Judith E. Fan

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Academic Positions

2023 – *Assistant Professor*, Psychology and, *by courtesy*, Education & Computer Science, Stanford University
Affiliated Faculty, Stanford Accelerator for Learning, Stanford Human-Centered Artificial Intelligence, Symbolic Systems, Center for Affective Science

2019—2023 *Assistant Professor*, Psychology, University of California, San Diego
Affiliated Faculty, Neurosciences Graduate Program, Halıcıoğlu Data Science Institute, The Design Lab, Computational Social Sciences Program

2017—2019 *Postdoctoral Scholar*, Psychology, Stanford University

2016 *Postdoctoral Research Associate*, Neuroscience Institute, Princeton University

Education

2011—2016 *PhD*, Psychology, Princeton University

2006—2010 *AB*, Neurobiology and Statistics, Harvard College
summa cum laude

Selected Honors

2021 Outstanding Faculty Mentorship Award, UC San Diego Graduate Student Association

2017 Robert J. Glushko Prize for Outstanding Doctoral Dissertation, Cognitive Science Society

2017 Finalist for the NIH Director's Early Independence Award

2015 Computational Modeling Paper Prize in Perception & Action, Cognitive Science Society

2013 Early Graduate Student Researcher Award, American Psychological Association

2009 Phi Beta Kappa, Harvard University

2007-2008 John Harvard Scholar, Harvard University (top 5% of class)

2006-2007 Harvard College Scholar, Harvard University (top 10% of class)

2006 Presidential Scholar, U.S. Department of Education (1 of 2 selected from state)

Research Grants

2025-2026 Learning through Creation with Generative AI Seed Grant
Source: Stanford Accelerator for Learning and Stanford Institute for Human-Centered Artificial Intelligence (HAI)
Title: Enhancing math learning and engagement through game creation
Role: PI, w/ Junyi Chu, Hyo Gweon, Nick Haber, & Hari Subramonyam

2025-2026 People Who Help Other People Learn (PWHOPL) Seed Grant
Source: Stanford Accelerator for Learning
Title: Helping novice tutors learn to notice student misconceptions in real time
Role: PI, w/ Dora Demszky & Susanna Loeb

2024-2026 EDU Core Research Grant
Source: National Science Foundation
Title: Improved measures of data visualization literacy to advance research and assessment in STEM education
Role: PI, w/ Elisa Kreiss, Lace Padilla, & Chris Potts

2024-2025 Hoffman-Yee Research Grant
Source: Stanford Institute for Human-Centered Artificial Intelligence (HAI)
Title: Integrating Intelligence: Building shared conceptual grounding for interacting with generative AI
Role: co-PI, w/ Maneesh Agrawala, Kayvon Fatahalian, Tobi Gerstenberg, Nick Haber, Hari Subramonyam, Jiajun Wu

2023-2024 Generative AI & the Future of Learning Seed Grant
Source: Stanford Accelerator for Learning and Stanford Institute for Human-Centered Artificial Intelligence (HAI)
Title: Generating descriptions of data visualizations to improve accessibility and learning outcomes in STEM education
Role: co-PI, w/ Chris Potts & Elisa Kreiss

2022-2023 School of Social Sciences Research Grant
Source: UC San Diego
Title: Measuring, modeling, and improving graph comprehension
Role: PI

2021-2026 Faculty Early Career Development Program (CAREER) Award
Source: National Science Foundation
Title: Mechanisms enabling the flexible expression of visual concepts
Role: PI

2021-2024 Science of Autonomy Research Grant
Source: Office of Naval Research
Title: Harnessing human intelligence for adaptive human-robot collaboration
Role: co-PI, w/ Dorsa Sadigh

2021-2023 Hoffman-Yee Research Grant
Source: Stanford Institute for Human-Centered Artificial Intelligence (HAI)
Title: Curious, self-aware AI agents to build cognitive models and understand developmental disorders
Role: co-PI, w/ Dan Yamins, Mike Frank, Nick Haber, Fei-Fei Li, & Dennis Wall

2020-2021 Course Development and Instructional Improvement Program Grant
Source: UC San Diego
Title: Enhancing the Psychology core methods curriculum: a new emphasis on computational literacy, open-science practices, and project-based collaboration
Role: PI, w/ Emma Geller and Celeste Pilegard

2015-2016 Council of the Humanities David A. Gardner '69 Magic Project Grant
Source: Princeton University
Title: Drawing as a window into the mind
Role: PI, w/ Nick Turk-Browne

