



Randal A. Koene

randal.a.koene@gmail.com

Randal A. Koene	1
Experience	2
Education	5
Publications	6
Peer Reviewed Publications	6
Neuroscience and Neural Engineering	6
Artificial Intelligence	9
Dissertations	10
Invited Talks	10
Interviews and Appearances	12
Lectures	13
Oral Presentations	13
Poster Presentations	16
Awards and Honors	18
Special Skills	19
Languages	20
Research Skills	20
Computer Skills	21
Professional Associations	21
References	21

Experience

Professional, Research & Teaching



Kernel (kernel.co)

Science Lead

October 2015 - August 2017 (includes activity prior to official founding)
Los Angeles

Founding science lead. Directed technical strategy, technical hiring and managed technical team activities before & during founding and early stage of the neurotechnology company.



OS Fund

Venture Modeling & Due Diligence Consulting

February 2014 - September 2015
Los Angeles / San Francisco

Developed the OS Playbook VC modeling method for the fund's due diligence on science-heavy tech ventures. Venture Capital consulting, applying Decision Analysis modeling method to individual investments and portfolios. Carried out due diligence on candidate investments for the fund in scientific/technical fields (synthetic biology, neurotechnology, etc).

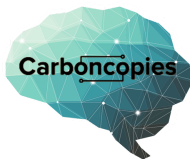


2045 Initiative

Science Director

May 2012 - present
San Francisco / New York

Directed scientific strategy and scientific collaborations of the initiative, architect and lead of scientific component of Global Futures 2045 Congress.



Carboncopies Foundation

Founder & Chairman

May 2010 - present
San Francisco

Carboncopies is a 501(c)(3) nonprofit organisation with the goal to advance the reverse engineering of neural tissue and complete brains, whole brain emulation, and development of neural prostheses that reproduce functions of mind in a substrate-independent manner.



Halcyon Molecular
Director of Analysis
May 2010 - March 2012
Redwood City, CA

Directed early-stage analysis department. Computer modeling, machine learning and artificial vision for the identification of DNA base markers in electron microscope images.



Tecnalia Research and Innovation
Director of Department of Neuroengineering
September 2008 - May 2010
San Sebastian, Spain

Architected, hired and directed the department of neuroengineering at Fatronik-Tecnalia. Managed research projects.



Boston University, Center for Memory and Brain
Research Assistant Professor
2007 - 2008
Postdoctoral Researcher
2001 - 2006
Boston

Computational neuroscience, modeling of mechanisms and neurophysiology responsible for memory function (short-term, working memory, LTP/LTD, long-term) in hippocampus, medial temporal lobes and reinforcement learning in the prefrontal cortex.



*VU University Medical Center - Neuroscience Campus Amsterdam
& Netherlands Institute for Neuroscience of the Royal Netherlands
Academy of Arts and Sciences*
Research Scientist
2004 - 2008
Amsterdam, Netherlands

Computational neuroscience research, modeling the outgrowth of neurons and the formation of neuronal networks, as part of the EU project CASPAN.



Boston University

Lecturer CAS PS336 Introduction to Cognitive Psychology

Fall 2007, Spring 2008

Lecturer Neural Models of Memory and Spatial Navigation (series)

December 2003, April 2006

Boston



McGill University, Department of Psychology

Teaching Assistant, Statistics for Experimental Design

1996 - 1997, 2000 - 2001

Montreal, Canada



Delft University of Technology, Electrical Engineering Department

Teaching Assistant, Software Engineering in Scheme/LISP

1994 - 1995

Teaching/Lab Assistant, Introductory Electronics Lab Course

1994

Delft, The Netherlands

Advising & Consulting



NeuroMem, Inc.

Scientific Advisor

August 2017 - present

Scientific advice and consultation to the neuromorphic chip company.



General Vision, Inc.

Scientific Advisor

April 2015 - present

San Francisco Bay Area

Scientific advice and consultation to the artificial intelligence company.



Brain Preservation Foundation

Scientific Advisor

Scientific advice and consultation to the 501(c)(3) nonprofit organization administering the Brain Preservation Prizes for the perfection of human brain preservation techniques.

Innerspace Foundation
Scientific Advisor
2008 - 2009

Education



McGill University

Doctor of Philosophy (Ph.D.), Computational Neuroscience
1996-2001

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



Delft University of Technology

Master's Degree, Electrical Engineering (Information Theory, AI)
1991-1996

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



University of Amsterdam

Physics
1989-1991

Publications

Peer Reviewed Publications

Neuroscience and Neural Engineering

Wiley, K.B. and Koene, R.A. (2015). [The Fallacy of Favoring Gradual Replacement Mind Uploading Over Scan-and-Copy](#). *Institute for Ethics and Emerging Technologies*. May 2, 2015.

