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version that includes
my home address.)

Please contact me to guarantee that you have an up-to-date version of this C.V.

Research Experience

Director, Department of Neuroengineering
Fatronik Foundation

Feb.2008 – **Present**
Department of Neuroengineering
Fatronik Foundation
San Sebastian, Spain

Research Assistant Professor
Boston University

2007 – **Present**
Laboratory of Computational Neurophysiology
Center for Memory and Brain
Boston University, Boston, MA

Research Associate
VU University of Amsterdam
(concurrent with Boston University position)

Dec.2006 – Aug.2008
Department of Experimental Neurophysiology
Center for Neurogenomics and Cognitive
Research
Vrije Universiteit Amsterdam, Amsterdam, The
Netherlands

Postdoctoral Research Fellow
Boston University

Sep.2001 – 2006
Laboratory of Computational Neurophysiology
Center for Memory and Brain
Boston University, Boston, MA

Research Associate
KNAW Netherlands Institute for Neuroscience
(concurrent with Boston University postdoc)

Sep.2004 – Nov.2006
Amsterdam, The Netherlands
(Incorporates the former
Netherlands Institute for Brain Research)

Teaching Experience

Instructor/Lecturer CAS PS336 Introduction to
Cognitive Psychology

Fall 2007, Spring 2008

Boston University

Department of Psychology
Boston University, Boston, Massachusetts

Advisor/Mentor to Masters Thesis students at
the Center for Neurogenomics and Cognitive
Research
VU University

Sep.2006 – Sep.2007

Department of Experimental Neurophysiology
Center for Neurogenomics and Cognitive
Research
Vrije Universiteit Amsterdam, Amsterdam, The
Netherlands

Neural Models of Memory and Spatial
Navigation, three-lecture series
Boston University

Dec.2003, Apr.2006

Boston University, Boston, Massachusetts

Teaching Assistant, Statistics for Experimental
Design
McGill University

Sep.2000 – May 2001

Sep.1996 – May 1997

Department of Psychology
McGill University, Montreal, Canada

Teaching Assistant, Software Engineering in
Scheme/LISP
Delft University of Technology

Jan.1995 – May 1995

Jan.1994 – May 1994

Faculty of Electrical Engineering
Delft University of Technology, Delft, The
Netherlands

Teaching/Lab Assistant, Introductory
Electronics Lab Course
Delft University of Technology

May 1994 – July 1994

Faculty of Electrical Engineering
Delft University of Technology, Delft, The
Netherlands

Peer Reviewed Publications

Koene, R.A., Green, N., Ramakers, G., van Pelt, J. and van Ooyen, A. (2008). NET-MORPH: A framework for the stochastic generation of large scale neuronal networks with realistic morphology. *Neuroinformatics*. *Submitted*.

Koene, R.A. and Hasselmo, M.E. (2008). Reversed and forward buffering of behavioral spike sequences may enable retrospective and prospective retrieval in hippocampal regions CA3 and CA1. *Neural Networks*. Vol.21 (2-3), pp.276-288. Neural Networks Advanced Access published on December 11, **2007**, doi:10.1016/j.neunet.2007.12.029.

Koene, R.A. and Hasselmo, M.E. (2008). Consequences of parameter differences in a model of short-term persistent spiking buffers provided by pyramidal cells in entorhinal cortex. *Brain Research*. Vol.1202C, pp.54-67. Brain Research Advanced Access published on July 17, **2007**, doi:10.1016/j.brainres.2007.06.067.

Koene, R.A. and Hasselmo, M.E. (2007). A reversing buffer mechanism that enables instances of retrospective activity in hippocampal regions CA3 and CA1. In *Proceedings of the International Joint Conference on Neural Networks (IJCNN2007)*.

Koene, R.A. and Hasselmo, M.E. (2007). Connectionist Memory Models of Hippocampal Function. In the *Learning and Memory: A Comprehensive Reference*. (*In press*). Elsevier.

Koene, R.A. and Hasselmo, M.E. (2007). Hippocampus: Computational models. In the *New Encyclopedia of Neuroscience*. (*In press*). Elsevier.

