Address: Room M210, Lazenby Hall, The Ohio State University
1827 Neil Ave, Columbus, Ohio, US, 43210
Email: zitonglu1996@gmail.com / lu.2637@osu.edu
Personal Homepage: zitonglu1996.github.io
GitHub Website: github.com/ZitongLu1996

Zitong Lu 路子童

(Update by 10/2022)

Education Background

The Ohio State University — Columbus, Ohio, the United State
Ph.D. in Cognitive Neuroscience — Expected 2025
Department of Psychology
Graduate Minor in Statistics — Expected 2023
Department of Statistics
M.S. in Psychology — 2022
Department of Psychology
Advised by Julie D. Golomb
Vision and Cognitive Neuroscience Lab https://u.osu.edu/golomblab/

East China Normal University — Shanghai, China
M.S. in Cognitive Neuroscience — 2021
The Institute of Cognitive Neuroscience, School of Psychology and Cognitive Science
Advised by Yixuan Ku, Yong-di Zhou & Huimin Wang
Memory and Emotion Lab (now in Sun Yat-sen University) https://sysumelab.com

Northeastern University — Shenyang, China
B.E. in Software Engineering — 2018
Department of Software Engineering, Software College

Research Interests

Visual stability, 3D perception, face perception, brain decoding & visual working memory using behavior, EEG, fMRI and computational models (MVPA, RSA & deep learning methods).

Working Experience

08/2022-
OSU EEG lab manager — Dept of Psychology, The Ohio State University, Columbus, OH

09/2020-06/2021
Research Assistant — Brain-Like Memory Group, Peng Cheng Laboratory, Shenzhen, China

05/2017-08/2017
Programmer (as Project Leader) — iSoftStone corporation, Shenyang, China

Research Experience

Independent/leading Projects:

Object-location binding mechanism of the moving object.
Department of Psychology, OSU 08/2022 –

- Explore the behavioral mechanism of moving object-location binding.

Dynamic state and gating object location mapping model for object location representations.
Department of Psychology, OSU 07/2022 –

- Propose a theoretical model to help explain the object-location binding mechanism.

Unfolding the spatiotemporal neural mechanisms of 3D perception in the human brain: an fMRI-EEG fusion study.
Department of Psychology, OSU 06/2022 –

- Explore and understand the depth perception and 3D integration in human brains.

Can landmark induce spatiotopic representation in object recognition?
Department of Psychology, OSU 03/2022 –

- Using the 'spatial congruency bias' paradigm to test the object-location binding under with-landmark and without-landmark conditions.

Dynamic saccade context triggers spatiotopic object-location binding
Department of Psychology, OSU 09/2021 – 03/2022

- Used the modified 'spatial congruency bias' paradigm to test the retinotopic and/or spatiotopic object-location binding in dynamic saccade context versus static context.

A Python EEG Data Analysis Handbook in Chinese

06/2021 – 07/2021

- The first Python EEG data analysis handbook in Chinese, including preprocessing, basic data analysis, statistical analysis, ERP analysis, time-frequency analysis, EEG decoding and representational similarity analysis.
- Website: https://github.com/ZitongLu1996/Python-EEG-Handbook. (130 stars on GitHub!)

Representation Comparisons between Human Brain and Hierarchical Deep Convolutional Neural Network in Face Perception Reveal a Fatigue Mechanism of Repetition Suppression
Institute of Cognitive Neuroscience, ECNU 09/2020 – 05/2021

- Used a hierarchical deep convolutional neural network as a tool to simulate the neural mechanism of facial repetition suppression as fatigue or sharpening of neurons.
- Cross-modalities Representational Similarity Analysis (RSA) was used to reveal a fatigue mechanism of repetition suppression.

Cross-Temporal Representational Similarity Analysis-based E/MEG Decoding on PyCTRSA (integrated into NeuroRA now!)
Institute of Cognitive Neuroscience, ECNU 07/2020 – 09/2020

- Independently designed and realized a cross-temporal E/MEG decoding method based on traditional RSA.
- Independently implemented a Python toolbox for Cross-Temporal RSA (CTRSA)-based decoding, called PyCTRSA.
- Website: https://github.com/ZitongLu1996/PyCTRSA. (16 stars on GitHub!)

Dynamic Object-based Encoding Mechanism in Visual Working Memory by EEG Decoding
Institute of Cognitive Neuroscience, ECNU 03/2019 – 03/2020

- Collected and analyzed EEG data independently from a VWM experiment with three different tasks.
- Applied Linear-SVM to conduct time-by-time and cross-temporal decoding for different visual features based on ERP and Alpha power to assess the representation of different features in VWM.
- Decoded for both the attended feature and the unattended feature based on data from different phase to explore the dynamic mechanism of memory storage.

