

Curriculum Vitae
Taro Toyoizumi, Ph.D.

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Address: 2-1 Hirosawa, Wako, Saitama 351-0198, Japan.

Phone: +81-48-467-9644

Fax: +81-48-467-9670

Email: taro.toyoizumi@brain.riken.jp

Citizenship: Japanese



Education

- B.S. Department of Physics, Tokyo Institute of Technology, Japan, March 2001. (Supervisor: Prof. Hidetoshi Nishimori).
- M.S. Department of Complexity Science and Engineering, The University of Tokyo, Japan, March 2003. (Supervisor: Prof. Kazuyuki Aihara).
- Ph.D. Department of Complexity Science and Engineering, The University of Tokyo, Japan, March 2006. (Supervisor: Prof. Kazuyuki Aihara).

Academic positions

- Visiting JSPS student (DC1) at Wulfram Gerstner Lab, EPFL, Switzerland, from December 2003 to November 2004.
- JSPS Postdoctoral Research Fellow at Shun-ichi Amari Lab, RIKEN Brain Science Institute, Japan, from April 2006 to August 2006.
- JSPS Postdoctoral Research Fellow (from September 2006 to February 2008) and The Patterson Trust Postdoctoral Fellow (from March 2008 to February 2010) at Kenneth D. Miller Lab and L. F. Abbott Lab, Columbia University, USA.
- Special Postdoctoral Researcher at Shun-ichi Amari Lab, RIKEN Brain Science Institute, Japan, from April 2010 to March 2011.
- Adjunct Lecturer, Department of Computational Intelligence and Systems Science, Tokyo Institute of Technology, Japan, from April 2013 to March 2016.
- Laboratory Head, Brain Science Institute (RIKEN, Japan) from April 2011 to present.

Honors

- The International Neural Network Society, Young Investigator Award, 2008.
- The Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology, The Young Scientists' Prize 2016

Professional activities

- *Scientific Reports*, Editorial Board 2016-
- *BMC Neuroscience*, Editorial Board 2015-
- *Neural Networks*, Editorial Board 2012-
- *Network: Computation in Neural Systems*, Editorial Board 2012-
- *Frontiers in Computational Neuroscience*, Review Editor 2009-
- *Organization for Computational Neuroscience*, Program Committee 2014-2016
- *HFSP Fellowship*, Review Committee 2016

Publications

1. T. Isomura and T. Toyoizumi, *Scientific Reports* 6, 28073 (2016). "A local learning rule for independent component analysis"
2. H. Huang and T. Toyoizumi, *Physical Review E* 93, 062416 (2016). "Clustering of neural code words revealed by a first-order phase transition"
3. S. Tajima, T. Yanagawa, N. Fujii, and T. Toyoizumi, *PLOS Computational Biology* 11, e1004537 (2015). "Untangling brain-wide dynamics in consciousness by cross-embedding"
4. H. Huang and T. Toyoizumi, *Physical Review E* 91, 050101 (2015). "Advanced mean field theory of restricted Boltzmann machine"
5. H. Shimazaki, K. Sadeghi, T. Ishikawa, Y. Ikegaya, and T. Toyoizumi, *Scientific Reports* 5, 9821 (2015). "Simultaneous silence organizes structured higher-order interactions in neural populations."

