TAEKJUN KIM, Ph.D.

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Acting Assistant Professor
Department of Biological Structure, Washington National Primate Research Center, University of Washington
• Address: Box 357420, HSB G520, 1959 NE Pacific Street, Seattle, WA 98195
• Email: taekjunkim1223@gmail.com • Phone: +1-510-847-8202
• Homepage: https://taekjunkim.github.io

Summary of qualifications

• Ph.D. in Vision Science (Neuroscience field)
• 10+ years research experience applying statistical and machine learning methods to analyze neural and behavioral data
• Demonstrated productivity in research, with 13 peer-reviewed, including 9 as the first author publications
• Skilled in various methodologies, including electrophysiology, computational modeling, optical imaging, human psychophysics
• Proficiency in programming languages - Python, Matlab, SQL
• Strong understanding of the anatomy and physiology of the visual system
• Experienced in mentoring and supervising undergraduate and graduate students in both laboratory and classroom settings

Machine Learning and Statistical Analyses

Techniques

• Hypothesis testing • Regression • Classification • Clustering • Dimensionality reduction • Deep Learning
• Ensemble Methods • Cross-validation • Time series analysis • Bayesian inference

Tools and Libraries

• Numpy • Scipy • Matplotlib • Pandas • Scikit-learn • PyTorch • PsychoPy • Psychophysics Toolbox

Programming languages

• Python • Matlab • SQL

Education

Ph.D. in Vision Science, University of California, Berkeley, CA — Aug 2010 – Dec 2014
Thesis: Relative functions of feedforward, feedback, and horizontal connections in the central visual pathway
Mentor: Prof. Ralph D. Freeman

M.A. in Biological Psychology, Seoul National University, Korea — Mar 2006 – Aug 2008
Thesis: Response selectivity of V1 neurons for spatiotemporal sequence of stimulus orientation
Mentor: Prof. Choongkil Lee

B.A. in Psychology, Seoul National University, Korea — Mar 2000 – Feb 2006
Thesis: Variable repulsion of spatial memory from the fixation locus
Mentor: Prof. Choongkil Lee

Research Experience

Washington National Primate Research Center, University of Washington — **Seattle, WA**
Supervisors: Prof. Anitha Pasupathy and Prof. Wyeth Bair

Acting Assistant Processor **|** Jan 2023 - Present

• Studying how prefrontal cortex modulates feature selectivity in visual cortex through inhibitory feedback
• Conducting multi-photon imaging and high-density electrophysiology experiments in anesthetized macaque visual cortex to characterize functional architecture
• Investigating the neural mechanisms of visual crowding in the behaving non-human primate
• Training graduate students and post-docs on experimental design, data analysis, and programming (Matlab, Python)

Acting Instructor **|** Oct 2019 – Jan 2023

• Investigated neural mechanisms underlying visual crowding effects using electrophysiology, psychophysics and convolutional neural networks (published in *J. Neurosci., 2024*)
• Mentored graduate students and research assistants on experimental design, data analysis (object segmentation, global motion processing), and programming (Matlab, Python)
• Studied visual texture processing in the visual cortex using electrophysiology and machine learning, finding that distinct texture sensations are associated with different temporal dynamics (published in *J. Neurosci., 2022*)
• Wrote two review papers on the topic of visual information processing in the ventral visual pathway (published in *Annu. Rev. Vis. Sci., 2020; Curr. Opin. Neurobiol., 2019*)

Senior Fellow | Oct 2015 – Sep 2019

• Devised metrics to quantify the perceptual qualities of natural texture images

- Studied how object shape and texture properties are jointly processed in the visual cortex using electrophysiology / computational modeling, finding that there are separate specializations in mid-level cortical processing for visual attributes of shape and texture (published in *J. Neurosci., 2019*)
- Advised and collaborated on a research project investigating neural correlates of global motion processing in the non-human primate visual cortex (published in *Curr. Biol., 2023*)

University of California, Berkeley **Berkeley, CA**
Supervisor: Prof. Ralph D. Freeman

Assistance Specialist | Jan 2015 – Sep 2015

- Designed a human psychophysics experiment to demonstrate that binocular integration can occur during substantial differences in left and right eye signal strength. Wrote Matlab / Python code for visual stimulus generation, data acquisition, and analysis (published in *Eur. J. Neurosci., 2017*)

