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GitHub Website: github.com/ZitongLu1996

Zitong Lu 路子童

(Update by 12/2023)

Education Background

The Ohio State University — Columbus, Ohio, USA
Ph.D. in Cognitive Neuroscience — Expected 2025
Department of Psychology

Graduate Minor in Statistics — 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

Research Interests

Main topics:

(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) Representational alignment between human brains and artificial neural networks; (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, pRF), and artificial deep neural networks (CNN, VAE, GAN, CLIP, Diffusion Model).

Working Experience

08/2022-
OSU EEG lab manager 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

Typical Research Projects

Image-driven fMRI diffusion
Department of Psychology, OSU 10/2023 –

Exploring human vision through Img2EEG: An encoding framework generating high-resolution temporal EEG signals from visual inputs
Department of Psychology, OSU 09/2023 –

Mimicking human neural representations to achieve more human brain-like vision models via human EEG alignments
Department of Psychology, OSU 07/2023 –

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

Human EEG and artificial neural networks reveal disentangled representations of object real-world size in natural images
Department of Psychology, OSU 11/2022 – 07/2023

Generate your neural signals from mine: individual-to-individual EEG converters
Department of Psychology, OSU 01/2023 – 02/2023
Website: https://zitonglu1996.github.io/EEG2EEG/ (21 stars on GitHub!)

The influence of a moving object's location on object identity judgements.
Department of Psychology, OSU 08/2022 – 04/2023

The influence of task-irrelevant landmarks on spatiotopic localization and object-location binding.
Department of Psychology, OSU 03/2022 – 01/2023

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

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

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

NeuroRA: A Python Toolbox of Representational Analysis from Multi-modal Neural Data
Institute of Cognitive Neuroscience, ECNU 03/2019 – Present, continuously updated
Website: https://zitonglu1996.github.io/NeuroRA/ (142 stars on GitHub!)

Publications

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

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.

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

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

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

Lu, Z*Ψ., & Golomb, J.DΨ. (In press). Dynamic saccade context triggers more stable object-location binding. ***Journal of Experimental Psychology: General***. Preprint: https://doi.org/10.1101/2023.04.26.538469

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

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

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

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

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

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

Ran. M*., **Lu. Z**Ψ., & Golomb, J.D. (in preparation). The influence of a moving object's location on object identity judgements.

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

Presentations

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] 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] 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

04/21/2021 OSU CCBBI Student Workshop
[Talk] Decode brain representations based on Python

03/31/2021 CogNeuro Prosem, OSU
[Talk] Generate your neural signals from mine: individual-to-individual EEG converters

03/08/2021 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] 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] 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
[Invited Talk] 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/ (142 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 (7 stars on GitHub!)
Chinese version:
https://github.com/ZitongLu1996/Python-EEG-Handbook-CN (225 stars on GitHub!)

EEG2EEG:
https://github.com/ZitongLu1996/EEG2EEG (21 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

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

04/2022 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)

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