TAEKJUN KIM, Ph.D.

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Acting Assistant Professor
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Professional Summary

- **Ph.D. in Vision Science (Neuroscience field)** with 15+ years of research experience
- Expertise in **statistical and machine learning methods** for analyzing neural and behavioral data
- Demonstrated **productivity in research**, with 13 peer-reviewed publications, including 9 as the first author
- Skilled in **electrophysiology, computational modeling, optical imaging, human psychophysics**
- Proficient in **Python, MATLAB, SQL** for data analysis and modeling
- Strong understanding of the **anatomy and physiology of the visual system**
- Experienced in **mentoring and supervising undergraduate and graduate students** in laboratory and classroom settings

Key Skills

- Neural Data Processing: spike trains, local field potentials (LFP), and time-series neural signals
- Imaging & Eye-Tracking Data Analysis
- Experimental Design & Behavioral Paradigm Development
- Development of dynamic and interactive visual stimuli for psychophysical and neurophysiological experiments
- Application of statistical modeling, machine learning algorithms for brain signal interpretation, neuronal decoding
- Programming – Proficient in Python, MATLAB, SQL, and scientific computing libraries

Education

Ph.D. in Vision Science, University of California, Berkeley, CA — Aug 2010 – Dec 2014

M.A. in Biological Psychology, Seoul National University, Korea — Mar 2006 – Aug 2008

B.A. in Psychology, Seoul National University, Korea — Mar 2000 – Feb 2006

Research Experience

Washington National Primate Research Center, University of Washington — Seattle, WA

Supervisors: Prof. Anitha Pasupathy and Prof. Wyeth Bair

Acting Assistant Professor | Jan 2023 - Present

- Investigating how the prefrontal cortex modulates feature selectivity in the 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 and artificial neural networks
- Designed and implemented data processing pipelines for high-density electrophysiology recording systems
- Mentoring graduate students and post-docs in experimental design, data analysis, and programming (MATLAB, Python)

Acting Instructor | Oct 2019 – Jan 2023

- Revealed novel neural correlates of visual crowding, demonstrating that this perceptual phenomenon is not simply a consequence of pooled encoding but involves a competitive mechanism influenced by the relative salience of the target and its surrounding stimuli (published in *J. Neurosci., 2024*)
- Authored two review papers on the joint encoding of object shape and surface properties in the ventral visual pathway, and on the current understanding of primate area V4 function (published in *Curr. Opin. Neurobiol., 2019; Annu. Rev. Vis. Sci., 2020*)
- Upgraded the lab's experimental control software from Python 2 to Python 3, enhancing performance and ensuring compatibility with current scientific libraries

Senior Fellow | Oct 2015 – Sep 2019

- Devised novel metrics to quantify the perceptual qualities of natural textures, revealed that neurons are tuned for these metrics with distinct temporal dynamics (published in *J. Neurosci., 2022*)
- Demonstrated that neurons in mid-level visual cortex exhibit separable but joint tuning for object shape and texture, suggesting a mechanisms for integrating these attributes during object processing (published in *J. Neurosci., 2019*)
- Revealed distinct neural representations for object and surface motion in the primate visual cortex using electrophysiological recordings and computational analysis (published in *Curr. Biol., 2023*)

University of California, Berkeley — Berkeley, CA

Supervisor: Prof. Ralph D. Freeman

Assistance Specialist | Jan 2015 – Sep 2015

- Designed and conducted human psychophysics experiments to demonstrate that binocular integration in the visual cortex is relatively coarse and can occur even under substantial interocular contrast differences (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