

Acting Assistant Professor

Department of Biological Structure, Washington National Primate Research Center, University of Washington

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Summary of qualifications

- Highly motivated and talented neuroscientist with 10+ years research experience
- Strong understanding of the anatomy and physiology of the visual system
- Skilled in a variety of techniques, including electrophysiological recordings, computational modeling, and human psychophysics
- Proven ability to design and conduct experiments, analyze data, and present findings in scientific journals and conferences
- Experienced in mentoring and supervising undergraduate and graduate students in both laboratory and classroom settings

Machine learning and statistical analyses

- Hypothesis testing
- Regression
- Classification
- Clustering
- Dimensionality reduction
- Cross-validation
- 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 experiments in anesthetized macaque V1 to characterize functional architecture
- 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
- 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 first-year 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

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- 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.

Conference Presentations

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- 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

Kim, K., **Kim, T.**, Lee, C. Temporal interval selectivity of the primate V1 neurons: summation of surround interaction revealed by single cell activity and local field potential, *Society for Neuroscience* 2009

Kim, T., Lee, C. Spatial and temporal effects of response modulation of the primate V1 neurons for sequential stimuli, *Society for Neuroscience* 2008

Kim, T., Kim, H. R., Lee, C. Response selectivity of V1 neurons for spatiotemporal sequence of stimulus orientation, *Society for Neuroscience* 2007

Kim, T., Kim, E. Y., Lee, C. Variable foveal bias of spatial memory, *Asian Conference of Vision* 2006

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
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References available upon request