Koene, R.A. and Hasselmo, M.E. (2007). First-in-first-out item replacement in a model of short-term memory based on persistent spiking. *Cerebral Cortex*. Vol.17(8), pp.1766-1781. Cerebral Cortex Advanced Access published on October 9, **2006**, doi: 10.1093/cercor/bhl088.

McGaughy, J., Koene, R.A., Eichenbaum, H. and Hasselmo, M.E. (2005). Cholinergic deafferentation of the entorhinal cortex in rats impairs encoding of novel but not familiar stimuli in a delayed nonmatch-to-sample task. *Journal of Neuroscience*. Vol.25(44), pp.10273-10281.

Koene, R.A. and Hasselmo, M.E. (2005). An integrate and fire model of prefrontal cortex neuronal activity during performance of goal-directed decision making. *Cerebral Cortex*. Vol.15:12, pp.1964-1981. (Cerebral Cortex Advanced Access published April 27, 2005.)

Koene, R.A. and Hasselmo, M.E. (2005). An integrate and fire model of prefrontal cortex provides a biological implementation of action selection in reinforcement learning theory that reuses known representations. In *Proceedings of the International Joint Conference on Neural Networks (IJCNN2005)*.

Koene, R.A., Gorchetchnikov, A., Cannon, R.C. and Hasselmo, M.E. (2003). Modeling goal-directed spatial navigation in the rat based on physiological data from the hippocampal formation. *Neural Networks*. Vol. 16:5-6, pp. 577-584.

Cannon, R.C., Hasselmo, M.E. and Koene, R.A. (2003). From biophysics to behavior: Catacomb2 and the Design of Biologically Plausable Models for Spatial Navigation. *Neuroinformatics*. Vol. 1:1, pp. 3-42.

Koene, R.A., Cannon, R.C. and Hasselmo, M.E. (2003). Goal-directed spatial navigation of the rat depends on phases of theta oscillation in hippocampal circuitry. In *Proceedings of the International Joint Conference on Neural Networks (IJCNN2003)*.

Hasselmo, M.E., Cannon, R.C. and Koene, R.A. (2002). A simulation of parahippocampal and hippocampal structures guiding spatial navigation of a virtual rat in a virtual environment: A functional framework for theta theory. In: Witter, M P. and Wouterlood, F.G. (eds.) *The Parahippocampal Region: Organization and Role of Cognitive Functions*. Oxford University Press: Oxford. pp.139-161.

Koene, R. and Takane, Y. (1999). Discriminant component pruning. Regularization and interpretation of multi-layered back-propagation networks. *Neural Computation*. Vol. 11, pp. 783-802.

Education

Ph.D. Experimental Psychology
Department of Psychology, 2001 Montreal, Canada
McGill University

Thesis: *Functional requirements determine relevant ingredients to model for on-line acquisition of context dependent memory*

M.Sc. Electrical Engineering
Faculty of Electrical 1995 Delft, Netherlands
Engineering, Delft University of
Technology

Thesis: *Extracting Knowledge in terms of Rules from Trained Neural Networks*

Awards and Honors

Marie Curie Fellowship, 2007, European Commission Grant MRTN-CT-2005-019247, “NEURoVERS-it”

Max Stern Recruitment Fellowship, 1996–1999

Magna Cum Laude, 1995

Special Skills

Experience contributing to successful U.S. and European Union grant applications

Experience preparing course materials and giving lectures, CAS PS336 Introduction to Cognitive Psychology 2007

Creator of the NETMORPH modeling framework that is uniquely able to simulate realistic morphological development of neurons in large scale networks with subsequent simulations of neuronal and network activity

Electrophysiology recording and Data Analysis in Animal Model Behavioral Experiments

Experience preparing course syllabi (Intro.Cog.Psych., 2007; Stat. for Exp. Design, 2000)

Experience as reviewer of articles submitted to scientific journals (e.g. *Journal of Neuroscience*, *Behaviormetrica*) and conference proceedings (e.g. *The International Joint Conference on Neural Networks*)

Languages

English, German, Dutch, French

Research Skills

Directing teams of post-doctoral research scientists in R&D projects that focus on rehabilitative and support technologies for persons with cognitive deficits and in biorobotics, as well as for caregivers. Projects involving brain-machine interfaces utilize EEG, TMS and fNIRS, and in healthcare and research settings involve the use of fMRI and MEG. New projects that I head at the department of neuroengineering emphasize progress in neural interfaces (including novel technologies for deep-brain stimulation) and neuroprosthetics.

