September 1st, 2009

CURRICULUM VITAE

Tomoki Fukai (male)

Personal Data

Date of Birth: January 8, 1958
Nationality: Japanese
Home Address: Tamagawa Gakuen 8-13-21, Machida,
Tokyo 194-0041, Japan
Affiliation:
Team Leader, Laboratory for Neural Circuit Theory
RIKEN Brain Science Institute
Hirosawa 2-1, Wako, Saitama 351-0198, Japan
(TEL) +81 (0)48-467-6896
(FAX) +81 (0)48-467-6899
E-mail: tfukai@riken.jp
Home page: http://nct.brain.riken.jp/

Education

B.Sc. (Mar 1980)	Department of Physics, Waseda University
M.Sc. (Mar, 1982)	Department of Physics, Waseda University
Ph.D. (Mar 1985)	Particle Physics Theory, Department of Physics, Waseda University, Tokyo, Japan

Research and Teaching Job Experiences

Apr 1985 – Mar 1986:	Research Fellow, Waseda University
Apr 1985 – Jul 1986:	Lecturer, Liberal Education (Mathematics), Seikei University
Aug 1986–Aug 1988:	Visiting Researcher, Theoretical Physics Group Tata Institute of Fundamental Research (Bombay)
Sep 1988 – Mar 1989:	Lecturer, Center for Foreign Student Educations, Tokai University
Apr 1989 – Mar 1991:	Lecturer, Management and Information Science Department, Gumma Women's College
Apr 1991 – Mar 1992:	Lecturer, Department of Electronic Engineering, Tokai University
Apr 1992 – Sep 1999:	Associate Professor, Department of Electronic Engineering, Tokai University
Dec 1992 – Mar 1998:	Visiting Researcher, RIKEN Brain Science Institute
Oct 1999 – Mar 2001:	Associate Professor, Department of Information-Communication Engineering, Tamagawa University
Apr 2001 – Mar 2005:	Professor, Department of Intelligent Information

	Engineering & Brain Science Research Center, Tamagawa University
Nov 1998 – Oct 2003:	Project leader, Crest, JST (Core Research for Evolutional Science and Technology, Japan Science and Technology)
Oct 2004 – present:	Team Leader, Lab. for Neural Circuit Theory, RIKEN BSI
Apr 2005 – Mar 2008:	Group Director, Computational Neuroscience Group, RIKEN BSI
Apr 2008 – Mar 2009:	Group Director, Theoretical Neuroscience Group, RIKEN BSI (Previous Computational Neuroscience Group and Brain-Style Information Processing Group were unified)

*The position of the Group Director system was abolished at the end of March 2009.

Apr 2007 – present:	Professor, Graduate School of Frontier Sciences, University of Tokyo
Nov 2007 – present:	Member of the Strategic Unit of RIKEN BSI-TOYOTA Collaboration Center
Oct 2008 – present:	Member of the Brain Research Team in Next-Generation Supercomputer Project

External Grants

1) 2005-2009 Grants-in-Aid for Scientific Research on Priority Areas
   "Neuronal dynamics and computations by the cortico-basal ganglia loops."
   Project Leader: Tomoki FUKAI 52,700,000 yen
2) 2007-2008 Riken President's Discretionary Fund
   "Neural code and computation in cortical microcircuits: modeling and experiment."
   Project Leader: Tomoki FUKAI 30,000,000 yen
3) 2004-2005 Grants-in-Aid for Scientific Research (B)
   "Computations in networks of neurons with multi-stable states"
   Project Leader: Tomoki FUKAI 7,300,000 yen
4) 2002-2004 21st Century Center of Excellence Program, Ministry of Education, Culture, Sports, Science and Technology – Japan.
   "Integrative Human Science"
   Member (Project Leader: Minoru Tsukada 220,000,000 yen)
5) 2003 Grants-in-Aid for Scientific Research on Priority Areas
   "Functional representation emergent from interactions between correlated spikes and neural network dynamics"
   Member (Project Leader: Toshio Aoyagi 3,500,000 yen)
6) 2000-2004 Grants-in-Aid for Scientific Research on Priority Areas (C)
   "Dynamical models of learning and memory and their experimental verification"
   Member (Project Leader: Minoru Tsukada 153,500,000 yen)
7) 1998-2003 Core Research for Evolutional Science and Technology, Japan Science

and Technology “Modeling neural basis for processing temporal information”
Project Leader: Tomoki Fukai 400,000,000 yen

