FENIL R. DOSHI

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RESEARCH INTEREST

Exploring the cognitive capacities of vision models and building mechanistic interpretability frameworks to dissect the underlying circuits that support them.

EDUCATION

Harvard University, Cambridge, MA *Sept 2021 - Present*
Ph.D. Program in Psychology (Cognition, Brain, and Behavior)
Advisor: Dr. George Alvarez and Dr. Talia Konkle (GPA: 3.97/4.0)

Harvard University, Cambridge, MA *Sept 2021 - Sept 2023*
MA in Psychology (Cognition, Brain, and Behavior) (GPA: 3.97/4.0)

SRM Institute of Science and Technology, Chennai, India *Sept 2014 - Jan 2018*
B.Tech in Computer Science and Engineering (GPA: 8.65/10.0)

RESEARCH EXPERIENCE

Dolby Laboratories, Advanced Technology Group (ATG) *June 2025 - Sept 2025*
PhD Research Intern
Focus: Human perceptual alignment in generative models.

Kempner Institute, Harvard University *August 2023 - Present*
Graduate Fellow
Focus: Machine and Human mid-level/object vision.

Harvard University, Dept. of Psychology *Nov 2018 - Dec 2020*
Research Assistant (Fellow)
Faculty Advisor: Dr. George Alvarez
Focus: Worked on models and psychophysics experiments that account for human judgements in intuitive physics tasks and capacity-limits in human visual working memory.

Harvard Medical School (BWH) *Jan 2018 - July 2018*
Research Intern, Shafiee Lab
Faculty Advisor: Dr. Hadi Shafiee
Focus: Trained convolutional neural networks to identify and qualitatively analyze the structural morphology of cells. Optimized the models to deal with class imbalance using class-sensitive training and sampling.

UW-Madison *Sept 2016 - Dec 2016*
Visiting student
Faculty Advisor: Dr. Dane Morgan
Focus: Used bayesian models and neural networks to predict changes in the mechanical properties of steel components due to alloy configurations.

MANUSCRIPTS

1. **Doshi, F.R.**, Fel, T., Konkle, T., & Alvarez, G.A. (2025) Visual Anagrams Reveal Hidden Differences in Holistic Shape Processing Across Vision Models. In *NeurIPS 2025*.
2. **Doshi, F.R.**, Konkle, T, Alvarez, G.A. (2025) A feedforward mechanism for human-like contour integration. In *PLOS Computational Biology, 2025*.

3. **Doshi, F.R.**, Konkle, T. (2023) Cortical topographic motifs emerge in a self-organized map of object space. In *Science Advances, 2023.*

4. Kanakasabapathy, M., Thirumalaraju, P., Kandula, H., **Doshi, F.**, Sivakumar, A., Kartik, D., Gupta, R., Pooniwala, R., Branda, J., Tsibris, A., Kuritzkes, D., Petrozza, J., Bormann, C., Shafiee H. (2021). Adaptive adversarial neural networks for the analysis of lossy and domain-shifted datasets of medical images. In *Nature Biomedical Engineering, 2021.*

5. Liu, Yc., Wu, H., Mayeshiba, T. et al. (2022).Machine learning predictions of irradiation embrittlement in reactor pressure vessel steels. In *NPJ Computational Materials, 2022.*

6. Thirumalaraju, P., Bormann, CL., Kanakasabapathy, M., **Doshi, F.**, Souter, I., Dimitriadis, I., Shafiee, H.(2018).Automated sperm morpshology testing using artificial intelligence. In *Fertility and sterility. 2018 Sep 1;110(4):e432.*

CONFERENCE TALKS

1. **Doshi, F.**, Konkle, T., Alvarez, G.A. (2022). Human-like signatures of contour integration in deep neural networks. Talk presented at *Vision Sciences Society, 2022.*

2. **Doshi, F.**, Konkle, T.(2021). Organizational motifs of cortical responses to objects emerge in topographic projections of deep neural networks. Talk presented at *Vision Sciences Society, 2021.*

CONFERENCE/WORKSHOP PRESENTATIONS

1. **Doshi, F. R.** , Fel, T, Konkle T., & Alvarez, G.A. (2025). From Local to Contextually-Enriched Local Representations: A Mechanism for Holistic Processing in DINOv2 ViTs. In *Mechanistic Interpretability Workshop at NeurIPS 2025.*

2. **Doshi, F. R.** , Fel, T, Konkle T., & Alvarez, G.A. (2025). Towards Holistic Vision in Deep Neural Networks: Disentangling Local and Global Processing. In *Vision Science Society, 2025.*

3. **Doshi, F. R.** , Konkle T., & Alvarez, G.A. (2024). Quantifying the Quality of Shape and Texture Representations in Deep Neural Network Models. In *Vision Science Society, 2024.*

4. **Doshi, F.**, Konkle, T., Alvarez, G.A. (2024). Configural-Shape Representation in Deep Neural Networks. In *Cognitive Computational Neuroscience (CCN), 2024.*

5. **Doshi, F. R.** & Konkle T. (2023). Face-deprived networks show distributed but not clustered face-selective maps. In *Vision Science Society, 2023.*