Theoretical and computational modeling at cognitive, system and biophysical levels. Most of my human and animal models addressed learning, memory, spatial navigation or executive decision making, with specific attention paid to the roles of brain regions in the medial temporal lobes and in the prefrontal cortex.

Through the creation of the novel NETMORPH simulation framework, I combined modeling of morphogenesis based on growth cone activity, the resulting biophysics of specific neuron morphology, and the effects of synapse location with the simulation of large-scale neuronal network dynamics.

I investigated modulatory effects and the effects of rhythmic activity and synchronization between neuronal networks in brain regions. In earlier work, I investigated learning from one-shot rapid acquisition, through working memory processes and episodic storage to long-term consolidation.

In addition to the statistical techniques of cognitive science and quantitative psychology (e.g. ANOVA, spline approximation, PCA), my experience in data analysis includes the signal analysis of multi-electrode recordings and reconstruction in serial images of neural tissue.

My early background in electrical engineering was focused on information theory, and A.I. approaches using neural networks, Bayesian networks or fuzzy logic.
(Please see my statement of research interests for more details.)

Computer Skills

Languages: C, C++, Java, MATLAB, Scheme, LISP, Pascal, Fortran, Basic, Assembler, Databases, various shell scripting languages (e.g. NEURON)

Operating Systems: Linux/Unix, Windows, Macintosh

Internet: SGML/HTML, CSS, CGI, Plone/Zope, XML

Professional Associations

Member Society for Neuroscience (SfN)

Member International Neural Networks Society (INNS)

Member Royal Netherlands Academy of Arts and Sciences (KNAW)

Member New England Complex Systems Institute (NECSI)

Committees and Service

Board member since 2008
Frontiers in Neuroscience Associate Editorial Board
Lausanne, Switzerland

Board member since 2007
Scientific Advisory Board of the InnerSpace Foundation
Boston, Massachusetts

Program Committee member 2007, 2008
Program Committee of the 2008 Conference on Artificial General Intelligence
Memphis, Tennessee

Chair, Organizing Committee
Whole Brain Emulation Social at the Annual
Meeting of the Society for Neuroscience

2007, inaugural
San Diego, California

Founding member
Society of Neural Prosthetics and Whole Brain
Emulation Science

2006 – present
Boston, Massachusetts

VP Finance
Graduate Association for Students in Psychology
(GASP)

Sept.1996 – Aug.2000
McGill University, Montreal, Canada

Chairman of Excursions
“Dispuut Infothedis” Student Association of the
Information Theory Group
student-staff relations

Jan.1994 – Dec.1995
Delft University of Technology, Delft,
Netherlands

References

Available on request

Invited Talks

Koene, R.A. (2008). Assessing the functional significance of errors and omissions by automated network reconstruction in phantom data generated with NETMORPH . Presented at the Minisymposium *High-Throughput Microscopy and Computational/Theoretical Challenges in the Analysis of Neural Circuit Structure* of the 2008 Annual Meeting of the Society for Neuroscience. November, 2008. Washington, D.C.

Koene, R.A. (2008). Neuroengineering: An intimate communication with the brain. Presented at the *Fatronik - University of Tubingen Research Retreat*. July, 2008. Fatronik. San Sebastian, Spain.

Koene, R.A., van Pelt, J. and van Ooyen, A. (2008). NETMORPH DEMO at INCF booth FENS 2008. Presented at the *6th FENS Forum of European Neuroscience*. Geneva, Switzerland.

Koene, R.A. and Hasselmo, M.E. and Stern, C. and Kahana, M. and Eichenbaum, H.B. (2008). Learning and Episodic Memory: Encoding and Retrieval. Presented at the *CELEST EASRB Meeting*. February, 2008. Center of Excellence for Learning in Education, Science, and Technology. Boston, MA.

Koene, R.A. (2008). Cognitive Facilitation and Memory Access. Presented at the *Medical Center of the University of Navarre (CIMA)*. January, 2008. Fatronik. San Sebastian, Spain.