8) 1999 Grants-in-Aid for Scientific Research on Priority Areas (A) “Dynamic functional information representation by spatiotemporal patterns of spiking activity”
Project Leader: Tomoki Fukai 500,000 yen
9) 1998 Grants-in-Aid for Scientific Research on Priority Areas (A) “Dynamic neural network models for memory functions interacting with motor planning and control”
Project Leader: Tomoki Fukai 700,000 yen
10) 1997 Grants-in-Aid for Scientific Research on Priority Areas
“Signal sampling by dendritic spines: general theory and experimental verification”
Project Leader: Tomoki Fukai 600,000 yen
11) 1996 Grants-in-Aid for Scientific Research on Priority Areas
“Computational studies of variability and functions of temporal neural code for memory and cognition”
Project Leader: Tomoki Fukai 500,000 yen
12) 1993 Grants-in-Aid for Young Scientists (A) “Statistical physics approach to associative memory models with columnar organization”
Project Leader: Tomoki Fukai 900,000 yen
13) 1992 Grants-in-Aid for Young Scientists (A) “Statistical physics models of self-organizing auditory feature detection maps”
Project Leader: Tomoki Fukai 1,000,000 yen
14) 1991 Grants-in-Aid for Young Scientists (A) “Macroscopic orders of phase transitions in self-organization of neural networks”
Project Leader: Tomoki Fukai 800,000 yen
15) 1990-1991 Grants-in-Aid for Scientific Research (C) “Nonlinear statistical physics of neural network models and its applications to biological neural systems”
Member (Project Leader: Masatoshi Shiino 2,400,000 yen)
16) 1990 Grants-in-Aid for Young Scientists (A) “Memory retrieval and phase transitions in self-organizing biological neural networks”
Project Leader: Tomoki Fukai 1,000,000 yen

Award

1) Jun-nosuke Teramae and Tomoki Fukai
“Single-cell graded persistent activity modelled by Ca2+ store dynamics”.
Research Award of the 14th Japanese Neural Network Society Meeting, Kyoto University, Sep. 27-29, 2004.
2) Hideyuki Cateau and Tomoki Fukai
“A stochastic method to predict the consequence of arbitrary forms of spike-timing-dependent plasticity”. Neural Computation 15: 597-620, 2003.
Research Paper Award of the 14th Japanese Neural Network Society Meeting, Kyoto University, Sep. 27-29, 2004.
3) Katsunori Kitano and Tomoki Fukai
“A multiple synfire-chain model for the predictive synchrony in the motor-related

cortical areas".
Best Poster Award of the 9th international conference on neural information processing, Singapore, Nov. 18-22, 2002.

Memberships in Scientific Societies

1) The Japan Neuroscience Society
2) Japanese Neural Network Society
3) The Physical Society of Japan
4) Society for Neuroscience (USA)

Contributions to Academic Societies

(Editorial board members of journals)

1) European Journal of Neuroscience
2) Neural Networks
3) Biological Cybernetics
4) Cognitive Neurodynamics

(Reviewers)

1) Journal of Neuroscience
2) Trends in Neuroscience
3) PLoS Computational Biology
4) PLoS One
5) Journal of Neurophysiology
6) European Journal of Neuroscience
7) Physical Review Letters
8) Physical Review E
9) Journal of the Physical Society of Japan
10) Neuroscience
11) Neural Networks
12) Journal of Computational Neuroscience
13) Neurocomputing
14) Biological Cybernetics
15) Cognitive Neurodynamics

(Grant application review)

1) Human Frontier Science Program, France (2008.11)
2) CONSOLIDER research programme, Spain (2008.6)
3) Japan-U.S. Brain Research Cooperative Program, Japan (2008.11)
4) Grant-in-Aid for Scientific Researches, Japan (2006-2007)
5) Wellcome Trust, England (2005)

(Organizing roles in scientific meetings)

1) "Computational and Systems Neuroscience", The German-Japanese Workshop, Berlin, Germany (2009.5.25-28)