6. **Doshi, F.**, Konkle, T., Alvarez, G.A. (2023). Feedforward Neural Networks can capture Human-like Perceptual and Behavioral Signatures of Contour Integration. In *Cognitive Computational Neuroscience (CCN), 2023.*

7. **Doshi, F.** & Konkle T. (2022). Cortical topography motifs emerge from self-organization of a unified object space. In *Society for Neuroscience, San Diego, CA, November 12-16, 2022.*

8. **Doshi, F.**, Pailian, H., Alvarez, G.A.(2020). Using Deep Convolutional Neural Networks to Examine the Role of Representational Similarity in Visual Working Memory. In *Vision Science Society, 2020.*

9. Conwell, C., **Doshi, F.**, Alvarez, G.A.(2019). Shared Representations of Stability in Humans, Supervised, & Unsupervised Neural Networks. In *Shared Visual Representations in Human and Machine Intelligence (SVRHM) workshop at NeurIPS 2019.*

10. Conwell, C., **Doshi, F.**, Alvarez, G.A.(2019). Human-Like Judgments of Stability Emerge from Purely Perceptual Features: Evidence from Supervised and Unsupervised Deep Neural Networks. In *Cognitive Computational Neuroscience (CCN), 2019.*

11. Chatterjee, S., Archana, V., Suresh, K., Saha, R., Gupta, R., **Doshi, F.**(2017).Detection of non-technical losses using advanced metering infrastructure and deep recurrent neural networks. In *IEEE International Conference on Environment and Electrical Engineering, 2017.*

INVITED TALKS

- Murty Lab, GeorgiaTech *2025*
- Serre Lab, Brown University *2019*
- Enigma Group, Stanford University, California *2025*
- Arcaro Lab, University of Pennsylvania, Philadelphia *2024*
- Museum of Science (Kempner Institute Seminar), Boston *2024*
- Hebart Lab, Max Planck Institute of Human Cognitive and Brain Sciences *2024*
- Kempner All Hands Meeting, Harvard University *2023*
- Livingstone and Ponce Lab, Harvard Medical School *2023*
- Program in Neuroscience, Harvard University *2023*
- Blitz Psychology Talk, Harvard University *2022*
- International week, Pontificia Universidad Catolica del Peru (PUCP) *2022*
- Serre Lab, Brown University *2019*

HONORS AND AWARDS

- Kempner Graduate Fellowship *2023-2027*
  Awarded to graduate students working at the intersection of natural and artificial intelligence by the Chan Zuckerburg initiative.
- Amartya Sen Fellowship *2021-2023*
  Awarded in honor of Prof. Amartya Sen (Nobel Laureate in Economic Sciences, 1998)
- Reimagine Education Award (Silver), Student-led Innovation for Next Tech Lab *2018*
  Quacquarelli Symonds (QS), Wharton School, University of Pennsylvania
- Best Outgoing Student, Class of 2018 *2018*
  Department of Computer Science, SRM Institute of Science and Technology
- National Champion *2017*
  Smart India Hackathon (India's biggest Hackathon)

TECHNICAL SKILLS

- **Programming**: Python, JavaScript, MATLAB, C, C++, C#, Java
- **Deep Learning**: PyTorch, TensorFlow; distributed training using DDP across multi-GPU and multi-node systems; SLURM-based job scheduling on HPC clusters
- **Experimental Techniques**: Computational modeling (supervised, unsupervised, and biologically-plausible architectures), mechanistic interpretability of large vision models, diffusion models, behavioral psychophysics
- **Data Science & Tools**: Non-parametric statistics, power analysis, simulation, resampling (bootstrapping), model comparison; factor analysis, PCA/SVD; scikit-learn, matplotlib, pandas, NumPy, seaborn

ADVISING EXPERIENCE

- **Teaching Fellow** *2024*
  Teaching the class – Brain Damage as a Window into the Mind: Cognitive Neuropsychology with Prof. Caramazza.
- **Teaching Fellow** *2024*
  Teaching the class – Biological and Artificial Visual Systems: How Humans and Machines Represent the Visual World with Prof. Konkle and Prof. Alvarez.
- **Mentor, Harvard Prospective Ph.D. & RA Event in Psychology (PPREP)** *2021-2022*
  Provide guidance to students from historically minoritized groups in STEM with their applications to graduate school, lab manager, and/or research assistant positions.
- **Mind Brain Behavior Steering Committee** *2021-2022*
- **Next Tech Lab, Founding Member and Advisor** *2015-2018*
  Co-founded a student-run AI research lab at SRM Institute of Science and Technology. Co-led over 160 students and helped build compute clusters

SCIENCE OUTREACH

- **Human-like perceptual capacity in models** *2025*
  Kempner article on contour integration
- **Harvard Brain Science Initiative** *2024*
  Interview for Humans of HBI Page
- **Harvard GSAS Bulletin** *2024*
  https://gsas.harvard.edu/news/seeing-how-we-see
- **Kempner Institute Spring into Science** *2024*
  Presented a talk on ongoing research at the Museum of Science, Boston