

## Curriculum Vitae: Gerard (Rod) Rinkus

Gerard J. Rinkus                      468 Waltham Street, Newton, MA 02465  
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### *Education*

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- 2004-2006    Postdoc, Computational neuroscience, with John Lisman. Brandeis University. Jointly supported by NIH and The Redwood Neuroscience Institute.
- 1996         Ph.D., Cognitive & Neural Systems. Boston University, Boston, Mass.  
Advisor: Daniel H. Bullock, Associate Professor, Cognitive & Neural Systems  
Thesis: A Combinatorial Neural Network Exhibiting Episodic and Semantic Memory Properties for Spatio-Temporal Patterns.
- 1989-1990    Ph.D. Student (Teaching Asst.), Exper. Psych. Dept., NYU, New York, N.Y.
- 1986         M.A., Computer Science. Hofstra University, Hempstead, N.Y.
- 1983         B.A., Cognitive Science. University of Rochester, Rochester, N.Y.

### *Employment History*

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- Jan 2010-Present            President [Neurithmic Systems](#), Newton, Mass.**  
R&D on biologically-inspired, probabilistic, hierarchical associative memory for learning / recognition of spatiotemporal patterns, e.g., video, speech, biosequences.
- Jan 2007-July 2009        Senior Research Engineer Scientific Systems Co Inc., Woburn, Mass.**  
Automated content-based alignment/integration of heterogeneous databases, geospatial reasoning.
- April 2006-Dec 2006     Visiting Scientist, Brandeis University, Waltham, Mass.**  
Computational neuroscience. Developed intelligent, scalable sequence recognition algorithms and a canonical cortical microcircuit model. Swing/Java3D-based GUI visualization apps.
- Sept 2004-April 2006    Postdoc, with John Lisman, Brandeis, Waltham, Mass.**  
Developed brain-inspired, hierarchical models of sequence learning/recognition. Support: NIH 5 T32 NS07292 & The Redwood Neuroscience Institute.
- June 1999-Oct 2003      Research Programmer, Enkidu Research. Lockport, N.Y.**  
Developed apps for NIH/NIMH-supported R&D and commercial augmentative communication devices, including statistical text analysis, speech recognition, Web crawling, Web-based teaching.
- June 1996-June 1999     Senior Scientist, Charles River Analytics. Cambridge, Mass.**  
Managed/executed DoD/Nasa Phase I/II SBIRs developing Bayes nets, case-based reasoning, and other AI technologies for situation/threat assessment, cognitive state estimation, battlefield course-of-action estimation and planning.
- Sept 1992-Sept 1995     Research Programmer Army Research Lab, Watertown, Mass.**  
Developed data acquisition modules (GPIB/LabView), neural-net-based process control and analysis of tank shock absorber data.
- Sept 1990-Aug 1991      Asst. System Admin. Cognitive & Neural Systems, Boston University**
- Sept 1989-Aug 1990      Graduate Teaching Asst., Experimental Psychology, NYU, NYNY**
- Sept 1986-Aug 1988      Instructor, Math & Comp. Sci., Adelphi University, Garden City, NY**  
Developed curricula/materials, taught Assembler, Data Structures, advised students.
- July 1984-April 1986     Software Engineer, Hazeltine, Inc. Greenlawn, NY**  
Developed Expert System for controlling the manufacture of printed circuit boards.

### *Patents*

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(Pending) [Overcoding-and-Paring: A bufferless chunking process and uses thereof](#) (#20110047110)

## Journal Papers

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- Rinkus, G. (2012) Quantum Computation via Sparse Distributed Representation. *NeuroQuantology* **10**(2) 311-315.
- Rinkus, G. (2010) [A cortical sparse distributed coding model linking mini- and macrocolumn-scale functionality](#). *Frontiers in Neuroanatomy* 4:17. doi:10.3389/fnana.2010.00017
- Sincebaugh, P., Green, W. & Rinkus, G. (1996) A Neural Network Based Diagnostic Test System for Armored Vehicle Shock Absorbers. *Expert Systems with Applications*, **11**(2) 237-244.

## Invited Talks

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- 12/14/12: Probabilistic Computing via Sparse Distributed Representations. Lyric Semiconductor Theory Seminar. Host: Ben Vigoda.
- 02/25/13: Constant-Time Probabilistic Learning & Inference via Hierarchical Sparse Distributed Representations. Neuro-Inspired Computational Elements (NICE) Workshop, Sandia Labs, Albuquerque. Feb 25-27. Host: Murat Okandan.
- 08/31/09: Overcoding-and-Pruning: A Novel Neural Model of Temporal Chunking and Short-term Memory. Kreiman Lab, Dept. of Ophthalmology and Neuroscience, Children's Hospital, Boston. Host: Gabriel Kreiman.
- 10/07: A Functional Role for the Minicolumn in Cortical Population Coding. Cortical Modularity and Autism Symposium. The U. of Louisville, Health Sciences Center. Host: Manuel Casanova.
- 02/06: Hierarchical Sparse Distributed Representations of Sequence Recall and Recognition. The Redwood Center for Theoretical Neuroscience. (UC Berkeley). Host: Bruno Olshausen.
- 06/04: A Sparse Distributed Model of Episodic and Semantic Spatiotemporal Memory. Redwood Neuroscience Institute, Menlo Park, CA. Host: Fritz Sommer.