2) "Understanding neuronal network functions through integrative experimental and theoretical approaches", National Institute for Physiological Sciences, Okazaki, Japan (2008.12.4)
3) "Logic and Statistics of Multineuronal Dynamics", The 31st Annual Meeting of the Japan Neuroscience Society, Tokyo, Japan (2008.7.10)
4) Member of the organizing committee for the "ISTC-RIKEN BSI workshop: Bridging non-linear dynamics with cellular and molecular neuroscience" (2008.3.18~19).
5) "Neuroimaging and Neurodynamics", Russian-Japanese Workshop on Topical Problems of Biophotonics 2007, Nizhny Novgorod – Moscow, Russia (2007.8.4-11)
6) The 9th China-India-Japan-Korea Joint Workshop on Neurobiology and Neuroinformatics (NBNI '07), Jeju city, Korea (2007.7.5-7)
7) "The 8th China-India-Japan-Korea Joint Workshop on Neurobiology and Neuroinformatics" (NBNI '06), Kyoto, Japan (2006.7.23-24)
8) The international symposium titled "Information representation and computation with spikes", The 29th Annual Meeting of the Japan Neuroscience Society, Kyoto, Japan (2006.7.19)
9) The Japan-Germany Symposium on Computational Neuroscience, Wako, Japan (2006.2.1-4)
10) The 7th China-India-Japan-Korea Joint Workshop on Neurobiology and Neuroinformatics 2005" (NBNI '05). Xiamen, China (2005.11.4-5).
11) Workshop, BSI-Picower Center (MIT) joint retreat, Boston, USA (2005.8)
12) Chair of the organizing committee for the BSI Summer Program 2005 (2005.7).

Outreach Activities

(Invited lectures)

1) "Irregular neuronal firing and the minimal conditional entropy principle", Beijing International Symposium on Computational Neuroscience 2009, Beijing, China (2009.7.24)
2) "Modeling recurrent neuronal networks through activity-dependent synaptic plasticity", Okinawa Computational Neuroscience Course, Okinawa Institute of Science and Technology (OIST) (2009.7.1)
3) "Information coding with excitation-inhibition balance", Systems Neurobiology Spring School, Kyoto Japan (2009.3.14)
4) "Self-organization and developmental models of cortical networks", Brain Informatics Forum, Tokyo Institute of Technology (2009.2.10)
5) "Network mechanisms of cognitive functions", Summer School for Young Scientists in Biophysics (sponsored by The Biophysical Society of Japan), Hachioji seminar house (2008.7.21)
6) "Reliability vs. variability in spike responses of recurrent neuronal networks", International Workshop-School on "Chaos and dynamics in biological networks", Cargèse – Corsica, France (2008.5.6)
7) "Dynamics, information representation, and computations of the brain circuitry", Kinki University, Osaka, Japan (2008.2.29-3.1)

8) "Introduction to Neuroscience: Computational Models of Brain Function", Tokyo University Medical School (2007.5.15)
9) "Neural dynamics and computation in decision making process", Colloquium talk at Bernstein Center for Computational Neuroscience (BCCN), Max Planck Institute for Dynamics and Self-Organization, Goettingen, Germany (2006.11.21)
10) "Membrane potential analysis and synaptic transmission III: Computational approach", RIKEN BSI Tutorial Series 2006 (2006.6.20)
11) "Synchronous firing in neuronal network models", Tokyo University Biophysics Seminar, Tokyo University (2006.6.6)
12) "Neuronal circuit wiring and its modeling", Robotics Seminar of the Robotics Society of Japan, Sanjo Conference Hall, Tokyo University (2006.4.25)
13) "Computational neuroscience", The 4th Forum on Information Technology on "Brain science meets information science" Chuo University, Tokyo (2005.9.8)
14) "Developmental model of cortical neuronal wiring inspired by neuronal avalanches", New York University, USA (2005.6.10)
15) "Network model of neuroanl avalanches", NIH, USA (2005.3.22)
16) "Is time everything?- Neural mechanism for leaning", Promotion of Communications between Different Research Areas, Japan Science and Technology, Kaga, Japan (2005.2.4)

(External thesis examiner)
1) Mitsuaki Nakamura, "Effects of spike-timing-dependent plasticity on the learning by a synapse population", University of Tokyo, Japan (2004.3).
2) Matthew Gilson, "Learning in biological-like neural networks", the University of Melbourne, Australia (2009.6)

(Cultural event)
"Neural clock", Exhibition by architect Shohei Matsukawa and advisory scientist T Fukai, Forum on Intellectual Unity II, Italian Cultural Institute, Akasaka, Tokyo (2007.12.7)

Books
1) Computational principles of the brain ― A text book for computational neuroscience (in Japanese), editor, Tokyo University Press (2009).
2) How does the brain represent information? In: *The front line of neuroscience research* in Blue Backs series (in Japanese), Kodansha publishing (2007).

