

TERRENCE C. STEWART

tcstewar@uwaterloo.ca
http://terrystewart.ca
519-497-9164

8 Churchill St.
Waterloo, Ontario
N2L 2X2

- RESEARCH INTERESTS**
- Computation in biological and bio-inspired systems
 - Software for low-power, parallel, asynchronous, and/or analog chips
 - Large-scale biologically realistic neural simulation of cognition
 - Adaptive algorithms for movement and cognition
- POSTDOCTORAL EXPERIENCE**
- University of Waterloo**, Centre for Theoretical Neuroscience, *2008–present*
- Development of Nengo neural compiler and simulator <nengo.ca>
 - Design and implementation of neuromorphic hardware drivers for Nengo
 - Large-scale neural models of perception, action, and cognitive control, including motor control, planning, memory, and structured representation
- EDUCATION**
- PhD Carleton University**, Institute of Cognitive Science, *2007*
Thesis: “A Methodology for Computational Cognitive Modelling”
- MPhil University of Sussex**, Computer Science and A.I., *2000*
Thesis: “Learning in Artificial Life: Conditioning, Concept Formation, and Sensorimotor Loops”
- BASc University of Waterloo**, Systems Design Engineering, *1999*
- INDUSTRY EXPERIENCE**
- Co-founder**, Applied Brain Research. *2014 – present*
- R&D company using neural models for AI and robotics
- Consultant**, Sprung-brett RDI. *2013 – 2015 (occasional)*
- Biomorphic computing, adaptive control, project development
- Software Developer**, Sweet Caesar. *2007 – 2012 (occasional)*
- Lead software architect for BlackBerry, Android, & iOS applications
- Freelance Programmer**, Google, Inc. *Summer 2007*
- Creation of on-line repository for academic computational models
- Consultant**, Ambient Vector, Inc. *Fall 2005*
- Consultant**, Terrados. *Winter 2005*
- Software Engineering**, American Android. *Summer 2003, 2004*
- Verbal control of bipedal robots for NASA
- Research and Development**, Hummingbird, *Summer 2001*
- Automatic document classification
- Software Engineering**, Array Systems Computing, *Fall 1997, Summer 1998*
- Neural-network object recognition in airport X-ray images
- DSP Research Engineering**, Genesis Microchip, *Summer 1996, 1997*
- Algorithm evaluation, implementation for real-time video processing
- Software Developer**, Alias|Wavefront, *Fall 1995*
- API development for Maya 3D animation software
- Hardware/Software Engineering**, Applied AI Systems, *Winter 1995*
- First robotic implementation of SAGA evolutionary algorithm

**WORK IN
PROGRESS**

- Neckar, A., Fok, S., Benjamin, B., Stewart, T.C., Oza, N., Eliasmith, C., Manohar, R., and Boahen, K. (submitted) Braindrop: A Mixed-Signal Neuromorphic Architecture with a Dynamical Systems-Based Programming Model
- Schroder, T., Kajic, I., Stewart, T.C., and Thagard, P. (submitted) The semantic pointer theory of emotion. *Psychological Review*.