## Selected Conference Papers, Posters, Chapters

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- (Accepted) A cortical theory of super-efficient probabilistic inference based on sparse distributed representations. 22nd Annual Computational Neuroscience Meeting, Paris, July 13-18.
- Rinkus, G. (2009) Overcoding-and-pruning: a bufferless neural chunking model. *Frontiers in Computational Neuroscience*. Conf. Abstract: COSYNE '09 doi: 10.3389/conf.neuro.10.2009.03.292
- Rinkus, G. (2008) Population Coding Using Familiarity-Contingent Noise. *AREADNE 2008: Research in Encoding and Decoding of Neural Ensembles*, Santorini, Greece, June 26-29
- Rinkus, G. & Lisman, J. (2005) Time-Invariant Recognition of Spatiotemporal Patterns in a Hierarchical Cortical Model with a Caudal-Rostral Persistence Gradient. *Society for Neuroscience Annual Meeting, 2005*. Washington, DC. Nov 12-16
- Rinkus, G. (2005) A Neural Network Model of Time-Invariant Spatiotemporal Pattern Recognition *First Annual Computational Cognitive Neuroscience Conference*, Washington, DC, Nov. 10-11
- Rinkus, G. (2004) A Neural Model of Episodic and Semantic Spatiotemporal Memory. *Proc. of the 26th Annual Conference of the Cognitive Science Society*. Kenneth Forbus, Dedre Gentner & Terry Regier, Eds. LEA, NJ. 1155-1160. Chicago, Ill.
- Leshner, G.W., Moulton, B.J., Rinkus, G. & Higginbotham, D.J. (2003) Software tools for emulation and analysis of augmented communication. *CSUN 2003*, California State University, Northridge.
- Leshner, G.W. & Rinkus, G. (2002) Leveraging word prediction to improve character prediction in a scanning configuration. *Proc. of the RESNA 2002 Annual Conference*, Reno.
- Leshner, G.W. & Rinkus, G. (2001) Domain-specific word prediction for augmentative communications. *Proc. of the RESNA 2002 Annual Conference*, Reno.
- Leshner, G.W. & Rinkus, G. (2001) Domain-specific word prediction for augmentative communications. *Proc. of the RESNA 2002 Annual Conference*, Reno.
- Leshner, G.W., Rinkus, G., Moulton, B.J., & Higginbotham, D.J. (2000) Logging and analysis of augmentative communication. *Proc. of the RESNA 2000 Annual Conference*, Reno. 82-85.
- Gonsalves, P.G. & Rinkus, G. (1998) Intelligent fusion and asset manager processor (IFAMP). *Proc. of the IEEE Information Technology Conference (Syracuse, NY)* 15-18.

- Rinkus, G. (1997) A Monolithic Distributed Representation Supporting Multi-Scale Spatio-Temporal Pattern Recognition. *International Conference on Vision, Recognition, and Action: Neural Models of Mind and Machine*, Boston University, Boston, Mass. May 29-31.
- Rinkus, G. (1995) TEMECOR: An Associative, Spatio-Temporal Pattern Memory for Complex State Sequences. *Proc. of 1995 World Congress on Neural Networks*, v. I, 442-448, Wash., DC
- Rinkus, G. (1993) Context-sensitive Spatio-temporal Pattern Memory. (1993) *Proc. of the 1993 World Congress on Neural Networks*, v. II, 344-347, Portland, OR.
- Rinkus, G. (1992) A Neural Model for Spatio-temporal Pattern Memory. *Proc. Wang Conference: Neural Networks for Learning, Recognition, and Control*, Boston University, Boston, Mass
- Rinkus, G. (1988) Learning as Natural Selection in a Sensori-Motor Being. *Proc. 1<sup>st</sup> Annual Conference of the Neural Network Society*, Boston, Mass.
- Mulgund, S., Rinkus, G., Illgen, C. & Zacharias, G. (1997) Situation Awareness Modeling and Pilot State Estimation for Tactical Cockpit Interfaces. *HCI International*, San Francisco, CA, August.
- Mulgund, S.S., Illgen, C., Rinkus, G., Zacharias, G.L. & Friske, J. (1997) OLIPSA: On-Line Intelligent Processor for Situation Assessment. *Proc. of 2<sup>nd</sup> Ann. Symp. on Situational Awareness in the Tactical Air Environment*. NAWCAD, Patuxent River, Md. June 3-4.

### *Book Chapters*

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- Mulgund, S.S., Zacharias, G.L. & Rinkus, G. (2003) Adaptive Pilot-Vehicle Interfaces for the Tactical Air Environment. in *Psychological Issues in the Design and Use of Virtual Adaptive Environments*. Hettinger, L.J. & Haas, M. (Eds.) LEA, NJ 483-524.

### *Theses*

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- Rinkus, G. (1996) A Combinatorial Neural Network Exhibiting Episodic and Semantic Memory Properties for Spatio-Temporal Patterns. Ph.D. Thesis. Boston University, Boston, Mass.
- Rinkus, G. (1986) Learning as Natural Selection in a Sensori-Motor Being. Master's Thesis. Hofstra University, Hempstead, N.Y.

### *Professional Activities*

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- Program Committee and reviewer: [Workshop on Unsupervised and Transfer Learning](#): ICML 2011, Bellevue, Washington.
- Organization for Computational Neurosciences, Faculty Member, 2012-present.
- Presenter & Panel Discussant. IARPA Automatic Machine Learning Workshop (4/16-17, 2012), NSF, Arlington, VA.

### *Funding*

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- (Current) ONR 341: N00014-12-C-0539: Scalable Machine Vision via Hierarchical Sparse Distributed Representations: 8/15/2012 – 2/15/2014.
- (Past) DARPA Deep Learning Program: Subcontract 337178J on Prime Contract N00173-09-C-2038: 03/2010 – 05/2011.