Publications
1) Isomura Y, Harukuni R, Takekawa T, Aizawa H, Fukai T (in press) Microcircuitry coordination of cortical motor information in self-initiation of voluntary movements. *Nat. Neurosci.*
2) Yazaki-Sugiyama Y, Kang S, Cateau H, Fukai T, Hensch TK (in press) Dynamic inhibitory circuits in visual cortical plasticity. *Nature*

3) Takekawa T, Fukai T (2009) A novel view of the variational Bayesian clustering. *Neurocomputing* 72, 3366-3369.
4) Okamoto H, Fukai T. (2009) Recurrent network models for perfect temporal integration of fluctuating correlated inputs. *PLoS Comput. Biol.* 5(6), e1000404.
5) Teramae J, Fukai T. (2008) Temporal precision of spike response to fluctuating input in pulse-coupled networks of oscillating neurons. *Physical Review Letters* 101, 248105.
6) Sakai Y, Fukai T (2008) When does reward maximization lead to matching law? *PLoS ONE* 3(11), e3795.
7) Teramae J, Fukai T (2008) Complex evolution of spike patterns during burst propagation through feed-forward networks. *Biolical Cybernetcs* 99 (2), 105-114.
8) Cateau H, Kitano K, Fukai T (2008) Interplay between a phase response curve and spike-timeing-dependent plasticity leads to wireless clustering. *Physical Review E* 77, 051909.
9) Sakai Y, Fukai T (2008) The actor-critic learning is behind the matching law: Matching versus optimal behaviors. *Neural Comput.* 20, 227-251.
10) Kang S, Kitano K, Fukai T (2008) Structure of spontaneous UP and DOWN transitions self-organizing in a cortical network model. *PLoS Comput. Biol.* 4(3), e1000022.
11) Teramae J, Fukai T (2007) Sequential associative memory with non-uniformity of the layer sizes. *Physical Review E* 75, 011910.
12) Fujiwara-Tsukamoto Y, Isomura Y, Imanishi M, Fukai T, Takada M (2007) Distinct types of ionic modulation of GABA actions in pyramidal cells and interneurons during electrical induction of hippocampal seizure-like network activity. *Eur. J. Neurosci.* 25, 2713-2725.
13) Teramae J, Fukai T (2007) Local cortical circuit model inferred from power-law distributed neuronal avalanches. *J. Comput. Neurosci.* 22, 301-312.
14) Tsubo Y, Takada M, Reyes AD, Fukai T (2007) Layer and frequency dependences of phase response properties of pyramidal neurons in rat moter cortex. *Eur. J. Neurosci.* 25, 3429-3441.
15) Okamoto H, Isomura Y, Takada M, Fukai T (2007) Temporal integration by stochastic recurrent network dynamics with bimodal neurons. *J. Neurophysiol.* 97, 3859-3867.
16) Takekawa T, Aoyagi T, Fukai T (2007) Synchronous and asynchronous bursting states: Role of intrinsic neural dynamics. *J. Comput. Neurosci.* 23, 189-200.
17) Kitano K, Fukai T (2007) Variability v.s. synchrony of neuronal activity in local cortical network models with different topologies. *J. Comput. Neurosci.* 23, 237-250.
18) Tsubo Y, Teramae J, Fukai T (2007) Synchronization of excitatory neurons with strongly heterogeneous phase responses. *Physical Review Lett.* 99, 228101.
19) Miura K, Tsubo Y, Okada M, Fukai T (2007) Balanced excitatory and inhibitory inputs to cortical neurons decouple firing irregularity from rate modulations. *J. Neurosci.* 27, 13802-13812.
20) Takekawa T, Aoyagi T, Fukai T (2006) Synchronization property of slow cortical

