CURRICULUM VITAE

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EDUCATION

Degree	*Institute*	*Year*
Ph.D.	Department of Multidisciplinary Studies, University of Tokyo	1997
M. S.	Department of Multidisciplinary Studies, University of Tokyo	1992
B. A.	Department of Natural and Artificial Systems, University of Tokyo	1990

RESEARCH EXPERIENCE

Position	*Institute*	*Period*
Team Leader	RIKEN Brain Science Institute *Laboratory for Integrated Theoretical Neuroscience*	01/2006 — present
Staff Scientist	RIKEN Brain Science Institute *Laboratory for Mathematical Neuroscience*	04/2005 — 12/2005
Research Scientist	RIKEN Brain Science Institute *Laboratory for Mathematical Neuroscience*	04/2000 — 03/2005
Special Postdoctoral Researcher	RIKEN Brain Science Institute *Laboratory for Information Synthesis*	04/1997 — 03/2000
Visiting Graduate	University of California, San Diego *Department of Cognitive Science*	12/1993 — 04/1996

TEACHING EXPERIENCE (Selected)

Position	*Institute*	*Period*
Adjunct Professor	Tokyo Institute of Technology *Interdisciplinary Graduate School of Science and Engineering, Department of Computational Intelligence and Systems Science*	10/2007 — 03/2012
Visiting Associate Professor	Japan Advanced Institute of Science and Technology *Department of Knowledge System Science, School of Knowledge Science*	10/2000 — 03/2003
Visiting Lecturer	Meiji University *Graduate School of Science and Technology*	04/1998 — 03/2001
Teaching Assistant	University of Tokyo *Department of Natural and Artificial Systems*	09/1992 — 09/1993

AWARDS and FELLOWSHIPS (Selected)

Award/Fellowship	*Organization*	*Year/Period*
Young Investigator Award	Japan Neuroscience Society	2004
Special Postdoctoral Fellowship	RIKEN	1997-2000
JSPS Research Fellowship	Japan Society for the Promotion of Science for Young Scientists	1996-1997
Rotary International Ambassadorial Scholarship	Rotary One Foundation	1994-1995
Study-Abroad Fellowship	University of Tokyo	1993-1994

SERVICES (Selected)

External	*Year/Period*
Symposium Organizer ("Functional architecture of collective neural activities and their networks: new advances in experimental and theoretical approaches") in Japanese Neuroscience Society Meeting	2012
Fellowship Review Committee Member for Human Frontier Science Program	2011-2012
Symposium Organizer ("New perspectives on value-based decision making") in Japanese Neuroscience Society Meeting	2010
Referee member for Graint-in-Aid for Scientific Research on Innovative Areas (Research in a proposed research project)	2009
Planning Group Member (Medical/Neuroscience section), the 3rd Japanese-French Frontiers of Science Symposium	2009
Co-organizer for International Workshop "Open Problems in Neuroscience of Decision Making", OIST, Okinawa	2008
Editor for *Neural Networks*	2003-2005, 2008-present
Editor for *Biological Cybernetics*	2007-present
Editor for *Computational Intelligence and Neuroscience*	2006-present
Committee member for Neurocomputing Technical Group, Information and Systems Society, The Institute of Electronics, Information and Communication Engineers	2002-2008
Assistant Secretary for Neurocomputing Technical Group, Information and Systems Society, The Institute of Electronics, Information and Communication Engineers	2000-2002
Internal (in RIKEN Brain Science Institute)	
Retreat Organizing Committee	2001, 2010, 2011
International Summer School Organizing Committee	2000

JOURNAL PUBLICATIONS

Nakahara H, Hikosaka O. (2012) Learning to represent reward structure: A key to adapting to complex environments. ***Neuroscience Research***. 74(3-4): 177-183.

Nakamura K, Santos GS, Matsuzaki R, **Nakahara H**. (2012) Differential reward coding in the subdivisions of the primate caudate during an oculomotor task. ***Journal of Neuroscience***. 32(45): 15963-15982.