6. T. Toyozumi and H. Huang, *Physical Review E* 91, 032802 (2015). "Structure of attractors in randomly connected networks"
7. T. Toyozumi, M. Kaneko, M. P. Stryker, and K. D. Miller, *Neuron* 84, 497-510 (2014). "Modeling the dynamic interaction of Hebbian and homeostatic plasticity"
8. T. Toyozumi, H. Miyamoto, Y. Yazaki-Sugiyama, N. Atapour, T. K. Hensch, and K. D. Miller, *Neuron* 80, 51-63 (2013). "A theory of the transition to critical period plasticity: inhibition selectively suppresses spontaneous activity"
9. M. Lankarany, W. P. Zhu, M. N. S. Swamy, T. Toyozumi, *Frontiers in Computational Neuroscience* 7:109 (2013). "Inferring trial-to-trial excitatory and inhibitory synaptic inputs from membrane potential using Gaussian Mixture Kalman Filtering"
10. S. Amari, H. Ando, T. Toyozumi, and N. Masuda, *Physical Review E* 87, 022814 (2013). "State concentration exponent as a measure of quickness in Kauffman-type networks"
11. T. Toyozumi, *Neural Computation* 24, 2678-2699 (2012). "Nearly extensive sequential memory lifetime achieved by coupled nonlinear neurons"
12. T. Toyozumi and L. F. Abbott, *Physical Review E* 84, 051908 (2011). "Beyond the edge of chaos: Amplification and temporal integration by recurrent networks in the chaotic regime"
13. J. Gjorgjieva, T. Toyozumi and S. J. Egle, *PLoS Computational Biology* 5, e1000618 (2009). "Burst-time-dependent plasticity robustly guides ON/OFF segregation in the lateral geniculate nucleus"
14. T. Toyozumi and K. D. Miller, *Journal of Neuroscience* 29, 6514-6525 (2009). "Equalization of ocular dominance columns induced by an activity-dependent learning rule and the maturation of inhibition"
15. T. Toyozumi, K. Rahnema Rad and L. Paninski, *Neural Computation* 21, 1203-1243 (2009). "Mean-field approximations for coupled populations of generalized linear model spiking neurons with Markov refractoriness"
16. Y. Sato, T. Toyozumi and K. Aihara, *Neural Computation* 19, 3335-3355 (2007). "Bayesian inference explains perception of unity and ventriloquism aftereffect: identification of common sources of audiovisual stimuli."

17. D. Sussillo, T. Toyozumi and W. Maass, *Journal of Neurophysiology* 97, 4079-4095 (2007). "Self-tuning of neural circuits through short-term synaptic plasticity"
18. T. Toyozumi, J.-P. Pfister, K. Aihara and W. Gerstner, *Neural Computation* 19, 639-671 (2007). "Optimality Model of Unsupervised Spike-Timing-Dependent Plasticity: Synaptic Memory and Weight Distribution"
19. T. Toyozumi, K. Aihara and S. Amari, *Physical Review Letters* 97, 098102 (2006). "Fisher Information for Spike-Based Population Decoding"
20. T. Toyozumi and K. Aihara, *Journal of the Society of Instrument and Control Engineers* 45, 741-747 (2006). "A Synaptic Plasticity Rule Derived Based on the Information Maximization Principle and Firing Rate Control" (A review in Japanese)
21. J.-P. Pfister, T. Toyozumi, D. Barber and W. Gerstner, *Neural Computation* 18, 1318-1348 (2006). "Optimal Spike-Timing Dependent Plasticity for Precise Action Potential Firing"
22. T. Toyozumi and K. Aihara, *International Journal of Bifurcation and Chaos* 16, 129-136 (2006). "Generalization of the mean-field method for power-law distributions"
23. T. Toyozumi, J.-P. Pfister, K. Aihara and W. Gerstner, *Proc. Natl. Acad. Sci. USA* 102, 5239-5244 (2005). "Generalized Bienenstock-Cooper-Munro rule for spiking neurons that maximizes information transmission"
24. T. Toyozumi, J.-P. Pfister, K. Aihara and W. Gerstner, *Advances in Neural Information Processing Systems* 17, 1409-1416 (2005). "Spike-timing dependent Plasticity and mutual information maximization for a spiking neuron model"
25. T. Toyozumi and K. Aihara, *Transactions of the Institute of Electronics* 86-D2, 959-965 (2003). "Mean-field and Variational Methods for alpha-families"
26. T. Sasamoto, T. Toyozumi and H. Nishimori, *Journal of Physics A* 34, 9555-9567 (2001). "Statistical mechanics of an NP-complete problem : Subset sum"