

# Curriculum Vitae

Eizaburo Doi

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## *Personal Information*

Name Eizaburo Doi  
Date of birth September 30, 1973  
Nationality Japan / Permanent resident of the United States

## *Education/Training*

March 1996: B. S. in Biology, Faculty of Science, Kyoto University, Japan.  
March 1999: M. A. in Psychology, Graduate School of Letters, Kyoto University, Japan.  
March 2003: Ph. D. in Informatics, Graduate School of Informatics, Kyoto University, Japan.  
Advisors: Prof. Toshio Inui, Prof. Te-Won Lee.  
February 2001 – March 2003: Visiting Scholar,  
Institute for Neural Computation, University of California, San Diego.  
Advisors: Prof. Te-Won Lee, Prof. Terrence J. Sejnowski.  
April 2003 – May 2007: Postdoctoral Research Associate,  
Center for the Neural Basis of Cognition, Carnegie Mellon University.  
Advisor: Prof. Michael S. Lewicki.  
June 2007 – Present: Postdoctoral Research Associate,  
Center for Neural Science, New York University.  
Advisors: Prof. Eero Simoncelli, Prof. Liam Paninski

## *Honors*

Research fellowship for young scientists (no. 200103140; April 2001–March 2003), Japan Society for the Promotion of Science.

### ***Peer-reviewed primary publications***

1. Doi, E., Inui, T., Lee, T.-W., Wachtler, T., and Sejnowski, T.J. (2003). Spatiochromatic receptive field properties derived from information-theoretic analyses of cone mosaic responses to natural scenes. *Neural Computation* 15, 397-417.
2. Doi, E., and Lewicki, M.S. (2005). Sparse coding of natural images using an overcomplete set of limited capacity units. In *Advances in Neural Information Processing Systems*, pp. 377-384.
3. Doi, E., Balcan, D.C., and Lewicki, M.S. (2006). A theoretical analysis of robust coding over noisy overcomplete channels. In *Advances in Neural Information Processing Systems*, pp. 307-314.
4. Doi, E., Balcan, D.C., and Lewicki, M.S. (2007). Robust coding over noisy overcomplete channels. *IEEE Transactions on Image Processing* 16, 442-452.
5. Doi, E., and Lewicki, M.S. (2007). A theory of retinal population coding. In *Advances in Neural Information Processing Systems*, pp. 353-360.
6. Wachtler, T., Doi, E., Lee, T.-W., and Sejnowski, T.J. (2007). Cone selectivity derived from the responses of the retinal cone mosaic to natural scenes. *Journal of Vision* 7, 1-14.
7. Doi, E., and Lewicki, M.S. Characterization of minimum error linear coding with sensory and neural noise. *Neural Computation*, To appear.
8. Doi, E., Gauthier, J.L., Field, G.D., Shlens, J., Sher, A., Greschner, M., Machado, T.A., Jepson, L.H., Mathieson, K., Gunning, D.E., Litke, A. M., Paninski, L., Chichilnisky, E. J., and Simoncelli, E. P. Efficient coding and redundancy in a complete retinal population. *Neuron*, Under review.

### ***Other Publications (selected)***

- 1 SFN abstract Doi, E., Inui, T., Lee, T.-W., Wachtler, T., and Sejnowski, T.J. (2001). Spatial and chromatic filters derived from an information-theoretic analysis of natural scenes. In *Society for Neuroscience Abstracts (San Diego, U.S.A.)*.
- 2 Invited review Doi, E., and Lewicki, M.S. Relations between the statistical regularities of natural images and the response properties of the early visual system. *Japanese Cognitive Science Society, SIG Pattern Recognition and Perception Models*, pp.1-8.
- 3 COSYNE abstract Doi, E., and Lewicki, M.S. (2006). Population coding of natural images with sensory and channel noise. In *Computational and Systems Neuroscience (Salt Lake City, UT)*.
- 4 SFN abstract Doi, E., Balcan, D.C., and Lewicki, M.S. (2006). Optimal filters under biological constraints predict population coding of retinal ganglion cells. In *Society for Neuroscience Abstracts (Georgia, U.S.A.)*.

- 5 COSYNE abstract Doi, E., Paninski, L., and Simoncelli, E.P. (2008). Maximizing sensory information with neural populations of arbitrary size. In Computational and Systems Neuroscience (Salt Lake City, Utah).
- 6 SFN abstract Doi, E., Gauthier, J., Field, G.D., Sher, A., Shlens, J., Greschner, M., Mathieson, K., Gunning, D., Litke, A.M., Paninski, L., *et al.* (2008). Efficient coding is consistent with the irregular shapes of retinal ganglion cell receptive fields. In Annual Meeting, Neurosciences (Washington, DC).
- 7 COSYNE abstract Doi, E., Field, G.D., Gauthier, J.L., Sher, A., Greschner, M., Shlens, J., Machado, T.A., Paninski, L., Gunning, D.E., Mathieson, K., *et al.* (2010). Testing efficient coding: Projective (not receptive) fields are the key theoretical prediction. In Computational and Systems Neuroscience (Salt Lake City, Utah).
- 8 COSYNE abstract Doi, E., Paninski, L., and Simoncelli, E.P. (2010). Diversity of efficient coding solutions for a population of noisy linear neurons. In Computational and Systems Neuroscience (Salt Lake City, Utah).
- 9 Book chapter Doi, E. (2011). Sensation of brightness and color. In Knowledge Base (in Japanese). The Institute of Electronics, Information and Communication Engineers (IEICE).
- 10 COSYNE abstract Doi, E., Gauthier, J.L., Field, G.D., Shlens, J., Sher, A., Greschner, M., Machado, T.A., Mathieson, K., Gunning, D.E., Litke, A.M., Paninski, L., Chichilnisky, E.J., and Simoncelli, E.P. (2011). Redundant representations in macaque retinal populations are consistent with efficient coding. In Computational and Systems Neuroscience (Salt Lake City, Utah).

***Presentations (selected)***

- 1 Invited talk Doi, E., and Lewicki, M.S. Robust coding over noisy channels with sparse overcomplete representation. *NIPS Workshop: In Overcomplete Representations*. British Columbia, Canada. December 2004.
- 2 Talk Doi, E. Retinal information processing. *NIPS Workshop: Decoding the neural code*, British Columbia, Canada. December 2006.
- 3 Talk Doi, E. Mutual information or mean squared error? *NIPS Workshop: Decoding the neural code*. British Columbia, Canada. December 2006.
- 4 Invited talk Doi, E. Testing efficient coding for a complete and inhomogeneous neural population. *Redwood Center for Theoretical Neuroscience, UC Berkeley*. Berkeley, CA, U.S.A. November, 2010.
- 5 Invited talk Doi, E. Testing efficient coding in a complete and inhomogeneous retinal ganglion cell population. *Symposium on Retinal coding in light of clinical applications. Max-Planck Institute for Biological Cybernetics*. Tübingen, Germany. July, 2011.