Koene, R.A. (2007). Accessing Memory by Serial Reconstruction. Presented at the *InnerSpace Foundation Neuroengineering Meeting*. Boston, MA.

Koene, R.A. (2007). Spike timing dependent mechanisms in cortical function and the involvement of specific neuron morphology in large scale neuronal networks. Presented at the *Laboratory of Theoretical Neurobiology of the University of Antwerp*. Antwerp, Belgium.

Koene, R.A. (2007). Three challenges in whole brain neuroscience. Verifying automated reconstruction methods by generating virtual known network data. Presented at the *University of Oxford Future of Humanity Institute Whole Brain Emulation Workshop 2007*. Faculty of Philosophy and James Martin 21st Century School at Oxford. Oxford, U.K.

Koene, R.A. (2006). Scope and Resolution in Neural Prosthetics and Special Concerns for the Emulation of a Whole Brain. Presented at the *2nd Annual Workshop on Geoeethical Nanotechnology*. Lincoln, Vermont.

Koene, R.A. (2004). Short-term memory. Presented at the *2004 Annual Meeting of the Group on Action and Perception (GAP)*. London, Ontario.

Koene, R.A. (2004). Design-based modeling of neurophysiology and environment gives insight into neuronal functions of goal-directed behavior. Presented at the *Netherlands Institute for Brain Research (NIBR)*. Amsterdam, Netherlands.

Koene, R.A. (1996). The Extraction of Rules from Neural Networks with the Knowledgetron Algorithm. Presented at the *Biophysics Meeting of the University of Nijmegen*. Nijmegen, Netherlands.

Lectures

Koene, R.A. (2007). Introduction to Cognitive Psychology. Lecture series given in *course CAS PS336 in Fall 2007 at Boston University*. Boston, MA.

Koene, R.A. (2007). Computational Modeling: Neural Morphogenesis and Network Development. Lecture given at the *NEURoVERS-it Workshop on Computational Modeling*. Amsterdam, Netherlands.

Oral Presentations

Koene, R.A. (2007). Large scale high resolution network generation: Producing known validation sets for serial reconstruction methods that use histological images of neural tissue. Presented at the *International Conference on Complex Systems 2007*. Boston, MA.

Koene, R.A. (2007). NETMORPH. Presented at the *May 2007 Meeting of the Center for Neurogenomics and Cognitive Research (CNCR)*. Amsterdam, Netherlands.

Koene, R.A. and Hasselmo, M.E. (2007). A reversing buffer mechanism that enables instances of retrospective activity in hippocampal regions CA3 and CA1. Presented at the *2007 International Joint Conference on Neural Networks (IJCNN2007)*. Orlando, FL.

Koene, R.A. (2007). NETMORPH: Technical. Presented at the *Center for Neurogenomics and Cognitive Research (CNCR)*. Amsterdam, Netherlands.

Koene, R.A. and Hasselmo, M.E. (2006). Short-term buffers sustained by intrinsic spiking in the entorhinal cortex. Presented at the *Computational Cognitive Neuroscience Conference 2006*. Houston, TX.

Koene, R.A. (2006). The network generator: NETMORPH present and future. Presented at the *October 2006 Meeting of the Computational Analysis of Spatiotemporal Patterns of Activity (CASPAN) Group*. Amsterdam, Netherlands.

van Pelt, J., Koene, R.A., van Ooyen, A., Vajda, I., Uylings, H. and Ramakers, G. (2006). Modeling the development of neurons and neuronal networks. Presented at the *Modeling the Brain's Labyrinth Meeting (MoBL2006)*. Fodele Beach (Crete), Greece.

van Ooyen, A. and Koene, R.A. (2006). Models of neuronal network development. Presented at the *Workshop on Mathematical Models of Development and Learning in the Nervous System*. University of Edinburgh, UK.

Koene, R.A. and Hasselmo, M.E. (2006). Encoding episodes in a specific temporal context depends on the reduction of interference by extending representations in dentate gyrus. Presented at the *Tenth International Conference on Cognitive and Neural Systems (ICCN2006)*. Boston, Massachusetts.

Koene, R.A. (2005). Simulating fiber direction in culture and cortical layers. Presented at the *December 2005 Meeting of the Computational Analysis of Spatiotemporal Patterns of Activity (CASPA) Group*. Amsterdam, Netherlands.