Fellowships

2015-2016 Cognitive Science Graduate Student Fellowship, Princeton University
2015-2016 Cognitive Science Graduate Research Grant, Princeton University
2015-2016 Council on Science and Technology Research Grant, Princeton University
2013-2016 Graduate Research Fellowship, National Science Foundation
2011-2012 Andrew W. Mellon Foundation Research Fellowship in Cultural Policy, Princeton University
2011-2012 Walker McKinney '50 Life Sciences Fellowship, Princeton University
2010-2011 Michael C. Rockefeller Foundation Memorial Fellowship, Harvard University
2009 Mary G. Roberts Mind/Brain/Behavior Thesis Fellowship, Harvard University
2009 Program for Research in Science and Engineering Fellowship, Harvard University
2008 Weissman International Internship Program Fellowship, Harvard University
2008 Lowe Career Decision Loan Fund Recipient, Harvard University
2007 Museum of Comparative Zoology Grants-in-Aid Recipient, Harvard University
2007-2009 Harvard College Research Program Fellowship, Harvard University
2006-2010 T.W. Lewis Foundation Scholar & Robert C. Byrd Scholar

Publications

under revision Brockbank, E., Verma, A., Lloyd, H., Huey, H., Padilla, L., and **Fan, J.** (*under revision*). Measuring convergence between two data visualization literacy assessments.

under revision Brockbank*, E., Lloyd*, H., Tait, Z., Bear, A., and **Fan, J.** (*under revision*). Measuring links between student attitudes, engagement, and learning in introductory data science courses.

under revision Verma, A., Mukherjee, K., Potts, C., Kreiss, E., and **Fan, J.** (*under revision*). CHART-6: Human-centered evaluation of data visualization understanding in vision-language models.

under revision Maeda, K., Tsai, C.-Y., **Fan, J.**, and Abtahi, P. (*under revision*). Multimodal conventions with hand gestures and language in collaborative physical tasks.

under review Vinker, Y., Shahm, T., Zheng, K., Zhao, A., **Fan, J.**, and Torralba, A. (*under review*). SketchAgent: Language-driven sequential sketch generation.

2024 Allen, K., Brändle, F.,... **Fan, J.**, ... Schulz, E. (2024). Using games to understand the mind. *Nature Human Behaviour.*

2024 Verma, A., Mukherjee, K., Potts, C., Kreiss, E., and **Fan, J.** (2024). Evaluating human and machine understanding of data visualizations. *Proceedings of the 46th Annual Meeting of the Cognitive Science Society.*

2024 Venkatesh, R., Chen, H., Feigelis, K., Jedoui, K., Kotar, K., Binder, F., Lee, W., Liu, S., Smith, K., **Fan, J.**, and Yamins, D. (2024). Counterfactual World Modeling for Physical Dynamics Understanding. *European Conference on Computer Vision (ECCV).*

2024 McCarthy, W., Anderson, S., and **Fan, J.** (2024). How does assembling an object affect memory for it? *Proceedings of the 46th Annual Meeting of the Cognitive Science Society.*

2024 Brockbank, E., Yang, J., Govil, M., **Fan, J.**, and Gerstenberg, T. (2024). Without his cookies, he's just a monster: a counterfactual simulation model of social explanation. *Proceedings of the 46th Annual Meeting of the Cognitive Science Society.*

2024 Wang, H., Jedoui, K., Venkatesh, R., Binder, F., Tenenbaum, J., **Fan, J.**, Yamins, D., and Smith, K. (2024). Probabilistic simulation supports generalizable intuitive physics. *Proceedings of the 46th Annual Meeting of the Cognitive Science Society.*

2024 McCarthy, W., Matejka, J., Willis, K., **Fan.**, J., and Pu, Y. Communicating design intent using drawing and text. *ACM Creativity and Cognition.*

2024 Huey, H., Leake, M., Aneja, D., Fisher, M., and **Fan, J.** How do video content creation goals impact which concepts people prioritize when generating B-roll imagery? *ACM Creativity and Cognition.*

2024 Bourouis, A., **Fan, J.**, and Gryaditskaya, Y. (2024). Open vocabulary semantic scene sketch understanding. *Computer Vision and Pattern Recognition (CVPR).*

2024 Holt, S., **Fan, J.**, and Barner, D. (2024). Creating ad hoc graphical representations of number. *Cognition.*

2024 Long, B., **Fan, J.**, Chai, Z., and Frank, M. (2023). Parallel developmental changes in children's drawing and recognition of visual concepts. *Nature Communications.*

2023 McCarthy, W., Kirsh, D., and **Fan, J.** (2023). Consistency and variation in reasoning about physical assembly. *Cognitive Science.*

2023 Mukherjee, K., Huey, H., Lu, X., Vinker, Y., Aguina-Kang, R., Shamir, A., and **Fan, J.** (2023). SEVA: Leveraging sketches to evaluate alignment between human and machine visual abstraction. *In Advances in Neural Information Processing Systems (Datasets & Benchmarks Track).*

2023 Tung, H.-Y., Ding, M., Chen, Z., Bear, D., Gan, C., Tenenbaum, J., Yamins, D., **Fan, J.**, and Smith, K. (2023). Physion++: Evaluating physical scene understanding that requires online inference of different physical properties. *In Advances in Neural Information Processing Systems (Datasets & Benchmarks Track).*