Suzuki S, Harasawa H, Ueno K, Gardner JL, Ichinohe N, Haruno M, Cheng K, **Nakahara H**. (2012) Learning to simulate others' decisions. ***Neuron***. 74: 1125-1137.

Santos GS, Nagasaka Y, Fujii N, **Nakahara H**. (2012) Encoding of social state information by neuronal activities in the macaque caudate nucleus. ***Social Neuroscience***. 7(1): 42-58.

Yu S, Yang H, **Nakahara H**, Santos GS, Nikolić D, Plenz D. (2011) Higher-order interactions characterized in cortical activity. ***The Journal of Neuroscience***. 31(48): 17514-17526.

Nakahara H, Kaveri S. (2010) Internal-time temporal difference model for neural value-based decision making. ***Neural Computation***. 22(12): 3062-3106.

Bromberg-Martin ES, Matsumoto M, **Nakahara H**, Hikosaka O. (2010) Multiple timescales of memory in lateral habenula and dopamine neurons. ***Neuron***. 67(3): 499-510.

Santos GS, Gireesh ED, Plenz D, **Nakahara H**. (2010) Hierarchical interaction structre of neural activities in cortical slice cultures. ***The Journal of Neuroscience***. 30(26): 8720-8733.

Bissmark F, **Nakahara H**, Doya K, Hikosaka O. (2008) Combining modalities with different latencies for optimal motor control. ***Journal of Cognitive Neuroscience***. 20(11): 1966-1979.

Plessy C, Fagiolini M, Wagatsuma A, Harasawa N, Kuji T, Asaka-Obam A, Kanzaki Y, Fujishima S, Waki K, **Nakahara H**, Hensch TK, Carninci P. (2008) A resource for transcriptomic analysis in the mouse brain. ***PLoS ONE***. 3(8): e3012.

Takenaka K, Nagasaka Y, Hihara S, **Nakahara H**, Iriki A, Kuniyoshi Y, Fujii N. (2007) Linear discrimination analysis of monkey behavior in an alternative free choice task. ***Journal of Robotics and Mechatronics***. 19(4): 416-422.

Nakahara H, Nakamura K, Hikosaka O. (2006) Extended LATER model can account for trial-by-trial variability of both pre- and post-processes. ***Neural Networks***. 19(8): 1027-1046.

Nakahara H, Morita K, Wurtz RH, Optican LM. (2006) Saccade-related spread of activity across superior colliculus may arise from asymmetry of internal connections. ***Journal of Neurophysiology***. 96(2): 765-774.

Amari S, **Nakahara H**. (2006) Correlation and independence in the neural code. ***Neural Computation***. 18(6): 1259-1267.

Hikosaka O, Nakamura K, **Nakahara H**, (2006) Basal ganglia orient eyes to reward, ***Journal of Neurophysiology***. 95(2): 567-584.

Nakahara H, Amari S, Richmond BJ. (2006) A comparison of descriptive models of a single spike train by information-geometric measure. ***Neural Computation***. 18(3): 545-568.

Nelson B, Nishimura S, Kanuka H, KuranagaE, Inoue M, Hori G, **Nakahara H**, Miura M. (2005) Isolation of gene sets affected specifically by polyglutamine expression: Implication of the TOR signaling pathway in neurodegeneraton, ***Cell Death and Differentiation***. 12(8): 1115-1123.

Amari S, **Nakahara H**. (2005) Difficulty of singularity in population coding, ***Neural Computation***. 17(4): 839-858.

Inoue M, Nishimura S, Hori G, **Nakahara H**, Saito M, Yoshihara Y, Amari S. (2004) Improved parameter estimation for variance-stabilizing transformation of gene-expression microarray data, ***Journal of Bioinformatics and Computational Biology***. 2(4): 669-679.

Wu S, Amari S, **Nakahara H**. (2004) Information processing in a neuron ensemble with the multiplicative correlation structure. ***Neural Networks***. 17(2): 205-214.

Nakahara H, Itoh H, Kawagoe R, Takikawa Y, Hikosaka O. (2004) Dopamine neurons can represent context-dependent prediction error. ***Neuron***. 41(2): 269-280.