NeuroRA: A Python Toolbox of Representational Analysis from Multi-modal Neural Data
Institute of Cognitive Neuroscience, ECNU 03/2019 – Present, continuously updated

- Independently designed and implemented a Python toolbox (NeuroRA) for multimode neural data (behavioral, EEG, MEG, fNIRS, fMRI, and some other neuroelectrophysiological data) representational analysis.
- Typical features in NeuroRA: calculating neural pattern similarity, calculating spatiotemporal pattern similarity (STPS), calculating inter-subject correlation (ISC), calculating representational similarity analysis (RSA), classification-based EEG decoding, doing statistical analysis and plotting results.
- Website: https://zitonglu1996.github.io/NeuroRA/. (112 stars on GitHub!)

Joint Projects:

Temporal dynamics of neural signature underlying category-tuned attentional filter disruption
Department of Psychology, OSU 07/2022 –

Participating in designing experiments and analyzing EEG data to explore the temporal neural mechanism of attentional filter disruption.

Gaze-centered Spatial Representation in Hippocampus
Department of Psychology, OSU 09/2021 –

Participating in analyzing fMRI data and applying RSA method to explore the neural mechanism of object location representations in human hippocampus.

Behavioral and neural evidence of musical training improving audiovisual match ability
Institute of Cognitive Neuroscience, ECNU 04/2021 – 06/2021

Participating in analyzing behavioral and EEG data and writing the manuscript.

Transcultural Differences of Theory of Mind among Chinese and Japanese Cultures: A fMRI Study
Institute of Cognitive Neuroscience, ECNU 04/2021 – 06/2021

Participating in analyzing fMRI data and applying RSA and ISC method to explore the different representations of the theory of mind between Chinese and Japanese participants.

Working Memory Mechanism of Methamphetamine Addicts
Institute of Cognitive Neuroscience, ECNU 10/2020 – Present

Participating in analyzing EEG data and comparing the neural activities under different conditions.

Differences in Working Memory Mechanism between Normal and Mild Cognitive Impairment
Tongji Hospital & Institute of Cognitive Neuroscience, ECNU 09/2018 – Present

Participating in classifying the health control and the MCI patients and decoding different tasks based on EEG data.

Reward and Penalty Expectations Facilitate the Precision of Visual Working Memory through Dissociable Neural Mechanisms
Institute of Cognitive Neuroscience, ECNU 04/2019 – 06/2020

Participating in doing Searchlight RSA and ROI-based RSA among behavioral data, different decision-making coding models and fMRI data.

Publications

Lu, Z., & Ku, Y. (2020). NeuroRA: A Python toolbox of representational analysis from multi-modal neural data. ***Frontiers in Neuroinformatic**s*. 14:563669. https://doi.org/10.3389/fninf.2020.563669

Lu. Z., Golomb, J.D. (in preparation). Dynamic saccade context triggers more stable object-location binding.

Shafer-Skelton, A., **Lu, Z**., & Golomb, J.D. (in preparation). Gaze-centered spatial representations in human hippocampus.

Lu, Z., Ku, Y. (in preparation). Facial representation comparisons between human brain and hierarchical deep convolutional neural network reveal a fatigue repetition suppression mechanism.

Zhang, M*., **Lu, Z***., Wang, Z. (preprint). Behavioral and neural evidence of musical learning improving audiovisual matching ability. *PsyArXiv*. https://doi.org/10.31234/osf.io/w74nr

Zhang, M*., **Lu, Z***., Otani, S., & Wang, Z. (in preparation). Transcultural differences in the neural correlates of Theory of Mind between Chinese and Japanese: an fMRI study.

Presentations

11/12/2022 Society of Neuroscience (SFN) 2022
[Poster] Dynamic saccade context triggers more stable object-location binding

08/27/2022 Cognitive Computational Neuroscience (CCN) 2022
[Poster] Gaze-centered spatial representations in human hippocampus

05/17/2022 Vision Sciences Society (VSS) 2022
[Talk] Dynamic saccade context triggers spatiotopic object-location binding

12/06/2021 OSU CCBBI Research Day 2021
[Talk] Gaze-centered spatial representations in human hippocampus

11/11/2021 Society of Neuroscience (SFN) 2021
[Poster] Representation comparisons between human brain and hierarchical deep convolutional neural network in face perception reveal a fatigue mechanism of repetition suppression