And in *Journal of Consciousness Studies* 23(3-4):212-235.

And in SSRN.

Preprint at arXiv: <https://arxiv.org/abs/1504.06320>

Deca, D. and Koene, R.A. (2014). [Experimental enhancement of neurophysiological function](#). *Frontiers in Systems Neuroscience*, vol.8, p.189. <https://doi.org/10.3389/fnsys.2014.00189>

Koene, R.A. (2014). [Feasible Mind Uploading](#). In *Intelligence Unbound: The Future of Uploaded and Machine Minds*. Eds. Blackford, R. and Broderick, D. Wiley-Blackwell, Oxford, UK. [\[PDF \(149K\)\]](#)

Original title: System Identification: The foundation of modern science and the core of feasible mind uploading

Koene, R. A. (2014). [Methodical Support for Informational Analysis of Mind: A Review of Igor Aleksander's and Helen Morton's—"Aristotle's Laptop: The Discovery of Our Informational Mind"](#).

International Journal of Machine Consciousness, 6(01), 41-43.

Koene, R. A. (2014) [How should humanity steer the future? Humanity must benefit the thriving of its constituents!](#). *Future of Life Institute Essay Contest 2014*.

Koene, R.A. (2013). [Global Future 2045: Towards a New Strategy for Human Evolution](#). A Review of the 2013 Congress in New York City.

Koene, R.A., Eds. (2013). [Congress Proceedings & Transcripts of Global Future 2045: Towards a New Strategy for Human Evolution](#), Lincoln Center, New York City, June 2013.

Koene, R.A. (2013). [Whole Brain Emulation: Reverse Engineering a Mind](#). *Global Future 2045: Towards a New Strategy for Human Evolution, Congress Proceedings*. Lincoln Center, New York City, June 2013

Koene, R.A. and Deca, D., Eds. (2013). [Brain Emulation and Connectomics, a convergence of Neuroscience and Artificial General Intelligence](#). *Special Issue of the Journal of Artificial General Intelligence*. Vol. 4:3, Dec 2013.

- Koene, R.A. and Deca, D. (2013). [Editorial: Whole Brain Emulation seeks to Implement a Mind and its General Intelligence through System Identification](#). *Special Issue of the Journal of Artificial General Intelligence*. Vol. 4:3. <https://doi.org/10.2478/jagi-2013-0012>
- Koene, R. A. (2013). [Uploading to Substrate-Independent Minds](#). *The transhumanist reader: Classical and contemporary essays on the science, technology, and philosophy of the human future*, 146-156.
- More, M., Koene, R. A., Rothblatt, M., Andrews, W. H., Kekich, D., Armstrong, R., ... & Prisco, G. (2013). *Longevitize!: Essays on the Science, Philosophy & Politics of Longevity*. Center for Transhumanity.
- Koene, R.A. (2012). [Fundamentals of Whole Brain Emulation: State, Transition and Update Representations](#). *Special Issue of the International Journal on Machine Consciousness*. Vol.4(1), doi: 10.1142/S1793843012500023. [[PDF \(3900K\)](#)]
- Koene, R.A. (2012). [Experimental Research in Whole Brain Emulation: The Need for Innovative In-Vivo Measurement Techniques](#). *Special Issue of the International Journal on Machine Consciousness*. Vol.4(1), doi: 10.1142/S1793843012500047. [[PDF \(5700K\)](#)]
- Koene, R.A. (2012). [Mind transfer: human brains in different materials](#). *New Scientist*. 24 Oct., 2012. [[preprint PDF](#)]
French version: [Transférer l'esprit humain et le faire évoluer dans d'autres milieux](#)
- Koene, R. A. (2012). [How to copy a brain](#). *New Scientist*, 216(2888), 26-27.
- Koene, R.A. (2012). [Substrate-Independent Minds](#). *Issues Magazine*, No. 98, March 2012. [[PDF](#)]
- Koene, R.A. (2012). [A Window of Opportunity](#). In *H+ Magazine*. May, 2012. [[HTML](#)]
[Critical Thought version](#), May 13, 2012.
- Koene, R.A. (2012). [Embracing competitive balance: The case for substrate-independent minds and whole brain emulation](#). In *The Singularity Hypothesis: A Scientific and Philosophical Assessment*. Eds. Eden, A., Søraker, J., Moor, J., and Steinhart, E. Springer, New York, NY. [[PDF \(362K\)](#)]
- Koene, R.A. (2012). [On Bray's "Brain versus Machine"](#). In *The Singularity Hypothesis: A Scientific and Philosophical Assessment*. Amnon Eden, Johnny Søraker, Jim Moor, and Eric Steinhart (Eds), Springer.
- Koene, R.A. (2011). [Achieving substrate-independent minds: no, we cannot 'copy' brains](#). *Kurzweil Artificial Intelligence*, August 24, 2011.
- Koene, R.A. (2011). [Pattern survival versus gene survival](#). *Kurzweil Artificial Intelligence*, February 11, 2011.
- Oses, N., Hoffmann, M. and Koene, R.A. (2010). [Embodied moving target seeking with prediction and planning](#). In *Proceedings of the 5th International Conference on Hybrid Artificial Intelligence Systems (HAIS2010)*. June, 2010. San Sebastian, Spain. [[PDF \(437K\)](#)]

