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 04/2024)

Education Background

The Ohio State University   Columbus, Ohio, USA
Ph.D. in Cognitive Neuroscience, Dept of Psychology   Expected 2025
Graduate Minor in Statistics, Dept of Statistics   2023
M.S. in Psychology, Dept of Psychology   2022
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, School of Psychology and Cognitive Science   2021
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, Dept of Software Engineering   2018

Research Interests

(1) **Neural and behavioral mechanisms of visual perception**:
   (A) Behavioral mechanisms of object-location binding; (B) Neural mechanisms of depth and 3D perception; (C) Visual and semantic representations in human brains; (D) Neural representations of generally spatial information across eye positions.

(2) **Mapping representations between human brains and artificial neural networks**:
   (A) Brain-like artificial neural networks via neural alignment; (B) Image-to-Brain encoding models; (C) Inter-individual neural converters; (D) Reverse engineering to interpret neural mechanisms.

Using behavior, Eye-tracking, EEG, fMRI and computational methods (MVPA, RSA, IEM), and artificial deep neural networks (CNN, VAE, GAN, CLIP, Diffusion Model).

Publications

(Google Scholar: https://scholar.google.com/citations?hl=en&user=bE5VCKsAAAAJ)
*: (co-)first author; Ψ: corresponding author

Submitted / Under Review:

17. **Lu, Z$^{\Psi}$.**, Wang, Y., & Golomb, J.D. (Under Review in **CCN2024**). ReAlnet: Achieving More Human Brain-Like Vision via Human Neural Representational Alignment.

16. **Lu, Z*Ψ**., & Golomb, J.D. (Under Review in ***CCN2024***). Probing Human Vision via an Image-to-EEG Encoding Model.

15. Ran, M*., **Lu, ZΨ**., & Golomb, J.D. (Submitted). The influence of a moving object's location on object identity judgements. Preprint on ***PsyArXiv***: http://doi.org/10.31234/osf.io/dcrhu

14. **Lu, Z*Ψ**., Wang, Y., & Golomb, J.D. (Submitted). Achieving More Human-Brain Like Vision via Human EEG Representational Alignment. Preprint on ***Arxiv***: https://doi.org/10.48550/arXiv.2401.17231

13. Zhang, M*., **Lu, Z**., Lin, Q., Weng, X., Zhou, Y., Ma, W., Li, X., Otani, SΨ., & Wang, ZΨ. (Submitted). Transcultural differences in neural representations of the Theory of Mind between Chinese and Japanese.

12. Zhang, M*., **Lu, Z***., Su, H., Kwok, S.CΨ., Li, XΨ., & Wang, ZΨ. (Submitted). Musical expertise attenuates cross-modal fast-"same" effect of pitches: an ERP study. Preprint on ***PsyArXiv***: https://doi.org/10.31234/osf.io/w74n

11. **Lu, Z*Ψ**., & Golomb, J.D. (Reviewed Preprint in Progress). Human EEG and artificial neural networks reveal disentangled representations of object real-world size in natural images. ***Elife***. Preprint on ***bioRxiv***: https://doi.org/10.1101/2023.08.19.553999

Published:

10. **Lu, Z*Ψ**., Li, W., Nie, L., & Zhao, K. (in Press). A Best Practices Handbook for EEG Data Analysis with Python. ***Brain-X***. Preprint on *PsyArXiv*: https://doi.org/10.31234/osf.io/dcmke

9. **Lu, Z*Ψ**., & Golomb, J.DΨ. (2024). Dynamic saccade context triggers more stable object-location binding. ***Journal of Experimental Psychology: General***, 153(4), 873-888. (**APA "Editor's Choice" paper!**) https://doi.org/10.1037/xge0001545

8. Clayson, P.E., …, **Lu, Z**., …, Langer. N. (2023 accepted, stage 1 registered replication). Contralateral delay activity as a marker of visual working memory capacity: a multi-site registered replication. ***Cortex***. Preprint on *PsyArXiv*: https://doi.org/ 10.31234/osf.io/shdea

7. **Lu, Z***., & Ku, YΨ. (2023). Bridging the Gap between EEG and DCNNs Reveals a Fatigue Mechanism of Facial Repetition Suppression. ***iScience***. 26(12), 108501. https://doi.org/10.1016/j.isci.2023.108501

