Yuxuan (Effie) Li

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- Ph.D. student with 4 years of research experience in cognitive (neuro)science and deep learning
- Research interests: learning, task decomposition, generalization, emergent behavior/representation

Education

2019 – 2024   **Stanford University, Ph.D. Candidate** in Cognitive Psychology. GPA: 4.0/4.0. Transcript.
  - Weiland Fellow, School of Humanities and Sciences
  - Trainee, Center for Mind, Brain, Computation and Technology

2013 – 2017   **Trinity College, B.S.** in Computer Science and Psychology. GPA: 4.0/4.0. *summa cum laude.*

Research Experience

2019 –   **Stanford University PDP Lab**, Ph.D. student researcher. Advisor: James McClelland.
  - Researching planning and task decomposition in humans and deep learning models.
  - Investigated multi-task learning, systematic generalization, and attention interpretability in transformers trained on structured tasks (paper, code).
  - Designed experiments, collected behavioral data, and built models to characterize the role of context-sensitivity in human goal- and subgoal-directed planning (paper, code).
  - Explored a hippocampus-inspired recurrent memory module (report, code) and transfer effects from transition learning (report, code) for deep reinforcement learning agents.

2017 – 2019   **UPenn Computational Memory Lab**, research specialist. Advisor: Michael Kahana.
  - Developed neural memory classifiers with large-scale EEG time series data and designed a novel sampling approach for model training (paper under review).
  - Analyzed EEG biomarkers of human episodic memory formation and retrieval.

2016 – 2017   **Trinity College Dept. of Psychology**, student researcher. Advisors: M.A. Grubb, E.D. Casserly.
  - Conducted research on human attention, visual search, and sentiment analysis.

2016   **Columbia Business School**, summer research intern. Advisor: Bruce Kogut.
  - Built predictive models of social investors, companies, and investment activities.

Publications

2022   **Li, Y.**, and McClelland, J.L. (2022). Systematic generalization and emergent structures in transformers trained on structured tasks. *NeurIPS 2022 Workshop on All Things Attention.*

under review   **Li, Y.**, Pazdera, J.K., and Kahana, M.J. (2022). EEG decoders track memory dynamics.

2022   **Li, Y.**, and McClelland, J.L. (2022). A weighted constraint satisfaction approach to human goal-directed decision making. *PLOS Computational Biology.*

2022   Kahana, M.J., Lohnas, L.J., Healey, K., . . ., **Li, Y.**, . . ., Weidemann, C.T. (2022). The Penn Electrophysiology of Encoding and Retrieval Study. *PsyArXiv.*

2022   Katerman, B.S., **Li, Y.**, Pazdera, J.K., Keane, C., & Kahana, M.J. (2022). EEG biomarkers of free recall. *NeuroImage.*

2018   Grubb, M.A., **Li, Y.** (2018). Assessing the role of accuracy-based feedback in value-driven attentional capture. *Attention, Perception, & Psychophysics.*

Talks and Presentations

2022   **Li, Y.** (Nov 2022). Systematic generalization and emergent structures in transformers trained on structured tasks. *FriSem seminar, Department of Psychology, Stanford University.*

2022   **Li, Y.** (Apr 2022). A weighted constraint satisfaction approach to human goal-directed decision making. *Cognitive Tools Lab, University of California, San Diego.*

2021   **Li, Y.** (Feb 2021). Model-based reinforcement learning and the reinforcement learning framework for human behavior. *TA Lecture in PSYCH 209, Stanford University.*

2021   **Li, Y.** (Oct 2020 & Oct 2021). Building online psychology experiments with jsPsych: a tutorial. *TA Lecture in PSYCH 251, Stanford University.*

2018   **Li, Y.**, & Kahana, M.J. (2018). Neural dynamics of memory encoding and retrieval. *Talk at the 51st Annual Meeting of the Society of Mathematical Psychology, Madison, WI.*

Honors and Awards

2022 – 2024 Ric Weiland Graduate Fellowship in the Humanities & Sciences. Stanford University.

2013 – 2017 Phi Beta Kappa, Dean's Scholar (top 5%), Faculty Honors, Holland Scholar. Trinity College.

Teaching Experience

2020 –   **Teaching Assistant**, Department of Psychology, Stanford University
- For graduate courses: Neural Network Models of Cognition, Brain Decoding, Experimental Methods, Developmental Psychology

2015 – 2017 **Teaching Assistant**, Department of Computer Science, Trinity College
- For undergraduate courses: Introduction to Computing, Mathematical Foundations of Computing

Service

Reviewer   Cognitive Science Society, 2022 –

Committee   Cognitive Neuroscience Seminar Organizing Committee, Stanford Psychology, 2021 – 2022

Technical Skills

Coursework   Graduate coursework in deep learning, reinforcement learning, deep multi-task and meta-learning, machine learning, computational neuroscience

Programming **Python, R,** some experience with MATLAB, HTML/CSS/JavaScript (jquery, jspsych)

Packages   **Deep learning** (pytorch, pytorch-lightning, einops), **machine learning** (scikit-learn), **data analysis** (scipy, numpy, pandas; tidyr, dplyr, lme4), **data visualization** (matplotlib; ggplot2), **cognitive science and neuroscience** (mne, ptsa; rtdists)

Other   LaTeX, statistics (linear modeling, generalized linear modeling, mixed-effects models), representation analysis, online behavioral platforms (Amazon MTurk, Prolific)