Koene, R.A. and Hasselmo, M.E. (2009). [Hippocampus: Computational models](#). In the *New Encyclopedia of Neuroscience*, Academic Press, pp.1137-1142. DOI: 10.1016/B978-008045046-9.00768-3 [[preprint PDF \(348K\)](#)]

Koene, R.A., Tijms, B., van Hees, P., Postma, F., de Ridder, S., Ramakers, G., van Pelt, J. and van Ooyen, A. (2009). [NETMORPH: A framework for the stochastic generation of large scale neuronal networks with realistic neuron morphologies](#). *Neuroinformatics*. Vol.7(3), pp.195-210. Neuroinformatics Advanced Access published on August 12, 2009, doi: 10.1007/s12021-009-9052-3. [[PDF \(978K\)](#)]

Nijboer, F., Hoffmann, U., Morin, F., Carmien, S., Leon, E. and Koene, R.A. (2009). [Affective Brain-Computer Interfaces: Psychophysiological Markers of Emotion in Healthy People and People with Amyotrophic Lateral Sclerosis](#). In *Proceedings of the Workshop on Affective Brain-Computer Interfaces & IEEE International Workshop on Social Signal Processing ABCI 2009*. Vol.II, pp.1-11. [[PDF \(2046K\)](#)]

Carmien, S., Cavallaro, F. and Koene, R.A. (2009). ['Senior Moments': Loss and Context](#). In *Proceedings of the 2nd International Conference on Pervasive Technologies Related to Assistive Environments (PETRA09)*. Workshop on 'Affect and Behavior Related Assistance in Support for the Elderly'. [[PDF \(55K\)](#)]

Koene, R.A. (2009). [Assessing the Abstraction Level for Neuroprosthesis: Proposing a Comparison of Functional Simulations in Neuronal Circuitry Generated to Resemble Large-Scale High-Resolution Reconstructions](#). In *NER '09. 4th International IEEE/EMBS Conference on Neural Engineering*, pp.92-95, doi: 10.1109/NER.2009.5109242. [[PDF \(1069K\)](#)]

Koene, R.A. and Hasselmo, M.E. (2008). [Reversed and forward buffering of behavioral spike sequences enables 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 [[PDF \(2239K\)](#)]

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. [[PDF \(984K\)](#)]

Koene, R.A. and Hasselmo, M.E. (2008). [Connectionist Memory Models of Hippocampal Function](#). In *Learning and Memory: A Comprehensive Reference*. Byrne, J.H. (Ed.), Oxford: Academic Press, pp.681-700. ISBN 978-0-12-370509-9. [[preprint PDF \(1037K\)](#)]

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. [[preprint PDF \(1305K\)](#), [free-access URL at Cerebral Cortex](#)]

Also note Dave Touretsky's [reimplementation of our algorithms](#).

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)*. [[preprint PDF \(642K\)](#)]

Koene, R.A. (2006). Scope and Resolution in Neural Prosthetics and Special Concerns for the Emulation of a Whole Brain. *Journal of Geoethical Nanotechnology*.1(4).