Kasai H, Matsuzaki M, Noguchi J, Yasumatsu N, **Nakahara H**. (2003) Structure-stability-function relationships of dendritic spines. ***Trends in Neurosciences***. 26(7): 360-368.

Nakahara H, Nishimura S, Inoue M, Hori G, Amari S. (2003) Gene interaction in DNA microarray data is decomposed by information geometric measure. ***Bioinformatics***. 19(9): 1124-1131.

Itoh H, **Nakahara H**, Hikosaka O, Kawagoe R, Takikawa Y, Aihara K. (2003) Correlation of primate caudate neural activity and saccade parameters in reward-oriented behavior. ***Journal of Neurophysiology***. 89(4): 1774-1783.

Amari S, **Nakahara H**, Wu S, Sakai Y. (2003) Synchronous firing and higher-order interactions in neuron pool. ***Neural Computation***. 15(1): 127-142.

Nakahara H, Amari S. (2002) Information geometric measure for neural spikes. ***Neural Computation***. 14(10): 2269-2316.

Wu S, Amari S, **Nakahara H**. (2002a) Asymptotic behaviors of population codes. ***Neurocomputing***. 44-46: 697-702.

Wu S, Amari S, **Nakahara H**. (2002b) Population coding and decoding in a neural field: A computational study. ***Neural Computation***. 14(5): 999-1026.

Takikawa Y, Kawagoe R, Ito H, **Nakahara H**, Hikosaka O. (2002) Modulation of saccadic eye movements by predicted reward outcome. ***Experimental Brain Research***. 142(2): 284-291.

Nakahara H, Amari S, Hikosaka O. (2002) Self-organization in the basal ganglia with modulation of reinforcement signals. ***Neural Computation***. 14(4): 819-844.

Nakahara H, Amari S. (2002) Attention modulation of neural tuning through peak and base rate in correlated firing. ***Neural Networks***. 15(1): 41-55.

Hikosaka O, Nakamura K, Sakai K, **Nakahara H**. (2002) Central mechanisms of motor skill learning. ***Current Opinion in Neurobiology***. 12(2): 217-222.

Nakahara H, Wu S, Amari S. (2001) Attention modulation of neural tuning through peak and base rate. ***Neural Computation***. 13(9): 2031-2047.

Wu S, **Nakahara H**, Amari S. (2001) Population coding with correlation and an unfaithful model. ***Neural Computation***. 13(4): 775-797.

Nakahara H, Doya K, Hikosaka O. (2001) Parallel cortico-basal ganglia mechanisms for acquisition and execution of visuomotor sequences: A computational approach. ***Journal of Cognitive Neuroscience***. 13(5): 626-647.

Hikosaka O, **Nakahara H**, Rand MK, Sakai K, Lu X, Nakamura K, Miyachi S, Doya K. (1999) Parallel neural networks for learning sequential procedures. ***Trends in Neuroscience***. 22(10): 464-471.

Nakahara H, Doya K. (1998) Near-saddle-node bifurcation behavior as dynamics in working memory for goal-directed behavior. ***Neural Computation***. 10(1): 113-132.

BOOK CHAPTERS

Bissmarck F, **Nakahara H**, Doya K, Hikosaka O. (2005) Responding to modalities with different latencies. ***Advances in Neural Information Processing***. 17: 169-176. Cambridge, MA: MIT Press.

Saido T, **Nakahara H**. (2003) Proteolytic degradation of Aβ by neprilysin and other peptidases. In T Saido (Ed.), ***Aβ Metabolism and Alzheimer's Disease***. 61-80. Georgetown, TX: Landes Bioscience.

Nakahara H, Amari S. (2002) Information-geometric decomposition in spike analysis. In TG Dietterich, S Becker, Z Ghahramani (Eds.), ***Advances in Neural Information Processing Systems***. 14: 253-260. Cambridge, MA: MIT Press.