oscillations. *Progress of Theoretical Physics Supplement* 161, 356-359.
21) Sakai Y, Okamoto H, Fukai T (2006) Computational algorithms and neuronal network models underlying decision processes. *Neural Networks* 19, 1091-1105.
22) Okamoto H, Isomura Y, Takada M, Fukai T (2005) Combined modeling and extracellular recording studies of UP and DOWN transitions in awake or behaving monkeys. *Basal Ganglia VIII Advances in Behavioral Biology* 56, 555-561.
23) Teramae J, Fukai T. (2005) A cellular mechanism for graded persistent activity in a model neuron and its implications in working memory. *Journal of Computational Neuroscience* 18, 105-121.
24) Kitano K, Fukai T (2004) Temporal characteristics of the predictive synchronous firing modeled by spike-timing-dependent plasticity. *Learning & Memory* 11, 267-276.
25) Nomura M, Fukai T, Aoyagi T (2004) Gamma frequency synchronization in a local cortical network model. *Neurocomputing* 58-60, 173-178.
26) Okamoto H, Fukai T (2004) Propagation of quasi-stable activation in a chain of recurrent neural networks. *Neurocomputing* 58-60, 235-238.
27) Kang S, Kitano K, Fukai T (2004) Spontaneous two-state membrane potential fluctuations in a self-organized network of realistic cortical neuron models. *The Journal of Japan Neural Network Society* 11(2), 56-63. (in Japanese).
28) Kang S, Kitano K, Fukai T (2004) Self-organized two-state membrane potential transitions in a network of realistically modeled cortical neurons. *Neural Networks* 17, 307-312.
29) Takekawa T, Aoyagi T, Fukai T (2004) Influences of synaptic location on the synchronization of rhythmic bursting neurons. *Network: Comput. Neural Syst.* 15, 1-12.
30) Kitano K, Fukai T (2004) Predictive synchrony organized by spike-based Hebbian learning with time-representing synfire activities. In: *Neural Information Processing: Research and Development*, pp. 77-93, Rajapakse, Jagath C., Wang, Lipo (Eds), Springer-Verlag.
31) Okamoto H, Fukai T (2003) Neural bases of accumulator models. *Neurocomputing* 52-54, 285-288.
32) Nomura M, Fukai T, Aoyagi T (2003) Synchrony of fast-spiking interneurons interconnected by GABAergic and electrical synapses. *Neural Computation* 15, 2179-2198.
33) Okamoto H, Fukai T (2003) Physiologically realistic modelling of a mechanism for neural representation of intervals of time. *BioSystems* 68, 229-233.
34) Fukai T, Kitano K, Okamoto H (2003) Time representation in the cortex: two models inspired by prefrontal persistent activity, synfire chain and unitary events. *Biological Cebernetics* 88, 387-394.
35) Aoyagi T, Takekawa T, Fukai T (2003) Gamma rhythmic bursts: coherence control in networks of cortical pyramidal neurons. *Neural Computation* 15, 1035-1061.
36) Cateau H, Fukai T (2003) A stochastic method to predict the consequence of arbitrary forms of spike-timing-dependent plasticity. *Neural Computation* 15(3), 597-620.