2023 **Fan, J.**, Bainbridge, W., Chamberlain, R., and Wammes, J. (2023). Drawing as a versatile cognitive tool. *Nature Reviews Psychology.*

2023 Hawkins, R., Sano, M., Goodman, N., and **Fan, J.** (2023). Visual resemblance and interaction history jointly constrain pictorial meaning. *Nature Communications.*

2023 Huey, H., Lu, X., Walker, C. and **Fan, J.** (2023). Explanatory drawings prioritize functional properties at the expense of visual fidelity. *Cognition.*

2023 Long, B., Wang, Y., Christie, S., Frank, M., and **Fan, J.** (2023). Developmental changes in drawing production under different memory demands in a U.S. and Chinese sample. *Developmental Psychology.*

2023 Lu, X., Wang, X., and **Fan, J.**. (2023). Learning dense correspondences between photos and sketches. *International Conference on Machine Learning (ICML).*

2023 Gweon, H., **Fan, J.**, Kim, B. (2023). Beyond imitation: Machines that understand and are understood by humans. *Philosophical Transactions of the Royal Society A.*

2023 Binder, F., Mattar, M., Kirsh, D., and **Fan, J.** (2023). Humans choose visual subgoals to reduce cognitive cost. *Proceedings of the 45th Annual Meeting of the Cognitive Science Society.*

2023 Mukherjee, K., Huey, H., Lu, X., Vinker, Y., Aguina-Kang, R., Shamir, A., and **Fan, J.** (2023). Evaluating machine comprehension of sketch meaning at different levels of abstraction. *Proceedings of the 45th Annual Meeting of the Cognitive Science Society.*

2023 Huey*, H., Oey*, L., Lloyd, H., and **Fan, J.** (2023). How do communicative goals guide which data visualizations people think are effective? *Proceedings of the 45th Annual Meeting of the Cognitive Science Society.*

2023 Martinez, J., Binder, F., Wang, H., Haber, N., **Fan, J.**, and Yamins, D. (2023). Humans choose visual subgoals to reduce cognitive cost. *Proceedings of the 45th Annual Meeting of the Cognitive Science Society.*

2022 Wong*, C., McCarthy*, W., Grand*, G., Friedman, Y., Tenenbaum, J., Andreas, J., Hawkins, R., and **Fan, J.** (2022). Identifying concept libraries from language about object structure. *Proceedings of the 44th Annual Meeting of the Cognitive Science Society.*

2022 Brockbank*, E., Wang*, H., Yang, J., Mirchandani, S., Erdem Bıyık, E., Sadigh, D., and **Fan, J.** (2022). How do people incorporate advice from artificial agents when making physical judgments? *Proceedings of the 44th Annual Meeting of the Cognitive Science Society.*

2022 Huey*, H., Long*, B., Yang, J., George, K., and **Fan, J.** (2022). Developmental changes in the semantic part structure of drawn objects. *Proceedings of the 44th Annual Meeting of the Cognitive Science Society.*

2022 Wang, H., Allen, K., Vul, E., and **Fan, J.** (2022). Generalizing physical prediction by composing forces and objects. *Proceedings of the 44th Annual Meeting of the Cognitive Science Society.*

2022 Wang, H., Yang, J., Tamari, R., and **Fan, J.** (2022). Communicating understanding of physical dynamics in natural language. *Proceedings of the 44th Annual Meeting of the Cognitive Science Society.*

2021 *Bear, D., *Wang, E., *Mrowca, D., *Binder, F., Tung, H.-Y., RT, P, Holdaway, C., Tao, S., Smith, K., Sun, F.-Y., Li, F.-F., Kanwisher, N., Tenenbaum, J., **Yamins, D., and ***Fan, J.** (2021). Physion: Evaluating physical prediction from vision in humans and machines. *In Advances in Neural Information Processing Systems (Datasets & Benchmarks Track) 2021.*

2021 Binder, F., Mattar, M., Kirsh, D. and **Fan, J.** (2021). Visual scoping operations for physical assembly. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 Holdaway, C., Bear, D., Radwan, S., Frank, M., Yamins, D., and **Fan, J.** (2021). Measuring and predicting variation in the interestingness of physical structures. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 Holt, S., Barner, D., and **Fan, J.** (2021). Improvised numerals rely on 1-to-1 correspondence. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 Huey, H., Walker, C., and **Fan, J.** (2021). How do the semantic properties of visual explanations guide causal inference? *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 Kachergis, G., Radwan, S., Long, B., **Fan, J.**, Lingelbach, M., Bear, D., Yamins, D., and Frank, M. (2021). Predicting children's and adults' preferences in physical interactions via physics simulation. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 *McCarthy, W., *Hawkins, R., Wang, H., Holdaway, C., and **Fan, J.** (2021). Learning to communicate about shared procedural abstractions. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 McCarthy, W., Mattar, M., Kirsh, D. and **Fan, J.** (2021). Connecting perceptual and procedural abstractions in physical construction. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 Wang, H., Polikarpova, N., and **Fan, J.** (2021). Learning part-based abstractions for visual object concepts. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 Wang, H., Vul, E., Polikarpova, N., and **Fan, J.** (2021). Theory acquisition as constraint-based program synthesis. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2021 Yang, J. and **Fan, J.** (2021). Visual communication of object concepts at different levels of abstraction. *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society.*