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)*. [[preprint PDF \(601K\)](#), [Powerpoint \(1116K\)](#), [presentation notes PDF \(129K\)](#), [AVI movie \(102K\)](#), [AVI movie \(121K\)](#)]

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. [[PDF \(532K\)](#)]

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.) [[preprint PDF \(875K\)](#)]

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 [[PDF \(575K\)](#), [preprint PDF \(580K\)](#)]

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. [[PDF \(842K\)](#)]

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)*. [[PDF \(372K\)](#)]

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. [[compressed postscript \(246K\)](#)]

Artificial Intelligence

Koene, R.A. (2014). [Methodical Support for Informational Analysis of Mind: A Review of Igor Aleksander's and Helen Morton's "Aristotle's Laptop: The Discovery of Our Informational Mind"](#). *International Journal of Machine Consciousness*. Vol 6:1, pp.41-43, doi: 10.1142/S179384301440006X [[PDF \(68K\)](#)]

Koene, R.A. (2012). [Toward Tractable AGI: Challenges for System Identification in Neural Circuitry](#). *Artificial General Intelligence, Lecture Notes in Computer Science* Vol. 7716, pp 136-147. (*Proceedings of the 5th International Conference on Artificial General Intelligence (AGI) 2012*. Oxford, UK. December 2012.) [[PDF \(934K\)](#), [presentation slides](#), [AGI-12 web site](#)]

Koene, R.A. (2012). [Emulation versus Understanding: A response to Dennis Bray "Brain versus Machine"](#). In *The Singularity Hypothesis: A Scientific and Philosophical Assessment*. Eds. Eden, A., Søraker, J., Moor, J., and Steinhart, E. Springer, New York, NY. [[PDF \(71K\)](#)]

Koene, R.A. (2011). [AGI and Neuroscience: Open Sourcing the Brain](#). Presented at *the Fourth Conference on Artificial General Intelligence (AGI2011)*. August, 2011. Mountain View, CA. [[PDF \(146K\)](#)]
Reduced version in *Proceedings of the Fourth Conference on Artificial General Intelligence (AGI2011)* [[PDF \(39K\)](#)]

Bleloch, A., Own, C., Hamalainen, M., Hershleb, J., Kemmish, K., Koene, R., Stark, H., Stark, J., Andregg, M., and Andregg, W. (2011). DNA Sequencing by Electron Microscopy, *Microscopy and Microanalysis* 17(S2):1274-1275, DOI:10.1017/S1431927611007240

Carmien, S. and Koene, R.A. (2009). [Distributed Intelligence and Scaffolding in Support of Cognitive Health](#). In *Proceedings of the 3rd International Conference on Human-Computer Interaction (HCI 09) in the parallel session 'Cognitive Accessibility and Cognitive Support' in the 5th International Conference on Universal Access in Human-Computer Interaction (UAHCI)*. Vol.5614, pp.334-343. [[PDF \(979K\)](#)]

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. [[PDF \(346K\)](#)]

Dissertations

Koene, R.A. (2001). *Functional requirements determine relevant ingredients to model for on-line acquisition of context dependent memory*. Ph.D. thesis, McGill University, Montreal, Canada. [reprint with additional resources [PDF \(1879K\)](#)]

Koene, R.A. (1995). *Extracting Knowledge in Terms of Rules from Trained Neural Networks*. M.Sc. thesis, Delft University of Technology, Delft, The Netherlands. [[compressed postscript \(315K\)](#)]

Invited Talks

Koene, R.A. (2012). [Machines in Minds to Reverse Engineer the Machine that is Mind](#). Presented at TEDxTallinn 2012. May, 2012. Tallinn, Estonia. [[Presentation Video + Slides](#)]

Koene, R.A. (2010). [Whole Brain Emulation: Issues of scope and resolution, and the need for new methods of in-vivo recording](#). Presented at the Third Conference on Artificial General Intelligence (AGI2010). March, 2010. Lugano, Switzerland. [[Presentation PDF \(1425K\)](#)]

Koene, R.A. (2010). [Neural mechanisms of reinforcement learning: How spreading activity in the prefrontal cortex can implement RL for goal-directed tasks](#). Presented at the Third Conference on Artificial General Intelligence (AGI2010). March, 2010. Lugano, Switzerland. [[Presentation PDF \(1281K\)](#)]

Koene, R.A. (2009). [The time is now: As a species and as individuals we need whole brain emulation](#). Presented at the Singularity Summit 2009. October, 2009. New York, NY. [[abstract PDF \(64K\)](#), [Powerpoint \(24541K\)](#), [PDF \(8654K\)](#), [video stream](#)]

Koene, R.A. (2009). [From Wheelchairs to Neural Interfaces in a Virtual Brain Laboratory](#). Presented at the Center for Adaptive Neural Systems Symposium on *Co-Adaptive Learning: Adaptive Technology for the Aging* (ANS2009). January, 2009. Tempe, AZ. [[Powerpoint presentation \(56532K\)](#), [PDF presentation \(3110K\)](#)]

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. [[lay-language summary PDF \(53K\)](#), [Powerpoint \(53390K\)](#), [PDF \(2211K\)](#)]