**JOURNAL
ARTICLES**

- Mirus, F., Axeninea, C., Stewart, T.C., and Conradt, J. (2018) Neuromorphic Sensorimotor Adaptation for Robotic Mobile Manipulation: From Sensing to Behaviour. *Cognitive Systems Research* 50, 52-66.
- Duggins, P., Stewart, T.C., Choo, X., and Eliasmith, C. (2017). Effects of Guanfacine and Phenylephrine on a spiking neuron model of working memory. *Topics in Cognitive Science* 9(1), 117-134.
- Kajic, I., Gosmann, J., Stewart, T.C., Wennekers, T., and Eliasmith, C. (2017). A spiking neuron model of word associations for the Remote Associates Test. *Frontiers in Psychology*, 8.
- DeWolf, T., Stewart, T.C., Slotine, J-J., and Eliasmith, C. (2016). A spiking neural model of adaptive arm control. *Proc R Soc B*, 20162134.
- Stewart, T.C., Mundy, A., Kleinhans, A., and Conradt, J. (2016). Serendipitous offline learning in a neuromorphic robot. *Frontiers in Neurobotics*, 10(1).
- Senft, V., Stewart, T.C., Bekolay, T., Eliasmith, C., Kroger, B. (2016) Reduction of dopamine in basal ganglia and its effects on syllable sequencing in speech. *Basal Ganglia* 6(1), 7-17.
- Stewart, T.C., DeWolf, T., Kleinhans, A., and Eliasmith, C. (2015). Closed-loop neuromorphic benchmarks. *Frontiers in Neuroscience*, 9(464).
- Conradt, J., Galluppi, F., and Stewart, T.C. (2015). Trainable sensorimotor mapping in a neuromorphic robot. *Robotics and Autonomous Systems*, 71, 60-68.
- Bobier, B., Stewart, T.C., and Eliasmith, C. (2014). A Unifying Mechanistic Model of Selective Attention in Spiking Neurons. *PLOS Computational Biology*, 10(6), 1-16.
- Thagard, P. and Stewart, T.C. (2014). Two Theories of Consciousness: Semantic Pointer Competition vs. Information Integration. *Consciousness and Cognition*
- Stewart, T.C. and Eliasmith, C. (2014). Large-scale synthesis of functional spiking neural circuits. *Proceedings of the IEEE*, 102(5).
- Stewart, T.C. and Eliasmith C. (2014). Large-scale modeling of the behaving brain. *IEEE Life Sciences Newsletter*, June 2014.
- Schroder, T., Stewart, T.C., and Thagard, P. (2014). Intention, Emotion, and Action: A neural theory based on semantic pointers. *Cognitive Science*, 38, 851-880.
- Bekolay, T., Bergstra, J., Hunsberger, E., DeWolf, T., Stewart, T.C., Rasmussen, D., Choo, X., Voelker, A., and Eliasmith, C. (2014). Nengo: A Python tool for building large-scale functional brain models. *Frontiers in Neuroinformatics*, 7(48).

- Stewart, T.C. and Eliasmith, C. (2013). Realistic neurons can compute the operations needed by quantum probability theory and other vector symbolic architectures. *Behavioral and Brain Sciences*, 36(3).
 Commentary on: Pothos, E. and Busemeyer, J. Can quantum probability provide a new direction for cognitive modeling?
- Eliasmith, C., Stewart, T.C., Choo, X., Bekolay, T., DeWolf, T, Tang, Y., Rasmussen, D. (2012). A large-scale model of the functioning brain. *Science*, 388:6111, 1202-1205.
- Stewart, T.C., Bekolay, T., and Eliasmith, C. (2012) Learning to select actions with spiking neurons in the basal ganglia. *Frontiers in Neuroscience*, 6:2, 1-14.
- Stewart, T.C. (2012) The Neural Engineering Framework. *AISB Quarterly*, 135.
- Stewart, T.C., Bekolay, T., and Eliasmith, C. (2011) Neural representations of compositional structures: Representing and manipulating vector spaces with spiking neurons. *Connection Science: Special issue on Compositional Connectionism*. 23(2), 145-153.
- Stewart, T.C., Tang, Y., and Eliasmith, C. (2011) A biologically realistic cleanup memory: Autoassociation in spiking neurons. *Cognitive Systems Research*, 12, 84-92.
- Thagard, P. and Stewart, T.C. (2011) The AHA! experience: Creativity through emergent binding in neural networks. *Cognitive Science*, 35(1).
- Stewart, T.C. and West, R.L. (2010) Testing for equivalence: A methodology for computational cognitive modelling. *Journal of Artificial General Intelligence*, 2(2), 69-87.
- Erev, I., Ert, E., Roth, A., Haruvy, E., Herzog, S., Hau, R., Hertwig, R., Stewart, T., West, R., and Lebiere, C. (2010). A choice prediction competition for choices from experience and from description. *Journal of Behavioral Decision Making: Special Edition on Decisions from Experience*. 23(1), 15-47.
- Stewart, T.C., Tripp, B., and Eliasmith, C. (2009) Python scripting in the Nengo simulator. *Frontiers in Neuroinformatics: Special edition on Python in Neuroscience*. 3(7), 1-9.
- Stewart, T.C. and West, R.L. (2007) Deconstructing and reconstructing ACT-R: Exploring the architectural space. *Cognitive Systems Research*. 8(3), 227-236.
- Chandrasekharan, S. and Stewart, T.C. (2007) The origin of epistemic structures and proto-representations. *Adaptive Behaviour*. 15(3) 329-359.
- Stewart, T. C., West, R. L., and Coplan, R. (2007) Multi-agent models of social dynamics in children. *Cognitive Systems Research*. 8(1), 1-14.
- BOOKS (EDITED)** R. West & T. Stewart (eds.) (2013), *Proceedings of the 12th International Conference on Cognitive Modeling*, Ottawa: Carleton University.
- BOOK CHAPTERS** Eliasmith, C., Rasmussen, D., and Stewart, T.C. (2013). Biological cognition: Syntax. In C. Eliasmith, *How to build a brain: A neural architecture for biological cognition*. Oxford University Press.