37) Cateau H, Kitano K, Fukai T (2002) An accurate and widely applicable method to determine the distribution of synaptic strength formed by the spike-timing-dependent plasticity. *Neurocomputing* 44-46, 343-351.
38) Fukai T, Kitano K, Aoyagi T, Kang Y (2002) Modeling the layer V cortical pyramidal neurons showing theta-rhythmic firing in the presence of muscarine. *Neurocomputing* 44-46, 103-108.
39) Kitano K, Cateau H, Fukai T (2002) Sustained activity with low firing rate in a recurrent network regulated by spike-timing-dependent plasticity. *Neurocomputing* 44-46, 473-478.
40) Kitano K, Cateau H & Fukai T (2002) Self-Organization of Memory Activity through Spike-Timing- Dependent Plasticity. *NeuroReport* 13, 795-798.
41) Aoyagi T, Kang Y, Terada N, Kaneko T, Fukai T (2002) The role of Ca(2+)-dependent cationic current in generating gamma frequency rhythmic bursts: modeling study. *Neuroscience* 115(4), 1127-1138.
42) Kitano K, Cateau H, Kaneda K, Nambu A, Takada M, Fukai T (2002) Two-State Membrane Potential Transitions of Striatal Spiny Neurons as Evidenced by Numerical Simulations and Electrophysiological Recordings in Awake Monkeys. *The Journal of Neuroscience* 22 RC230, 1-6.
43) Okamoto H, Fukai T (2001) On experimental predictions from a model for a neural mechanism of internal timer. *Neurocomputing* 38-40, 1489-1493.
44) Kitano K, Aoyagi T, Fukai T (2001) Synchronous and asynchronous activities in a network of striatal spiny projection neurons. *Neurocomputing* 38-40, 721-726.
45) Terada N, Aoyagi T, Kang Y, Kaneko T, Fukai T (2001) A bursting mechanism of chattering neurons based on calcium-dependent cationic currents. *Neurocomputing* 38-40, 93-98.
46) Fukai T (2001) Neuronal analog-digital information transformations at the gamma frequency. *Neurocomputing* 38-40, 615-619.
47) Cateau H, Fukai T (2001) Fokker-Planck approach to the pulse packet propagation in synfire chain. *Neural Networks* 14, 675-685. (Special Issue: Spiking Neurons in Neuroscience and Technology).
48) Fukai T, Kanemura S (2001) Noise-tolerant stimulus discrimination by synchronization with depressing synapses. *Biological Cybernetics* 85, 107-116.
49) Kitano K, Aoyagi T, Fukai T (2001) A possible functional organization of the corticostriatal input within the weakly-correlated striatal activity : A modeling study. *Neuroscience Research* 40, 87-96.
50) Okamoto H, Fukai T (2001) A neural mechanism for cognitive timer. *Physical Review Letters* 86, 3919-3922.
51) Fukai T (2000) Neuronal communication within synchronous gamma oscillations. *NeuroReport* 11, 3457-3460.
52) Fukai T, Kanemura S (2000) Precisely-timed synchronization by depressing synapses. *Neurocomputing* 32-33, 133-140.
53) Okamoto H, Fukai T (2000) A model for neural representation of intervals of time. *Neurocomputing* 32-33, 935-939.
54) Okamoto H, Fukai T (2000) A model for neural representation of temporal duration.

BioSystems 55, 59-64.
55) Fukai T, Kimoto T, Okada M (1999) Coexistence of uncorrelated and correlated attractors in a nonmonotonic neural network. *Journal of Physics A: Math. Gen.* 32, 5551-5562.
56) Fukai T (1999) Modeling the interplay of short-term memory and the basal ganglia in sequence processing. *Neurocomputing* 26-27, 687-692.
57) Fukai T (1999) Sequence generation in arbitrary temporal patterns from theta-nested gamma oscillations: A model of the basal ganglia-thalamo-cortical loops. *Neural Networks* 12, 975-987. (Special Issue: Organisation of Computation in Brain-like Systems).
58) Asai T, Fukai T, Tanaka S (1999) A subthreshold MOS circuit for the Lotka-Volterra neural network possessing the winner-take-all and winners-share-all solutions. *Neural Networks* 12, 211-216.
59) Okada M, Fukai T, Shiino M (1998) Random and systematic dilutions of synaptic connections in a neural network with a nonmonotonic response function. *Physical Review* E57, 2095-2103.
60) Fukai T, Tanaka S (1997) A simple neural network exhibiting selective activation of neuronal ensembles: From winner-take-all to winners-share-all. *Neural Computation* 9, 77-97.
61) Fukai T (1996) Competition in the temporal domain among neural activities phase locked to subthreshold oscillations. *Biological Cybernetics* 75, 453-461.
62) Fukai T (1996) Bulbocortical interplay in olfactory information processing via synchronous oscillations. *Biological. Cybernetics* 74, 309-317.
63) Asai T, Yokotsuka H, Fukai T (1996) A MOS circuit for a nonmonotonic neural network with excellent retrieval abilities. *IEEE Trans. Neural Networks* 7, 182-189.
64) Fukai T (1995) Oscillations for rapid selection of neural activities based on spike timing. *NeuroReport* 7, 273-277.
65) Matsushita T, Moriyama S, Fukai T (1995) Switching dynamics and the transient memory storage in a model enzyme network involving Ca^{2+}/calmodulin protein kinase II in synapses. *Biological Cybernetics* 72, 497-509.
66) Fukai T, Kim J, Shiino M (1995) Retrieval properties of analog neural networks and the nonmonotonicity of transfer functions. *Neural Networks* 8, 391-404.
67) Fukai T (1995) A model cortical circuit for the storage of temporal sequences in cortex. *Biological Cybernetics* 72, 321-328.
68) Fukai T, Shiino M (1995) Memory recall by quasi-fixed-point attractors in neural networks of oscillators. *Neural Computation* 7, 529-548.
69) Fukai T (1994) Synchronization of neural activity is a promizing mechanism of memory information processing in networks of columns. *Biological Cybernetics* 71, 215-226.
70) Fukai T, Shiino M (1994) Memory encoding by oscillator death. *Europhysics Letters* 26, 647-652.
71) Fukai T (1994) A model of cortical memory-processing based on columnar organization. *Biological Cybernetics* 70, 427-434.
72) Shiino M, Fukai T (1993) Self-consistent signal-to-noise analysis of the statistical

