

Curriculum Vitae

Hyeonsu Lee, Ph.D.

hyeonsu.lee@kist.re.kr / hyeonsu.lee.93@gmail.com

EDUCATION

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

RESEARCH EXPERIENCE

2024.10 ~ Present	Postdoctoral researcher	KIST	- Modeling and analyzing cognitive and social behaviors
2016.03 ~ 2024.08	Graduate researcher	KAIST	- Modeling neural circuits for visual cognitive functions: (<i>Quantity comparison, visual working memory, etc.</i>) - Analyzing neural data: Spike, LFP, Calcium imaging, etc.
2015.01 ~ 2016.02	Research intern	KAIST	- Modeling visual system-like image compression algorithm
2014.04 ~ 2014.11	Researcher	ybrain	- Design clinical trials (AD and MDD), Neural data analysis, Human psychophysical experiments
2013.07 ~ 2013.08	Research intern	KAIST	- 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”

Neural Data Analysis

Jeong M*, **Lee H***, ..., Paik SB[†], Lim BK[†] & Kim D[†] *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

Cho S, **Lee H**, Baek S & Paik SB *arXiv* (2024) [\[link\]](#)
“Neuromimetic metaplasticity for adaptive continual learning”

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

(*: equal contribution)

CONFERENCE PRESENTATIONS

Selected

- 1 *Computational and Systems Neuroscience (Cosyne)* 2022, Choi W*, **Lee H*** & Paik SB,
“Spontaneous emergence of magnitude comparison units in untrained deep neural networks”
- 2 *Society for Neuroscience (SfN)* 2018, **Lee H**, Choi W, Park Y & Paik SB,
“Resource overwrite model for sequential working memory in human” (Oral)
- 3 *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)

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 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”
- 2 *Korean Physical Society Meeting (KPS)* 2018, **Lee H**, Choi W, Park Y & Paik SB,
“A theory of resource allocation for sequential memory in human”
- 3 *Annual Korean Society for Computational Neuroscience Meeting (cbrain)* 2017, **Lee H**, Choi W & Paik SB,
“Working memory resource allocation improves the sequential memory performance”
- 4 *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”
- 5 *Korean Physical Society Meeting (KPS)* 2016, Song M, **Lee H** & Paik SB,
“Computational Classification of Neural Network Activity Patterns for Imaging Data”
- 6 *Annual 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”
- 7 *Korean Physical Society Meeting (KPS)* 2015, **Lee H**, Jang J & Paik SB,
“A Biologically Inspired Adaptive Model for Efficient Image Compression”

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”

AWARDS

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

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

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

SKILLS

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