6. **Lu, Z*Ψ**. (2023). Visualizing the Mind's Eye: A Future Perspective on Applications of Image Reconstruction from Brain Signals to Psychiatry. ***Psychoradiology***. kkad022. https://doi.org/10.1093/psyrad/kkad022

5. **Lu, Z***., & Golomb, J.D. (2023). Object real-world size representations in human brains and artificial neural networks. ***Proceedings of the Conference on Cognitive Computational Neuroscience (CCN) 2023.*** https://2023.ccneuro.org/proceedings/0000909.pdf

4. **Lu, Z***., & Golomb, J.D. (2023). Generate your neural signals from mine: individual-to-individual EEG converters. ***Proceedings of the 45th Annual Meeting of the Cognitive Science Society (CogSci 2023)***. https://escholarship.org/uc/item/5xn0885t

3. **Lu, Z*.**, Shafer-Skelton, A., & Golomb, J.D. (2022). Gaze-centered spatial representations in human hippocampus. ***Proceedings of the Conference on Cognitive Computational Neuroscience (CCN) 2022***. https://2022.ccneuro.org/proceedings/0000614.pdf

2. **Lu, Z*.**, & Ku, Y[Ψ]. (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

1. **Lu, Z*[Ψ]**. (2020). PyCTRSA: A Python package for cross-temporal representational similarity analysis-based E/MEG decoding. ***Zenodo***. https://doi.org/10.5281/zenodo.4273674

In preparation:

Lu, Z*[Ψ]., & Golomb, J.D. (in preparation). The influence of task-irrelevant landmarks on spatiotopic localization and object-location binding.

Lu, Z*[Ψ]., Wang, Y., & Golomb, J.D. (in preparation). Let artificial vision models learn human neural representations from fMRI in object recognition.

Lu, Z*[Ψ]., & Golomb, J.D. (in preparation). Exploring human vision through Img2EEG: An encoding framework generating high-resolution temporal EEG signals from visual inputs.

Presentations

06/03/2024 — Dept of Psychology, Sun Yat-sen University
[Invited Talk] Bridging the Gap between Neuroscience and AI in Visual Perception
05/31/2024 — Dept of Psychology, Shenzhen University
[Invited Talk] Exploring Human Visual Mechanisms: Integrating Human EEG and Artificial Neural Networks
05/20/2024 — Vision Sciences Society (VSS) 2024
[Talk] Human EEG and artificial neural networks reveal disentangled representations of object real-world size in natural images
05/19/2024 — Vision Sciences Society (VSS) 2024
[Poster] Object size and depth representations in human visual cortex
03/22/2024 — CogNeuro Prosem, OSU
[Talk] Exploring human vision through Img2EEG: An encoding framework generating high-resolution temporal EEG signals from visual inputs
12/07/2023 — OSU CCBBI Research Day 2023
[Talk] Object size and depth representations in human visual cortex
12/07/2023 — OSU CCBBI Research Day 2023
[Poster] Human EEG and artificial neural networks reveal disentangled representations of object real-world size in natural images
10/18/2023 — Dept of Biomedical Engineering, Tsinghua University
[Invited Talk (virtually)] Generate your neural signals from mine: individual-to-individual EEG converters
09/22/2023 — OSU CCBS Retreat 2023
[Poster] Examining Hering's theory for color responses in human V1 and V4
09/22/2023 — OSU CCBS Retreat 2023
[Poster] The influence of a moving object's location on object identity judgments
09/22/2023 — OSU CCBS Retreat 2023
[Poster] The influence of task-irrelevant landmarks on spatiotopic localization and object-location binding
09/14/2023 — Advanced Computational Neuroscience Network (ACNN) 2023
[Poster] Generate your neural signals from mine: individual-to-individual EEG converters
08/26/2023 — Cognitive Computational Neuroscience (CCN) 2023
[Poster] Object real-world size representations in human brains and artificial neural networks
07/2023 — Annual Meeting of the Cognitive Science Society (CogSci) 2023
[Poster (virtually)] Generate your neural signals from mine: individual-to-individual EEG converters

| 07/2023 | Eye Movements Gordon Research Conference 2023 |
[Poster] Dynamic saccade context triggers more stable object-location binding

| 07/2023 | Eye Movements Gordon Research Seminar 2023 |
[Poster] Dynamic saccade context triggers more stable object-location binding