2020 McCarthy, W., Holdaway, C., Hawkins, R., and **Fan, J.** (2020). Emergence of compositional abstractions in human collaborative assembly. *NeurIPS Workshop on Object Representations for Learning and Reasoning.*

2020 McCarthy, W., and **Fan, J.** (2020). Rapid policy updating in human physical construction. *ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning.*

2020 Wang, H., and **Fan, J.** (2020). Library learning for structured object concepts. *ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning.*

2020 McCarthy W., Kirsh D., *&* **Fan J.** (2020). Learning to build physical structures better over time. *Proceedings of the 42nd Annual Meeting of the Cognitive Science Society.*

2020 **Fan J.**, Wammes J., Gunn J., Yamins D., Norman K., Turk-Browne N. (2020). Relating visual production and recognition of objects in human visual cortex. *Journal of Neuroscience.*

2020 Xu T., **Fan J.**, *&* Dow S. (2020). Schema and metadata guide the collective generation of relevant and diverse insights. *Proceedings of the 8th AAAI Conference on Human Computation and Crowdsourcing.*

2020 **Fan J.**, Hawkins R., Wu M., *&* Goodman N. (2020). Pragmatic inference and visual abstraction enable contextual flexibility during visual communication. *Computational Brain & Behavior.*

2019 Achlioptas, P., **Fan J.**, Hawkins R., Guibas L., *&* Goodman N. (2019). ShapeGlot: Learning language for shape differentiation. *International Conference on Computer Vision (ICCV).*

2019 Hawkins R.*, Sano, M.*, Goodman N., *&* **Fan J.** (2019). Graphical convention formation during visual communication. *Proceedings of the 41st Annual Meeting of the Cognitive Science Society. * equal contribution; Sayan Gul Travel Award*

2019 Mukherjee K., Hawkins R.., *&* **Fan J.** (2019). Communicating semantic part information in drawings. *Proceedings of the 41st Annual Meeting of the Cognitive Science Society.*

2019 Long B., **Fan J.**, Chai R., *&* Frank M. (2019). Developmental changes in the ability to draw distinctive features of object categories. *Proceedings of the 41st Annual Meeting of the Cognitive Science Society.*

2019 **Fan J.**, Dinculescu M., *&* Ha D. (2019). Collabdraw: An environment for collaborative sketching with an artificial agent. *Proceedings of the 2019 ACM SIGCHI Conference on Creativity and Cognition.*

2018 Cullen S., **Fan J.**, van der Brugge E., *&* Elga A. (2018). Improving analytical reasoning and argument understanding: A quasi-experimental field study of argument visualization. *npj Science of Learning.*

2018 **Fan J.**, Yamins D., *&* Turk-Browne, N. (2018) Common object representations for visual production and recognition. *Cognitive Science.*

2018 Long, B., **Fan J.**, *&* Frank M. (2018) Drawing as a window into developmental changes in object representations. *Proceedings of the 40th Annual Conference of the Cognitive Science Society.*

2016 **Fan J.**, Hutchinson, J., and Turk-Browne, N. (2016) When past is present: Substitutions of long-term memory for sensory evidence in perceptual judgments. *Journal of Vision.* 16(8), 1-12.

2016 **Fan J.** and Turk-Browne, N. (2016) Incidental biasing of attention from long-term memory. *Journal of Experimental Psychology: Learning, Memory, & Cognition.* 42(6), 970-977.

2016 **Fan J.**, Turk-Browne, N., *&* Taylor, J. (2016) Error-driven learning in statistical summary perception. *Journal of Experimental Psychology: Human Perception and Performance*, 42(2), 266–280.

2015 **Fan J.**, Yamins D., *&* Turk-Browne, N. (2015) Common object representations for visual recognition and production. *Proceedings of the 37th Annual Meeting of the Cognitive Science Society.*

2015 **Fan J.** (2015) Drawing to learn: how producing graphical representations enhances scientific thinking. *Translational Issues in Psychological Science.* 1(2), 170-181.

2014 **Fan J.** and Suchow, J. (2014) The crowd is self-aware. *Behavioral and Brain Sciences*, 37(1), 81-82.

2013 **Fan J.** and Turk-Browne, N. (2013) Internal attention to features in visual short-term memory guides object learning. *Cognition*, 129(2), 292-308.

2013 **Fan J.**, Turk-Browne, N., *&* Taylor, J. (2013) Feedback-driven tuning of statistical summary representations. *Visual Cognition*, 21(6), 685-689.