Wu S, **Nakahara H**, Murata N, Amari S. (2000) Population decoding based on an unfaithful model. In SA Solla, TK Leen, and K Mueller (Eds.), ***Advances in Neural Information Processing Systems***. 12: 192-198. Cambridge, MA: MIT Press.

Hikosaka O, Sakai K, **Nakahara H**, Lu X, Miyachi K, Nakamura K, Rand MK. (2000) Neural mechanisms for learning of sequential procedures. In MS Gazzaniga (Ed.), ***The New Cognitive Neurosciences***. 553-572. Cambridge, UK: MIT Press.

Ikeda S, Amari S, **Nakahara H**. (1999) Convergence of the wake-sleep algorithm. In MS Kearns, SA Solla, DA Cohn (Eds.), ***Advances in Neural Information Processing Systems***. 11: 239-245. Cambridge, MA: MIT Press.

Nakahara H, Doya, K. (1996) Dynamics of attention as near saddle-node bifurcation behavior. In DS Touretzky, MC Mozer, ME Hasselmo (Eds.), ***Advances in Neural Information Processing Systems***. 8: 38-44. Cambridge, MA: MIT Press.

[*The followings are in Japanese, including articles for general public.*]

Nakahara H. (2011) Love as neural computation: from a perspective of value-based decision making. ***Science Journal KAGAKU.*** 81(1): 58-63. Tokyo, Japan: Iwanami Shoten.

Nakahara H. (2010) Computations and mathematics on neural networks. ***Brain science essentials: for biological understandidng of mental disease — Lumiere for clinitians on mental disease as medical specialist vol 16***. 303-304. Tokyo, Japan: Nakayama Shoten.

Nakahara H. (2009) Population coding. ***Encyclopedia of modern mathematical sciences (2nd Edition)***. 313-315. Tokyo, Japan: Maruzen Publishing.

Nakahara H. (2009) Decision making and its learning theory (Chapter 5). ***Computational theories of brain (Brain Science series vol 1)***. 159-221. Tokyo, Japan: University of Tokyo Press.

Nakahara H. (2008) Computational models of the basal ganglia: reinforcement learning for reward prediction and acquisition. ***Japanese Journal of Molecular Psychiatry***. 8(4): 307-313. Tokyo, Japan: Sentan Igaku-sya.

Nakahara H. (2007) Pleasure creates brain (Chapter 11). ***Frontiers of neuroscience research (vol 2)***. 233-297. Tokyo, Japan: Kodansya.

Nakahara H. (2006) Inferring brain network and gene network. ***Brain 21***. 9(3): 11-20. Kyoto, Japan: Kinpodo.

Nakahara H. (2005) Function of neuron and neural network. ***Encyclopedia of Artificial Intelligence***. 153-155. Tokyo, Japan: Kyoritsu Shuppan.

Nakahara H. (2005) Development and neural plasticity. ***Encyclopedia of Artificial Intelligence***. 153-155. Tokyo, Japan: Kyoritsu Shuppan.

Nakahara H. (2005) Computational models of the basal ganglia (Chapter 11). ***Computational mechanisms of the brain***. 140-161. Tokyo, Japan: Asakura Publishing.

Nakahara H. (2005) Dopamine activity for appetitive system, as reinforcement learning singals. ***Seitai no Kagaku***. 56(1): 17-25. Tokyo, Japan: IGAKU-SHOIN Ltd.

Nakahara H. (2005) Population coding, spike analysis and information geometry. ***Mathematical Sciences***. 3(501): 32-38. Tokyo, Japan: Saiensu-sya.

Nakahara H, Hori G, Inoue M, & Nishimura S. (2002) Mathematical neuroscience and its relation to gene data analysis. ***Progress in neural information and mathematical sciences (Mathematical Sciences separate volume)***. 133-143. Tokyo, Japan: Saiensu-sya.

Nakahara H, Doya K, Hikosaka O. (2000) Computational theories of cortico-basal ganalia systems. ***Brain 21***. 3(3): 29-34. Kyoto, Japan: Kinpodo.

Nakahara H, Doya K, Hikosaka O. (2000) Brain global networks for learning the motor sequence control. ***Brain Science***. 22(10): 101-111. Tokyo, Japan: Seiwa Shoten.