Koene, R.A. (2008). [2nd Whole Brain Emulation Social of the Society for Neural Prosthetics and Whole Brain Emulation Science](#). Presented at the *InnerSpace Foundation Satellite Symposium at {SFN2008}*. November, 2008. Washington, D.C. [[Powerpoint \(2473K\)](#), [PDF \(528K\)](#)]

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. [[compressed archive \(4698K\)](#), [AVI movie \(42142K\)](#), [AVI movie \(1773K\)](#), [Word File \(364K\)](#)]

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. [[compressed archive \(4735K\)](#)]

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. [[Powerpoint \(9742K\)](#)]

Koene, R.A. (2008). [Cognitive Facilitation and Memory Access](#). Presented at the *Medical Center of the University of Navarre (CIMA)*. January, 2008. Pamplona, Spain. [[Powerpoint \(192660K\)](#)]

Koene, R.A. (2007). [Accessing Memory by Serial Reconstruction](#). Presented at the *InnerSpace Foundation Neuroengineering Meeting*. Boston, MA. [[directory \(315296K\)](#)]

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. [[Powerpoint \(15469K\)](#), [PDF \(2979K\)](#)]

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. [[Powerpoint \(12584K\)](#)]

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 Geoethical Nanotechnology*. Terasem Green Mountain Center Retreat, Lincoln, Vermont. [[compressed Powerpoint \(4568K\)](#), [compressed narrated Powerpoint \(8276K\)](#), [PDF \(4814K\)](#), [presentation text RTF \(55K\)](#), [video stream](#)]

Koene, R.A. (2004). Short-term memory. Presented at the *2004 Annual Meeting of the Group on Action and Perception (GAP)*. London, Ontario. [[presentation PDF \(K\)](#), [compressed presentation postscript \(K\)](#), [Powerpoint \(4157K\)](#), [notes PDF \(K\)](#)]

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. [[presentation PDF \(10898K\)](#), [compressed presentation postscript \(3504K\)](#), [Powerpoint \(1475K\)](#), [movie 1 MPG \(304K\)](#), [movie 2 AVI \(236K\)](#), [notes plain text \(1K\)](#)]

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.

Interviews and Appearances

Piore, A. (2014). [The Neuroscientist Who Wants To Upload Humanity To A Computer](#). *Popular Science*, Issue May 2014.

Muelhauser, L. (2014). [Randal Koene on whole brain emulation](#). *Machine Intelligence Research Institute*, March 20, 2014.

Koene, R.A. interviewed by Krueel, A. (2013). [Randal Koene On Cryonics](#). Krueel.Co, January 16, 2013. [[PDF \(316K\)](#)]

Koene, R.A. (2012). [SIM, Emulation, Structure & Function](#). Interview by Adam Ford at Fitzroy Gardens, Melbourne, Singularity Summit Australia 2012.

Koene, R.A. interviewed by Goertzel, B. (2011). [Randal Koene on Substrate-Independent Minds](#). *H+ Magazine*. August 31, 2011. [[PDF \(1251K\)](#)]

Koene, R.A. (2011). [Achieving substrate-independent minds: no, we cannot 'copy' brains](#). *KurzweilAI.net*. 24 August, 2011. [[PDF \(999K\)](#)]

Koene, R.A. interviewed by Olson, S. (2011). [Are substrate-independent minds possible?](#) *NextBigFuture.com*. August 22, 2011. [[PDF \(2067K\)](#)]

Koene, R.A. (2011). [Pattern survival versus Gene survival](#). *KurzweilAI.net*. 11 February, 2011. [[PDF \(152K\)](#)]

Koene, R.A. appearance in article by Halpern, D. (2009). [About the Singularity](#). *GQ Magazine*. New York, NY.

Koene, R.A. interviewed by Loew, J. (2009). [All about neural prostheses, mind uploading, and brain emulation](#). *Sunday Evening Update* of Immlnst.org. October 25, 2009. [[video stream](#)]

Koene, R.A. appearance in article by Rein, L. (2009). [Singularity Summit - Anders Sandberg and Randal Koene On Whole Brain Emulation](#). *H+ Magazine, Editor's Blog*. San Jose, CA. [[PDF \(165K\)](#)]

Koene, R.A. interviewed by Orban, D. (2009). [Randal Koene on Whole Brain Emulation](#). *DavidOrban.com*. [[video stream](#)]

Koene, R.A. interviewed (2009). [About the Department of Neuroengineering in the Health Unit of the Tecnalia Research Centers](#). *La Razon* (newspaper, Spanish). Madrid, Spain.