2013 **Fan J.** (2013) Can ideas about food inspire real social change? The case of Peruvian gastronomy. *Gastronomica*, 13(2), 31-42.

2010 Strange B., Kroes M., **Fan J.**, *&* Dolan R. (2010) Emotion causes targeted forgetting of established memories. *Frontiers in Behavioral Neuroscience.* 4, 1-13.

2009 Sharot T., Shiner T. Brown A., **Fan J.**, *&* Dolan, R. (2009) Dopamine enhances expectation of pleasure in humans. *Current Biology*, 24(19), 2077-1080.

Invited Talks

2025 Cognitive tools for uncovering useful abstractions
University of Maryland, College Park, September 2025

2025 Cognitive tools for uncovering useful abstractions
Massachusetts Institute of Technology, March 2025

2025 Cognitive tools for uncovering useful abstractions
Arizona State University, February 2025

2025 Cognitive tools for visual communication
Aarhus University, January 2025

2024 Cognitive tools for uncovering useful abstractions
Workshop on Analyzing High-dimensional Traces of Intelligent Behavior, Institute for Pure & Applied Mathematics, University of California, Los Angeles, September 2024

2024 Cognitive tools for uncovering useful abstractions
Princeton University, April 2024

2024 Cognitive tools for uncovering useful abstractions
Johns Hopkins University, April 2024

2024 Cognitive tools for uncovering useful abstractions
University of California, Irvine, March 2024

2024 Cognitive tools for uncovering useful abstractions
University of California, Santa Cruz, March 2024

2024 Cognitive tools for uncovering useful abstractions
Stanford HAI Seminar Series, February 2024

2024 Putting cognitive science to work to accelerate human learning
Stanford AI + Education Summit, February 2024

2024 Cognitive tools for uncovering useful abstractions
TU Darmstadt, February 2024

2023 Cognitive tools for uncovering useful abstractions
User Interface Software and Technology (UIST) Keynote, October 2023

2023 What enables the mind to make sense of so many kinds of visual media?
Stanford CSLI Workshop on Iconicity & Cognition, September 2023

2023 Cognitive tools for uncovering useful abstractions
National Taiwan University, August 2023

2023 Learning to communicate about shared procedural abstractions
Computational Summer School on Modeling Social and collective behavior (COSMOS), July 2023.

2023 Advancing cognitive science and AI through Cognitive-AI Benchmarking
Conference on Human-Compatible Artificial Intelligence, June 2023.

2023 How do visual content and communicative context determine pictorial meaning?
Studies in Language, Information, Meaning, and Expression, May 2023.

2023 Discovering abstractions that bridge perception, action, and communication
Workshop on Neurosymbolic Generative Models at ICLR, May 2023.

2023 How do visual content and social context influence pictorial meaning?
Second Salzburg Workshop on Imagistic Cognition, May 2023.

2023 Discovering abstractions that bridge perception, action, and communication
Invited Symposium on "Learning and generalization in humans and machines"at Cognitive Neuroscience Society, March 2023.

2023 Cognitive technologies for uncovering useful abstractions
University of California, Santa Barbara, March 2023.

2023 Cognitive technologies for uncovering useful abstractions
Carnegie Mellon University, February 2023.

2023 Cognitive tools for uncovering useful abstractions
University of Oregon, January 2023.

2022 Towards human-like understanding of 3D physical scenes
ECCV: Language for 3D Scenes Workshop, October 2022.

2022 Physion: Evaluating physical prediction from vision in humans and machines
ECCV: Visual object-oriented Learning meets Interaction (VOLI) Workshop, October 2022.

2022 Cognitive technologies for uncovering useful abstractions
University of California, Merced, September 2022.

2022 Cognitive technologies for uncovering useful abstractions
Diverse Intelligences Summer Institute, August 2022.

2022 Cognitive tools for uncovering useful abstractions
Max-Planck Institute for Biological Cybernetics, July 2022.

2022 Learning to communicate about shared procedural abstractions
CVPR: Artificial Social Intelligence Workshop, June 2022.

2022 Physion: Evaluating physical prediction in humans and machines
CVPR: Graph Machine Learning for Visual Computing Tutorial, June 2022.

2022 Cognitive tools for uncovering useful abstractions
University of California, Irvine, April 2022.

2022 Cognitive tools for uncovering useful abstractions
University of Wisconsin-Madison, March 2022.

2022 Cognitive tools for uncovering useful abstractions
Dartmouth College, February 2022.

2022 Cognitive tools for uncovering useful abstractions
Stanford University, February 2022.

2022 Cognitive tools for uncovering useful abstractions
University of California, Los Angeles, January 2022.

2021 Visual content and social context jointly determine pictorial meaning
Psychonomics Symposium: Beyond the Button Press: Studying the Mind Through Drawings, November 2021.