INVITED LECTURES /TALKS /SYMPOSIA (Selected)

Time	*Place/Talk title*
11/2012	California Institute of Technology, Division of Humanities & Social Sciences, Pasadena, USA. *Learning to simulate and predict the other*.
11/2012	Stanford University, Psychology Department and Medical School, San Francisco, USA. *Learning to simulate and predict the other*.
11/2012	Kyoto University, Department of Systems Science, Graduate School of Informatics, Integrated Systems Biology. Kyoto, Japan. *Learning to simulate and predict the other*.
09/2010	Symposium "Functional architecture of collective neural activities and their networks: new advances in experimental and theoretical approaches", Japanese Neuroscience Society Meeting (Neuro2012), Nagoya, Japan. *Neural interaction as a signature of functional structure.*
07/2012	BSI Summer Program 2012 "The Collective Brain", RIKEN Brain Science Institute. Wako, Japan. *Social learning: learning to simulate other's value-based decisions*.
11/2011	Columbia University, Center for Theoretical Neuroscience, New York, USA. *Two issues in neural value-decision making: emulating the other's decision processes, and time representations.*
11/2011	New York University, Center for Neural Science, New York, USA. *Two issues in neural value-decision making: emulating the other's decision processes, and time representations.*
04/2011	University of Oxford, Department of Experimental Psychology, Oxford, UK. *Two issues in neural value-decision making: emulating the other's decision processes, and time representations.*
04/2011	University College London, Gatsby Computational Neuroscience Unit, London, UK. *Two issues in neural value-decision making: emulating the other's decision processes, and time representations.*
04/2011	University College London, Wellcome Trust Centre for Neuroimaging (*Emotion club seminar*), London, UK. *Two issues in neural value-decision making: emulating the other's decision processes, and time representations.*
04/2011	Workshop on Geometric and Algebraic Statistics 3 (WOGAS3), University of Warwick, Coventry, UK. *Hierachical interaction structures of neural coding, in relation to information geometry.*
11/2010	California Institute of Technology, Division of Biology (*Shimojo Psychophysics Laboratory Seminar*), Pasadena, USA. *Computations for value-decision making in nonsocial and social situations.*
10/2010	10th China-India-Japan-Korea Joint Workshop on Neurobiology and Neuroinformatics (NBNI 2010), Kunming, China. *Value-based decision making, and the mechanisms of neural computations.*
09/2010	Symposium "New perspectives on value-based decision making", Japanese Neuroscience Society Meeting (Neuro2010), Kobe, Japan. *Computational issues on value-decision making in nonsocial and social contexts.*
08/2010	Bernstein Center for Computational Neuroscience, Berlin, Germany. *Value-based decision making: time, context and latent structure.*

08/2010 Information Geometry and Its Applications III, Leipzig, Germany. *Neural coding and information geometry.*

02/2010 Reward and Decision Making Batsheva Conference, Jerusalem, Israel. *Computational Issues for Value Based Decision Making in Nonsocial and Social Contexts.*

05/2009 Waseda University, Institute for Research in Contemporary Political and Economic Affairs (Waseda Monday Seminar), Tokyo, Japan. *Value-based decision making -- temporal discounting and context effect: neural mechanisms and computations (in Japanese).*

02/2009 Neuro Social Science Workshop, Osaka, Japan. *Context and Time of Neural Value-Based Decision Making.*

12/2008 EPSRC Workshop on Computational Neuroscience, University of Warwick, Birmingham, UK. *Analyzing neural dynamics by considering higher-order interaction and, also, the effect of time on reward prediction.*

12/2008 RIKEN BSI Tutorial Series 2008, RIKEN BSI, Wako, Japan. *Emotion to Decision and Basal Ganglia.*

10/2008 Open Problems in Neuroscience of Decision Making, OIST Seaside House, Okinawa, Japan. *Effects of internal time and context representation on dopamine activity and value-based decision making.*