Graduate Student Researcher | Aug 2010 – Dec 2014

- Analyzed a database of cortical neurons to determine the degree of non-linearity of direction selectivity for cells within different laminae of the visual cortex (published in *Eur. J. Neurosci., 2016*)
- Investigated the effects of non-invasive transcranial magnetic stimulation (TMS) on functional tuning properties of visual cortical neurons (published in *Brain Stimul., 2015*)
- Conducted neurophysiological experiments to reveal segregated activity of feedforward, feedback, and horizontal pathways in visual cortex (published in *Neuroscience, 2014*)
- Led lab and discussion sessions for optometry students in *Geometrical Optics* class

Seoul National University **Seoul, Korea**
Supervisor: Prof. Choongkil Lee

Research Associate | Sep 2008 – Jun 2010

- Studied the spatiotemporal selectivity of V1 response using Gabor stimuli that were sequentially presented with a variable stimulus onset asynchrony. Wrote Matlab code for visual stimulus generation, data acquisition, and analysis (published in *PLoS One, 2012; PLoS One, 2015*)

Graduate Student Researcher | Mar 2006 – Aug 2008

- Conducted a human psychophysics study to examine the spatial localization error in visual short-term memory task (published in *KCBPA, 2014*)
- Led lab and discussion sessions for psychology students in *Neuroscience* and *Biopsychology* classes

Publications

Kim, T., & Pasupathy, A. (2024). Neural correlates of crowding in macaque area V4. *Journal of Neuroscience, 44(24), e2260232024*.

Bigelow, A. W.*, **Kim, T.***, Namima, T., Bair, W., & Pasupathy, A. (2023). Dissociation in neuronal encoding of object versus surface motion in the primate brain. *Current Biology, 33(4), 711-719.* (*contributed equally)

Kim, T., Bair, W., & Pasupathy, A. (2022). Perceptual Texture Dimensions Modulate Neuronal Response Dynamics in Visual Cortical Area V4. *Journal of Neuroscience, 42(4), 631-642.*

Pasupathy, A., Popovkina, D. V., & **Kim, T.** (2020). Visual functions of primate area V4. *Annual review of vision science, 6, 363-385.*

Pasupathy, A., **Kim, T.**, & Popovkina, D. V. (2019). Object shape and surface properties are jointly encoded in mid-level ventral visual cortex. *Current opinion in neurobiology, 58, 199-208.*

Kim, T., Bair, W., & Pasupathy, A. (2019). Neural coding for shape and texture in macaque area V4. *Journal of Neuroscience, 39(24), 4760-4774.*

Kim, T., & Freeman, R. D. (2017). Binocular function during unequal monocular input. *European Journal of Neuroscience, 45(4), 601-609.*

Kim, T., & Freeman, R. D. (2016). Direction selectivity of neurons in the visual cortex is non-linear and lamina-dependent. *European Journal of Neuroscience, 43(10), 1389-1399.*

Kim, K., **Kim, T.**, Yoon, T., & Lee, C. (2015). Covariation between spike and LFP modulations revealed with focal and asynchronous stimulation of receptive field surround in monkey primary visual cortex. *PloS one, 10(12), e0144929.*

Kim, T., Allen, E. A., Pasley, B. N., & Freeman, R. D. (2015). Transcranial magnetic stimulation changes response selectivity of neurons in the visual cortex. *Brain stimulation, 8(3), 613-623.*

Kim, E. Y., **Kim, T.**, & Lee, C. (2014). Repulsive bias in egocentric localization. *The Korean Journal of Cognitive and Biological Psychology, 26(4), 295-316.*

Kim, T., & Freeman, R. D. (2014). Selective stimulation of neurons in visual cortex enables segregation of slow and fast connections. *Neuroscience, 274, 170-186.*

Kim, T., Kim, H. R., Kim, K., & Lee, C. (2012). Modulation of V1 spike response by temporal interval of spatiotemporal stimulus sequence. *PloS one, 7(10), e47543*.