08/27/2021 The European Conference on Visual Perception (ECVP) 2021
[Poster] Representation comparisons between human brain and hierarchical deep convolutional neural network in face perception reveal a fatigue mechanism of repetition suppression

06/27/2021 Centre for Cognition and Brain Science, University of Macau
[Talk] Using computational methods to explore the neural representational mechanism in cognitive neuroscience

06/08/2021 UNIQUE Student Symposium 2021
[Talk] Representation comparisons between human brain and hierarchical deep convolutional neural network in face perception reveal a fatigue mechanism of repetition suppression

12/28/2020 Dept of Biomedical Engineering, UESTC
[Talk] Representational Analysis for Cognitive Neuroscience based on NeuroRA

12/17/2020 Dept of Biomedical Engineering, Shenzhen University
[Talk] Representational Analysis for Cognitive Neuroscience based on NeuroRA

Toolboxes & Tutorials

NeuroRA toolbox:
https://zitonglu1996.github.io/NeuroRA/ (112 stars on GitHub!)
Citation: Lu, Z., & Ku, Y. (2020). NeuroRA: A Python toolbox of representational analysis from multi-modal neural data. *Frontiers in Neuroinformatics*. 14:563669. https://doi.org/10.3389/fninf.2020.563669

PyCTRSA toolbox:
https://github.com/ZitongLu1996/PyCTRSA (16 stars on GitHub!)
Citation: Lu, Z. (2020). PyCTRSA: A Python package for cross-temporal representational similarity analysis-based E/MEG decoding. *Zenodo*. https://doi.org/10.5281/zenodo.4273674

Transfer Learning based on PyTorch tutorial in Chinese:
https://github.com/ZitongLu1996/TransferLearning_Pytorch_withChineseAnnotation

Inverted Encoding Model (IEM) based on Python tutorial in Chinese:
https://github.com/ZitongLu1996/Python_IEM_tutorial_Chinese (4 stars on GitHub!)

Python EEG data analysis handbook in Chinese:
https://github.com/ZitongLu1996/Python-EEG-Handbook (130 stars on GitHub!)

Programming & Experiment Skills

Computer Languages: Python, C, C++, MATLAB, Java, Julia
Software & Toolboxes: EEGLAB, MNE, SPM, Nibabel, Nilearn, NeuroRA, Tensorflow, PyTorch
Experimental Experience: EEG, fMRI, Eye tracker and TMS

Ad Hoc Reviewing

Scientific Reports, Advances in Psychological Science

Honors & Awards

04/2022	CCBBI Gibson Research Award (**USD 3,000**, by OSU CCBBI)
08/2021	University Fellowship (**USD 30,000**, by OSU)
04/2021	Outstanding Graduate Student (**3%**, Department of Education of Shanghai City) (上海市优秀毕业生)
12/2019	Short-Term Overseas Research Scholarship (about **USD 7,000**, by ECNU)
12/2018	Third prize (**30%**, China Graduate Student Mathematical Contest in Modeling)
12/2017	Outstanding Graduate Student (**3%**, Department of Education of Liaoning Province) (辽宁省优秀毕业生)
11/2017	Second-Class Merit Scholarship (**13%**, by NEU)
04/2017	Meritorious Winner (**13%,** Mathematical Contest in Modeling, by the U.S COMAP)
12/2016	First-Class Liu Dajie & Fang Wenyu's Scholarship (**<1%**, **USD 1500**, by NEU)
11/2016	Provincial First Prize (**3%**, China Undergraduate Mathematical Contest in Modeling)
11/2016	First-Class Merit Scholarship (**3%**, by NEU)
04/2016	Honorable Mention (**30%**, Mathematical Contest in Modeling, by the U.S COMAP)
11/2015	Second-Class Merit Scholarship (**13%**, by NEU)

References

Julie D. Golomb, Associate Professor golomb.9@osu.edu
Department of Psychology, The Ohio State University

Yixuan Ku, Professor kuyixuan@mail.sysu.edu.cn
Department of Psychology, Sun Yat-sen University

Yong-Di Zhou, Professor ydzhou@psy.ecnu.edu.cn
NYU-ECNU Insititute of Brain and Cognitive Science, NYU-Shanghai
Department of Psychology, Shenzhen University

Hui Chen, Professor chenhui@zju.edu.cn
Department of Psychology and Behavior Science, Zhejiang University

Qing Cai, Professor qcai@psy.ecnu.edu.cn
NYU-ECNU Insititute of Brain and Cognitive Science, NYU-Shanghai
Institute of Cognitive Neuroscience, East China Normal University