SungJun Cho

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Education

The University of Chicago 2016-2020
B.A. in Philosophy
B.S. in Neuroscience
GPA: 3.77/4.00

Thesis: Theoretical modeling of neuronal networks: Paroxysmal depolarization and ictal wave propagations in focal epileptic seizures
Advisor: Wim van Drongelen

Research Interests

Computational cognitive neuroscience, learning and representation, abstract cognition, neuropsychiatry, signal processing, machine learning

Employments

AutoML Team | Lunit Inc. Seoul, South Korea
ML/DL Research Intern, PI: HyunJae Lee Oct 2021 - Present

- Conducting researches focused on neural architecture search, augmentation search, and hyper-parameter optimization for medical image segmentation problems
- Building a large-scale AutoML system in a cloud environment

Jee Lab | Korea Institute of Science and Technology Seoul, South Korea
Postgraduate Research Intern, PI: Jee Hyun Choi Jul 2020 - Sep 2021

- Evaluated efficiency of the burst detection algorithms for identifying precise temporal link between neural activities and behaviors
- Studied behavioral correlates of neural oscillations in mouse basolateral amygdala and prefrontal cortex, concentrating on the relationship between open-field behaviors and physiological characteristics of oscillatory bursts

Research Experiences

van Drongelen Epilepsy Lab | The University of Chicago Chicago, IL
Undergraduate Research Assistant, PI: Wim van Drongelen Oct 2018 - Jun 2020

- Theoretically modelled ictal machinery of the focal epileptic seizure to examine the mechanism of the paroxysmal depolarization shift in parvalbumin inhibitory interneurons
- Modified and developed a UI package for simultaneous analyses of mouse respiration data and neural signals (measured from medullary neurons)

Brain Dynamics Lab | The University of Chicago Chicago, IL
Undergraduate Research Assistant, PI: Stephanie Cacioppo Nov 2018 - Jun 2020

- Led acquisition, preprocessing, and analysis of ERP data of the control subjects and hypoactive sexual desire disorder (HSDD) patients to investigate the Flibanserin-induced changes in brain activities
- Identified menopause-dependent neural activation differences in HSDD patients by analyzing spatiotemporal dynamics of the electrophysiological data

Clinical Cognitive Neuroscience Center | Seoul National University Seoul, South Korea
Undergraduate Visiting Scholar, PI: Jun Soo Kwon Jul 2018 - Sep 2018

- Studied the functional and structural connectivity of the hippocampal-medial prefrontal circuitry based on the open-source fMRI and DTI data of the patients with schizophrenia

Impression Formation Social Neuroscience Lab | The University of Chicago Chicago, IL
Undergraduate Research Assistant, PI: Jasmin Cloutier and Jennifer Kubota Nov 2016 - Jul 2017

- Managed human behavioral experiments to investigate how people internally perceive and evaluate the social status of others based on personal prejudices
- Analyzed behavioral data on how external motivation to respond without prejudice alters the neural processing of attention and decision making in response to the individuals' perceived race and status

Cognitive Neurology and Dementia Lab | Samsung Medical Center Seoul, South Korea
Clinical Intern & Research Assistant, PI: DukRyul Na Jul 2015 - Aug 2015

- Assisted experiments to study the effect of intra-arterial administration of mesenchymal stem cells on transgenic mice with Alzheimer's disease

Publications

[1] Tryba AK, Merricks E, Lee S, Pham T, **Cho SJ**, Nordli Jr. DR, Eissa TL, Goodman R, McKhann G, Emerson R, Schevon C, & van Drongelen W. (2019). The role of paroxysmal depolarization in focal seizure activity. *Journal of Neurophysiology*, 122(5): 1861-1873.

[2] Cho SJ, Choi JH. Comparison of algorithmic accuracy in detecting beta/gamma oscillatory bursts for precise temporal linking between brain activities and behaviors. **In preparation.**

Posters & Conferences

[1] **Cho SJ** & Choi JH. (2021). Transient beta and gamma bursts in simulations and the mouse basolateral amygdala during the open field test. *Society for Neuroscience 2021.*

[2] **Cho SJ** & Choi JH. (2021). Comparison of burst detection algorithms for characterizing transient neural oscillatory events. *Korean Society for Brain and Neural Sciences 2021.*

[3] **Cho SJ**, Siewsrichol W, & Cacioppo S. (2020). Neural Differences in Hypoactive Sexual Desire Disorder: An ERP Microstate Study. *Cognitive Neuroscience Society 2020.*

[4] van Drongelen W, Tryba AK, Pham T, Merricks E, Bhansali A, Pesce L, **Cho SJ**, Lee S, Eissa TL, Nordli Jr. DR, & Schevon CA. (2019). Dynamics sustaining focal seizures: a dual function of inhibition and interactions across scales. *Society for Neuroscience 2019.*

Honors & Awards

Dean's Fund for Undergraduate Research - Conference 2020
Micro-Metcalf Internship Award 2020
Liew Family College Research Fellowship 2019
Jeff Metcalf Internship Award 2018-19
Dean's List (3x times) 2016-19

Teaching Experiences

VCA Course Assistant, MATH 15200 Calculus II Fall '19
Teaching Assistant (Lecture & Lab), BIOS 10130 Core Biology (Nervous System) Spring '18

Other Academic Experiences

Deep Learning Summer School, Neuromatch Academy 2021

- Used a DQN algorithm developed by Deepmind and trained it on a LunarLander environment imported from OpenAI Gym to test the effect of hyperparameter tuning and reward shaping

Phonology Laboratory, Department of Linguistics, The University of Chicago 2020

- Designed and implemented an online experiment to study the relationship between pitch and voice onset time (VOT) under the context of human speech perception

Directed Reading Program, Department of Mathematics, The University of Chicago 2019

- Studied persistent homology and its application to the field of neuroscience and computer science under the context of algebraic topology

Physician Shadowing Program, The University of Chicago Medicine 2018-19

- Shadowed Prof. Helene Rubeiz at the Department of Neurology and Prof. Nishant Agrawal at the Department of Surgery to observe various neuromuscular diseases and otolaryngology surgeries
- Visited operating room under the guidance of Prof. Ross Milner (1/23/19): Endovascular Abdominal Aneurysm Repair (EVAR) of renal arteries

Skills

Programming Languages: MATLAB, Python, R, Julia, HTML, CSS, JavaScript, SQLite
Research Platform: Qualtrics, Amazon MTurk, GitHub, Docker, Google Cloud Platform
Research Software: ImageJ, FSL (FreeSurfer, MRtrix3), NetStation, Brainstrom
Natural Languages: Korean, English, Chinese (Mandarin)
Certifications: Introduction to Logic (Coursera), Bayesian Statistics: From Concepts to Data Analysis (Coursera)

References

Wim van Drongelen, Ph.D.
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Research Profile

Stephanie Cacioppo, Ph.D.
Assistant Professor
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Lab Website

Jee Hyun Choi, Ph.D.
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Lab Website