# Jacob S. Prince

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## Education

**Harvard University**　　Cambridge, MA
Ph.D. Candidate in Psychology (Cognition, Brain, and Behavior)　　September 2021 – present
Advisors: Dr. Talia Konkle and Dr. George Alvarez

**Carnegie Mellon University**　　Pittsburgh, PA
Research Associate, Psychology Department　　September 2019 – August 2021
Advisor: Dr. Michael Tarr

**Yale University**　　New Haven, CT
B.S. in Cognitive Science, GPA: 3.70/4.00　　September 2014 – December 2018

## Selected Publications

Google Scholar Profile

1. **Prince, JS.**, Alvarez, GA., Konkle, T. (2024). Contrastive learning explains the emergence and function of visual category-selective regions. *Science Advances*. https://doi.org/10.1126/sciadv.adl1776.

2. **Prince, JS.**, Fajardo, G., Alvarez, GA., Konkle, T. (2024). Manipulating dropout reveals an optimal balance of efficiency and robustness in biological and machine visual systems. *ICLR 2024*. https://openreview.net/forum?id=ADDCErFzev.

3. Conwell, C., **Prince, JS.**, Alvarez, GA., Konkle, T. (2024). A large-scale examination of inductive biases shaping high-level visual representation in brains and machines. *Nature Communications*. https://doi.org/10.1038/s41467-024-53147-y.

4. **Prince, JS.**, Alvarez, GA., Konkle, T. (2024). Representation with a capital R: measuring functional alignment with causal perturbation. *UniReps Workshop @ NeurIPS 2024* (**Oral**). https://openreview.net/forum?id=pn7KvRSRm3&noteId=jK926fssbe.

5. **Prince, JS.**, Conwell, C., Alvarez, GA., Konkle, T. (2024). A case for sparse positive alignment of neural systems. *Re-Align Workshop @ ICLR 2024*. https://openreview.net/forum?id=8FnN1QmR84.

6. Kay, KN., **Prince, JS.**, Gebhart, T., Tuckute, G., Zhou, J., Naselaris, T., Schutt, H. (2024). Disentangling signal and noise in neural responses through generative modeling. *bioRxiv*. https://doi.org/10.1101/2024.04.22.590510.

7. Vinken, K., **Prince, JS.**, Konkle, T., Livingstone, M. (2023). The neural code for 'face cells' is not face specific. *Science Advances*. https://doi.org/10.1126/sciadv.adg1736.

8. **Prince, JS.**, Charest, I., Kurzawski, JW., Pyles, JA., Tarr, MJ., Kay, KN. (2022). Improving the accuracy of single-trial fMRI response estimates using GLMsingle. *eLife*. https://doi.org/10.7554/eLife.77599.

9. Jain, N., Wang, A., Henderson, MH., Lin, R., **Prince, JS.** ... Wehbe L. (2022). Selectivity for food in human ventral visual cortex. *Nature Communications Biology*. https://doi.org/10.1038/s42003-023-04546-2.

10. Allen, EJ., St-Yves, G., Wu, Y., Breedlove, JL., **Prince, JS.** ... Kay KN. (2022). A massive 7T fMRI dataset to bridge cognitive neuroscience and artificial intelligence. *Nature Neuroscience*. https://doi.org/10.1038/s41593-021-00962-x.

11. Kronemer, SI., Aksen, M., Ding, Z., Ryu, JH., Xin, Q., Ding, Z., **Prince, JS**...Blumenfeld, H. (2022). Human visual consciousness involves large scale cortical and subcortical networks independent of task report and eye movement activity. *Nature Communications*. https://doi.org/10.1038/s41467-022-35117-4.