**REFEREED
CONFERENCE
TALKS
(WITH FULL
PROCEEDINGS
PUBLICATION)**

- Eliasmith, C., Stewart, T.C., and Bobier, B. (2013). Biological cognition: Control. In C. Eliasmith, *How to build a brain: A neural architecture for biological cognition*. Oxford University Press.
- Stewart, T.C. and Eliasmith, C. (2012). Compositionality and biologically plausible models. In M. Werning, E. Machery, and W. Hinzen (Eds.), *Oxford Handbook of Compositionality*. Oxford University Press.
- Stewart, T.C. (2006) Embodied decisions: Models of decision making within a larger cognitive framework. In B. Hardy-Vallée (Ed.), *Cognitive Decision-Making: Empirical and Foundational issues*. Cambridge: Cambridge Scholars Press Ltd.
- Stewart, T.C., Thorgeirsson, S., and Eliasmith, C. (2018). Supervised Learning of Action Selection in Cognitive Spiking Neuron Models. *Annual Meeting of the Cognitive Science Society*.
- Thorgeirsson, S., Stewart, T.C., and Eliasmith, C. (2018). Analysis of Learning Action Selection Parameters in a Neural Cognitive Model. *Annual Meeting of the Cognitive Science Society*.
- Neckar, A., Stewart, T.C., Benjamin, B., and Boahen, K. (2018). Optimizing an Analog Neuron Circuit Design for Nonlinear Function Approximation. *IEEE International Symposium on Circuits and Systems*.
- Tieck, C.V., Weber, S., Stewart, T.C., Rönnau, A., Dillmann, R. (2018) Triggering robot hand reflexes with human EMG data using spiking neurons. *International Conference on Intelligent Autonomous Systems*.
- Clawson, T., Stewart, T.C., Eliasmith, C., and Ferrari, S. (2017). An Adaptive Spiking Neural Controller for Flapping Insect-scale Robots. *IEEE Symposium Series on Computational Intelligence*.
- Stewart, T.C., Penner-Wilger, M., Waring, R., and Anderson, M. (2017). A Common Neural Component for Finger Gnosis and Magnitude Comparison. *Annual Meeting of the Cognitive Science Society*.
- Kajic, I., Gosmann, J., Komer, B., Orr, R., Stewart, T.C., and Eliasmith, C. (2017). A Biologically Constrained Model of Semantic Memory Search. *Annual Meeting of the Cognitive Science Society*.
- Shein, M., Stewart, T.C., and Eliasmith, C. (2017). Parameter exploration of a neural model of state transition probabilities in model-based reinforcement learning. *International Conference on Cognitive Modelling*.
- Ulbrich, S., Stewart, T.C., Peric, I., Roennau, A., Zoellner, M., and Dillmann, R. (2017). Model-based Polynomial Function Approximation with Spiking Neural Networks. *IEEE Conference on Cognitive Informatics and Cognitive Computing*.
- Kauderer-Abrams, E., Gilbert, A., Voelker, A., Benjamin, B., Stewart, T.C., Boahen, K. (2017). A Population-Level Approach to Temperature Robustness in Neuromorphic Systems. *IEEE International Symposium on Circuits and Systems*.
- Voelker, A., Benjamin, B., Stewart, T.C., Boahen, K., and Eliasmith, C. (2017). Extending the Neural Engineering Framework for nonideal silicon synapses. *IEEE Int. Symposium on Circuits and Systems*.