2021 Cognitive tools for learning and communication
Configural Processing Consortium Keynote Talk, November 2021.

2021 Cognitive tools for learning and communication
University of Edinburgh Computational Cognitive Science Seminar, October 2021.

2021 Cognitive technologies for visual communication
CogSci 2021 Workshop: Symbolic and sub-symbolic systems in people and machines, July 2021.

2021 Drawing games as a window into concepts, communication, and collaboration.
CogSci 2021 Workshop: Using games to understand intelligence, July 2021.

2021 Cognitive technologies for making the invisible visible
Diverse Intelligences Summer Institute, July 2021.

2021 Relating visual production and recognition in human visual cortex.
Wellcome Trust Centre for Neuroimaging, June 2021.

2021 Cognitive tools for making the invisible visible.
Workshop on Sketch-Oriented Deep Learning, CVPR, June 2021.

2021 Cognitive tools for learning and communication.
Nokia Bell Labs, February 2021.

2021 Cognitive tools for learning and communication.
Department of Cognitive, Linguistic & Psychological Sciences, Brown University, February 2021.

2020 Cognitive tools for learning and communication.
Institute for Cognitive Science, University of Michigan, December 2020.

2020 Cognitive tools for making the invisible visible.
Department of Philosophy, University of Southern California, June 2020.

2020 Emergence of graphical communication protocols.
Robotics: Science & Systems Workshop: Emergent Behaviors in Human-Robot Systems, July 2020.

2020 Cognitive tools for making the invisible visible.
ICLR Workshop on Bridging AI and Cognitive Science, Addis Ababa, Ethiopia, April 2020.

2019 Cognitive tools for learning and communication.
Design @ Large, UC San Diego, La Jolla, CA, May 2019.

2019 Cognitive tools for learning and communication.
Halıcıoğlu Data Science Institute, UC San Diego, La Jolla, CA, January 2019.

2018 Cognitive tools for learning and communication.
Hult International Business School, San Francisco, CA, April 2018.

2018 Drawing as a window into the mind.
Netflix, Los Gatos, CA, April 2018.

2018 Cognitive tools for learning and communication.
University of California Berkeley, Berkeley, CA, February 2018.

2018 Cognitive tools for learning and communication.
University of California San Diego, La Jolla, CA, January 2018.

2018 Cognitive tools for learning and communication.
Indiana University, Bloomington, IN, January 2018.

2017 Drawing as a window into the mind.
Rhode Island School of Design, Providence, RI, November 2017.

2017 Role of cognitive actions in learning.
Annual Meeting of the Cognitive Science Society, London, UK, July 2017.

2016 Drawing as a window into the mind.
Princeton University Art Museum, Princeton, NJ, October 2016.

2016 Drawing as cognitive technology.
Drawing and the Brain Symposium, Indiana University Center for Art + Design, Bloomington, IN, April 2016.

2016 Drawing to learn: how visual production refines object representations.
Indiana University in Bloomington, IN, April 2016.

2015 Drawing as a window into learning.
Educational Testing Service, Princeton, NJ, October, 2015.

2015 Common object representations for visual recognition and production.
University of British Columbia, Vancouver, BC, March, 2015.

2015 Drawing as a window into the mind.
Smart Design, New York City, NY, March, 2015.

2013 Can ideas about food lead to real social change?
Princeton Woodrow Wilson School Bernstein Gallery Art Exhibit on "Cooking for Change", Princeton, NJ, May 2013.

2011 Apégate a la causa! La gastronomía peruana como fenómeno social total.
Faculty of Social Sciences, Pontificia Universidad Católica del Perú, Lima, Peru, July 2011.

Conference Presentations

2024 Cognitive Science Society.

2024 CVPR.

2024 Society for Philosophy and Psychology.

2023 NeurIPS.

2023 Cognitive Science Society.

2023 International Conference on Machine Learning (ICML).

2023 Vision Sciences Society.

2023 International Conference on Learning Represenations (ICLR) Workshop on Neurosymbolic Generative Models.

2023 Cognitive Neuroscience Society.

2022 Cognitive Science Society.

2022 Computer Vision and Pattern Recognition (CVPR).

2022 Society for Philosophy and Psychology Annual Meeting.

2021 Annual Meeting of the Psychonomic Society.

2021 Cognitive Science Society.

2021 Computer Vision and Pattern Recognition (CVPR).

2021 Society for Philosophy and Psychology Annual Meeting.

2020 Robotics: Science & Systems Workshop: Emergent Behaviors in Human-Robot Systems.

2020 Cognitive Science Society.

2020 ICML Workshop on Object-Oriented Learning: Perception, Representation, and Reasoning.

2020 ICLR Workshop on Bridging AI and Cognitive Science.

2019 Cognitive Science Society. *Sayan Gul Travel Award.*

2019 Society for Philosophy and Psychology Annual Meeting.
2019 ACM SIGCHI Conference on Creativity and Cognition.
2018 Vision Sciences Society.
2018 Society for Neuroscience.
2017 Vision Sciences Society.
2017 Cognitive Science Society. *Glushko Dissertation Prize.*
2016 Vision Sciences Society.
2015 Vision Sciences Society.
2015 Cognitive Science Society. *Computational Modeling Paper Prize.*
2014 Vision Sciences Society.
2014 ACM SIGGRAPH.
2013 Vision Sciences Society.
2013 Annual Meeting on Object Perception, Attention, and Memory (OPAM). *Student Travel Award*
2013 Annual Meeting of the Psychonomic Society.
2012 Vision Sciences Society.
2012 New School for Social Research Sociology Conference.
2010 Vision Sciences Society.

