Suhee Cho

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Research Interest

- **Building normative models of the brain's learning and memory capabilities,** bridging low-level neural mechanisms with high-level cognitive functions.
- **Identifying biological mechanisms** that give rise to these normative models.

Education

Korea Advanced Institute of Science and Technology (KAIST) Mar, 2019 - Feb, 2024
Bachelor of Science (BSc) in Bio & Brain Engineering Daejeon, S. Korea

- Double Major in Biological Sciences
- GPA: 4.09/4.30 (Top in the department)
- Valedictorian at 2024 Commencement

Skills

Computation ANN Simulations, ML Algorithms, Statistical learning, Information theory
Programming Python, MATLAB, C++, C, R, Javascript, Dart
Experiment Psychophysics, Mouse Behavior, Cell Biology, Biochemistry

Publications

- **Cho, S.**, & McClelland, J. L. (2025). An updated integrative theory of the cognitive map and its neural implementation capturing rapid neural and behavioral adaptation. *bioRxiv*. DOI: 10.64898/2025.12.25.696522
- **Cho, S.**, Lee, H., Baek, S., & Paik, S. B. (2025). Neuromimetic metaplasticity for adaptive continual learning without catastrophic forgetting. *Neural Networks*, 107762. DOI: 10.1016/j.neunet.2025.107762
- Balwani, A., **Cho, S.**, & Choi, H. (2025). Exploring the Architectural Biases of the Cortical Microcircuit. *Neural Computation*, *37*(9), 1551-1599. DOI: 10.1162/neco.a.23

Conference Presentations

- **Cho, S.**, McClelland, J. L., (2025). Behavioral timescale synaptic plasticity, replay, and emergent behavioral choice. *Cognitive Computational Neuroscience*. Amsterdam, Netherlands.
- **Cho, S.**, Lee, H., Baek, S., Paik, S. (2024). Brain-inspired synaptic rule for adaptive continual learning in deep neural networks. *Cognitive Computational Neuroscience*. Boston, U.S.A.
- **Cho, S.**, Baek, S., Paik, S. (2023). Balancing stable and unstable synapses for continual learning in deep neural networks. *Society for Neuroscience*. Washington, D.C., U.S.A.
- **Cho, S.**, Baek, S., Paik, S. (2023). Stable and unstable synapses for continual learning in deep neural networks. *Korean Society for Brain and Neural Sciences*. Busan, S. Korea
- **Cho, S.**, Balwani, A., Choi, H. (2022). Leveraging predictive coding to improve artificial neural network performance. *Collaborative Research in Computational Neuroscience*. Atlanta, U.S.A.

Research Experiences

Cognitive Map Model Development Sep, 2024 - Present
Stanford University, Advisor: Dr. Jay McClelland

- **Proposed a normative model explaining how the brain adaptively encodes spatial information in relation to rewards.**
- Using Hippocampus-inspired ANNs, demonstrated that perceived-salience-weighted successor representation can be encoded in the hippocampus through behavioral time-scale synaptic plasticity, and further be consolidated via hippocampal replay.
- Further showed that the learned model can predict the presence of environmental features, supporting animal's flexible decision-making.

Sequential Working Memory Model Development Jan, 2023 - Aug, 2024
KAIST, Advisor: Dr. Se-Bum Paik

- **Developed a theoretical model that retains sequential visual information in brain-like manners utilizing deep neural networks.**
- Demonstrated that a simple synaptic rule can replicate key benchmark effects of the sequential working memory including primacy effect, recency effect, and Hebb's repetition effect in neural networks.

Exploring the Benefits of Predictive Coding in the Brain Jan, 2022 - Dec, 2022
Georgia Institute of Technology, Advisor: Dr. Hannah Choi

- **Investigated the advantages of predictive coding framework in the brain using recurrent neural network models.**
- Devised a predictive coding-inspired training algorithm and studied its impact by measuring input decodability and dimensionality of the neural representation.
- Demonstrated that the predictive coding improves cortical encoding of noisy stimuli, supporting its intrinsic role in brain function.

AWARDS & SCHOLARSHIPS

Korea Foundation for Advanced Studies Overseas PhD Scholarship 2026-2031

- Stipends of total 65,000 USD will be provided over 5 years.

Talent Award in Korea (대한민국 인재상) Dec, 2024

- Awarded by South Korean prime minister to 50 representative young adults who have overcome significant adversaries and are likely to be a future leader in Korea.

KAIST Pioneer Research Award Jul, 2022

- Awarded to the best undergraduate student with an outstanding research project, providing a stipend to conduct research overseas.

KAIST Alumni Association Scholarship Mar, 2021

- Awarded for high academic achievement and exemplary personal values.
- Stipends were provided for 3 years.

Korean Presidential Science Scholarship - Biology (대통령과학장학금) May, 2019

- Awarded by South Korean president to approximately 20 undergraduate freshmen with high potential in the field of biology.
- Full tuition and additional living expenses were provided for 4 years.

Korea Undergraduate Science & Engineering Scholarship Mar, 2019

- Awarded to undergraduate freshmen who entered KAIST at the top of their class.

OTHER EXPERIENCES

Team Leader of KAIST Leadership Executing Team Sep, 2019 - 2024

- Created and carried out educational programs for young students with under-represented backgrounds to help them develop careers and discover their potential.

Undergraduate Tutor at KAIST Mar, 2019 - Dec, 2021

- General Biology (2020), Calculus II (2020, 2021), Biochemistry I (2021), Korean I (2021)
- Responsibilities include: leading recitation sessions and small group study sessions, and creating problem sets with solutions.

Policy&Welfare Officer at Undergraduate Student Association Mar 2021 - Dec 2021

- Communicated and conveyed the student's needs to the KAIST student affairs team and public officials of the city to lead the actual changes in students' life.

Conference Facilitator at ICISTS-KAIST Mar 2019 - Aug 2019

- Organized the biggest conference for undergraduate students in Asia on the integration of science, art, and social problems.