- Duggins, P., Stewart, T.C., Choo, X., and Eliasmith, C. (2016). *Effects of Guanfacine and Phenylephrine on a Spiking Neuron Model of Working Memory*. International Conference on Cognitive Modelling.
- Kajić, I., Gosmann, J., Stewart, T.C., and Eliasmith, C. (2016). *Towards a Cognitively Realistic Representation of Word Associations*. Annual Meeting of the Cognitive Science Society.
- Sharma, S., Komer, B., Stewart, T.C., and Eliasmith, C. (2016). *A Neural Model of Context Dependent Decision Making in the Prefrontal Cortex*. Annual Meeting of the Cognitive Science Society.
- Stewart, T.C., Blouw, P., and Eliasmith, C. (2015). *Explorations in Distributed Recurrent Biological Parsing*. International Conference on Cognitive Modelling.
- Mundy, A., Knight, J., Stewart, T.C., and Furber, S. (2015). *An efficient SpiNNaker implementation of the Neural Engineering Framework*. International Joint Conference on Neural Networks.
- Galluppi, F., Denk, C., Meiner, M.C., Stewart, T.C., Plana, L.A., Eliasmith, C., Furber, S., and Conradt, J. (2014). *Event-based neural computing on an autonomous mobile platform*. IEEE International Conference on Robotics and Automation.
- Stewart, T.C., Choo, X., and Eliasmith, C. (2014). *Sentence processing in spiking neurons: A biologically plausible left-corner parser*. Annual Meeting of the Cognitive Science Society.
- Davies, S., Stewart, T.C., Eliasmith, C., and Furber, S. (2013). *Spike-based learning of transfer functions with the SpiNNaker neuromimetic simulator*. International Joint Conference on Neural Networks.
- Choudhary, S., Sloan, S., Fok, S., Neckar, A., Trautmann, E., Gao, P., Stewart, T.C., Eliasmith, C., and Boahen, K. (2012). *Silicon neurons that compute*. International Conference on Artificial Neural Networks.
- Stewart, T.C., Choo, X., and Eliasmith, C. (2012). *Spaun: A perception-cognition-action model using spiking neurons*. Annual Meeting of the Cognitive Science Society.
- Stewart, T.C. and Eliasmith, C. (2011) *Neural planning and reasoning using the synaptic connections of the basal ganglia and thalamus*. International Conf. on Biologically Inspired Cognitive Architectures.
- Junker, M-O. and Stewart, T.C. (2011). *A linguistic atlas for endangered languages*. International Conference on Education and New Learning Technologies.
- Stewart, T.C., Choo, X., and Eliasmith, C. (2010). *Symbolic reasoning in spiking neurons: A model of the cortex/basal ganglia/thalamus loop*. Annual Meeting of the Cognitive Science Society.
- Stewart, T.C., Choo, X., and Eliasmith, C. (2010). *Dynamic behaviour of a spiking model of action selection in the basal ganglia*. International Conference on Cognitive Modelling.
- Stewart, T.C. and Eliasmith, C. (2010) *Neural symbolic decision making: A scalable and realistic foundation for cognitive architectures*. International Conf. on Biologically Inspired Cognitive Architectures.

- Stewart, T.C. and Eliasmith, C. (2009) *Spiking neurons and central executive control: The origin of the 50-millisecond cognitive cycle*. International Conference on Cognitive Modelling.
- Stewart, T.C., Tang, Y., and Eliasmith, C. (2009) *A biologically realistic cleanup memory: Autoassociation in spiking neurons*. International Conference on Cognitive Modelling.
- Stewart, T.C. and West, R.L. (2007) *Equivalence: A novel basis for model comparison*. Annual Meeting of the Cognitive Science Society.
- Junker, M-O. and Stewart T.C. (2007) *Building search engines for Algonquian languages*. Algonquian Conference.
- Stewart, T.C. and West, R. L. (2006) *Deconstructing ACT-R*. International Conference on Cognitive Modelling.
- Stewart, T.C. (2006) *Tools and techniques for quantitative and predictive cognitive science*. Annual Meeting of the Cognitive Science Society.
- West, R., Stewart, T.C., Lebiere, C., and Chandrasekharan, S. (2005) *Stochastic resonance in human cognition: ACT-R versus game theory, associative neural networks, recursive neural networks, Q-learning, and humans*. Annual Meeting of the Cognitive Science Society.
- Chandrasekharan, S. and Stewart, T.C. (2004) *Reactive agents learn to add epistemic structures to the world*. Joint Conference of the Society for Philosophy and Psychology.
- Stewart, T.C. and West, R. (2001) *Levels of description: A role for robots in cognitive science education*. PHICS Graduate Student Conference, Carleton University.
- Stewart, T.C. (2001) *Extrema selection: Accelerated evolution on neural networks*. IEEE Congress on Evolutionary Computation.
- Stewart, T.C. and Wood, S. (2001) *Conditioning and concept formation in embodied agents*. AAAI Spring Symposium.

