Xinyi Xu

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RESEARCH INTERESTS

Computational Modeling of Cognition and Behavior *Psychology* *Integrator Models of Decision Making*
Machine Learning *Neuroeconomics* *Reinforcement Learning*

EDUCATION

Wuhan University of Technology Expected June 2022

Bachelor of Electrical Engineering and Automation;

Current GPA：4.011/5.0; **Compulsory courses:** 4.065/5.0 **Ranking:** 14/263

Major Courses:

Advanced Math (with ODE) *Linear Algebra* *Probability Theories* *Signals & Systems*

SKILLS

Languages: English (fluent) and Chinese (native)
Programming: Practical experience for Python, R and MATLAB; Working knowledge for C++ and JavaScript
Typesetting: LATEX
fMRI Data Analysis

- Preprocessing: SPM12; fMRIprep
- Univariate analysis: First level & second level analysis(one sample/two sample/paired t-test);
- Constructed GLMs & Performed parametric modulation
- Coding batch scripts using MATLAB
- MVPA; connectivity analysis

Psychophysics

- PsychoPy & pygame: designed a binary choice task
- basic experimental design skills

RESEARCH EXPERIENCES

CAS Laboratory of Behavioral Science, Institute of Psychology **Beijing, China**

Research assistant supervised by Prof. Haiyan Wu April 2019 – Present

PROJECTS

Neural and computational substrates of the consistency of lying December 2020 – Present

In Progress, *Undergraduate researcher*

This project aims to investigate how people evaluate honesty, money and the consistency of lying by using mouse tracking technique and fRMI. A pilot behavioral experiment was first performed, followed by the formal fMRI experiment.

- Attended weekly lab meetings and worked closely with Prof. Haiyan Wu to design and develop the experiment using **Psychopy** to accommodate current methods of data collection.
- Ran the pilot experiment online through **Pavlovia,** and analyzed complete behavioral data set with **Python**.
- Constructed five different kinds of drift diffusion models (multi-attribute, time-dependent DDM; multi-attribute DDM; time-dependent DDM; simple DDM; stopping-time DDM) to explore the effects and the temporal dynamics of money and consistency in evidence accumulation process while lying with **C++**.
- Estimated the parameters using differential evolution algorithm and maximized the likelihood of the observed data with **R**.
- Coded **shell** scripts and used fMRIprep to preprocess the fMRI data.

Capture concealed memory with aIAT and mouse tracking July 2019 – February 2021
Undergraduate researcher

*This project is supported by **National Natural Science Foundation of China** (U1736125). Based on the autobiographical implicit association test (aIAT), this study assessed the validity and prospect of aIAT integrated mouse tracking (aIAT) in detecting concealed memories. Also, a connectionist model combined with a drift diffusion model (DDM) was posited to explore the dynamics of decision making and simulate the behavioral performance.*

- Attended weekly lab meetings and worked closely with Prof. Haiyan Wu to discuss project paradigms, recent findings and relevant publications.
- Worked with lab students to recruit participants and collected behavioral and mouse tracking data by running the E-prime scripts.
- Compared the reaction time and mouse trajectories of different stimuli types and modalities in congruent and incongruent condition with **Python** and **R**.
- Literature review about models in binary non value-based decision making involving memory retrieving and finally chose the **connectionist model** and **DDM**.
- Constructed the connectionist model to generate firing rates as input of the DDM using **MATLAB** for measuring non-linear bifurcations in the dynamical system toward on response or the other. Temporal discretization with Euler scheme is applied to the system.
- Simulated the reaction time with the model and the IAT-effect can be observed as well as behavioral results.
- Calculated the mouse trajectory angle with firing rates in every time window to determine whether and how concentration were changing over time with **MATLAB**.
- Wrote the paper.

EEG evidence of negativity bias in impression change under social influence April – May 2019
Research assistant

people are more likely to update their next trial ratings when majority's rating is lower than themselves', with higher conformity scores in the second round rating to faces that peer group's rating is lower than when peer group's rating is higher.

- Recruited participants and collected behavioral data by running E-prime scripts.
- Visualized the conformity scores under peers-higher and peers-lower condition with **Matplotlib** and **Seaborn**.
- Performed correlation analysis between theta band power and conformity scores with **Python**.

Collaboration with Hospital July - November 2019
Research assistant

This project is to compare the brain activity of patients who has brain stem damage with normal people when swallowing before and after taking a kind of medicine.

- Preprocessed fMRI data and performed first level analysis for every subject to check if there is any difference between before and after taking the medicine when swallowing by using **SPM12** and coding batch scripts with **MATLAB**.
- Performed second level analysis to compare the difference between the patients and normal people using SPM12 and MATLAB.
- Generated the activation table, visualized the activation areas and completed the reports using **MRIcron** and **bspmview**.

PUBLICATIONS

[1] **Xu, X.**, Liu, X., Hu, X., & Wu, H. (2021, September 18). MT-aIAT: Integrating mouse tracking into memory-detection aIAT. https://doi.org/10.31234/osf.io/ny9xq
[2] Haiyan Wu, Quanying Liu, **Xinyi Xu**, Xun Liu*. Behavioral and EEG evidence of of negativity bias in impression change under social influence (under revision of eNeuro)