Koene, R.A. and Hasselmo, M.E. (2005). Decision making with an integrate-and-fire model that encodes and retrieves temporal context in hippocampus and dentate gyrus. Presented at the *2005 Annual Meeting of the Society for Neuroscience* (author was unable to present).

Koene, R.A. (2005). Fibre to synapses to connectivity. Presented at the *September 2005 Meeting of the Computational Analysis of Spatiotemporal Patterns of Activity (CASPA) Group*. Amsterdam, Netherlands.

Koene, R.A. (2005). Improving Network Generation to Produce Structure that Resembles Data from Culture. Presented at the *May 2005 Meeting of the Computational Analysis of Spatiotemporal Patterns of Activity (CASPA) Group*. Amsterdam, Netherlands.

Koene, R.A. (2005). Simulating Activity in Large Scale Neural Networks with Spatial Detail: A Network Generation Framework. Presented at the *February 2005 Meeting of the Computational Analysis of Spatiotemporal Patterns of Activity in Neuronal Networks (CASPA) Group*. Amsterdam, Netherlands.

Koene, R.A. and Hasselmo, M.E. (2004). An integrate and fire model of minicolumns in prefrontal cortex explains selective firing of neurons during goal-directed behavior. Presented at the *2004 Annual Meeting of the Society for Neuroscience*.

Koene, R.A., Cannon, R.C. and Hasselmo, M.E. (2004). Goal directed behavior guided by the output of a spiking neuron model of prefrontal cortical function. Presented at the *Eighth International Conference on Cognitive and Neural Systems (ICCN2004)*. Boston, Massachusetts.

Koene, R.A., Cannon, R.C. and Hasselmo, M.E. (2003). Modeling delayed spatial alternation behavior in the rat using a combined model of prefrontal cortex and medial temporal episodic memory function. Presented at the *2003 Annual Meeting of the Society for Neuroscience*. 28: 584.9.

Koene, R.A., Cannon, R.C. and Hasselmo, M.E. (2003). Goal-directed spatial navigation depends on theta oscillations in hippocampal circuitry. Presented at the *International Joint Conference on Neural Networks (IJCNN2003)*. Portland, Oregon.

Koene, R.A. (2003). A multi-phase model of relational knowledge acquisition. Presented at the *Ph.D. Oral Defense*. McGill University, Montreal, Canada.

Koene, R.A., Cannon, R.C. and Hasselmo, M.E. (2002). Exploring the Virtual Rat I-IV. Presented at *Seminars of the Boston University Laboratory of Computational Neurophysiology*. Boston, Massachusetts.

Koene, R.A., Cannon, R.C. and Hasselmo, M.E. (2002). Simulation of single unit recording data in a neural simulation guiding movement of a virtual rat in a virtual environment. In *Proceedings of the 2002 Computational Neuroscience Meeting (CNS*02)*. Chicago, Illinois.

Koene, R.A., Takane, Y. and Kiers, H.A.L. (1999). Nonlinear Discriminant Component Pruning of Backpropagation Neural Networks. Presented at the *1999 St.Helene Quantitative Psychology Retreat*. St.Helene, QC, Canada.

Koene, R.A. and Takane, Y. (1998). Discriminant Component Pruning: Effective Regularization and Improved Interpretability of Back-propagation Neural Networks. Presented at the *Brain, Behavior and Cognitive Science Conference (BBCS1998)*. Carleton University, Ottawa.

Koene, R.A. (1998). Evaluating the Influence of Implementational Parameters in Networks of Spiking Neurons. Presented at *Structural Equation Models*. McGill University, Montreal.

Koene, R.A. (1998). Modeling with Spiking Neurons. Presented at *the Laboratory for Natural and Simulated Cognition*. McGill University, Montreal.

Koene, R.A. and Takane, Y. (1997). Discriminant Component Pruning and Network Interpretation. Presented at *the Laboratory for Natural and Simulated Cognition*. McGill University, Montreal.

Koene, R.A. and Takane, Y. (1997). Discriminant Component Pruning. Presented at *the Laboratory for Natural and Simulated Cognition*. McGill University, Montreal.

