

# Curriculum Vitae

**Hyeonsu Lee, Ph.D.**

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## EDUCATION

2018.02 ~ 2024.08	<b>Ph.D.</b>	Bio and Brain Engineering (Advisor: <b>Se-Bum Paik</b> )	<b>KAIST</b>	Korea
2016.03 ~ 2018.02	<b>M.S.</b>	Bio and Brain Engineering (Advisor: <b>Se-Bum Paik</b> )	<b>KAIST</b>	Korea
2011.02 ~ 2016.02	<b>B.S.</b>	Mathematical Sciences Business and Technology Management (Minor)	<b>KAIST</b>	Korea

## RESEARCH EXPERIENCE

2024.10 ~ Present	Postdoctoral researcher (Advisor: <b>Jaeson Jang</b> )	<b>KIST</b>	- <b>Multi-agent model simulation</b> of social behavior and trend - <b>Data analysis</b> (human/animal behaviors, mouse proteomics)
2016.03 ~ 2024.08	Graduate researcher	<b>KAIST</b>	- <b>Neural circuit modeling</b> of visual cognitive functions - Interpret behavioral data via <b>reinforcement learning</b> model - <b>Neural data analysis</b> : Spike, LFP, Calcium imaging, etc.
2015.01 ~ 2016.02	Research intern	<b>KAIST</b>	- Modeling visual system-like image compression algorithm
2014.04 ~ 2014.11	Researcher	<b>ybrain</b>	- Design clinical trials (AD and MDD), Neural data analysis, Human psychophysical experiments
2013.07 ~ 2013.08	Research intern	<b>KAIST</b>	- Analyzing functional brain imaging (DWI)

## PUBLICATIONS

### *Neural Network Modeling*

- Lee H\***, Choi W\*, Lee D & Paik SB *Cell Reports* (2023) [\[link\]](#)  
“Comparison of visual quantities in untrained neural networks”
- Lee H**, Choi W, Park Y & Paik SB *Neural Networks* (2020) [\[link\]](#)  
“Distinct role of flexible and stable encodings in sequential working memory”
- Cho S, **Lee H**, Baek S & Paik SB *Neural Networks* (2025) [\[link\]](#)  
“Neuromimetic metaplasticity for adaptive continual learning without catastrophic forgetting”

### *Neural Data Analysis*

- Jeong M\*, **Lee H\***, ..., Paik SB<sup>†</sup>, Lim BK<sup>†</sup> & Kim D<sup>†</sup> *eNeuro* (2021) [\[link\]](#)  
“Interhemispheric cortico-cortical pathway for sequential bimanual movements in mice”
- Bae JW\*, Jeong H\*, ..., **Lee H**, Paik SB & Jung MW *Nature Communications* (2021) [\[link\]](#)  
“Parallel processing of working memory and temporal information by distinct types of cortical projection neurons”
- Song M\*, Kang MS\*, **Lee H**, Jeong Y & Paik SB *Scientific Reports* (2018) [\[link\]](#)  
“Classification of spatiotemporal neural activity patterns in brain imaging data”

## PRE-PRINTS

- Choi W, **Lee H** & Paik SB *bioRxiv* (2020) [\[link\]](#)  
“Slow rhythmic eye motion predicts periodic alternation of bistable perception”

(\*: equal contribution)

## SELECTED CONFERENCE PRESENTATIONS

- 1 *Korean Society for Brain and Neural Sciences (KSBNS)* 2025, **Lee H**, Baek S, Jang J & Paik SB, “Spontaneous social change driven by Stochastic Individual Behavior”
- 2 *Computational and Systems Neuroscience (Cosyne)* 2022, Choi W\*, **Lee H\*** & Paik SB, “Spontaneous emergence of magnitude comparison units in untrained deep neural networks”
- 3 *Society for Neuroscience (SfN)* 2018, **Lee H**, Choi W, Park Y & Paik SB, “Resource overwrite model for sequential working memory in human” (Oral)
- 4 *Korean Society for Brain and Neural Sciences (KSBNS)* 2017, **Lee H**, Choi W & Paik SB, “Working memory pre-allocation improves the performance of sequential memory task” (Best Presentation Award)

## PATENTS

Paik SB, **Lee H**, Park Y, **US Patent**, 16/674919 (2019) “Storage device using neural network and operating method for automatic redistribution of information and variable storage capacity based on accuracy-storage capacity tradeoff thereof”

\* 신경망을 이용한 기억 장치 및 그의 정확성-저장용량 트레이드오프에 기반한 정보의 자동적 재분배 및 가변적 용량 구현을 위한 동작 방법

Paik SB, Cho S, **Lee H**, Baek S, **KR Patent**, 10-2024-0199987 (2024) “Method for addressing catastrophic forgetting in artificial neural networks using neuromimetic metaplasticity rules observed in natural brains”

\* 생물학적 두뇌의 메타가소성 법칙을 적용하여 인공신경망 학습에서 파괴적 망각을 해결하는 방법 및 장치

## AWARDS

Best Presentation Awards, Korean Society for Brain and Neural Sciences (**KSBNS**), 2017

Poster Presentation Awards, Korean Society for Computational Neuroscience (**cbrain**), 2017

Best TA awards, Bio and Brain Engineering, KAIST, 2018

## SKILLS

Neural network modeling & simulation, Mathematical modeling, Neural data analysis,