## INVITED TALKS

- Harvard University – Kempner Institute      Upcoming: May. 14, 2025
  *Title TBD*
- Brown University – AI, Neuro, CogSci Research (ANCOR) talk series      Upcoming: Apr. 28, 2025
  *Title TBD*
- Stanford University – Scaffolding of Cognition Team (PI: Cameron Ellis)      Upcoming: Mar. 14, 2025
  *Title TBD*
- University of Minnesota – Center for Neuroengineering Seminar      Upcoming: Feb. 27, 2025
  *Title TBD*
- University of Minnesota – Computational Visual Neuroscience Laboratory (PI: Kendrick Kay)      Oct. 24, 2024
  *Enhancing the reliability of neural data with signal-aware low-rank denoising.*
- Bissell Grogan Symposium, The Brimmer and May School, Newton MA      Jan. 16, 2024
  *The promise and pitfalls of AI for visual recognition.*
- Visual Inference Lab, Columbia University (PI: Nikolaus Kriegeskorte)      Jan. 5, 2024
  *A unifying contrastive coding framework for visual category representation in the human brain.*
- Vision and Computational Cognition Group, Max Planck Institute (PI: Martin Hebart)      Dec. 21, 2023
  *A unifying contrastive coding framework for visual category representation in the human brain.*
- Brains Minds and Machines Summer Course, Marine Biological Laboratory, Woods Hole      Aug. 23, 2023
  *Quantifying dataset diversity with brain-guided curriculum learning.*
- University of Minnesota – Dept. of Psychology Perception Lunch      Feb. 21, 2023
  *GLMsingle: A toolbox for accurate single-trial fMRI response estimates.*
- MIT Brain and Cognitive Sciences – Computational Tutorial Series      April 29, 2022
  *GLMsingle: a toolbox for improving single-trial fMRI response estimates.*
  *Recording: https://cbmm.mit.edu/video/glmsingle-toolbox-improving-single-trial-fmri-response-estimates.*
- University of Minnesota – Computational Visual Neuroscience Laboratory (PI: Kendrick Kay)      Sept. 25, 2020
  *Data-driven fMRI denoising enhances cross-dataset representational stability and boosts image decodability.*
- Natural Scenes Dataset Conference 2020 (online)      Aug. 12, 2020
  *GLMsingle: a turnkey solution for accurate single-trial fMRI estimates.*
- University of California, Irvine – Visual Perception and Neuroimaging Lab (PI: Emily Grossman)      Mar. 18, 2020
  *The effect of fMRI design and preprocessing paradigms on SNR and temporal autocorrelation.*
- Carnegie Mellon University - VisCog Group (PIs: M.Behrmann, D.Plaut, M.Tarr, B.Nozari, B.Mahon)      Feb. 3, 2020
  *An overview of large-scale neuroimaging datasets and implications for the study of high level vision.*

## CONFERENCE TALKS

1. **Prince, JS.**, Alvarez, GA., Konkle, T. (2024). Representation with a capital R: measuring functional alignment with causal perturbation. Presented at the UniReps Workshop, NeurIPS 2024, Dec 14, Vancouver, Canada.

2. **Prince, JS.**, Conwell, C., Konkle, T. (2024). Large datasets: a Swiss Army knife for diverse research aims in NeuroAI. Presented at "Large-scale visual neural datasets: where do we go from here?" symposium; Vision Sciences Society, May 17-24, St. Pete Beach, FL.

3. **Prince, JS.**, Fajardo, G., Alvarez, GA., Konkle, T. (2023). Manipulating category selectivity and information distribution in visual recognition systems using dropout. Presented at the Conference on Cognitive Computational Neuroscience, Aug 24-27, Oxford, UK.

4. **Prince, JS.**, Konkle, T. (2022). Neural and computational evidence that category-selective visual regions are facets of a unified object space. Presented at the Vision Sciences Society, May 13-18, St. Pete Beach, FL.

5. **Prince, JS.**, Konkle, T. (2020). Computational evidence for integrated rather than specialized feature tuning in category-selective regions. Presented at the Virtual Vision Sciences Society, June 19-24. Video: www.tinyurl.com/jp-vss2020.

## Selected Conference Posters

1. **Prince, JS.**, Wang, B., Jagadeesh, AV., Fel, T., Lo, E., Alvarez, GA., Livingstone, MS., Konkle, T. (2025). Feature accentuation along the encoding axes of IT neurons uncovers hidden differences in model-brain alignment. Submitted to Vision Sciences Society, May 16-20, St. Pete Beach, FL.

2. **Prince, JS.**, Hamblin, C., Alvarez, GA., Konkle, T. (2024). Dissecting visual population codes with brain-guided feature accentuation. **Poster** presented at the Conference on Cognitive Computational Neuroscience, Aug 6-9, Boston, MA.

3. **Prince, JS.**, Hamblin, C., Alvarez, GA., Konkle, T. (2024). Interpreting distributed population codes with feature-accentuated visual encoding models. **Poster** presented at Vision Sciences Society, May 17-24, St. Pete Beach, FL.

4. Conwell, C., **Prince, JS.**, Alvarez, GA., Konkle, T. (2023). The Unreasonable Effectiveness of Word Models in Predicting High-Level Visual Cortex Responses to Natural Images. **Poster** presented at the Conference on Cognitive Computational Neuroscience, Aug 24-27, Oxford, UK.