Poster Presentations

Postma, F., Koene, R.A., van Pelt, J. and van Ooyen, A. (2008). NETMORPH: a framework for the stochastic generation of large scale neuronal networks with realistic morphology. *Frontiers in Neuroinformatics. Conference Abstract: Neuroinformatics 2008*. doi: 10.3389/conf.neuro.11.2008.01.089. INCF. Stockholm, Sweden.

Koene, R.A. and Hasselmo, M.E. (2007). Biophysical simulation of mechanisms for a persistent firing buffer that is based on intrinsic currents of entorhinal pyramidal cells. Presented at the *2007 Annual Meeting of the Society for Neuroscience*. San Diego, CA.

Koene, R.A., van Pelt, J. and van Ooyen, A. (2007). Stochastic neuronal morphogenesis and network development with NETMORPH. Presented at the *NWO Computational Life Sciences Meeting 2007*. Utrecht, Netherlands.

Koene, R.A. and Hasselmo, M.E. (2007). Hippocampal activity may depend on multiple sequence buffers with specific characteristics in layer II of entorhinal cortex. Presented at the *Eleventh International Conference on Cognitive and Neural Systems*.

Koene, R.A. and Hasselmo, M.E. (2006). A model of reverse reactivation of episodic activity in the hippocampus during idle awake periods. Presented at the *2006 Annual Meeting of the Society for Neuroscience*.

Koene, R.A., Green, N., Ramakers, G., van Pelt, J. and van Ooyen, A. (2006). Scope and resolution, simulating large scale neuronal networks to study the effect of morphological detail on emergent large scale patterns of activity. *Presented at the NINDS Neural Interfaces Workshop 2006 (The 37th Annual Neural Prosthesis Workshop)*. Bethesda, Maryland.

Cannon, R.C., Koene, R.A. and Hasselmo, M.E. (2006). Modelling neural systems with Catacomb3. *Neurocomputing (supplement), Fifteenth Annual Computational Neuroscience Meeting CNS*2006*. Edinburgh, U.K.

Koene, R.A and Green, N. and Ramakers, G. and van Pelt, J. and van Ooyen, A. (2006). A framework for the generation of large scale neuronal networks with realistic morphology by applying stochastic growth models. Presented at the *Fifth Dutch Endo-Neuro-Psycho Meeting (ENP2006)*.

Koene, R.A and Hasselmo, M.E. (2006). An integrate-and-fire model of temporal context specific episodic encoding and retrieval in the hippocampal formation. Presented at the *Computational and Systems Neuroscience (COSYNE) Meeting 2006*.

Koene, R.A and Hasselmo, M.E. (2005). An integrate and fire neuron model of short-term memory with ordered replacement of spike patterns. Presented at the *Ninth International Conference on Cognitive and Neural Systems*.

Koene, R.A. (2005). An automated method for the generation of connections in a simulated cultured neuronal network with fibre specificity. Presented at the *2005 Computational Life Sciences Meeting of the Netherlands Organization for Scientific Research (NWO)*. Utrecht, Netherlands.

McGaughy, J.A. and Koene, R.A., Eichenbaum, H.B. and Hasselmo, M.E. (2004). Effects of cholinergic deafferentation of prefrontal cortex on working memory: A convergence of behavioral and modeling results. Presented at the *2004 Annual Meeting of the Society for Neuroscience*.

Koene, R.A, Cannon, R.C. and Hasselmo, M.E. (2004). Goal directed behavior guided by an integrate and fire model of mechanisms in prefrontal cortex. Presented at the *Annual Meeting of the Boston University Center for Memory and Brain*.

Koene, R.A, Cannon, R.C. and Hasselmo, M.E. (2003). Three important roles of theta oscillations in a model of goal-directed spatial navigation. Presented at the *Seventh International Conference on Cognitive and Neural Systems*.

Koene, R.A., Cannon, R.C. and Hasselmo, M.E. (2002). The importance of theta oscillations in rat hippocampal circuitry for goal-directed spatial navigation. Presented at the *2002 Annual Meeting of the Society for Neuroscience*.

Koene, R.A. (2001). Attentional Highlighting and Neuron Recruitment in the Transfer of Memories from Sparse Hippocampal to Dense Neocortical Encoding. Presented at the *Fifth International Conference on Cognitive and Neural Systems*.