**REFEREED
CONFERENCE
POSTERS
(WITH FULL
PROCEEDINGS
PUBLICATION)**

- Wertheim, J. and Stewart, T.C. (2018). Explaining Reasoning Effects: A Neural Cognitive Model of Spatial Reasoning. *Annual Meeting of the Cognitive Science Society*.
- Stewart, T.C. and Eliasmith, C. (2013). *Parsing Sequentially Presented Commands in a Large-Scale Biologically Realistic Brain Model*. 35th Meeting of the Cognitive Science Society.
- Galluppi, F., Davies, S., Stewart, T., Eliasmith, E., and Furber, S. (2012). *Real Time On-Chip Implementation of Dynamical Systems with Spiking Neurons*. 2012 International Joint Conference on Neural Networks.
- Dethier, J., Nuyujukian, P., Stewart, T.C., Eliasmith, C., Shenoy, K., and Boahen, K. (2011) *A brain-machine interface operating with a real-time spiking neural network control algorithm*. 25th Annual Conference on Neural Information Processing Systems.
- Stewart, T.C. and Eliasmith, C. (2011) *Neural cognitive modelling: A biologically constrained spiking neuron model of the Tower of Hanoi task*. 33rd Annual Meeting of the Cognitive Science Society.

- Stewart, T.C., West, R., and Lebiere, C. (2009) *Applying cognitive architectures to decision-making: How cognitive theory and the equivalence measure triumphed in the Technion prediction tournament*. 31st Annual Meeting of the Cognitive Science Society.
- Gormley, A. and Stewart, T.C. (2009) *Errors in speech production: Explaining mismatch and accommodation*. 31st Annual Meeting of the Cognitive Science Society.
- Stewart, T.C. and Eliasmith, C. (2008) *Building production systems with realistic spiking neurons*. 30th Meeting of the Cognitive Science Society.
- Stewart, T.C. and West, R.L. (2007). *Cognitive redeployment in ACT-R: Salience, vision, and memory*. 8th International Conference on Cognitive Modelling.
- Stewart, T.C. (2004) *Teaching computational modelling to non-computer scientists*. 6th International Conference on Cognitive Modelling.
- Stewart, T.C., West, R., and Coplan, R. (2004) *A dynamic, multi-agent model of peer group formation*. 6th International Conference on Cognitive Modelling.
- Stewart, T.C. and Chandrasekharan, S. (2004) *Simple agents learning to add useful structures to the world*. 6th International Conference on Cognitive Modelling.

TECHNICAL REPORTS

- Voelker, A., Gosmann, J., and Stewart, T.C. (2017) *Efficiently sampling coordinates from the n-sphere and the n-ball*. Centre for Theoretical Neuroscience Technical Report, University of Waterloo.
- Stewart, T.C. (2012) *A technical overview of the Neural Engineering Framework*. Centre for Theoretical Neuroscience Technical Report, University of Waterloo.
- Stewart, T.C. (2005) *Notes for the development of a philosophy of computational modelling*. Carleton University Cognitive Science Technical Report 2005-04.
- Stewart, T.C. and Chandrasekharan, S. (2005) *Two cognitive descriptions of Q-learning*. Carleton University Cognitive Science Tech Report 2005-03.
- Stewart, T.C. and Brook, A. (2003) *Four forms of information*. Carleton University Cognitive Science Technical Report 2003-06.
- Stewart, T.C. (2000) *Neural models of concept formation and conditioning: A literature review*. Technical Report, CSRP-524, School of Cognitive and Computing Sciences, University of Sussex.

CONFERENCE DEMOS

- Neckar, A., Stewart, T.C., Benjamin, B., and Boahen, K. (2018). Live Demonstration: Optimizing an Analog Neuron Circuit Design for Nonlinear Function Approximation. *IEEE International Symposium on Circuits and Systems*.
- Stewart, T.C., Galluppi, F., Conradt, J. (2013) *Learning by example with SpiNNaker, Nengo, and an Omnidirectional robot*. Bernstein Sparks Workshop.

Galluppi, F., Conradt, J., Stewart, T.C., Eliasmith, C., Horiuchi, T., Tapson, J., Tripp, B., Etienne-Cummings, R., Furber, S. (2012) *Spiking ratSLAM: Rat Hippocampus Cells in Spiking Neural Hardware*. Biomedical Circuits and Systems Conference.