Koene, R.A. interviewed by Zucca, K. (1997). [Losing your mind? Upload your brain and gain eternal life](#). *The Link* (newspaper). Montreal: Concordia University. [[PDF \(88K\)](#)]

Koene, R.A. interviewed by Mesley, W. and Harbron, A. (1996). [Wired Flesh](#). *Undercurrents* on CBC Television. November 29, 1996. Montreal, Canada.

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. (2009). [Obtaining in-vivo dynamic state and post-mortem neuronal circuit structure at large scale and high resolution](#). Presented at the *Thirteenth International Conference on Cognitive and Neural Systems (ICCNS2009)*. Boston, MA. [[abstract PDF \(46K\)](#), [Powerpoint \(53546K\)](#), [PDF \(1767K\)](#)]

Koene, R.A., Postma, F., van Pelt, J. and van Ooyen, A. (2008). [Stochastic generation of large scale neuronal networks for the study of structural change in neuronal cell cultures and slice](#). Presented at the *July 2008, Review Meeting of Neurovers-IT (Marie-Curie Program)*. Amsterdam, Netherlands. [[Powerpoint \(27671K\)](#), [PDF \(5911K\)](#), [presentation notes PDF \(1847K\)](#)]

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. [[Powerpoint \(14801K\)](#), [PDF \(32K\)](#)]

Koene, R.A. (2007). [NETMORPH](#). Presented at the *May 2007 Meeting of the Center for Neurogenomics and Cognitive Research (CNCR)*. Amsterdam, Netherlands. [[Powerpoint \(5676K\)](#), [PDF \(4060K\)](#), [notes PDF \(496K\)](#)]

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. [[Powerpoint \(952K\)](#), [PDF \(1039K\)](#), [preprint PDF \(642K\)](#)]

Koene, R.A. (2007). [NETMORPH: Technical](#). Presented at the *Center for Neurogenomics and Cognitive Research (CNCR)*. Amsterdam, Netherlands. [[Powerpoint \(121K\)](#)]

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. [[Powerpoint \(???\)K](#), [abstract PDF \(???\)K](#), [poster PDF \(???\)K](#)]

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 (CASPAR) Group*. Amsterdam, Netherlands. [[Powerpoint \(2380K\)](#), [PDF \(3413K\)](#)]

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. [[abstract RTF \(18K\)](#)]

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. [[...abstract PDF \(?\)K...](#)], [[...presentation PDF \(?\)K...](#)], [[...Powerpoint \(?\)K...](#)]

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. [[abstract PDF \(48K\)](#), [presentation PDF \(301K\)](#), [Powerpoint \(755K\)](#), [presentation text PDF \(87K\)](#), [explanation PDF \(75K\)](#)]

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 (CASPAR) Group*. Amsterdam, Netherlands. [[Powerpoint \(9314K\)](#), [PDF \(4168K\)](#)]

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). [[abstract PDF \(40K\)](#) *Society for Neuroscience Abstracts*, [Powerpoint \(501K\)](#), [PDF \(1876K\)](#)]

Koene, R.A. (2005). [Fibre to synapses to connectivity](#). Presented at the *September 2005 Meeting of the Computational Analysis of Spatiotemporal Patterns of Activity (CASPAR) Group*. Amsterdam, Netherlands. [[Powerpoint \(3703K\)](#), [PDF \(1222K\)](#)]

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 (CASPAR) Group*. Amsterdam, Netherlands. [[Powerpoint \(8141K\)](#)]

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 (CASPAN) Group*. Amsterdam, Netherlands. [[compressed presentation PDF \(3166K\)](#), [Powerpoint \(4786K\)](#)]

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*. [[abstract PDF \(41K\)](#) *Society for Neuroscience Abstracts*, [Powerpoint \(958K\)](#), [compressed presentation postscript \(1548K\)](#), [compressed presentation notes postscript \(29K\)](#), [presentation notes PDF \(30K\)](#)]

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 (ICCNS2004)*. Boston, Massachusetts. [[abstract PDF \(30K\)](#), [compressed postscript \(-pending-K\)](#), [Powerpoint \(347K\)](#)]

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. [[abstract PDF \(35K\)](#) *Society for Neuroscience Abstracts*, [presentation PDF \(269K\)](#), [compressed presentation postscript \(367K\)](#), [Powerpoint \(631K\)](#), [movie 1 MPG \(304K\)](#), [movie 2 AVI \(236K\)](#), [notes RTF \(18K\)](#)]