09/2008 Human Forum 2008, Honda Research Institute, Wako, Japan. *Mathematics in neuroscience: motivation, learning and decision making (in Japanese).*

07/2008 The 3rd APCTP-KAIST Summer School for Brain Dynamics, Korea Advanced Institute of Science and Technology, Daejeon, South Korea. *Computational modeling of Basal Ganglia.*

01/2008 HFSP International Workshop on Neural Control of Attention, Perception and Learning, OIST, Okinawa, Japan. *Basal ganglia and superior colliculus for decision making.*

01/2008 University College London, Gatsby Computation Neuroscience Unit, London, UK. *Dopamine neural response as context-dependent prediction error. and functional clusters underlying neural avalanches.*

01/2008 Paris College de France, Institut des Science Cognitives, Paris, France. *Dopamine neural response as context-dependent prediction error. and functional clusters underlying neural avalanches.*

01/2008 The 2nd Japanese-French Frontiers of Science Symposium, Station Biologique, Roscoff, France. *Decision making brain mechanisms.*

01/2008 RIKEN BSI Tutorial Series 2007, RIKEN BSI, Wako, Japan. *Basal Ganglia and Motivated Behavior.*

11/2007 RIKEN BSI-MIT Picower Workshop 2007 (this talk is shared with Dr. N. Fujii), RIKEN BSI, Wako, Japan. *Social Neurophysiology: a Science of Relationships.*

10/2007 Pre-making for Japanese-French frontiers of science symposium, Tokyo, Japan. *Decision Making.*

10/2007 Korea Advanced Institute of Science and Technology, Department of Bio and Brain Engineering, Daejeon, Korea. *Integrated theoretical neuroscience; basal ganglia and reinforcement learning.*

10/2007 NIPS workshop on Neural Mechanisms for Attention and Decision Making,

National Institute for Physiological Sciences (NIPS), Okazaki, Japan. *Basal ganglia related systems for decision making with motivational signals (in Japanese).*

07/2007 International Conference Stochastic Processes and Applications (ICSPA 2007), Indian Institute of Science, Bangalore, India. *Information geometric approach for neural spike analysis.*

07/2007 Workshop on Mathematical Aspects of Neuroscience, Indian Institute of Science, Bangalore, India. *Neural population coding and spike analysis.*

07/2007 Workshop on Mathematical Aspects of Neuroscience, Indian Institute of Science, Bangalore, India. *Basal ganglia functions and reinforcement learning.*

06/2007 The 3rd Technical Committee on Brain Communication, Tokyo, Japan. *Tutorial for machine learning in BMI (in Japanese).*

04/2007 21st Century COE Program Center for Evolutionary Cognitive Sciences, The University of Tokyo, Tokyo, Japan. *Integrated theoretical neuroscience (in Japanese).*

03/2007 Spring School in Computational Neuroscience, Shanghai, China. *Reinforcement learning by the basal ganglia mechanisms and issues of population coding and information geometry.*

12/2006 NIPS workshop on Neural Mechanisms with Cerebral Cortical Units, National Institute for Physiological Sciences (NIPS), Okazaki, Japan. *Basal ganglia and superior colliculus from theoretical neuroscience perspective (in Japanese).*

08/2006 RIKEN BSI Tutorial Series 2006, RIKEN BSI, Wako, Japan. *Basal Ganglia.*

11/2006 The 5th study meeting for 'Neural mechanisms and computational processes for human motor control and language acquistion', Kyoto University, Kyoto, Japan. *Research in theoretical neuroscience (in Japanese).*

08/2006 RIKEN BSI International Summer School, RIKEN BSI, Wako, Japan. *Integrated Theoretical Neuroscience.*

07/2006 2006 “Wings of Mathematical Science” Workshop, Tokyo, Japan. *Mathematical Neuroscience － mathematical sciences and neuroscience, for creating the brain! (in Japanese)*

05/2006 RIKEN Joint Retreat, Shizuoka, Japan. *Inference of gene expression cascades and neural networks by information geometry.*

11/2004 Special Session, International Symposium on Nonlinear Theory and its Applications, Fukuoka, Japan. *Comments on analysis of neural coding by information geometric measure.*

