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Xinlei Lin (Daisy)

Ph.D. candidate

personal website
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I am a Ph.D. candidate at New York University. I study how sequences of actions in complex environments are made in AI and in humans. My thesis projects focus on improving deep RL models with cognitive insights, using transformer model to predict human gameplay, improving LLM planning and reasoning, and studying the latent factors and individual differences of complex planning.

EDUCATION

Ph.D. candidate in Computational Neuroscience, *New York University* — Graduating 2025 Dec
B.S/M.S in Biochemistry, *University of California, San Diego* — 2019.3

SKILLS

Language	Python, TensorFlow, PyTorch, Unix, Matlab, Git, R, JavaScript
Tools	Reinforcement learning and planning, Large Language Models, Mathematical modeling, Deep learning framework, Explainable AI, Large-scale high-Dimensional Data Analysis, Human Behavioral Modeling and Simulation

SELECTED RESEARCH EXPERIENCE

Improving LLM planning and reasoning with RL — **2024.9 — Present**
Amazon AGI Autonomy team — *Amazon Science internship*

- Improved LLM planning and reasoning ability with tree-search based self-play methods in cross-domain benchmarks including science/math, games, day-to-day planning, thereby boosting agentic performance.
- Developed a boardGame benchmark for planning evaluation.

Learning how humans play board games with GPT Models (AAAI) — **2023.6 — Present**
Wei Ji Ma lab + Acerbi lab — *Center for Neural Science and department of Computer Science*

- Trained GPT models on 10M+ games to predict characteristics of human gameplay, achieving SOTA performance.

Comparing planning between AI and humans (NeurIPs, CogSci) — **2022.4 — Present**
Wei Ji Ma lab + Brenden Lake Lab — *Center for Data Science and Center for Neural Science, NYU*

- Trained Deep RL models (AlphaZero type agents) to solve planning tasks.
- Improved AlphaZero performance on puzzle solving by leveraging human-inspired features in cognitive models.

Validating Model Metrics with Verbalization — **2023.12 — Present**
Wei Ji Ma lab — *Center for Neural Science*

- Designed "think-out-loud" experiment and used verbalizations to model planning behavior.

Improving the efficiency of an unbiased log-likelihood estimation method (github) — **2021.12 — 2024.2**
Luigi Acerbi lab — *Department of Computer Science, University of Helsinki*

- Developed a dynamic resource-allocation method for unbiased log-likelihood estimation, reducing the variance of estimation

The latent factors of complex planning decisions (github) — **2021.1 — 2023.12**
Wei Ji Ma lab — *Center for Neural Science, NYU, NY*

- Developed a battery of 8 games to run a large-scale behavioral data collection online.
- Used dimensionality reduction techniques to investigate the individual differences and latent factors of complex planning

PUBLICATIONS AND CONFERENCES

X. Lin, B. Lake, W.Ma **Limitations in Planning Ability in AlphaZero** (NeurIPs 2024 Workshop)
X. Lin, W.Ma **The architecture of planning** (In preparation)
V. Yeom-Song, **X. Lin**, I. Kuperwajs, H.Schütt, W.Ma, L.Acerbi, **Learning how Humans Learn to Play Board Games with GPT-4IAR** (AAAI workshop 2024; FCAI AI Day 2023)
X. Lin.*, Z.Zheng.*, J.Topping.*, W.Ma, **Comparing Machine and human learning in a planning task of intermediate complexity** (Proceedings of the Annual Meeting of the Cognitive Science Society, 2022; RLDM, 2022)
Gjoni E.*, Sristi R.D.*, Liu H.*, Dror S., **Lin, X.,** O'Neil, K., Arroyo O., Hong S.W., Blumenstock S., Lim B., Mishne G., and Komiyama T. **Dissection of inter-area interactions of motor circuits** (COSYNE 2023, Simons Collaboration for the Global Brain Annual Meeting)

ACTIVITIES

Teaching Assistant for Brain and Behavior, NYU — 2021.1-2021.5