CONFERENCE TALKS (ABSTRACT-ONLY PUBLICATION)	<p>Stewart, T.C. (2014) <i>Whole-brain simulation for modeling neural disorders and diseases</i>. AAAS Annual Meeting.</p> <p>Stewart, T.C., and Eliasmith, C. (2013) <i>Implementing high-order cognition in neuromorphic hardware</i>. Brain-Inspired Computing Workshop at ACM/IEEE International Symposium on Computer Architecture.</p> <p>Stewart, T. C., Tripp, B., and Eliasmith, C. (2008) <i>Supplementing neural modelling with ACT-R</i>. 15th Annual ACT-R Workshop.</p> <p>Stewart, T. C. and Eliasmith, C. (2008) <i>Implementing the ACT-R production system in spiking Neurons</i>. 15th Annual ACT-R Workshop.</p> <p>Stewart, T. C. and West, R. L. (2006) <i>ACT-R versus not-ACT-R: Demonstrating cross-domain validity</i>. 13th Annual ACT-R Workshop.</p> <p>West, R. L., Stewart, T. C., Pyke, A., and Emond, B. (2006) <i>Modeling emotion in ACT-R</i>. 13th Annual ACT-R Workshop</p> <p>Stewart, T.C. (2005) <i>Embodied decisions: Models of decision making within a larger cognitive framework</i>. Cognitio 2005: Graduate Student Conference in Cognitive Science.</p> <p>Stewart, T.C. and West, R. L. (2005) <i>Python ACT-R: A new implementation and a new syntax</i>. 12th Annual ACT-R Workshop.</p>
---	---

CONFERENCE POSTERS	<p>Gonschorek, D., Schmors, L., and Stewart, T.C. (2018) <i>Biologically plausible model of olfactory learning in Drosophila melanogaster using the Neural Engineering Framework</i>. Federation of European Neuroscience Societies Forum of Neuroscience (FENS 2018).</p> <p>Bobier, B., Stewart, T.C., and Eliasmith, C. (2011) <i>The attentional routing circuit: receptive field modulation through nonlinear dendritic interactions</i>. 8th Computational and Systems Neuroscience Meeting.</p> <p>Bobier, B., Stewart, T.C., and Eliasmith, C. (2010) <i>The dynamic routing model of visuospatial attention</i>. 7th Computational and Systems Neuroscience Meeting.</p> <p>Eliasmith, C., Stewart, T.C., Rasmussen, D., and Choo, X. (2010) <i>How brains think</i>. Canada Research Chair Recognition Event, Toronto.</p> <p>Stewart, T.C. (2009) <i>Spiking neurons and cognitive decisions at the 50-millisecond time scale</i>. SHARCNET Research Day, U. of Waterloo.</p> <p>Stewart, T.C. (2005) <i>The philosophy of cognitive modelling: When to do it, Why to do it, and How to do it</i>. Cognitive Science Spring Conference 2005, Institute of Cognitive Science, Carleton University.</p>
-------------------------------	--

CONFERENCE TALKS (NO PUBLICATION)	<p>Stewart, T.C. (2014) <i>What are neurons good for?</i> Biologically Inspired Cognitive Architecture Society.</p> <p>Stewart, T.C. (2006) <i>Dealing with complexity: The analysis of embodied behaviour</i>. Cognitio 2006: Graduate Student Conf. in Cognitive Science.</p>
--	---

Junker, M-O. and Stewart, T. C. (2005) *Building a search that allows spelling mistakes for the EastCree dictionary on the web*. Algonquin Dictionaries Round Table at the 37th Algonquin Conference.

INVITED
LECTURES,
TUTORIALS,
WORKSHOPS

Workshop, “Building applications for Braindrop,” Topic Area for *Telluride Neuromorphic Cognition Engineering Workshop*, Telluride, CO, 2018.

Session, “Nengo,” at the *Groningen Spring School on Cognitive Modelling*, Netherlands, 2016, 2017, 2018.

Session, “Building large-scale neural models: Cognitive control with Nengo,” at *Interdisciplinary College*, Germany, 2015, 2016, 2017, 2018.

Workshop, “Neuromorphic approaches to drone autonomy,” Topic Area for *Telluride Neuromorphic Cognition Engineering Workshop*, Telluride, CO, 2017.

Tutorial, “Building Cognition from Spiking Neurons: Nengo and the Neural Engineering Framework,” at the *International Conference on Cognitive Modeling*, UK, 2017.

Lecture, “Neural Engineering and Nengo,” Rochester Institute of Technology, 2017.

Lecture, “Neural Engineering and Nengo,” Technische Universität München, 2017.

Talk, “Programming with spikes: The Nengo framework for efficient and adaptive large-scale spiking systems,” at NIPS, Spain, 2016

Talk, “Building Brains: Bio-Inspired Computing,” at the *EuroScience Open Forum*, UK, 2016.

