



## Judith Ellen Fan

Assistant Professor of Psychology

### Bio

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#### BIO

I direct the Cognitive Tools Lab (<https://cogtoolslab.github.io/>) at Stanford University. Our lab aims to reverse engineer the human cognitive toolkit — in particular, how people use physical representations of thought to learn, communicate, and solve problems. Towards this end, we use a combination of approaches from cognitive science, computational neuroscience, and artificial intelligence.

#### ACADEMIC APPOINTMENTS

- Assistant Professor, Psychology

#### ADMINISTRATIVE APPOINTMENTS

- Assistant Professor, University of California, San Diego, (2019-2023)

#### HONORS AND AWARDS

- CAREER, National Science Foundation (2021-2026)
- Outstanding Faculty Mentorship Award, UC San Diego Graduate Student Association (2021)
- Robert J. Glushko Prize for Outstanding Doctoral Dissertation, Cognitive Science Society (2017)

#### PROFESSIONAL EDUCATION

- PhD, Princeton University , Psychology (2016)
- AB, Harvard College , Neurobiology & Statistics (2010)

#### LINKS

- Cognitive Tools Lab: <https://cogtoolslab.github.io/>

### Research & Scholarship

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#### RESEARCH INTERESTS

- Assessment, Testing and Measurement
- Brain and Learning Sciences
- Data Sciences
- Higher Education
- Psychology
- Technology and Education

## Teaching

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### COURSES

#### 2023-24

- Bids for Scale in Psychological Science: PSYCH 267A (Win)
- Introduction to Statistical Methods: Precalculus: PSYCH 10, STATS 160, STATS 60 (Aut)

### STANFORD ADVISEES

#### Doctoral (Program)

Sean Anderson

#### Postdoctoral Research Mentor

Erik Brockbank

## Publications

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### PUBLICATIONS

- **Consistency and Variation in Reasoning About Physical Assembly.** *Cognitive science*  
McCarthy, W. P., Kirsh, D., Fan, J. E.  
2023; 47 (12): e13397
- **Creating ad hoc graphical representations of number.** *Cognition*  
Holt, S., Fan, J. E., Barner, D.  
2023; 242: 105665
- **Developmental changes in drawing production under different memory demands in a U.S. and Chinese sample.** *Developmental psychology*  
Long, B., Wang, Y., Christie, S., Frank, M. C., Fan, J. E.  
2023; 59 (10): 1784-1793
- **Drawing as a versatile cognitive tool** *NATURE REVIEWS PSYCHOLOGY*  
Fan, J. E., Bainbridge, W. A., Chamberlain, R., Wammes, J. D.  
2023; 2 (9): 556-568
- **Socially intelligent machines that learn from humans and help humans learn.** *Philosophical transactions. Series A, Mathematical, physical, and engineering sciences*  
Gweon, H., Fan, J., Kim, B.  
2023; 381 (2251): 20220048
- **Visual resemblance and interaction history jointly constrain pictorial meaning.** *Nature communications*  
Hawkins, R. D., Sano, M., Goodman, N. D., Fan, J. E.  
2023; 14 (1): 2199
- **Common Object Representations for Visual Production and Recognition** *COGNITIVE SCIENCE*  
Fan, J. E., Yamins, D. K., Turk-Browne, N. B.  
2018; 42 (8): 2670-2698
- **Improving analytical reasoning and argument understanding: a quasi-experimental field study of argument visualization.** *NPJ science of learning*  
Cullen, S., Fan, J., van der Brugge, E., Elga, A.  
2018; 3: 21