09-10/2004 The US-Japan Brain Research Collaborative Program (BRCP) Workshop on Bioinformatic Analysis of Brain Function, Hawaii, USA. *Information geometric approach to decipher the functions of many variables: neural population network and gene regulatory network.*

09/2004 Symposium “Neural correlates of action selection based on reward and goal”. Japanese Neuroscience Society Meeting (Neuro2004), Osaka, Japan. *Dopamine neurons reoresent context-dependent reward prediction error.*

05/2004 Advanced Telecommunications Research Institute (ATR), Computational Neuroscience Laboratories, Kyoto, Japan. *Information geometric measure: analysis of multi-unit neural recording and DNA microarray.*

04/2004 Honda Research Institute, Wako, Japan. *Computational neuroscience information geomtry and basal ganglia circuit.*

03/2004 The 31st NIPS International Symposium “Multidisciplinary Approaches to Sensorimotor Integration ---Old Questions Meet New Concepts---”, NIPS, Okazaki, Japan. *Dopamine neurons can represent a context-dependent prediction error.*

08/2003 The 4th Summer workshop for mechanism of brain and mind. Echigoyuzawa, Japan. *Attention modulation through peak & base rate of tuning curve (in Japanese).*

02/2003 Univerity of Tokyo, Graduate school of Medicine, Japan. *Statistical methods for mciroarray and SNP analysis, in relationto Altzheimer's disease (in Japanese).*

12/2002 National Cancer Institute (NIH), Laboratory of Population Genetic, Bethesda, USA. *Gene interaction in DNA microarray is decomposed by information geometric measure.*

11/2002 National Eye Institute (NIH), Laboratory of Sensorimotor Research, Bethesda, USA. *Information geometric measure for spike firing.*

11/2002 Johns Hopkins University, Department of Biomedical Engineering, Baltimore, USA. *Information geometric measure for spike firing.*

09/2002 The 7th Tamagawa Dynamic Brain Forum, Visegrad, Hungary. *Information geometric measure for spike firing.*

09/2002 University of Freiburg, Department of Neurobiology and Biophysics, Freiburg, Germany. *Information geometric measure for spike firing.*

09/2002 Technical University of Berlin, Department of Electrical Engineering and Computer Science, Berlin, Germany. *Population coding: computational approach.*

09/2002 Fraunhofer FIRST, The Intelligent Data Analysis Group, Berlin, Germany. *Information geometric measure for spike firing.*

12/2001 Public Symposium on the Basal Ganglia and Cortical Areas for Motor Control, Tokyo, Japan. *Cortico-basal ganglia loop for oculomotor control with reward (in Japanese).*

09/2001 The 6th Tamagawa Dynamic Brain Forum, Breisach, Germany. *Information geometric measure for spike firing.*

06/2001 NIPS workshop on Visual and Percetual Mechanisms, NIPS, Okazaki, Japan. *Attention modulation through the change of peak and base rate (in Japanese).*

01/2001 NIPS workshop on Information Synthesis in Brain for Motor Control, NIPS, Okazaki, Japan. *Parallel cortico-basal ganglia loops for sequential motor control (in Japanese).*

08/2000 Neuroinformatics Summer School, Kanagawa, Japan. *Computational models of basal gangalia functions (in Japanese).*

10/1999 MIT, Department of Brain and Cognitive Sciences, Boston, USA. *Parallel Basal Ganglia Circuit for Motor Sequence Control.*

09/1999 Satellite symposium of brain sciences in the Biophysical Society of Japan meeting, Wako, Japan. *Population Coding: Functions of attention in relation to neural correlation structure (in Japanese).*

06/1999 RIKEN BMC Forum, Nagoya, Japan. *Multiple representations in the basal*

ganglia loops for acquisition and execution of sequential motor control (in Japanese).

08/1998 The 3rd Summer Workshop by 'System-level understandings of higher-order brain functions, Fujiyoshida, Japan. *Multiple representations in the basal ganglia loops for acquisition and execution of sequential motor control (in Japanese)*.