Advising

Students

Stanford

Postdoctoral Scholars

2023 – Erik Brockbank (*NSF SBE Postdoc Fellow*; co-mentored by Tobi Gerstenberg)
2024 – Junyi Chu (co-mentored by Hyo Gweon)
2024 – Lio Wong (*Stanford HAI Postdoc Fellow*)
2025 – Kushin Mukherjee

PhD Students

2023 – Sean Anderson (*NSF Graduate Fellow*)
2024 – Linas Nasvytis
2024 – Alexa Tartaglini (*Stanford Computer Science*)

Dissertation Committee

2022 Elias Wang (*Stanford Electrical Engineering*)
2023 – Sarah Wu
2024 Lio Wong (*MIT Brain & Cognitive Sciences*)
2024 – Shawn Schwartz
2024 – Veronica Boyce

2024 — Effie Li
2024 — Joy Hsu (*Stanford Computer Science*)
2024 — Rose Wang (*Stanford Computer Science*)
2024 — Ian Huang (*Stanford Computer Science*)
2024 — Honglin Chen (*Stanford Computer Science*)

Selected Undergraduates and Master's
2024 — Nora Dee
2024 — Vryan Feliciano
2018 — 2019 Renata Chai
2018 — 2019 Xin Yuan
2018 — 2019 Kushin Mukherjee
2018 — 2019 Megumi Sano (*Sayan Gul Travel Award*)
2017 Karl Mulligan

UC San Diego

PhD Students
2019 — 2024 Haoliang Wang
2019 — 2024 Holly Huey (co-advised by Caren Walker)
2019 — 2024 Will McCarthy (co-advised by David Kirsh)
2020 — 2024 Felix Binder (co-advised by David Kirsh)
2020 — 2022 Cameron Holdaway (co-advised by Ed Vul)
2019 — Sebastian Holt (co-advised by David Barner)
2021 — 2023 Hannah Lloyd (co-advised by Celeste Pilegard)
2022 — 2023 Lauren Oey (co-advised by Ed Vul)
2022 — 2023 Erik Brockbank (co-advised by Ed Vul)

Qualifying Exam Committee
2021 Yang Wang
2021 Cameron Holdaway
2022 Hyojeong (Jenny) Yoo

Dissertation Committee
2022 Helen Wang (*UCSD Neuroscience*)
2023 Tone Xu (*UCSD Cognitive Science*)
2023 Sunyoung Park
2023 Isabella DeStefano
2023 Aubrey Lau
2024 James Qi
2024 Zheng Guo (*UCSD Computer Science & Engineering*)

2024 Mohan Gupta

Selected Undergraduates

2019 — 2022 Justin Yang, Honors: *UCSD Chancellor's Research Scholarship, HDSI Research Scholarship, Triton Research & Experiential Learning Scholarship*
2019 — 2024 Xuanchen Lu, Honors: *UCSD Psychology Research Perseverence During COVID Award*
2019 — 2020 Julia Xu, Honors: *HDSI Research Scholarship*
2020 — 2023 Sirui Tao, Honors: *HDSI Research Scholarship*
2020 — 2021 Zhe Huang, Honors: *Triton Research & Experiential Learning Scholarship*
2021 — 2022 Jane Yang, Honors: *Triton Research & Experiential Learning Scholarship*
2022 — 2024 Zoe Tait, Honors: *UCSD Chancellor's Research Scholarship*
2022 — 2025 Rio Aguina-Kang

Princeton

Selected Undergraduates

2015 — 2016 Laura Herman
2016 Jessica Ji
2015 Jordan Gunn
2015 Rachel Klebanov
2013 - 2014 Ryan O'Connell
2013 Annie Chen
2012-2013 Max Luo

Other Mentorship

2024-2025 HAI Student Affinity Group: Debugging Dali: An Exploration of AI Art, Faculty Mentor
2020 Mentor, Científico Latino Graduate Student Mentorship Initiative
2017-2018 Stanford Center for the Study of Language & Information, Mentor
2019–2026 Faculty Mentor, Cognitive Science Society Annual Meeting Princeton Wilson College, Resident Graduate Advisor
2015-2016 Princeton Cognitive Science Program Graduate Student Fellow
2013-2014 Princeton Psychology Senior Thesis Writing Group Leader