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. [[PDF \(1014K\)](#), [Powerpoint file \(1012K\)](#)]

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

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. [[PDF \(784K\)](#), [abstract PDF \(342K\)](#)]

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. [[PDF \(33K\)](#), [abstract PDF \(16K\)](#), [compressed abstract postscript \(12K\)](#)]

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. [[compressed postscript \(105K\)](#)]

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. [[compressed postscript \(90K\)](#)]

Koene, R.A. (1998). Evaluating the Influence of Implementational Parameters in Networks of Spiking Neurons. Presented at *Structural Equation Models*. McGill University, Montreal. [[compressed postscript \(10K\)](#)]

Koene, R.A. (1998). [Modeling with Spiking Neurons](#). Presented at *the Laboratory for Natural and Simulated Cognition*. McGill University, Montreal. [[compressed postscript \(18K\)](#)]

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. [[compressed postscript \(91K\)](#)]

Koene, R.A. and Takane, Y. (1997). [Discriminant Component Pruning](#). Presented at *the Laboratory for Natural and Simulated Cognition*. McGill University, Montreal. [[compressed postscript \(25K\)](#)]

Poster Presentations

Koene, R.A. (2009). [Neuroprosthetic emulation: What data is needed to replicate accurate personal brain function?](#) Presented at the *2009 Annual Meeting of the Society for Neuroscience. 2009 Neuroscience Meeting Planner*. Program No. 389.13. Chicago, IL: Society for Neuroscience, 2009. Online. [[abstract PDF \(152K\)](#)] *Society for Neuroscience Abstracts*

Estep, P. and Koene, R.A. (2009). [The roles of real-world corroborative audiovisual data in brain reverse engineering](#). Presented at the *2009 Annual Meeting of the Society for Neuroscience. 2009 Neuroscience Meeting Planner*. Program No. 389.11. Chicago, IL: Society for Neuroscience, 2009. Online. [[abstract PDF \(154K\)](#)] *Society for Neuroscience Abstracts*

Nijboer, F., Halder, S., Furdea, S.A., Kleih, S.C., Koene, R.A. and Kubler, A. (2009). [The effect of monetary reward and stimulus modality on motivation and performance in a Brain-Computer Interface paradigm based on event-related potentials](#). Presented at the *2009 Annual Meeting of the Society for Neuroscience. 2009 Neuroscience Meeting Planner*. Program No. 289.14. Chicago, IL: Society for Neuroscience, 2009. Online. [[abstract PDF \(158K\)](#)] *Society for Neuroscience Abstracts*

Koene, R.A. (2009). [Using NETMORPH tools to teach neural and brain development](#). Presented at the *2009 Annual Meeting of the Society for Neuroscience. 2009 Neuroscience Meeting Planner*. Program No. 23.13. Chicago, IL: Society for Neuroscience, 2009. Online. [[abstract PDF \(152K\)](#)] *Society for Neuroscience Abstracts*

Koene, R.A. (2009). [Toward a Virtual Brain Laboratory: Applications of NETMORPH](#). *Frontiers in Neuroinformatics. Conference Abstract: 2nd INCF Congress of Neuroinformatics*. Doi: 10.3389/conf.neuro.11.2009.08.107. Pilsen, Czech Republic. [[abstract PDF \(285K\)](#)]

van Pelt, J., de Ridder, S., Hoedemaker, S., Postma, F., Koene, R. and van Ooyen, A. (2009). [Emerging synaptic connectivity in simulated networks of outgrowing neurons with realistic morphologies using NETMORPH](#). *Frontiers in Neuroinformatics. Conference Abstract: 2nd INCF Congress of Neuroinformatics*. Doi: 10.3389/conf.neuro.11.2009.08.040. Pilsen, Czech Republic. [[abstract PDF \(285K\)](#)]