Selected Conference Presentations

Chen, H., **Kim, T.**, Beaufrand, S., Pasupathy, A. Dissecting Pulvinar's electrophysiological properties using alert fixating macaque, *Society for Neuroscience 2024*

Kamath, R., **Kim, T.**, Pasupathy, A. Stimulus selective prospective signals modulate responses of macaque area V4 neurons, *Society for Neuroscience 2024*

Hatanaka, G., Chatterjee, S., Takasaki, K., Dylla, C. J. M., Warren, N., **Kim, T.**, Pasupathy, A., Waters, J., Reid, R. C., Bair, W. Acute and chronic windows for macaque multi-photon Ca^{2+} imaging in areas V1, V2 and V4 of the visual cortex, *Society for Neuroscience 2024*

Kim, T., Fyall, A., Beaufrand, S., Pasupathy, A. Investigating the neural mechanisms of visual crowding in the behaving non-human primate, *European Conference on Visual Perception 2024*

Kim, T., Kempkes, E., Beaufrand, S., Pasupathy, A. Prefrontal cortex modulates V4 shape selectivity through inhibitory feedback, *Society for Neuroscience 2023*

Kamath, R. S., Kerr, K., **Kim, T.**, Namima, T., Hatanaka, G., Bair, W., Pasupathy, A. High density recordings in macaque V2 reveal large clusters for shape and texture encoding, *Society for Neuroscience 2023*

Hatanaka, G., Chatterjee, S., Takasaki, K., **Kim, T.**, Dylla, C. J. M., Balaram, P., Pasupathy, A., Waters, J., Reid, R. C., Bair, W. Characterizing neurons in anesthetized macaque V1 with multi-photon imaging via a chronically implanted window, *Society for Neuroscience 2023*

Kim, T., Pasupathy, A. The effects of visual crowding on shape processing in the macaque area V4, *Neural Computation and Engineering Connection 2023*

Takasaki, K., Chatterjee, S., Dylla, C. J. M., **Kim, T.**, Maclennan, B., Balaram, P., Pasupathy, A., Reid, R. C., Waters, J., Bair, W. Multi-photon imaging in the visual cortex of the anesthetized macaque, *Society for Neuroscience 2022*

Kim, T., Pasupathy, A. The effects of visual crowding on shape processing in the macaque area V4, *Society for Neuroscience 2022*

Kim, T., Pasupathy, A. The effects of visual crowding on shape processing in the macaque area V4, *Collaborative Research in Computational Neuroscience PI Meeting 2022*

Bigelow, A. W., Namima, T., **Kim, T.**, Bair, W., Pasupathy, A. Dissociation in neuronal encoding of object versus surface motion in the primate brain, *Collaborative Research in Computational Neuroscience PI Meeting 2022*

Kim, T., Pasupathy, A. Neural correlates of visual crowding in macaque area V4, *Vision Sciences Society 2022*

Bigelow, A. W., Namima, T., **Kim, T.**, Bair, W., Pasupathy, A. A single neuron correlate for long-range motion in ventral visual area V4, *Society for Neuroscience Global Connectome 2021*

Bigelow, A. W., **Kim, T.**, Bair, W., Pasupathy, A. Long-range apparent motion tuning in ventral visual area V4, *Society for Neuroscience 2019*

Kim, T., Bair, W., Pasupathy, A. Response dynamics in primate V4 are modulated by perceptual dimensions of visual textures, *Society for Neuroscience 2019*

Kim, T., Bair, W., Pasupathy, A. Neural representation of perceptual texture dimensions in macaque area V4, *Computational Neuroscience Meeting 2018*

Kim, T., Bair, W., Pasupathy, A. Neural responses to shape and texture stimuli in macaque area V4, *Vision Sciences Society 2017*

Kim, T., Freeman R. D. Transcranial magnetic stimulation (TMS) changes response selectivity of neurons in visual cortex, *Society for Neuroscience 2013*

Kim, T., Freeman R. D. Activation of classical and surround regions of cortical receptive fields enables selective study of neural connections, *Society for Neuroscience 2011*

Kim, K., **Kim, T.**, Lee, C. Stimulus-dependency of local field potential in surround interaction of primate V1, *Society for Neuroscience 2010*

Teaching Experiences

Graduate Student Instructor for **"Geometrical Optics"**	University of California, Berkeley, CA.	Fall 2010 – 2011
Teaching Assistant for **"Neuroscience"**	Seoul National University, Korea	Fall 2006 – 2009
Teaching Assistant for **"Biopsychology"**	Seoul National University, Korea	Spring 2007 – 2009

Extra-Curricular Activities

Military Service in Korea Army	Dec 2001 – Feb 2004

References

Available upon request