MATLAB, Python, Psychophysics (Psychtoolbox, PsychoPy), Eye-tracking (EyeLink), Illustrator

## CONFERENCE PRESENTATIONS

### **International**

- 1 *Society for Neuroscience (SfN)* 2023, **Lee H** & Paik SB, “Emergence of aesthetic preferences in untrained deep neural networks”
- 2 *Society for Neuroscience (SfN)* 2023, Kim G, Kang M, **Lee H**, Park Y, Song M & Paik SB, “Random imitation as an efficient survival strategy in multi-agent systems”
- 3 *Korean Society for Brain and Neural Sciences (KSBNS)* 2023, Kang M, Kim G, **Lee H**, Park Y, Song M & Paik SB, “Random imitation as an evolutionary strategy in a multi-agent system”

- 4 *Society for Neuroscience (SfN)* 2022, **Lee H\***, Choi W\*, Lee D & Paik SB,  
“Quantity comparison in untrained deep neural networks”
- 5 *Society for Neuroscience (SfN)* 2022, Kang M, **Lee H**, Park Y, Song M & Paik SB,  
“Random imitation for evolution in multi-agent systems”
- 6 *Annual Computational Neuroscience Meeting (CNS)* 2022, **Lee H\***, Choi W\*, Lee D & Paik SB,  
“Comparison of visual quantities in untrained deep neural networks”
- 7 *Korean Society for Brain and Neural Sciences (KSBNS)* 2022, **Lee H\***, Choi W\*, Lee D & Paik SB,  
“Visual quantity comparison in untrained deep neural networks”
- 8 *Society for Neuroscience (SfN)* 2021, **Lee H\***, Choi W\* & Paik SB,  
“Visual proportion sense in untrained deep neural networks”
- 9 *Korean Society for Brain and Neural Sciences (KSBNS)* 2020, Bae JW, ..., **Lee H**, Paik SB & Jung MW,  
“Distinct types of cortical projection neurons for working memory and timing”
- 10 *Annual Computational Neuroscience Meeting (CNS)* 2020, Choi W, **Lee H** & Paik SB,  
“Rhythmic eye movement predicts active perception of ambiguous visual stimulus”
- 11 *Society for Neuroscience (SfN)* 2019, Jeong M, **Lee H**, ..., Lim BK, Paik SB & Kim D,  
“Neuronal ensemble encoding bimanual motor coordination in mice”
- 12 *Annual Computational Neuroscience Meeting (CNS)* 2018, **Lee H**, Choi W, Park Y & Paik SB,  
“A dynamic resource model for sequential working memory”
- 13 *Society for Neuroscience (SfN)* 2017, **Lee H\***, Park Y\* & Paik SB,  
“Pre-allocation of memory resources improves working memory performance in a sequential memory task”
- 14 *Annual Computational Neuroscience Meeting (CNS)* 2017, **Lee H**, Choi W & Paik SB,  
“Pre-allocation of working memory modulates memory performance”
- 15 *Society for Neuroscience (SfN)* 2016, Choi W, **Lee H** & Paik SB,  
“Local disinhibition modulates brain functions by mediating global network state”
- 16 *Society for Neuroscience (SfN)* 2016, Song M\*, Kang M\*, **Lee H**, Lee H, Jeong Y† & Paik SB†,  
“Spatio-Temporal Classification of Neural Activity Patterns in Dynamic Brain Imaging Data”
- 17 *Annual Computational Neuroscience Meeting (CNS)* 2016, Song M, **Lee H** & Paik SB,  
“Quantitative Classification of Neural Network Activity Patterns in Imaging Data”

## Domestic

- 1 *Korean Society for Computational Neuroscience Meeting (cbrain)* 2025, **Lee H**, Baek S, Jang J & Paik SB,  
“Emergent Cycles in Social Behavior from Stochastic Individuals”
- 2 *Korean Society for Cognitive Science Meeting (KSCS)* 2018, **Lee H**, Choi W, Park Y & Paik SB,  
“Sequential overwrite model can explain the serial-position effects in working memory”
- 3 *Korean Physical Society Meeting (KPS)* 2018, **Lee H**, Choi W, Park Y & Paik SB,  
“A theory of resource allocation for sequential memory in human”
- 4 *Annual Korean Society for Computational Neuroscience Meeting (cbrain)* 2017, **Lee H**, Choi W & Paik SB,  
“Working memory resource allocation improves the sequential memory performance”
- 5 *Korean Physical Society Meeting (KPS)* 2017, **Lee H**, Choi W & Paik SB, “A comparative study on simultaneous versus sequential presentation of stimuli for working memory performance”

- 6 *Korean Physical Society Meeting (KPS)* 2016, Song M, **Lee H** & Paik SB,  
“Computational Classification of Neural Network Activity Patterns for Imaging Data”
- 7 *Korean Society for Computational Neuroscience Meeting (cbrain)* 2015, **Lee H\***, Song M\* & Paik SB,  
“Classification of the Neural Activity Patterns by Spatio-Temporal Correlation Index”
- 8 *Korean Physical Society Meeting (KPS)* 2015, **Lee H**, Jang J & Paik SB,  
“A Biologically Inspired Adaptive Model for Efficient Image Compression”