robustness to Image Perturbations**. NeurIPS, 2020 (Spotlight)

[6] Chung, S.*, **Dapello, J.***, Cohen, U., DiCarlo, J. J., Sompolinsky, H. (2020), **Separable Manifold Geometry in Macaque Ventral Stream and DCNNs**. Poster, COSYNE 2020.

[7] Guitchounts, G., Lotter, W., **Dapello, J.**, Cox, D., (2020), **Stable 3D head direction signals in the primary visual cortex,** biorxiv, 2020.09. 04.283762

[8] Saxe, A. M., Bansal, Y., **Dapello, J.**, Advani, M., Kolchinsky, A., Tracey, B. D., & Cox, D. D. (2018) **On the Information Bottleneck Theory of Deep Learning**, ICLR, 2018.

[9] Fracchia, C., **Dapello, J.**. (2016). DEF CON 24: Reverse engineering biomedical equipment for fun and open science. DEFCON24, Biohacking Village

[10] Rodriques, S., Marblestone, A., Scholvin, J., **Dapello, J.**, Sarkar, D., Mankin, M., Gao, R., Wood, L., Boyden, E. (2016) **Multiplexed neural recording along a single optical fiber via optical reflectometry**, Journal of Biomedical Optics, Vol. 21, Issue 5, 057003 (May 2016)

[11] Avants, B., Murphy, D.,, **Dapello, J.**, Robinson, J., (2015) **NeuroPG: open source software for optical pattern generation and data acquisition,** Frontiers in Neuroengineering 2015/3/2