5. Conwell, C., **Prince, JS.**, Hamblin, C., Alvarez, GA. (2023). Controlled assessment of CLIP-style language-aligned vision models in prediction of brain & behavioral data. **Poster** presented at the Workshop on Understanding Foundation Models, ICLR 2023, May 1-5, Kigali, Rwanda.

6. **Prince, JS.**, Alvarez, GA., Konkle, T. (2023). Lesioning category-selective units *in silico* yields functionally specialized deficits. **Poster** presented at the Vision Sciences Society, May 19-24, St. Pete Beach, FL.

7. Conwell, C., **Prince, JS.**, Alvarez, GA., Konkle, T. (2023). Language Models of Visual Cortex: Where do they work? And why do they work so well where they do? **Poster** presented at the Vision Sciences Society, May 19-24, St. Pete Beach, FL.

8. Conwell, C., **Prince, JS.**, Alvarez, G., Konkle, T. (2022). What can 5.17 billion regression fits tell us about artificial models and the human visual system? **Poster** presented at the Vision Sciences Society, May 13-18, St. Pete Beach, FL.

9. Conwell, C., **Prince, JS.**, Kay, K., Alvarez, GA., Konkle, T. (2022). Opportunistic experiments on a large-scale survey of diverse artificial vision models in prediction of 7T human fMRI data. **Poster** presented at the Conference on Cognitive Computational Neuroscience, August 25-28, San Francisco, CA.

10. Vinken, K., **Prince, JS.**, Konkle, T., Livingstone, M. (2022). Common encoding axes for face-selectivity and non-face objects in macaque face cells. **Poster** presented at the Conference on Cognitive Computational Neuroscience, August 25-28, San Francisco, CA.

11. **Prince, JS.**, Charest, I., Kurzawski, JW., Pyles, JA., Tarr, MJ., Kay, KN. (2021). GLMsingle: a turnkey solution for accurate single-trial fMRI response estimates. **Poster** presented at the Virtual Vision Sciences Society, May 21-26. Video: www.tinyurl.com/jp-vss2021.

12. Kallmayer, A., **Prince, JS.**, Konkle, T. (2020). Comparing representations that support object, scene, and face recognition using deepnet trajectory analysis. **Poster** presented at the Virtual Vision Sciences Society, June 19-24.

13. **Prince, JS.**, Konkle, T. (2019). Relating category-selective regions in biological and artificial neural networks. **Poster** presented at the Vision Sciences Society, May 17-22, St. Pete Beach, FL.

14. **Prince, JS.**...Blumenfeld, H. (2017). Machine learning to predict conscious visual perception using pupillary dynamics. **Poster** presented at the Society for Neuroscience, November 11-15, Washington, D.C.

## Grants and Awards

- National Defense Science and Engineering Graduate (NDSEG) Fellowship — Award Term: 2022-2024
- Elsevier/Vision Research Travel Award — Vision Sciences Society 2020
- Rising Stars Travel Grant: Shared Visual Representations in Humans and Machines Workshop — NeurIPS 2019

## Activities and Service

- Co-chair, Trainee Organizing Committee, Cognitive Computational Neuroscience conference                August 2024
  *Extensive involvement in planning logistics for the conference; organizing 650-person social event.*
- Brains, Minds, and Machines Summer Course, Marine Biological Laboratory, Woods Hole                August 2023
  *Attended intensive month-long summer school, completed project assessing whether human visual representational dimensions can guide the selection of useful training samples for object recognition ANNs.*
- Mentor, Harvard Prospective Ph.D. & RA Event in Psychology (PPREP)                Sept. 2021 - present
  *Provide career guidance and CV/essay feedback to 3 students (per year) from historically minoritized groups in STEM who are applying to graduate school, lab manager, and/or research assistant positions.*
- TA, Computational Methods in Human Neuroscience (NSCI 258, Prof. Nick Turk-Browne, Yale)                Spring 2019
  *Assisted with creation and debugging of Python workbooks with focus on ML-driven computational fMRI analyses. Mentored students and reinforced key concepts from lecture during weekly office hours.*

- Journal and conference reviewing: Nature Neuroscience; ICLR; Imaging Neuroscience; Cognitive Computational Neuroscience; SVHRM Workshop @ NeurIPS; Re-Align Workshop @ NeurIPS; UniReps Workshop @ NeurIPS