Talk, “Neural Engineering: Biological Constraints on the Computation of Relevance,” at the *Many Faces of Relevance Workshop 1*, Finland, 2016.

Lecture, “Biologically Constrained Cognitive Modelling: How neuroscience helps us evaluate and discover cognitive theories,” Finland, 2016.

Workshop, “Designing Virtual Brains,” *Waterloo Unlimited high school enrichment*, 2016

Summit Talk, “Spaun on SpiNNaker,” at the *Human Brain Project Summit*, Madrid, 2015.

Tutorial, “Nengo, Neural Engineering, and Cognition,” at the *International Conference on Cognitive Modeling*, Netherlands, 2015.

Session, “Neuronal architecture for biological cognition,” at *INCF Training Course on Information Processing in Neural Systems*, Germany, 2015.

Lecture, “Neural engineering,” at *Osnabrück Computational Cognition Alliance Meeting*, Germany, 2015.

Workshop, “Neuromorphic Olympics,” Topic Area for *Telluride Neuromorphic Cognition Engineering Workshop*, Telluride, CO, 2014.

Workshop, “Implementing algorithms in neurons: the Neural Engineering Framework,” *Bernstein Sparks Workshop*, Munich, 2013.

Workshop, “Validating models of cognition,” *Waterloo Institute for Complexity & Innovation: Data Visualization and Analysis*, 2013.

Colloquium Talk, “Why bother with neurons?” *University of Waterloo Vision and Image Processing Lab Seminar*, 2013.

Workshop, “Spaun: A large-scale brain simulation exhibiting cognitive behavior,” *DARPA Collaborative Brain Data Exploitation Workshop*, Arlington, 2013

Colloquium Talk, “Spaun; The first functional simulated brain,” *University of Waterloo Knowledge Integration Seminar*, 2013.

Colloquium Talk, “What the world’s largest functional simulated brain tells us about cognitive science,” *Carleton University Cognitive Science Colloquium*, 2013

Workshop, “Neuromorphic architectures: Neurogrid and Beyond,” *Joint EU-US Workshop on Cortical Processors*, Heidelberg, 2013

Tutorial, “A general purpose architecture for building spiking neuron models of biological cognition,” *35th Annual Meeting of the Cognitive Science Society*, 2013

Colloquium Talk, “How and why to build a brain,” King's University College, 2012

Tutorial, “Nengo and the Neural Engineering Framework: From spikes to cognition,” *34th Annual Meeting of the Cognitive Science Society*, 2012

Colloquium Talk, “Everything I need to know about life I'm learning from cognitive science,” *University of Waterloo Knowledge Integration Seminar*, 2012.

Tutorial, “Nengo and the Neural Engineering Framework: Connecting cognitive theory to neuroscience,” *33rd Annual Meeting of the Cognitive Science Society*, 2011

Workshop, “Vision and the Brain: What we see and what we think we see,” *Waterloo Unlimited high school enrichment*, 2008, 2009, 2010, 2011

Workshop, “Designing Virtual Worlds,” *Waterloo Unlimited high school enrichment*, 2009, 2010, 2011, 2013, 2014

Colloquium Talk, “How Brains Think,” *Carleton University Cognitive Science Colloquium*, 2010

Colloquium Talk, “The Neural Engineering Framework: Bridging cognitive science and neuroscience,” *Franklin & Marshall College, Department of Psychology*, 2010.

Workshop, “The Mind: What it is, what it does, and how to study it,” *Shad Valley high school enrichment program*, 2010

Tutorial, “Nengo and the Neural Engineering Framework: Connecting cognitive theory to neuroscience,” *32nd Annual Meeting of the Cognitive Science Society*, 2010

Sole Presenter, “Cognitive Modelling 2-Day Workshop,” *University of Basel, Department of Psychology*, Switzerland, 2009

Sole Presenter, “Python ACT-R Workshop,” *Ben-Gurion University of the Negev, Dept. of Industrial Engineering and Management*, Israel, 2009

Tutorial, “Cognitive modelling with the Neural Engineering Framework,” *9th International Conference on Cognitive Modelling*, 2009

Colloquium Talk, “Evaluating cognitive theories via neurological evidence: Working memory and compositionality,” *Carleton University Institute of Cognitive Science Distinguished Lecture Series*, 2008