Teaching

Stanford

2025 PSYCH / DATASCI / EDUC 149: Data Science and the Science of Learning
2024 COLLEGE 101: Why College? Your Education and the Good Life
2024 PSYCH 10: Introduction to Statistical Methods: Precalculus

2024 PSYCH 267A: Bids for Scale in Psychological Science
2023 PSYCH 10: Introduction to Statistical Methods: Precalculus

UC San Diego

Instructor-of-Record

2022 PSYC 201A: Quantitative Methods in Psychology
2022 PSYC 60: Introduction to Statistics
2022 PSYC 193L: Science of Learning Data Science
2021 PSYC 230: Computational Approaches to Visual Abstraction
2021 PSYC 60: Introduction to Statistics
2021 PSYC 230: Computational Approaches to Visual Abstraction
2020 PSYC 193: Perception & Computation
2020 PSYC 60: Introduction to Statistics
2019 PSYC 272: Computational Approaches to Visual Abstraction

Guest Lectures

2025 SYMSYS 280: Symbolic Systems Research Seminar (Stanford)
2021 PSYC 523b: Cognitive Psychology (Yale)
2021 PHIL 281: Non-Linguistic Representation (UCLA)
2020 NEU 200C: Basic Neuroscience
2020 PSYC 111A: Research Methods
2020 COGS 200: Faculty Research Seminar

Professional Service

Service to the University and Broader Community

2025- Stanford Undergraduate Data Science Program Advisory Board
2023-2025 Stanford Psychology Statistics Committee
2023-2025 Stanford Psychology Graduate Admissions Committee
2023-2025 Stanford Psychology Media & Outreach Committee
2020-2023 UCSD Marshall College Commencement Representative
2020-2023 UCSD Pathways2AI Initiative, Co-Founder
2020-2023 UCSD Psychology Undergraduate Research Assistant Common Application Initiative, Co-Chair

Service to the Field

Workshops Organized

2024 CogSci Workshop: COGGRAPH: Building bridges between cognitive science and computer graphics

2024 CourseKata Researcher Workshop (DREAM): Insights from data about current state of data science education

2023 CogSci Workshop: How does the mind discover useful abstractions?

2023 CogSci Workshop: Advancing cognitive science and AI through Cognitive-AI Benchmarking

2022 ECCV Workshop: 1st Challenge on Machine Visual Common Sense: Perception, Prediction, Planning

2022 CogSci Workshop: Images2Symbols: Drawing as as Window into the Mind

2022 CCN Generative Adversarial Collaboration: To what extent does the brain simulate the external world?

2022 CogSci Discussion Group: Neural Network Models of Cognition

2022 CVPR Sketch Deep Learning Workshop

Program and Awards Committees

2025 Symposium Committee, Cognitive Science Society

2020-2024 Program Committee, Cognitive Science Society

2022, 2024, 2025 Program Committee, Cognitive Computational Neuroscience (CCN) Meeting

2021, 2024 Program Committee, Conference on the Theory and Application of Diagrams

2021 Program Committee, ACM Creativity and Cognition

2020 Program Committee, NeurIPS Object Representations for Learning and Reasoning Workshop

2020 Program Committee, ICML Object-Oriented Learning Workshop

2020 Awards Committee, Cognitive Science Society

Editorial Service

Guest Editor, Memory & Cognition

Grant Reviewing

Panelist, NSF Integrative Strategies for Understanding Neural and Cognitive Systems (NCS)
Panelist, NSF Perception, Action & Cognition
Panelist, NSF Cognitive Neuroscience
Panelist, NSF EDU Core Research
Panelist, NSF Computational Cognition (CompCog)

Journal Reviewing

Cognition
Cognitive Research: Principles and Implications
Cognitive Science
Developmental Science
Frontiers in Psychology
Empirical Studies of the Arts
Gastronomica
Journal of Experimental Psychology: General
Journal of Experimental Psychology: Human Perception and Performance
MIT Handbook of Attention
Memory & Cognition
Nature Human Behaviour
Nature Commnuications
npj Science of Learning
Open Mind
PLoS Computational Biology
Proceedings of the National Academy of Sciences
Philosophical Transactions of the Royal Society B
Psychonomic Bulletin & Review
Psychological Review
Psychological Science
Quarterly Journal of Experimental Psychology
Thinking Skills & Creativity
Translational Issues in Psychological Science

Conference Reviewing

ACM Creativity and Cognition
ACM SIGGRAPH
Cognitive Science Society
Cognitive Computational Neuroscience
Conference on the Theory and Application of Diagrams
NeurIPS Datasets & Benchmarks

Affiliations

Cognitive Science Society (2015–), Association for Psychological Science (2014–), American Psychological Association (2011–), Vision Sciences Society (2010–), Society for Neuroscience (2008–), American Association for the Advancement of Science (2008–), Association for Computing Machinery (2019–)