behavior of analog neural networks & enhancement of the storage capacity. *Physical Review* E48, 867-897.
73) Shiino M, Fukai T (1993) Onset of super retrieval phase & enhancement of the storage capacity in neural networks of nonmonotonic neurons. *Journal of Physics A : Math. Gen.* 26, L831-L841.
74) Fukai T, Shiino M (1992) Study of self-inhibited analog neural networks using the self-consistent signal-to-noise analysis. *Journal of Physics A : Math. Gen.* 25, 4799-4811.
75) Fukai T, Shiino M (1992) Comparative study of spurious state distribution of analog neural networks & the Boltzmann machine. *Journal of Physics A : Math. Gen.* 25, 2873-2887.
76) Shiino M & Fukai T (1992) Self-consistent signal-to-noise analysis & its application to analog neural networks with asymmetric connections. *Journal of Physics A: Math. Gen.* 25, L375 -L381.
77) Fukai T, Shiino M (1990) Large suppression of spurious states in neural networks of nonlinear analog neurons. *Physical Review A42* (12), 7459-7466.
78) Shiino M, Fukai T (1990) Replica-symmetric theory of the nonlinear analogue neural networks. *Journal of Physics A : Math. Gen.* 23, L1009-L1017.
79) Shiino M, Fukai T (1990) Chaotic image retrieval in markovian asymmetric neural networks with sign-constrained synaptic couplings. *Journal of Physical Society of Japan* 59(5), 1529-1532.
80) Fukai T, Shiino M (1990) Asymmetric neural networks incorporating the Dale hypothesis & noise-driven chaos. *Physical Review Letters* 64, 1465-1468.
81) Fukai T (1990) Metastable states of neural networks incorporating the physiological Dale hypothesis. *Journal of Physics A : Math. Gen.* 23(2), 249-258.
82) Shudo A, Mizutani M, Fukai T (1988) Canonical correlations of non-integrable quantum system. *Physics Letters* 130A, 338-343.
83) Fukai T (1988) BRST quantization of local supersymmetric chiral boson-fermion system. *Physical Review* D37, 3582-3587.
84) Fukai T (1988) Anomaly cancellations in the local supersymmetric Siegel lagrangian. *Nuclear Physics* B299, 346-354.
85) Fukai T, Atre MV (1987) Topology of the grassmanian sigma model on a lattice. *Modern Physics Letters* A2, 601-608.
86) Fukai T, Kizukuri Y, Oshimo N, Otake Y, Sugiyama N (1987) Study of wino pair production in e+e- annihilation. *Progress of Theoretical Physics* 78, 395-412.
87) Fukai T, Sugiyama N (1986) Gravitino as the dark matter on all scales. *Physics Letters* 173B, 120-125.
88) Fukai T, Okano K (1985) Stochastic quantization of linearized Euclidean gravity & no-ghost Feynman rules. *Progress of Theoretical Physics* 73, 790-802.
89) Fukai T, Kizukuri Y (1984) A backward hierarchy model coupled to N=1 supergravity & the double missing partner mechanism. *Physics Letters* 143B, 396-402.
90) Fukai T, Oshimo N, Kizukuri Y (1984) A supersymmetric SU(5)xU(1) model with natural gauge hierarchy. *Zeitschrift fur Physik* C25, 75-80.

91) Fukai T (1984) The pseudoscalar masses in the technicolor model with the massive techniquarks. *Nuovo Cimento* 79A, 410-418.
92) Fukai T, Nakazato H, Ohba I, Okano K, Yamanaka Y (1983) Stochastic quantization method of fermion fields. *Progress of Theoretical Physics* 69, 1600-1616.