**HONORS AND
AWARDS**

Most Promising New Neuromorph Award, 2011

- Telluride Neuromorphic Cognition Engineering Workshop

SHARCNET Postdoctoral Fellowship, 2009 – 2010

Winner of Technion Prediction Tournament (repetition condition), 2008

- predictions of human performance in repeated binary choice task

Derbyshire Graduate Scholarship in Cognitive Science, 2004 – 2006

NSERC Post-Graduate Scholarship, 1999 – 2003

British Council Chevening Scholarship, 1999 – 2000

Colonel Hugh Heasley Engineering Scholarship, 1994 – 1999

Canada Scholarship, 1994 – 1999

**RESEARCH
EXPERIENCE**

Carleton University, Institute of Cognitive Science, 2003 – 2007

Lab Coordinator, Carleton Cognitive Modelling Lab

- Developed toolkit for implementing and evaluating cognitive models

Carleton University, School of Linguistics, 2005 – 2007

Research Assistant, Dr. Marie-Odile Junker

- Created on-line tools for teaching written Cree, linguistic atlas

University of Waterloo, Systems Design Engineering, 1999

Research Assistant, Pattern Analysis and Machine Intelligence Lab

- Redesigned motor control and visual system for soccer-playing robots

**TEACHING
EXPERIENCE**

University of Waterloo, Systems Design Engineering, Waterloo, Canada

Sessional Lecturer, Winter 2018

Sessional Lecturer, Winter 2014

- Taught *Simulating Neurobiological Systems* at both graduate and undergraduate level

Carleton University, Institute of Cognitive Science, Ottawa, Canada

Sessional Lecturer, Fall 2005

Sessional Lecturer, Fall 2004

Sessional Lecturer, Winter 2004

- Developed and taught *Cognition and Artificial Systems* course
- Neural Networks, Genetic Algorithms, Cognitive Architectures
- 6 to 14 graduate and upper year undergraduate students, some with no programming experience and some with extensive experience
- Average teaching evaluation: 4.5 out of 5

Sessional Lecturer, Fall 2003

- Taught Introduction to Computers for the Arts and Social Sciences
- 150 students; average teaching evaluation 4.35 out of 5

Teaching Assistant, Developmental Psychology, Winter 2005

Teaching Assistant, English for Engineers, Winter 2003

Teaching Assistant, First Year Seminar on Cognition, Fall 2002

**PROFESSIONAL
AFFILIATIONS**

Behavioral & Brain Sciences Associate, 2005 – present

Cognitive Science Society Member, 2002 – present

**PROFESSIONAL
SERVICE**

Summer School Organizer and Lecturer

- Nengo Summer School, University of Waterloo, *2014 – 2017*

Conference Co-Chair

- International Conference on Cognitive Modelling, *2013*

Editorial Board

- Review Editor for Frontiers in Neurorobotics Journal, *2014, 2015*

Workshop and Tutorial Committee

- Cognitive Science Society Annual Meeting, *2011, 2012*

Organizing Committee

- Telluride Neuromorphic Cognition Engineering Workshop, *2018*
- Interdisciplinary College, *2018*

Program Committee

- Cognitive Science Society Annual Meeting, *2014, 2015*
- International Conference on Cognitive Modelling, *2015, 2016, 2018*
- Biologically Inspired Cognitive Architectures, *2010, 2011*

Awards Committee

- International Conference on Cognitive Modelling, *2010*

Peer-Reviewed Articles for Journals

- British Journal for the Philosophy of Science, *2016*
- Frontiers in Robotics and AI, *2017*
- Frontiers in Psychology, *2015 – 2017*
- Frontiers in Systems Neuroscience, *2015*
- Neural Networks, *2015*
- Proceedings of the National Academy of Sciences, *2013*
- Journal of Computational Neuroscience, *2013*
- Biologically Inspired Cognitive Architectures, *2012 – 2015*
- Cognitive Science, *2011 – 2012*
- Philosophical Psychology, *2011*
- Games, *2011*
- Minds and Machines, *2010*
- Frontiers in Neuroinformatics, *2008*

Peer-Reviewed Grants for Agencies

- National Science Foundation, *2013*

Peer-Reviewed Submissions for Conferences

- Cognitive Science Society, *2005 – 2018*
- International Conference on Cognitive Modelling, *2009 – 2018*
- IEEE Conference on Intelligent Robots and Systems, *2017*
- AAAI Fall Symposium, *2012*
- Cognitio student conference, *2006, 2007*
- European Cognitive Science Society, *2007*