02/1998 Workshop for 'Present homeostasis apporaches', Univ of Tokyo, Tokyo, Japan. *Dynamical model of working memory that balances quick cancellation and robust maintenance of memory (in Japanese).*

04/1997 ATR, Human Information Processing Research Laboratories, Kyoto. *Parallel basal ganglia circuit.*

CONFERENCE PAPERS

Kim CH, Tsujino H, **Nakahara H**. (2011) Learning attentive-depth switching while interacting with an agent. *2011 IEEE/SICE International Symposium on System Integration*. 1305–1310. Kyoto, Japan.

Kim CH, Tsujino H, **Nakahara H**. (2011) Decoupling MDPs step by step from a POMDP. *The 10th International Conference on Autonomous Agents and Multiagent Systems 2011: Autonomous Robots and Multirobot Systems Workshop.* 19-33. Taipei, Taiwan.

Nakahara H, Shimono M, Uchida G, Tanifuji M. (2008) Stimulus-induced pairwise interaction can be revealed by information geometric approach. *Advances in Cognitive Neurodynamics: Proceedings of the International Conference on Cognitive Neurodynamics-2007.* 71-75. Springer Netherlands.

Takenaka K, Shiina S, **Nakahara H**, Iriki A, Kuniyoshi Y, Fujii N. (2006) Retrieving internal decision process of primates during alternative free choice task (in Japanese). *The 7th SICE System Integration Division Meeting*. 870-871. Sapporo, Japan.

Nakahara H. (2004) Comments on analysis of neural coding by information geometric measure. *2004 International Symposium on Nonlinear Theory and its Applications*. 31-34. Fukuoka, Japan.

Inoue M, Nishimura S, Hori G, Amari S, Saito M, Yoshihara Y, **Nakahara H**. (2002) Transformation of DNA mciroarray data for statistical tests (in Japanese). *Japanese Neural Network Society 2002*. 37-40. Tottori, Japan.

Nishimura S, Inoue M, Hori G, Amari S, **Nakahara H**. (2002) Inference of higher-order interactions of genes from DNA microarray data (in Japanese). *Proceedings of the 5th Workshop on Information-Based Induction Sciences (IBIS2002)*. 214-219. Fujiyoshida, Japan.

Hori G, Inoue M, Nishimura S, **Nakahara H**. (2001) Blind gene classification: An application of a signal separation method. *Genome Informatics Workshop*. 255-256. Tokyo, Japan.

Hori G, Inoue M, Nishimura S, **Nakahara H**. (2001) Blind gene classification on ICA of microarray data. *Independent Component Analysis and Blind Signal Separation 2001.* 332-336. San Diego, CA, USA.

Wu S, Amari S, **Nakahara H**. (2001). Asymptotic behaviors of population codes. *Proceedings of the 10th annual Computational Neuroscience Meeting: Neurocomputing* 44–46: 697-702. Monterey, CA, USA.

Sakai Y, **Nakahara H**, Amari S. (2001) Spike correlations in feed-forward neural networks (in Japanese). *Japanese Neural Network Society 2001*. 175-176. Nara, Japan.

Wu S, **Nakahara H**. (1999) Optimize the distribution of preferred stimulus in a population code. *Proceedings of the 5th International Conference on Neural Information Processing*. 326-330. San Francisco, CA, USA.

Doya K, **Nakahara H**, Bapi RS, Hikosaka O. (1999) Multiple representations and algorithms for sequence learning. *The 2nd International Conference on Cognitive Science*. 17-19. Tokyo, Japan.

Trappenberg T, **Nakahara H**, Hikosaka O. (1998) Modeling reward dependent activity pattern of caudate neurons. *Proceedings of the 8th International Conference on Artificial Neural Network*. 973-978. Skeovde, Sweden.

Nakahara H, Doya K, Hikosaka O, Nagano S. (1998) Reinforcement learning with multiple representations in the basal ganglia loops for sequential motor control. *Proceedings of International Joint Conference on Neural Network*. 1553-1558. Anchorage, AK, USA.

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