| 05/23/2023 | Vision Sciences Society (VSS) 2023 |
[Poster] A novel framework to study configural and holistic processing

| 05/23/2023 | Vision Sciences Society (VSS) 2023 |
[Poster] Examining Hering's theory for color responses in human V1 and V4

| 05/21/2023 | Vision Sciences Society (VSS) 2023 |
[Poster] The influence of a moving object's location on object identity judgments

| 05/20/2023 | Vision Sciences Society (VSS) 2023 |
[Poster] The influence of task-irrelevant landmarks on spatiotopic localization and object-location binding

| 04/21/2023 | OSU CCBBI Student Workshop |
[Talk] Decode brain representations based on Python

| 03/31/2023 | CogNeuro Prosem, OSU |
[Talk] Generate your neural signals from mine: individual-to-individual EEG converters

| 03/08/2023 | CogPsy Prosem, OSU |
[Talk] Object real-world size representations in human brains and artificial neural networks

| 12/31/2022 | The 2nd Neural Network Interdisciplinary Forum 2022 |
[Talk (virtually)] Facial representation comparisons between human brain and hierarchical deep convolutional neural network reveal a fatigue repetition suppression mechanism

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

| 10/22/2022 | OSU CCBS Retreat 2022 |
[Talk] 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

| 04/15/2022 | CogNeuro Prosem, OSU |
[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 (virtually)] 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 (virtually)] 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 |
[Invited Talk (virtually)] Using computational methods to explore the neural representational mechanism in cognitive neuroscience

| 06/08/2021 | UNIQUE Student Symposium 2021 |
[Talk (virtually)] 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 |
[Invited Talk (virtually)] Representational Analysis for Cognitive Neuroscience based on NeuroRA

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

Toolboxes & Tutorials

NeuroRA toolbox:

https://zitonglu1996.github.io/NeuroRA (150 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

Python EEG data analysis handbook:

> https://github.com/ZitongLu1996/Python-EEG-Handbook (24 stars on GitHub!)
>
> Chinese version:
>
> https://github.com/ZitongLu1996/Python-EEG-Handbook-CN (285 stars on GitHub!)

EEG2EEG:

> https://github.com/ZitongLu1996/EEG2EEG (22 stars on GitHub!)
>
> Citation: Lu, Z., & Golomb, J.D. (2023). Generate your neural signals from mine: individual-to-individual EEG converters. *Proceedings of the 45th Annual Meeting of the Cognitive Science Society (CogSci 2023)*. https://escholarship.org/uc/item/5xn0885t

Programming & Experiment Skills

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

Working Experience

08/2022-
OSU EEG lab manager Dept of Psychology, OSU

01/2024-
EEG Tech Search Committee Dept of Psychology, OSU

08/2023-
CCBBI Technical Committee Center for Cognitive and Behavioral Brain Imaging, OSU

08/2023-12/2023
Teaching Assistant (Co-Instructor) (PSYCH 5621 - Intro to ERP) Dept of Psychology, OSU

08/2023-12/2023
Teaching Assistant (PSYCH 3310 – Sensation and Perception) Dept of Psychology, OSU

08/2022-04/2023
Teaching Assistant (PSYCH 4510 - Cognitive Psychology Lab) Dept of Psychology, OSU

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

05/2017-08/2017
Programmer (as Project Leader) iSoftStone corporation

Mentoring

Mengxin Ran (undergrad student at The Ohio State University)
Wanru Li (undergrad student at East China Normal University; now PhD student at Peking University w/ Pinglei Bao)

Honors & Awards

04/2024   Summer Research Excellence Awards (**USD 6,500**, OSU Dept of Psychology)

04/2022   CCBBI Gibson Research Award (**USD 3,000**, OSU CCBBI)

08/2021   University Fellowship (**USD 30,000**, 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)

Ad Hoc Reviewer

Scientific Reports, Advances in Psychological Science, Conference on Cognitive Computational Neuroscience (CCN) 2022, Annual meeting of the cognitive science society (CogSci) 2023, Conference on Cognitive Computational Neuroscience (CCN) 2023, Cerebral Cortex.

Collaborators

Yile Wang at The University of Texas at Dalla
Fan Cheng at Kyoto University and ATR
David Osher at The Ohio State University
Mingmin Zhang at University of Groningen
Yixuan Ku at Sun Yat-sen University