- de Ridder, A., van Ooyen, A., Postma, F., Hoedemaker, S., Koene, R.A. and van Pelt, J. (2009). [Simulated Networks with Realistic Neuronal Morphologies show Small-World Connectivity](#). *BMC Neuroscience, Proceedings of the Eighteenth Annual Computational Neuroscience Meeting CNS*2009*. Vol. 10(supp.1), P5, Paper no.196. Berlin, Germany. [[abstract PDF \(546K\)](#), [preprint PDF \(319K\)](#)]
- Koene, R.A. (2009). [Neuroengineering in alzheimer's disease research: using a virtual brain laboratory](#). Presented at the *Alzheimer's Association 2009 International Conference on Alzheimer's Disease (ICAD2009)*. Vienna, Austria. [[abstract PDF \(72K\)](#), [poster PDF \(1377K\)](#)]
- Koene, R.A. (2009). [Creating a Culture of Cognitive Health](#). Presented at the *31st Annual Conference of the Cognitive Science Society*. Amsterdam, The Netherlands. [[abstract PDF \(86K\)](#)]
- Koene, R.A. and Hasselmo, M.E. (2008). [One-shot method of buffering novel spatial content that enables sweeps at choice points during reward-directed navigation](#). Presented at the *2008 Annual Meeting of the Society for Neuroscience*. Washington, DC. [[abstract PDF \(34K\)](#)] *Society for Neuroscience Abstracts*, [poster PDF \(696K\)](#)
- 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. [[abstract PDF \(78K\)](#), [poster PDF \(?K\)](#)]
- Koene, R.A., van Pelt, J. and van Ooyen, A. (2008). [Stochastic generation and analysis of large scale neuronal networks with realistic morphology using NETMORPH](#). Presented at the *6th FENS Forum of European Neuroscience*. Geneva, Switzerland. [[abstract PDF \(36K\)](#), [poster PDF \(14093K\)](#)]
- 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. [[abstract PDF \(33K\)](#)] *Society for Neuroscience Abstracts*, [[poster PDF \(1178K\)](#)]
- 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. [[poster PDF \(3959K\)](#), [compressed poster PDF \(1477K\)](#)]
- 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*. [[abstract PDF \(36K\)](#), [compressed poster PDF \(1477K\)](#)]
- 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*. [[abstract PDF \(33K\)](#)] *Society for Neuroscience Abstracts*, [[poster PDF \(1267K\)](#), [poster references PDF \(34K\)](#)]
- 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. [[abstract PDF \(38K\)](#), [poster PDF \(365K\)](#)]

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*. [[abstract PDF \(55K\)](#), [compressed poster PDF \(667K\)](#)]

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*. [[abstract PDF \(38K\)](#), [compressed poster PDF \(1245K\)](#)]

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. [[poster PDF \(619K\)](#) [compressed flash presentation PDF \(306K\)](#)]

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*. [[abstract compressed postscript \(13K\)](#)] *Society for Neuroscience Abstracts*, [[poster PDF \(1828K\)](#)]

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*. [[poster PDF \(525K\)](#)]

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*. [[abstract PDF \(36K\)](#), [compressed poster PDF \(426K\)](#)]

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*. [[abstract PDF \(35K\)](#)] *Society for Neuroscience Abstracts*, [[poster PDF \(561K\)](#)]

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*. [[compressed abstract postscript \(12K\)](#), [compressed poster postscript \(88K\)](#)]

Awards and Honors

Marie Curie Fellowship, 2007, European Commission Grant MRTN-CT-2005-019247, "NEURoVERSit"

Max Stern Recruitment Fellowship, 1996–1999

Magna Cum Laude, 1995

Special Skills

Technology startup founding and early-stage sci-tech team leadership, management, talent acquisition (Kernel)

Special-purpose chip design for implantable neurotechnology (Kernel)

Software architecting and engineering, software team leadership (Kernel)

Venture Capital due diligence and fund modeling (OS Fund, The OS Playbook)

Congress organization and production (GF2045 New York)

Public speaking and lectures (TEDx, Carboncopies)

Founding an leadership of 501(c)(3) nonprofit organization (Carboncopies Foundation)

Data Analysis (Halcyon Molecular)

Machine Learning for automated Image Labeling (Halcyon Molecular)

Electronmicroscopy imaging and evaluation (Halcyon Molecular)

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, Behaviormetrika) and conference proceedings (e.g. The International Joint Conference on Neural Networks)

Languages

English, German, Dutch, French

Research Skills

Directing scientists and engineers, project management and planning, executive scientific and technical leadership (Kernel, Tecnia)

Research Collaboration architecting and management (2045 Initiative, Kernel)

Directing teams of post-doctoral research scientists in R&D projects that focus on rehabilitation 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.

Computer Skills

Languages: Python, 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 Federation of European Neurosciences (FENS)

Member Dutch Neurofederation (DNF)

Member Institute of Electrical & Electronics Engineers (IEEE)

Member IEEE Engineering in Medicine and Biology Society (IEEE EMBS)

Member International Neural Networks Society (INNS)

Member Cognitive Science Society (CSS)

Member International Society to Advance Alzheimer Research and Treatment (ISTAART)

Member Royal Netherlands Academy of Arts and Sciences (KNAW)

Member New England Complex Systems Institute (NECSI)

References

Available upon request.